BASELINE ECOLOGICAL RISK ASSESSMENT FOR THE ESTUARY AT THE LCP CHEMICAL SITE IN BRUNSWICK, GEORGIA

Site Investigation/Analysis And Risk Characterization

(Revision 4)

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April 2011

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LIST OF ACRONYMS, ABBREVIATIONS AND DEFINITIONS

AET	apparent effects threshold
Ah	aryl hydrocarbon
ANOVA	analysis of variance
ARCO	Atlantic Richfield Company
AUF	area-use factor
AVS	acid volatile sulfide
BAF	bioaccumulation factor
BERA	baseline ecological risk assessment
BSAF	biota sediment accumulation factor
BW	body weight
Ca^{2+}	calcium, ion
CF1, …, CF4	concentrations in various food items of wildlife
CI	confidence interval
cm	centimeter
COPCs	chemicals of potential concern
CS	sediment concentration
CW	water concentration
DNA	deoxyribonucleic acid
^oC	degree Celsius
4,4’DDT	4,4’ Dichlorodiphenyltrichloroethane
dry wt or dw	dry weight
EC50	effective concentration
EEE	estimated environmental exposure
EEV	ecological effects value
EPA	Environmental Protection Agency
ER-L	effects range low
ER-M	effects range medium
ERT	Emergency Response Team
ESV	ecological screening value
F	filial
F_0, F_1, F_2	first, second, and third generations
FIR	food ingestion rate
FS	feasibility study
ft	foot
g/kg	Grams per kilograms
GADNR	Georgia Department of Natural Resources
Ha	hectares
HQ	hazard quotient
kg	kilogram
km	kilometer
kW	kilowatt

LIST OF ACRONYMS, ABBREVIATIONS AND DEFINITIONS (Continued)

L	liter
LC50	Lethal Concentration 50
LCP	Linden Chemicals and Plastics
LD50	Lethal Dose 50
LOAEL	lowest observed adverse effect level
LOE	line of evidence
m	meter
mm	millimeters
µ	micron
mg	milligram
µg	microgram
mg/kg or µg/g	milligrams per kilograms
µg/kg	microgram per kilogram
µg/L	microgram per Liter
µmol/L	micromoles per liter
µg/mL	microgram per milliliter
mm	millimeter
NEQ	neurotoxic equivalent
ng/L	nanograms per liter
ng/kg	nanograms per kiloliter
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no observed adverse effect level
NPDES	National pollutant discharge elimination system
OU	Operable Unit
P1, …, P4	percentage of each food item in diet of wildlife
PAH	polynuclear aromatic hydrocarbon
PEL	probable effect levels
PCB	polychlorinated biphenyl
PCDF	polychlorinated dibenzofurans
PEL	probable effect level
R^2	multiple coefficient of determination
r^2	coefficient of determination
REP	Relative Potency
RGO	Remedial Goal Options
RI	Remedial Investigation
SAIC	Science Applications International Corp.
SEC	sediment effect concentration
∑SEM	simultaneously extracted metal
SIR	sediment ingestion rate
Site	Linden Chemical and Plastic (LCP) Superfund Site
spp.	more than one species

LIST OF ACRONYMS, ABBREVIATIONS AND DEFINITIONS (Continued)

SQuiRT	screening quick reference table
TCDD	2, 3, 7, 8 tetrachlorodibenzo-p-dioxin
TEL	threshold effects level
TEC	toxicity equivalence concentrations
TEQ	total toxic equivalents
State	the State of Georgia
TIE	toxicity identification evaluation
TOC	total organic carbon
TRV	toxicity reference value
TUF	time-use factor
95 UCL	95th upper confidence limit of the mean
VIF	variance inflation factor
wet wt or ww	wet weight
WHO	World Health Organization
WIR	water ingestion rate
wt	weight
x	mean

EXECUTIVE SUMMARY

This document is the baseline ecological risk assessment (BERA) report for Operable Unit (OU) 1 of the Linden Chemical and Plastics (LCP) Superfund Site (Site), located in Brunswick, Georgia. Site owner Honeywell International, Inc. (Honeywell), formerly Allied Signal, Inc., submitted numerous versions of the BERA to the Environmental Protection Agency (EPA) for approval, starting in June 1997. EPA, the State of Georgia (the State) and the National Oceanic and Atmospheric Administration (NOAA) reviewed each draft and provided successive sets of comments and instructions to Honeywell. After a thorough review of the most recent submission in July 2009 by EPA, the State and NOAA, EPA disapproved the draft BERA for the reasons outlined in EPA's letter to Honeywell dated July 2, 2010.

This BERA report presents the results of the "Site Investigation/Analysis" Phase and "Risk Characterization" Phase (Steps 6 and 7) of the BERA conducted for the estuary at the LCP Site, located in Brunswick, Georgia. This document addresses the extensive amount of environmental information generated for the estuary at the LCP Site from 2000 through 2007 and includes a comprehensive evaluation of major potential sources of uncertainty pertaining to ecological conditions in the estuary at LCP Site.

General Issues

Major chemicals of potential concern (COPCs) addressed in the BERA are mercury (including methylmercury), Aroclor 1268, lead, and total polynuclear aromatic hydrocarbons (PAHs). These are the chemicals identified as COPCs in the initial documents developed for this BERA. However, other chemicals considered to be COPCs are also addressed in the risk assessment.

Ecological conditions in the LCP estuary were monitored by Honeywell on an annual basis from 2000 through 2007 (except for 2001). Data derived from each of these years are evaluated in the BERA using mean COPCs concentrations and the 95th upper confidence limit of the mean (95UCL) concentrations for major areas of the estuary and grand mean values for the whole estuary, as suggested by scientists from NOAA during an initial review of the BERA (Dillon, 2008). In addition, uncertainty in the results of the BERA is addressed partly through a discussion of results from other scientific studies pertinent to the LCP estuary including investigations conducted prior to 1998-1999, when sediment remediation (removal) occurred in selected parts of the estuary.

Temporal Trends of Chemicals of Potential Concern in Surface Sediment during 2000 - 2007

There were no discernable trends in the concentrations of COPCs in surface sediment at continuously monitored sentinel stations in major creeks of the LCP estuary, with the possible exception of total mercury at the mouth of the Main Canal. In the case of sentinel marsh stations, the only possible COPC to exhibit attenuation was total mercury, in the Marsh Grid of Domain 1.

Surface Water Chemistry

The highest concentration of total mercury in surface water of major creeks in the LCP estuary was 188 nanograms per liter (ng/L) (in the Eastern Creek during 2000), which was less than the EPA chronic ambient water quality criterion of 940 ng/L. Methylmercury concentrations in surface water at the Site ranged from 0.15 to 10 ng/L and were usually greater than levels at reference locations (0.008 – 0.22 ng/L). Mean and maximum ratios of methylmercury/total mercury were, respectively, 3.05 and 10.1 percent. Aroclor 1268 was infrequently detected in creeks or at reference locations. Dissolved lead concentrations at the Site never exceeded criteria developed for that form of the metal.

Surface Sediment Chemistry

Concentrations of total mercury and Aroclor 1268 in surface sediment of the LCP estuary exceeded their site-specific sediment effect concentrations (SECs) (e.g., probable effect levels [PELs]) for aquatic invertebrates in most portions of the Eastern Creek, Main Canal, and Domain 1. Lead exceeded PEL concentrations in portions of Eastern Creek, and Domains 2 and 3, and Feasibility Study (FS) locations. The PELs for PAHs were exceeded in the Eastern Creek, Domain 3 and in portions of other areas. Mean and maximum ratios of methylmercury to total mercury in sediment were 0.08 and 11 percent, respectively.

Total mercury and Aroclor 1268 appeared to exhibit similar distribution patterns of elevated sediment concentrations throughout the Site (and possibly origin). A similar pattern was suggested for lead and total PAHs.

Of 21 additional metals that were also evaluated, screening-level ecological effects values (EEVs) for sediment were available for eight of the metals – antimony, arsenic, cadmium, chromium, copper, nickel, silver, and zinc. Of these eight metals, arsenic occurred at similar concentrations at both Site and reference locations. Of the remaining seven metals, chromium and nickel occasionally exceeded their respective EEVs at the Site.

All of the 21 metals were evaluated for aquatic hazard by all available and appropriate protocols. The metals were first screened for toxicity as discussed above. Following this screening, “whole” sediment toxicity tests were conducted that reflected the toxicity of the sediment mixtures. In addition, an estimate was made of the relative contribution to sediment toxicity of the COPCs and other factors that may have influenced the toxicity test results.

Body Burdens of Biota

Body burdens of COPCs in biota key to the functioning of the estuarine system at the LCP Site – cordgrass (*Spartina alterniflora*), Eastern oysters (C*rassostrea virginica*), grass shrimp (*Palaemonetes pugio*), fiddler crabs (*Uca* spp.), blue crabs (*Callinectes sapidus*), mummichogs (*Fundulus heteroclitus*), and various large finfish – were typically higher in the LCP estuary as compared to biota at reference locations.

Percentage of total mercury occurring as methylmercury in body burdens of biota was – cordgrass: ~10%, Eastern oysters: 70%, fiddler crabs: 68%, blue crabs: 100%, mummichogs: 92%, silver perch (*Bairdiella chrysoura*): 100%, red drum (*Sciaenops ocellatus*): 89%, black drum (*Pogonias cromis*): 91%, spotted seatrout (*Cynoscion nebulosus*): 100%, and striped mullet (*Mugil cephalus*): 37%.

Chronic Toxicity of Surface Water

Surface water from the LCP estuary was nontoxic to mysids (*Mysidopsis bahia*) and sheepshead minnows (*Cyprinodon variegatus*) as measured by survival and growth of both species.

Chronic Toxicity of Surface Sediment

Amphipods (*Leptocheirus plumulosus*) and grass shrimp (*Palaemonetes pugio*) were evaluated for chronic toxicity of surface sediment from the LCP estuary. The two types of tests generated similar results in terms of the number of tests of sediment from the LCP estuary that were characterized by toxicity significantly greater (from a statistical perspective) than toxicity for reference locations – 51% of 90 tests for amphipods and 46% of 71 tests for grass shrimp.

Using all valid toxicity test data, sediment effect concentrations were calculated separately for each of the assessment endpoints for amphipods and grass shrimp. The SECs included apparent effects thresholds (AETs), threshold effect levels (TELs), PELs, effects range low (ER-L), and effects range medium (ER-M). These SECs provided a range of values to assess potential toxicity. Measures of accuracy and reliability of the SECs were also performed for each endpoint and species.

For amphipods, survival was the most sensitive endpoint, followed by reproductive response. The amphipod TELs (based on all toxicity tests since 2000) for total mercury, Aroclor 1268, lead, and total PAHs in sediment were 4.9, 6.5, 45, and 0.8 milligrams per kilograms (mg/kg) dry weight (dw), respectively.

For grass shrimp, the most sensitive endpoint was embryo development. Calculated sediment TELs for this endpoint for total mercury, Aroclor 1268, lead, and total PAHs in sediment were 1.4, 3.2, 139, and 1.6 mg/kg (dw), respectively.

Probable causes of sediment toxicity were evaluated in 2006 by a comprehensive set of amphipod studies that included a site-specific toxicity identification evaluation (TIE), equilibrium partitioning study for metals, and an AET study. However, based on these evaluations, there was no discernable COPC exposure-response relationship of high predictive value. Detailed analysis of the toxicity test results indicate that other factors such as the COPC mixtures, total organic carbon, sulfide content, and sediment grain size confounded predictions of sediment toxicity to amphipods and grass shrimp.

Health of Indigenous Grass Shrimp

Health of indigenous grass shrimp (*Palaemonetes pugio*) in major areas of the LCP estuary was evaluated for hatching success of embryos of adult female shrimp and deoxyribonucleic acid (DNA) strand damage of the embryos. Throughout the 2002-2007 monitoring period for grass shrimp, these measurement endpoints deviated statistically (and negatively) from control conditions in the Main Canal, the bank of the Main Canal, and the Eastern Creek. Relationships (logarithmic r^2 values) were defined in 2006 between body burdens of COPCs in adult shrimp and biological responses of embryonic shrimp.

Characteristics of Benthic Macroinvertebrate Community

A study of the benthic invertebrate community was based on sampling of macrobenthos in surface sediment at four stations in the LCP estuary and at two reference locations in 2000. The potentially negative major differences in vital statistics of the macrobenthos community between site and reference areas were a lesser number of taxa, individuals, and density of individuals at two of the four Site stations. Dominance by polychaetes was characteristic of all reference locations and site stations. In addition, there were no problematic "shifts" in feeding habits between Site vs. reference benthos. However, because benthic community data were not collected as part of the long-term contaminant monitoring program after 2000, any potential contaminant-related effects are unknown.

A preliminary study of the abundance of fiddler crabs (*U.* spp.) observed to inhabit the AB seep location (at a single sampling location), and characterized by high mean body burdens (in dry weight) of total mercury (1.00 mg/kg), Aroclor 1268 (2.54 mg/kg), and lead (8.78 mg/kg) observed in biota indigenous to the LCP estuary, found that they were present in numbers (200 young and adult crabs per square meter) that might be expected to occur in a relative pristine marsh. However, co-located surface water and sediment chemistry samples to assess potential exposures were not collected. In addition, because fiddler crab abundance data were not collected during the long-term monitoring program (2000 - 2007), any potential contaminant related effects to their abundance are unknown.

Development of Hazard Quotients for Finfish and Wildlife

Hazard quotients (HQs) were developed for higher trophic level fish based on food-web exposure models and from field-collected data. HQs were developed for red drum (*Sciaenops ocellatus*), silver perch (*Bairdiella chrysoura*), black drum (*Pogonias cromis*), spotted seatrout (*Cynoscion ocellatus*), and striped mullet (*Mugil cephalus*) based on actual field-collected tissue data. Major results of these modeling and field studies are presented in the following section of this summary that pertains to risk characterization for finfishs (Assessment Endpoint 8).

HQs were also developed by modeling for wildlife representing various assessment endpoints – diamondback terrapin (*Malaclemys terrapin*) representing omnivorous reptiles, red-winged blackbird (*Agelaius phoeniceus*) and clapper rail (*Rallus longirostris*) for omnivorous birds, green heron (*Butorides striatus*) for piscivorous birds, marsh rabbit (*Sylvilagus palustris*) for herbivorous mammals, raccoon (*Procyon lotor*) for omnivorous mammals, and river otter (*Lutra canadensis*) representing piscivorous mammals. The HQs sometimes referenced in food-web exposure modeling are based on toxicity reference value (TRVs) predicated on lowest-observed-adverse-effect-levels (LOAELs) and no-observed-adverse-effect-levels (NOAELs) of COPCs for finfish and wildlife.

Major results of these modeling studies are presented in the following sections of this summary that pertain to Assessment Endpoints 2 through 7.

Risk Characterization for Assessment Endpoints

The BERA was primarily designed to address potential risk pertaining to the following eight fundamental assessment endpoints according to a “strength-of-evidence” approach.

Benthic Estuarine Community (Assessment Endpoint 1)

Three basic measurement endpoints were employed to evaluate the viability of the structure and function of the benthic estuarine community in the LCP estuary. These endpoints were: 1) comparisons of concentrations of COPCs in surface sediment with site-specific effects levels; 2) results of toxicity tests conducted with sensitive life stages of benthic biota exposed to surface sediment; and 3) evaluation of the indigenous benthic community. For this BERA, there is a wealth of sediment chemistry and sediment toxicity data available for many locations in the LCP marsh developed during eight years of field investigations. In contrast, the benthic community information is limited to a single study conducted in 2000 at four tidal creek stations in the LCP marsh.

Concentrations of total mercury and Aroclor 1268 in creek and marsh surface sediment exceeded their site-specific SECs in most segments of the Eastern Creek, the Main Canal, and Domain 1. Levels of lead in surface sediment exceeded the site-specific effects range low (ER-L) of 60 mg/kg (Table 4-20) in portions of Domain 2 and in Domain 3, including some FS Areas. Total PAHs occurred in excess of their site-specific survival ER-L of 1.5 mg/kg in the Eastern Creek, and in portions of Domains 2 and 3.

In a comprehensive chronic (28-day) toxicological study detailed in this document, survival, growth, and/or reproduction of amphipods (*Leptocheirus plumulosus*) exposed to surface sediment obtained throughout the LCP estuary were often significantly reduced relative to controls and some reference areas. This toxicity appeared to be caused by COPCs, and to a limited extent, from other metals. Toxic expression also appears to be substantially influenced by other factors including total organic carbon (TOC), sulfide, and grain size. This conclusion supports the findings of others (EPA, 2001; Dillon, 2006a) who have noted the toxicological importance of COPCs and other stressors in the LCP estuary.

Toxicity test results with lab-cultured grass shrimp (*Palaemonetes pugio*) evaluated with collocated COPCs sediment concentrations suggest that grass shrimp may be more sensitive than amphipods. For example, reproductive TELs for embryo development and hatching success from exposure to mercury in sediments ranged from 1.4 to 3.9 mg/kg, while the reproductive TEL for amphipods exposed to mercury was 4.9 mg/kg.

Hatching success and DNA strand damage of embryos produced from indigenous grass shrimp throughout their 2002-2007 study period deviated statistically (and adversely) from control conditions in the Main Canal, the bank of the Main Canal, and the Eastern Creek. Furthermore, in a preliminary unreplicated study of fiddler crabs characterized by relatively high body burdens of COPCs, abundance of crabs was similar to that reported over 30 years ago in the Duplin Estuary Marsh, Georgia (Wolf *et al.*, 1975). However, exposure to COPCs was not quantified in this study.

An evaluation of the indigenous benthic community in the LCP estuary suggested a hazard less than that predicted by laboratory-based studies. In a single field evaluation conducted in 2000, the potentially negative major differences in vital statistics of the macrobenthos community between Site and reference areas were a lesser number of taxa, individuals, and density of individuals at two of the four Site stations. Dominance by polychaetes was characteristic of all Site and reference stations. Benthic community structure was not evaluated in subsequent field investigations.

These above-discussed lines of evidence (LOE) for collectively evaluating the viability of the structure and function of the benthic estuarine community in the LCP estuary indicate that the potential for risk associated with COPCs and non-COPCs is evident, especially in the southeastern part of the estuary (in particular, the Main Canal and Eastern Creek).

Omnivorous Reptiles (Assessment Endpoint 2)

The single LOE available for evaluating the viability of omnivorous reptilian species utilizing the LCP marsh consisted of HQs derived from food-web exposure models for diamondback terrapins (*Malaclemys terrapin*).

In the modeling study, all HQs derived for diamondback terrapins indigenous to the LCP estuary were substantially less than unity (1). Consequently, there is no potential risk to the viability of omnivorous reptiles utilizing the LCP estuary.

Omnivorous Birds (Assessment Endpoint 3)

There were two LOE generated to evaluate the viability of omnivorous avian species utilizing the LCP estuary. These LOE were: 1) HQs derived from food-web exposure models for red-winged blackbirds (*Agelaius phoeniciceus*); and 2) HQs derived from food-web exposure models for clapper rails (*Rallus longirostris*).

Red-winged blackbirds and clapper rails exposed to COPCs at the Site exhibited a basic similarity in that none generated HQs for inorganic mercury, Aroclor 1268, or lead that indicated a potential for risk. For methylmercury, there was a NOAEL HQ of 1.0 in Domain 1 for red-winged blackbirds. All of the LOAEL HQs were less than 1.0, suggesting no risk to red-winged blackbirds.

For clapper rails modeled for exposure to methylmercury, all Site LOAEL HQs were less than 1.0: however, NOAEL HQs were slightly greater than 1.0 (1.7 – 3.0) in Domain 1, Eastern Creek, and the Main Canal. The overall potential for risk to omnivorous birds in the LCP estuary is judged to be minimal.

Piscivorous Birds (Assessment Endpoint 4)

Only one LOE was available to evaluate the viability of piscivorous avian species utilizing the LCP estuary: HQs derived from food-web exposure models for green herons *(Butorides striatus*).

Green herons modeled for exposure to inorganic mercury, Aroclor 1268, and lead at the Site presented no potential for risk. However, all Site NOAEL HQs generated by the green heron modeled for exposure to methylmercury were in excess of unity (1), with NOAEL HQs (1.4 – 10.6) being most clearly distinguishable from reference HQ (0.6). LOAEL HQs for green herons modeled for methylmercury exposure at the Site were greater than 1.0 in Domain 1 (2.8), Eastern Creek (3.5), and the Main Canal (1.5). This suggests that potential risk to the viability of piscivorous avian species in the LCP estuary is moderate.

Herbivorous Mammals (Assessment Endpoint 5)

The single LOE available for evaluating the viability of herbivorous mammalian species utilizing the LCP marsh consisted of HQs derived from food-web exposure models for marsh rabbits *(Sylvilagus palustris*).

The modeling study for marsh rabbits generated a site-related NOAEL HQ for Aroclor 1268) of 3.0 in Domain 1. No LOAEL-based HQ for Aroclor 1268 was greater than unity (1). In addition, no risk potential was associated with mercury or lead.

Consequently, the potential for risk to the viability of herbivorous mammals utilizing the LCP estuary is judged to be minimal.

Omnivorous Mammals (Assessment Endpoint 6)

The only LOE generated for assessing the viability of omnivorous mammals utilizing the LCP estuary consisted of HQs derived from food-web exposure models for raccoons *(Procyon lotor*).

In the modeling study, all HQs for inorganic mercury, methylmercury, and lead derived for raccoons indigenous to the LCP estuary were less than unity (1). The NOAEL HQ for Aroclor 1268 of 2.6 was estimated for Domain 1 and an HQ of 1.1 for Domain 2. None of the LOAEL HQs exceeded unity. Consequently, the potential for risk to the viability of omnivorous mammals utilizing the LCP estuary is judged to be minimal.

Piscivorous Mammals (Assessment Endpoint 7)

The sole LOE for evaluating the viability of piscivorous mammals utilizing the LCP estuary consisted of HQs derived from food-web exposure models for river otters *(Lontra canadensis).*

The modeling study for river otters generated site-related NOAEL HQ for Aroclor 1268 (based on a TRV for Aroclor 1254) that ranged from 0.1 to 3.9. No LOAEL-based HQ for Aroclor 1268 was greater than unity (1). In addition, no potential for risk was associated with mercury or lead.

The potential risk to the viability of piscivorous mammalian species utilizing the LCP estuary is judged to be minimal.

Finfish (Assessment Endpoint 8)

There were five basic measurement endpoints available for evaluating the viability of finfish utilizing the LCP estuary. These endpoints, most of which are characterized by similar strength of evidence, were: 1) comparisons of concentrations of COPCs in surface water to general literature-based effects levels; 2) results of toxicity tests conducted with early (and sensitive) life stages of aquatic biota exposed to COPCs in surface water; 3) HQs derived from food-web exposure models for upper trophic-level fish; 4) HQs derived from measured residues in field-collected finfish; and 5) evaluation of the benthic macroinvertebrate community (as a food source for juvenile and adult fishes).

The highest concentration of total mercury measured in surface water of the LCP estuary was 188 ng/L in the Eastern Creek during 2000, as compared to the EPA chronic ambient water quality criterion of 940 ng/L. The highest concentration of dissolved lead in water was 2.5 micrograms per liter (µg/L) in the Main Canal during 2000, as contrasted to the EPA chronic criterion of 8.1 µg/L. (No criteria have been developed specifically for Aroclor 1268.)

Laboratory toxicity tests designed to evaluate chronic toxicity of “whole” surface water from the LCP estuary to mysids (*Mysidopsis bahia*) and sheepshead minnows (*Coleonyx* *variegatus*) generated similar results. Mean survival of mysids exposed to surface water from the Site and two reference locations ranged from 92.4 to 100%, which was greater than the minimum acceptable survival for control organisms (80%). Mean growth (weight) of mysids exposed to Site and reference waters was from 0.50 to 0.84 mg (dw), which exceeded the weight of control organisms (0.48 mg). Survival of sheepshead minnows exposed to the same surface water ranged from 80 to 100%, which was at least equal to the minimum acceptable survival for control organisms (80%). Mean growth (weight) of fish exposed to Site water was statistically similar to weight observed for at least one reference location.

Finfish bioaccumulation modeling generated a mean LOAEL-based HQ of 2.9 for methylmercury, which is considered to be over-predictive relative to field-collected finfish from the LCP estuary. However, LOAEL HQs exceeded 1 in silver perch (HQ=1.3) and spotted seatrout (HQ=1.9) collected from the field.

Based on three bioaccumulation model approaches to finfish for effects attributable to Aroclor 1268 in the LCP estuary, generated mean LOAEL-based HQs ranged from 0.5 to 1.4 (Table 4-28). The mean LOAEL HQ for field collected finfish was 1.1 for silver perch and black drum, 0.95 for and spotted seatrout, suggesting relatively comparable results with the modeled HQs. The mean HQ for striped mullet was 2.5. The HQs are all higher when the upper-bound tissue residue concentrations are used. Because the fish TRVs were largely based on reproductive and growth endpoints to assess potential chronic problems and or long-term decline in viability of fish populations, the LOAEL HQs suggest chronic risk. The absence of gross abnormalities in finfish collected from Purvis Creek during the empirical study and the absence of reported fish kills during years of intensive interest and monitoring at the LCP Site suggest that there are no acute toxicity concerns to finfish.

Evaluation of the benthic macroinvertebrate community in the LCP estuary did not identify a limitation of this source of food to fishes (refer to information presented for Assessment Endpoint 1), although toxicity to benthic organisms may limit food for fish in portions of the Main Canal, Eastern Creek, and Western Creek Complex.

The overall conclusion derived from the five above-discussed measurement endpoints is that there is no risk to finfish in the LCP estuary from direct exposure to COPCs in the water column. The modeling and field data for finfish suggest that chronic risk to viability of finfish indigenous to the LCP estuary is of concern.

Ecologically Protective Media Concentrations

Ecological risks from hazardous substances released to the LCP estuary create a need to evaluate measures that would reduce the incidence of adverse growth and reproductive effects to benthic organisms, fish, and wildlife. The receptors at risk include:

- omnivorous and piscivorous birds from methylmercury;
- herbivorous, omnivorous, and piscivorous mammals from Aroclor 1268;
- fish from methylmercury and Aroclor 1268;
- benthic invertebrates from methylmercury, Aroclor 1268, lead, and PAHs.

The development of protective sediment concentrations is dependent on sediment to biota bioaccumulation factors (BAFs) which are measurements of COPCs in biota tissue divided by the sediment COPCs concentrations. The methodologies used for each receptor are described in detail in Section 7 of the report. The overall approach to derive BAFs for organisms in the LCP estuary focused on addressing the variability in sediment concentrations while maximizing the biota tissue data relative to habitat use areas for each of the receptors. The estimated BAFs were then used in the wildlife exposure models to back-calculate protective NOAEL and LOAEL sediment concentrations when the hazard quotients are set to 1.0.

Protective Sediment Concentrations for Wildlife Receptors

The most sensitive modeled receptors from exposure to mercury are piscivorous birds as represented by the green heron, with protective sediment concentrations ranging from about 0.5 to 2.8 mg/kg dw. The least sensitive receptors to mercury are omnivorous birds (clapper rail). Although the piscivorous river otter was not considered to be at risk from any specific exposure area (all HQs were less than 1), overall exposure to the entire Site (approximately 790 acres) results in protective sediment mercury concentrations between 1.7 and 4.2 mg/kg dw.

The most sensitive modeled receptor from exposure to Aroclor 1268 is the river otter with protective sediment concentrations ranging from 0.27 to 4.6 mg/kg dw. The least sensitive receptors to Aroclor 1268 are herbivorous mammals (e.g., marsh rabbit).

Protective Sediment Concentrations for Finfish

The protective mercury sediment concentrations for finfish generally ranged from about 1 to 3 mg/kg, with the exception of the striped mullet. Protective concentrations based on field-collected striped mullet tend to fall outside these general ranges because mercury residues were lower and Aroclor 1268 residues higher compared to the other four species of fish. The reason why mullet residues vary from the other species is currently unknown but may be related to different feeding strategies, feeding behaviors and in situ exposure scenarios. The other finfish have protective sediment concentrations for Aroclor 1268 ranging from about 1 to 8 mg/kg.

Protective Sediment Concentrations for Benthic Invertebrates

Due to the lack of any significant COPCs exposure-response relationships based on the results of over 200 sediment toxicity tests, the establishment of "safe" levels for benthic invertebrates is highly uncertain. It appears that the interactions between COPCs, organic carbon, sulfides, grain size, and other factors such as oxidization/reduction changes in sediment chemistry, collectively confounded the toxicity test results. Based on the amphipod and grass shrimp toxicity studies, the following COPCs concentration ranges protective of benthic invertebrates were determined in mg/kg (dw):

Mercury	1.4 – 3.2
Aroclor 1268	3.2 – 12.8
Total PAHs	0.8 – 1.5
Lead	41 – 60

Protective Surface Water Concentrations

Mercury and Aroclor 1268 in surface water of the LCP estuary occasionally exceed their respective State water quality standards and may pose a risk to aquatic life (Section 4.2.1). The risk to wildlife from the surface water pathway is minimal relative to prey and sediment ingestion. Although there may be seeps or contaminated groundwater upwelling into estuary component, there is no indication that State of Georgia water quality standards would not be protective of aquatic life.

1.0 INTRODUCTION

Honeywell, formerly AlliedSignal, Inc. is currently conducting a Remedial Investigation/Feasibility Study (RI/FS) for the LCP Superfund Site (Site) in Brunswick, Glynn County, Georgia (Figure 1-1). The RI/FS is being conducted pursuant to an Administrative Order by Consent, EPA Docket Number 95-17-C, dated July 6, 1995. Because the Site presented a variety of geographical features and contaminated media, the Site has been divided into three OUs: the estuary is designated OU1; the groundwater is designated OU2; and the uplands portion of the Site is OU3.

One integral part of the RI/FS, especially for OU1, is the BERA. Honeywell first submitted a draft BERA report for OU1[1] to the EPA in June 1997. EPA and the State of Georgia (State) reviewed the BERA, disapproved it in October 1997, and provided comments for Honeywell to address. After several successive iterations, Honeywell submitted its last revised BERA report to EPA on July 6, 2009. This revised report, which was also reviewed by EPA, the State and the NOAA, was also disapproved on July 2, 2010. At this time, EPA provided Honeywell with all final comments and included an EPA-revised BERA report, along with explanations of the modifications. Following an August 10, 2010 meeting with Honeywell and review of its August 18 and September 10, 2010 letters, EPA modified the BERA, where necessary and appropriate, to address Honeywell's concerns.

This BERA Report is EPA contractor Black & Veatch's finalized revision of the Honeywell's July 6, 2009 report. Completed in accordance with all EPA guidance, this BERA report has been reviewed and approved by EPA and the State. It incorporates very significant amounts of information provided by Honeywell. While the accuracy of the information provided by Honeywell is accepted for purposes of this BERA report, it has not been independently verified by either Black & Veatch or EPA. EPA therefore reserves the right to correct or amend any information provided by Honeywell if warranted by the discovery of new or different information.

The major COPCs addressed in the BERA are mercury (including methylmercury), Aroclor 1268, lead, and total PAHs. These are the chemicals identified as COPCs in the initial documents developed for the BERA. However, other chemicals that were later considered to be COPCs are also addressed in the risk assessment.

Two key and related elements of the BERA merit emphasis. First, ecological conditions in the LCP estuary were monitored by Honeywell on an annual basis from 2000 through 2007 (except for 2001). Data derived from each of these years are evaluated in the BERA.

Second, an historical perspective of ecological conditions in the LCP estuary is presented by a review of the results of numerous investigations conducted by independent (non-Honeywell) scientists, many of which were peer-reviewed and presented in the scientific literature. This review is presented in the "Uncertainty Section" of this document since some of these investigations were conducted prior to 1998-1999, when sediment remediation (removal) occurred in selected parts of the estuary, and are believed to reflect a "worst-case" baseline for the estuary.

The BERA consists of a main text, as well as associated figures and tables. A series of appendices are also presented that support the main body of the BERA. All environmental data pertaining to the estuary at the LCP Site are maintained in an electronic data base (Environmental Planning Specialists, 2007a). This data base contains data generated as early as 1970, as well as data generated during more recent environmental monitoring investigations.

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[1] This BERA supersedes an earlier BERA conducted in 2000 (CDR Environmental Specialists and GeoSyntec Consultants, 2001) for the estuary at the LCP Site. This new BERA addresses the extensive amount of environmental information generated for the estuary at the LCP Site since that time.

Initial components of the risk assessment process – in particular, "Problem Formulation" (Step 3; Honeywell International, 2001a) and "Study Design and Data Quality Objectives" (Step 4; Honeywell International, 2001b) – are referenced, but not presented in their entirety, in this document.

2.0 INDUSTRIAL HISTORY

Industrial activities began at the LCP Site in 1836, when a segment of the Brunswick-Altamaha Canal was constructed. This canal segment (approximately 1,220 meters or 4,000 feet) ran in a north-south direction along the interface between the upland and estuarine parts of the Site. The canal eventually extended about 19 kilometers (km) (12 miles) from Academy Creek (Brunswick Harbor) north to the Altamaha River. The canal opened in 1854, but operated only until 1855. Waste-disposal and soil-filling activities appear to have occurred along parts of the canal that traversed the Site (i.e., in the north and south disposal areas).

The Atlantic Refining Company, a predecessor of Atlantic Richfield Company (ARCO), used the Site as a petroleum refinery from 1919 through 1929. The refinery processed Gulf Coast and Mexican crude oil into finished products that included light asphalt, fuel oil, lubricating oil, gas oil, kerosene, and gasoline. The boiler at the refinery was fueled by coal until 1922, after which oil was employed.

Georgia Power purchased part of the Site from ARCO and operated an oil-fired power-generating facility from 1937 through 1950 that reached a generating capacity of 5,500 kilowatts (kW) in 1941 (GeoSyntec Consultants, 1996). The Dixie Paint and Varnish Company (which eventually became the Dixie O’Brien Corporation and, subsequently, a subsidiary of the O’Brien Corporation) purchased another part of the Site from ARCO in 1941, where it operated a paint and varnish manufacturing facility until 1955 (GeoSyntec Consultants, 1996).

Allied Chemical and Dye Company (the predecessor to AlliedSignal, which has now merged with Honeywell) purchased the Site in 1955, with the exception of a 1.2-hectares (ha) (2.9-acres) parcel still owned by Georgia Power (GeoSyntec Consultants, 1996). AlliedSignal constructed and operated a chlor-alkali facility at the Site, utilizing the Solvay (mercury-cell) process. Primary products of the chlor-alkali operation were chlorine gas, hydrogen gas, and sodium-hydroxide solution.

LCP Chemical-Georgia (which became a division of the now defunct Hanlin Group, Inc.) purchased all of AlliedSignal’s part of the Site in 1979 and continued to operate the chlor-alkali facility until 1994, when operations were discontinued (GeoSyntec

Consultants, 1996). In May 1998, Allied Signal (Honeywell) purchased the LCP property from the estate in bankruptcy.

3.0 PROBLEM FORMULATION

Problem Formulation establishes the goals, extent, and focus of the BERA. An initial Problem Formulation document was developed in 2001 (Honeywell International, 2001a). This section describes the environmental setting, ecosystem characteristics, the ecosystem potentially at risk, identifies chemicals of potential ecological concern, and develops assessment and measurement endpoints that will be used to assess potential risks to ecological receptors.

3.1 Environmental Setting

The LCP Site is located immediately northwest of the City of Brunswick, in Glynn County, Georgia (Figure 1-1). The Site, which has an area of about 222 ha (550 acres), consists of approximately 28 ha (70 acres) of largely developed (industrialized) upland and 194 ha (480) acres of estuary. The Site was later expanded to include the area west of Purvis Creek to the Turtle River for a total of 320 ha (790 acres) in Operable Unit 1, the estuary at the LCP Site.

The estuary, situated west of the industrialized area, drains into Purvis Creek, which, in turn, discharges to the Turtle River. A ditch, termed the LCP Ditch or Main Canal, runs from the industrialized upland part of the Site to Purvis Creek. A secondary road parallels the ditch along its northern bank and, at one time, connected with a boardwalk (now in ruins) that crossed Purvis Creek and the most western marsh to the Turtle River. The Turtle River/Purvis Creek estuarine system is tidally influenced, with tidal range being about 2 to 3 m (7 to 10 foot [ft]) in the vicinity of the LCP Site.

The LCP Site is bordered by a County landfill and police firing range on the north, Ross Road on the east, and Brunswick Celluose, Inc., on the south side. The Brunswick Cellulose pulp operation discharges effluent to the Turtle River, as does the City of Brunswick Academy Creek Wastewater Treatment Plant (via Academy Creek), which is located south of the pulp company.

The surface geology at the LCP Site consists of sandy beach and dune deposits in the upland area and organic-rich silty clays in the tidal marsh (GeoSyntec Consultants, 1996). These surface sediments are about 15 meters (m) thick. Underlying the surface sediments is a layer of coarse sand, silty clay, and sandstone (deposited during the late

Miocene Epoch), which extends to a depth of approximately 55 m. These late Miocene sediments are underlain by a sequence of silt, clay, phosphatic sand, and limestone of the Hawthorn Group (an early Miocene formation) that extends to a depth of about 150 m.

Storm water runoff from the industrial part of the LCP Site, which historically discharged to the estuary, is now contained by storm water diversion structures. Potentiometric surface measurements indicate that shallow-aquifer groundwater (0-15 m in depth) discharges to the estuary (GeoSyntec Consultants, 1996).

OU1, the marsh at LCP, was divided into four domains for the purpose of characterization (Figure 3-1). Domain 1 is bounded by the uplands to the east, the Main Canal to the north, and Eastern creek to the west. The removal of contaminated sediments took place in the eastern portion of Domain 1 in 1998-1999. Domain 1 is salt marsh. Marsh grass has filled in the removal area. Domain 2 is bounded on the east by Domain 1, the south by uplands not part of the LCP property, and the west and north by Purvis Creek and the Main Canal. Domain 2 is salt marsh with tidal creeks. It contains the Western Creek Complex. Domain 3 is bounded to the south by the Main Canal, the east by the LCP uplands, and the west and north by Purvis Creek. It is a salt marsh with abundant small tidal creeks. Domain 4 is the area west of Purvis Creek to the Turtle River. Domain 4 is divided into an eastern and western portion by the flow divide between creek and river.

Purvis Creek is a saltwater, tidal water body that flows adjacent to the Site and into the Turtle River. Purvis Creek has a maximum width of 500 feet, a maximum depth of 11 feet, and is approximately two miles long. Large areas of salt marsh associated with Purvis Creek and tributaries to Purvis Creek are present in the western portion of the Site as well as throughout the immediate area. Tributaries of Purvis Creek wind throughout these marshes and form a complex and extensive hydrologic system. The salt marsh west of the Site is bisected by a narrow earthen causeway that extends from the Site to Purvis Creek. The causeway separates the northern marsh from the southern marsh and surface hydrologic communication occurs only indirectly through the tidal cycling of Purvis Creek.

The Main Canal carried effluent from the LCP outfall to a tributary of Purvis Creek. The Canal is situated along the southern margin of the causeway and ranges from 10 to 20 feet wide. Purvis Creek discharges to the Turtle River, which is located approximately one mile downstream of the Site. The Turtle River is tidally influenced and is considered salt water in the vicinity of the Site. It is a relatively large water body, approximately 2,000 feet wide at the Purvis Creek confluence with an average depth of approximately 10 feet. A 30-foot deep channel has been dredged in the Turtle River, up to a pulp and paper facility.

The habitat present appears to follow a fairly abrupt topographic contour along the western portion of the facility area of the Site. Although the elevation difference between "higher" and "lower" ground is only one and a half to two feet, it is perceptible in the hydrology and plant species composition. The salt marsh present in the western portion of the Site is vegetated primarily with marsh grass (*Spartina alterniflora*), with occasional patches of black needle rush (*Juncus roemerianus*), and is entirely flooded during high tide. The upland present in the eastern portion of the Site is subject to infrequent inundation and has a higher proportion of plant species that are adapted for less saturated conditions than those which dominate the wetland. The Site area serves as a commercial and recreational fisheries resource.

3.2 Ecosystem Characteristics

The Brunswick River estuary, like most estuaries in the southeastern United States, is a highly productive ecosystem that consists of both salt marsh and associated tidal creeks. High productivity is believed to be at least partially caused by the mixing of fresh water flowing in the upper part of the water column towards the sea and denser salt water flowing in the lower part of the water column towards the land (Odum, 1961). These counter-moving currents produce a "nutrient trap," which retains and recirculates nutrients within the estuary. Although salinity and other environmental variables are intermediate between the conditions occurring in fresh water and salt water, almost all aquatic life inhabiting the estuary is of marine origin.

The salt marsh in the Brunswick River estuary has five basic ecological zones (UGA, 1996): 1) a border zone; 2) high marsh; 3) low marsh; 4) marsh levees (or creek banks); and 5) tidal creeks. The border zone is covered by tidal water only during spring and storm tides. Consequently, the soil is relatively low in salt content, thereby permitting the growth of a variety of plants. The border zone is also the habitat for the red-jointed fiddler crab (*Uca minax*), which is the largest of the fiddler crabs and is often found living well above the high-tide line at the edge of the transition zone.

The high marsh is covered by tidal water for only about an hour or less each day. However, sediment in the high marsh is high enough in salt content to support only salt-tolerant plants such as smooth cordgrass, which possess special glands on their leaves that excrete excess salt. However, because of the salty sediment, the cordgrass grows to only about 8 to 30 centimeters (cm) in height. The dominant fiddler crab in the high marsh is the sand fiddler (*Uca pugilator*), which, as its common name implies, tends to be found more in sandy sediment than in muddy substrates.

The low marsh is inundated by tides for several hours each day. The substrate of the low marsh is typically dark, anaerobic mud. Smooth cordgrass dominates plant life in this zone and provides substrate and nutritional support for a number of animals. The dominant fiddler crab in the low marsh is the mud fiddler (*Uca pugnax*), which feeds upon plant detritus and algae that cover the surface of the mud flats. The marsh periwinkle (*Littorina irrorata*) lives on the cordgrass stalks, moving up and down the stalks in response to changing tidal conditions and feeding on detritus and algae. The ribbed mussel (*Geukensia demissus*) anchors itself by threads to the base of the cordgrass, where it filters particulate matter from passing water. The mud snail (*Illynassa obsolete*) and colonies of the Eastern oyster (*Crassostrea virginica*) also inhabit the low marsh.

Marsh levees are characterized by the continuous movement of water across their surfaces during high tides. The movement of water in this narrow zone of the salt marsh precludes sediment from being anaerobic or having a high salt content. Marsh levees form when sediment particles carried by the tides are filtered out by marsh grasses adjacent to the tidal creeks. Steady supplies of nutrients are delivered to the marsh levees by tides. The constant supply of nutrients results in the formation of a narrow zone of high productivity known as “marsh edge” (Kneib 2003, Minello and Rozas, 2002). Consequently, smooth cordgrass, the only plant found on the levees, grows at a maximum rate to its greatest height (about 3 m) adjacent to tidal creeks. In the fall, cordgrass leaves turn from the color of green to a yellow-brown or golden color, giving Georgia's coastal islands the nickname "The Golden Isles." The leaves then die, break into small pieces, and commence the decomposition process that results in detritus, which, in turn, forms an attachment Site for microscopic organisms such as bacteria, fungi, and algae.

Tidal creeks experience the full amplitude (about 3 m) of the semidiurnal tides that occur in the Brunswick River estuary. These creeks support a variety of water-column and benthic organisms. Water-column organisms include phytoplankton (which is less important than detritus as a basic food source in the estuary; Pomeroy and Wiegert, 1981), zooplankton (both holoplankton and meroplankton), and fishes characteristic of estuaries in the southeastern United States.

An endangered fish species - the shortnose sturgeon (*Acipenser brevirostrum*) - may pass through the estuary, but is not known to frequent the Turtle River or Purvis Creek. Benthic plants commonly found in the estuary include emergent smooth cordgrass (*Spartina alterniflora)*) and black needlerush (*Juncus roemerianus*), which, after death, are major sources of detritus. Some of the more common benthic animals are polychaete worms, periwinkles, Eastern oysters, amphipods, barnacles, mysids (*Mysidopsis bahia*), penaeid shrimp, grass shrimp (*Palaemonetes pugio*), fiddler crabs, and blue crabs (*Callinectes sapidus*).

Two fish indigenous to the estuary are the mummichog (*Fundulus heteroclitus*) and red drum or channel bass (*Sciaenops ocellatus*). The mummichog is one of the most stationary of all fish. Fish over 6 cm in length typically maintain a summer home range of 36-38 m along one bank of a tidal creek, although some fish may move as much as 375 m (Lotrich, 1975). Mummichogs forage for food primarily during daylight near the upper limit of the high-tide zone (Weisberg and Lotrich, 1980). The fish are omnivores, feeding on a variety of detritus, algae, zooplankton, and benthos (including fiddler crabs). The population density of larger (>4 cm in length) mummichogs during the summer may range as high as 6 individuals/m^2 (Kelso, 1979). The number of fish in the largest size class (>7 cm in length) peaks in August and declines dramatically by October due to movement to the mouths of tidal channels and mortality (Meredith and Lotrich, 1979).

Red drum normally do not move far from the estuary to which they recruited (Sea-Stats, 2000a). Indeed, a tagging study on Florida's west coast indicated that 50-85% of fish were captured within 11 kilometers km (6 nautical miles) of their original release Site.

Red drum, which can have a life span of 40 years, spawn in the fall near ocean passes and inlets. The newly spawned young then begin their journey into estuarine nursery areas, where they may remain for up to four years and reach a weight of about 6 kilograms (13 lbs). Red drum feed primarily in the early morning and late afternoon on benthic organisms. Diet of late juvenile and adult red drum includes crabs, shrimp, and other fishes.

Other fish in the Turtle/Brunswick River estuary are black drum (*Pogonias cromis*), sheepshead (*Archosargus probatocephalus*), silver perch (*Bairdiella chrysoura*), spotted seatrout (*Cynoscion nebulosus*), striped mullet (*Mugil cephalus*), Atlantic croaker (*Micropogonias undulatus*), Southern kingfish (*Menticirrhus americanus*), and spot (*Leiostomus xanthurus*).

Benthic aquatic life inhabiting the tidal creeks include the previously referenced fiddler crabs and Eastern oyster and, in addition, various polychaete worms, amphipods, barnacles, mysids, penaeid shrimp, grass shrimp (*Palaemonetes pugio*), and blue crabs (*Callinectes sapidus*). Grass shrimp and mummichogs (*Fundulus*) constitute the most important food supply for secondary consumers in the estuary. Grass shrimp are normally found at low tide near the water's edge and move within the tidal estuary. Penaeid shrimp - the pink shrimp (*Penaeus duorarum*), white shrimp (*Penaeus setiferus*), and brown shrimp (*Peromyscu aztecus*) - spawn in offshore waters, but young postlarval shrimp move during early spring and summer into the estuary. Shrimp reside in the estuary for two to three months before becoming young adults and migrating back to offshore waters. Of the three penaeid shrimp species, the brown shrimp normally migrates furthest offshore to spawn and, consequently, is the least reliable indicator of environmental conditions in the estuary.

Blue crabs inhabit the upper (landward) part of the estuary from the megalopal stage to adulthood. Mating of crabs then typically occurs during all but the coldest months of the year. After mating, male crabs usually remain in the upper estuary, while females migrate to higher salinity water in the lower estuary or ocean to ensure egg development. After eggs hatch, the crabs pass through a number of larval stages before reaching the megalopal stage, which then begins their shoreward movement to the estuarine nursery grounds. Blue crabs feed on a variety of plant and animal materials, both alive and dead. Blue crabs may live for as many as three years, but most die within a year (Sea Science, 2000). Tagging studies have documented that female crabs can migrate 800 km (500 miles) in 100 days (Sea-Stats, 2000b).

Wildlife inhabiting the general vicinity of the LCP Site includes a variety of reptiles, birds, and mammals. The most common reptile in Atlantic coast salt marshes is the diamondback terrapin (*Malaclemys terrapin*). In addition, several species of threatened or endangered Atlantic sea turtles, the green turtle (*Chelonia mydas*), Kemp's ridley turtle (*Lepidochelys kempi*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and leatherback turtle (*Dermochelys coriacea*), may visit the Site.

Birds indigenous to the estuary include a variety of grebes, cormorants, herons and bitterns, ibises, geese, marsh ducks, mergansers, vultures, hawks, ospreys, falcons, rails (including the clapper rail [*Rallus longirostris*]), stilts, plovers, sandpipers, gulls and terns, pelicans, skimmers, kingfishers, and passeriform birds. The wood stork (*Mycteria americana*), an endangered species, has been observed foraging in tidal creeks of the salt marsh and breeding at several colonies in the vicinity of Brunswick. The upland bird fauna is likely to consist mostly of species adapted to abandoned industrial sites, but may also include various species of hawks foraging in the grassy areas of the upland (USDOI, 1995).

Mammals found in the estuary include various shrews, bats, raccoons (*Procyon lotor*), mink (*Mustela vison*), river otters (*Lutra canadensis*), marsh rice rats (*Oryzomys palustris*), and marsh rabbits (*Sylvilagus palustris*). The West Indian manatee (*Trichechus manatus*), an endangered species, and the Atlantic bottle-nosed dolphin (*Tursiops truncatus*), both of which are protected under the Marine Mammal Protection Act, occur in the Brunswick estuary and have been observed in Purvis Creek. West Indian manatees have been observed feeding on smooth cordgrass on the banks of the Turtle River, and a manatee has been seen near the LCP Site. Upland mammals are likely to include raccoons, various shrews and rodents, Eastern cottontails (*Sylvilagus floridanus*), opossums (*Didelphis marsupialis*), and nine-banded armadillos (*Dasypus novemcinctus*) (USDOI, 1995).

3.3 Ecosystem Potentially at Risk

Previous risk assessments conducted at the Site concluded that there were risks to ecological receptors inhabiting the estuary. A Conceptual Site Model (Figure 3-2) provided a basis for evaluating contaminant migration pathways to ecological receptors. Elevated concentrations of mercury and polychlorinated biphenyls (PCBs) were detected in fish tissue samples from Turtle River, Gibson Creek, and Purvis Creek by the Georgia Department of Natural Resources (GADNR, 1995). An EPA Emergency Response Team (ERT) field study found mercury and PCB contamination in most abiotic and biotic samples (Sprenger, 1997). Mercury and PCBs were found in fiddler crabs, blue crabs, killifish, marsh periwinkles, marsh grass, diamondback terrapins, clapper rails, brown shrimp, grasshoppers, spot, and rats. The highest concentration of mercury (330 mg/kg) was found in a terrapin liver sample. The highest concentration of Aroclor 1268 (3,500 mg/kg) was found in a terrapin liver sample. Elevated levels of persistent organic pollutants were detected in bottlenose dolphins in the Turtle River/Brunswick Estuary (Pulster et al., 2009).

Early indications from sediment toxicity testing by ERT were that the contaminants at the Site were not acutely toxic to benthic invertebrates in 10-day tests conducted with brown shrimp (*Penaeus vannamei*), amphipods (*Leptocheirus plumulosus*), and Japanese medaka (*Oryzias latipes*) embryos (Sprenger, 1997). However, hydrophobic organic compounds like PCBs require time to accumulate in test organisms before they reach toxic levels. It is more likely that toxicity tests would show effects on growth or reproduction in longer-term tests than mortality in a 10- or 14-day test. For instance, hatching of medaka embryos was delayed in all test sediments relative to reference sediments (Sprenger 1997). Hence, the ecological risk assessment had its initial focus on risks to fish and wildlife through bioaccumulation into tissues of organisms or their potential to become exposed through ingestion of contaminated prey. The ecological risk assessment has focused on the prevalent and bioavailable chemicals among those chemicals identified as of potential concern at the Site. The most prevalent and bioavailable chemicals (mercury, Aroclor 1268, lead, and PAHs) were extensively monitored in abiotic media and biota. Multiple rounds of sediment toxicity testing have identified other chemical factors (e.g., organic carbon and sulfides) that affect bioavailability of these chemicals in sediment.

3.4 Chemicals of Ecological Concern

Since the preparation of the initial 2001 Problem Formulation document (Honeywell International, 2001a), Environmental Planning Specialists (2007b) and CDR Environmental Specialists and Environmental Planning Specialists (2009) identified mercury, PCBs - specifically Aroclor 1268, PAHs, lead, and several other metals of concern at the LCP Site. This section updates the screening-level process to identify other COPCs that may contribute to ecological risks based on all data collected between 2000 and 2007. The surface water screening benchmarks were obtained from Region 4 and from State surface water standards. Sediment screening benchmarks were obtained from Region 4 and consensus sediment benchmarks (MacDonald et al. 2000). If the maximum concentration of chemicals exceeded its EEV, then the chemical was retained as a COPC to be evaluated further.

A description of the screening process and results are presented in Appendix B and are summarized below.

3.4.1 Chemicals of Potential Concern in Sediment

Based on the ecological screening for COPCs presented in Appendix B (Table B-1), mercury, Aroclor 1268, lead, and PAHs were identified as the primary COPCs and will be evaluated quantitatively in this assessment. Inorganic chemicals were analyzed from at least 242 sediment samples; however, only a few occasionally exceeded their screening EEVs. These, along with their maximum HQs, included: arsenic (HQ=3), chromium (HQ=3), copper (HQ=2), nickel (HQ=2), and zinc (HQ=1). These COPCs are not expected to be of significant concern since their maximum HQs are low and their frequencies above the screening EEVs were not widespread. Therefore, these metal COPCs will not be quantified in this risk assessment as bioaccumulators in the food web, but are evaluated for potential contribution to benthic organism risks.

Metals that exceeded reference concentrations by three- to five-fold, yet lacked EEVs (beryllium, cobalt, manganese, thallium, and vanadium) could also contribute to benthic organism risk. Therefore, COPCs qualitatively evaluated for potential risks to benthic organisms include arsenic, beryllium, cobalt, chromium, copper, lead, mercury, manganese, nickel, thallium, vanadium, and zinc.

A few pesticides were detected with dichlorodiphenyltrichloroethane (4,4'DDT) being most prevalent but only detected in four of 42 samples with a maximum HQ of 9 (Appendix B). Therefore, pesticides are not expected to substantially contribute to risk and are not quantified. Bis(2-ethylhexyl)phthalate was detected in 22 of 25 samples but infrequently above the EEV with a maximum HQ of 4. 3,4-methylphenol, butylbenzylphthalate, and hexachlorobenzene were each detected once in 25 samples. These chemicals will not be quantified further, but will be discussed qualitatively in the uncertainty section.

Dioxins/furans were collected from three sediment samples in October 2000 at C-6, C-8, and C-15 in the LCP estuary. Two additional samples were collected from the Troup Creek and Crescent River reference stations. Using the mammalian toxicity equivalency factors for each of the dioxin/furan congeners (U.S. EPA, 2008a), the toxicity equivalence concentrations (TECs) at the LCP estuary stations ranged from 54 ng/kg to 1,878 ng/kg. At the two reference stations the dioxin TEC concentrations were less than 10 ng/kg. The EPA Region 4 sediment screening-level for dioxins is 2.5 ng/kg which are based on the most toxic form of dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD]). The maximum concentration of TCDD in the reference samples was 1.7 ng/kg while the highest concentration of TCDD from the three estuary samples was 53.7 ng/kg at C-6. Therefore, dioxins/furans are of concern. However, no further sediment or biota samples were analyzed for dioxins/furans during the monitoring program. Therefore, potential risk cannot be adequately evaluated in this assessment based on the three sediment samples collected in 2000, but will be discussed further in the uncertainty section.

3.4.2 Chemicals of Potential Concern in Surface Water

The ecological screening for surface water (Appendix B) (Table 2) identified mercury as the COPC with the highest HQ of 20. Out of 11 unfiltered water samples, aluminum, copper, and iron were identified as COPCs with maximum HQs of 1, 2, and 4, respectively. Dissolved copper and iron had maximum HQs of 1 and 2, respectively. It appears unlikely that aluminum, copper, and iron will substantially contribute to ecological risks, and are therefore not quantified in this assessment. Mercury in the water column may pose a risk to aquatic organisms and is consequently retained for further evaluation. Aroclor 1268 was detected in 23 out of 75 water samples and is also retained as a COPC. Aroclor-1268 was detected at concentrations above the State standard for protection of marine life (0.03 µg/L) at almost all Site locations where Aroclor-1268 was detected in surface water. Aroclor-1268 was less frequently detected in 2000 – 2004 due to elevated detection limits in those years (ranging between 0.5 and 1.2 µg/L), thereby introducing considerable uncertainty regarding actual concentrations during that time period.

A few other chemicals were infrequently detected (e.g., methylnaphthalene and bis[2-ethylhexyl]phthalate) and are not considered to pose a substantial threat to aquatic receptors and are not evaluated further in this assessment.

3.4.3 COPC Summary

The primary COPCs in estuary sediments and in aquatic organism tissues to be evaluated quantitatively include mercury, methylmercury, Aroclor 1268, lead, and total PAHs. Primary surface water COPCs are mercury and Aroclor 1268. The principle routes of exposure are direct contact, ingestion of sediment, and food-web transfer through contaminated prey.

3.5 Constituent Fate and Transport

The fate and transport of chemicals in sediment and surface water will affect both the short- and long-term potential for ecological receptors to be exposed to constituents at the Site. Most of the chemicals detected at the Site are relatively insoluble and tend to be associated with suspended sediments in surface water or with bed sediments. COPCs such as mercury and Aroclor 1268 are highly persistent in the environment. Divalent metals bind strongly with sulfides in bed sediments. Organic compounds bind with organic carbon in sediments. The fate and transport of most of the constituents identified in Site samples is related most strongly to sediment transport.

3.5.1 Fate and Transport in Surface Water and Sediment

Chemicals in upland soils may have been transported to the estuary by surface runoff (including eroded soil). Another pathway for chemicals to be transported to the estuary was via the facility outfall ("LCP Ditch"), which received chemicals from the plant's wastewater treatment system and discharged them into Purvis Creek under a National Pollutant Discharge Elimination System (NPDES) permit (note that untreated wastewater was discharged directly through the outfall during the manufacturing operations preceding NPDES regulatory authority). At times, NPDES permit limits for COPCs were exceeded during the period of LCP Chemicals operations. Constituents dissolved in surface water or bound to suspended sediments can be transported by tidal cycles within the estuary and through the tidal creeks. Sediments in the tidal creeks can be transported back and forth within the creeks with the tides. Sediments in the creeks can also be deposited in the marsh. Fate and transport processes can lead to widespread dispersal of contaminants within the estuary.

3.5.2 Fate and Transport in Groundwater

Groundwater in the upland area of the Site is shallow (1.5 to 3.3 m below ground surface [or 5 to 10.7 ft]). Chemicals associated with the various operations at the LCP Facility were in the past disposed of and/or released in both the subsurface and in surface spills on upland soils. The releases of chemicals in the upland area have impacted groundwater quality. Groundwater discharges to surface water have occurred in Purvis Creek and associated tidal channels and, to a lesser extent in surface sediment at near-shore locations in the estuary. Groundwater, originating in part from contaminated uplands of the LCP Site continues to discharge to the estuary. The points of greatest discharge are seeps which discharge to tidal creeks. An aerial infrared thermography survey conducted in 2009 identified a number of potential seeps. In the summer of 2010, sediment porewater (shallow groundwater) samples were collected from eight seeps in the LCP estuary. One seep sample (located near the M-AB station) contained substantially elevated concentrations of COPCs and appears to serve as an ongoing source of contamination to the estuary. Seepsi can serve as an ongoing source of contamination to the estuary in cases where groundwater originating from the seeps is contaminated by the Site. Contaminants at the Site are relatively immobile and are not readily transported in groundwater. However, the mercury associated with the caustic brine pool might be more mobile than mercury in other settings due to changes in the chemistry associated with waste materials that tend to enhance solubility. PCBs can become mobilized in groundwater through colloidal transport or through co-solvency with other waste organic compounds. Once contamination is deposited and is present within the sediments in the marsh, groundwater flows through the subsurface sediment thus transporting contamination as the groundwater migrates up into tidal creeks.

3.6 Ecotoxicity of Chemicals of Potential Concern

This section provides a brief description of the potential ecotoxicity of the major COPCs groups.

3.6.1 Lead and other Metals

Elevated levels of lead and other metals in contaminated sediments have been associated with impacts to benthic communities. Consensus based sediment screening benchmarks for evaluating sediment quality were published by MacDonald et al. (2000).

Region 4 uses several sources of sediment benchmarks for evaluating the potential risk to benthic communities of contaminant levels in sediments. The dominant source is MacDonald (1996). The sediment benchmarks are based on observed changes to benthic communities or toxicity observed in natural sediments that contained a mixture of constituents. The benchmarks represent probabilities that sediments with the same levels of contamination will be toxic. The magnitude of actual toxicity of sediments will depend on site-specific factors affecting the bioavailability of contaminants. Site-specific metals speciation is affected by water quality parameters such as pH and hardness. Metals in surface water or sediment pore water can exist as free ions, inorganic complexes, or can precipitate as insoluble salts. Most metals do not bioaccumulate to a great degree. Predicting the bioconcentration of metals in an estuary is complex and depends on the organisms involved. Some organisms such as algae can bioaccumulate certain metals while fish generally do not because they can regulate trace metal levels in their bodies. Toxicity of metals in sediments to infaunal organisms is generally related to the toxicity of the metal dissolved in pore water. However, metals suspended in the water column can be a source of exposure to filter-feeding benthic organisms and epibenthic organisms.

Mercury

Ecologically relevant physical characteristics of elemental mercury are a density of 13.534 g/cm^3 and a solubility in water of 0.056 mg Hg/L, while a methylated form of mercury (methylmercury chloride) is characterized by a density of 4.063 g/cm^3 and water solubility of -1,016 mg Hg/L (Eisler, 1987a). Mercury is primarily a neurological poison, with methylmercury being the most hazardous mercury species because of its high stability, positive ionic properties that permit ready penetration of biological membranes, and high lipid solubility. Methylmercury is produced primarily by bacteria-mediated methylation of inorganic mercury under aerobic and anaerobic conditions, although anaerobic conditions are favored (Eisler, 1987a). Methylmercury is relatively insoluble in water, but tends to form water soluble compounds with thiol-containing proteins and amino acids. The mercury body burdens of all organisms near the apex of the ecological food web are in the form of methylmercury, which usually is acquired by biomagnification of methylmercury present in prey.

Ecotoxicity of mercury is characterized by at least three basic points (Eisler, 1987a). First, mercury is a mutagen, teratogen, and carcinogen that causes cytochemical, histopathological, and embryocidal effects in biological organisms. Second, forms of mercury with relatively low toxicity (e. g., inorganic mercury) can be transformed by biological and other processes into forms with exceptionally high toxicity (e. g., methylmercury). Last, biomagnification of methylmercury through the ecological food web can lead to extremely high concentrations of the metal in apex predators.

In general, methylmercury is more toxic than inorganic mercury. Plants are typically resistant to the toxic effects of mercury. Young animals (including larvae of aquatic life) are more sensitive to mercury than older animals. Mercury commonly affects the reproductive capacity of birds and mammals. Bioaccumulation of methylmercury is rapid and depuration is slow (297 - 1,200 days for marine organisms to reduce their mercury body burden by one-half). Among the numerous symptoms of mercury poisoning in fishes is the inability to capture prey or avoid predators.

3.6.2 Polychlorinated Biphenyls (PCBs)

The dominant PCB at the LCP Site is Aroclor 1268, which has been less investigated than some of the other Aroclors (in particular, Aroclor 1254). However, Aroclor 1268 is characterized by various general properties that are common to all PCBs. All PCBs are extremely hydrophobic. Volatilization and sedimentation are the major processes that determine the fate of PCBs in aquatic systems (Eisler, 1986). Both processes remove PCBs from the water, but the amount of transferred chemicals is dependent on dissolved-particulate phase partitioning, which determines the relative sizes of the soluble pool available for volatilization and the particulate pool available for sedimentation.

All PCBs remaining in the aquatic environment are extremely stable compounds that are slow to degrade. All PCBs are more toxic (direct toxicity) to embryonic and juvenile organisms than to adult organisms. All PCBs are highly lipophilic and, as a consequence, have the potential to biomagnify in the ecological food web. Aroclor 1268 is one of only two Aroclors (the other being Aroclor 1270) to exist in its unaltered form as a solid, as contrasted to a viscous liquid (Aroclor 1254), mobile oil (Aroclors 1221, 1232, 1242, and 1248), or sticky resin (Aroclors 1260 and 1262). Aroclor 1268 is less soluble in water and, hence, less mobile than other Aroclors, because of the inverse relationship that exists between degree of chlorination of PCBs (68% for Aroclor 1268) and water solubility.

Toxicity of Aroclor 1268 to several types of aquatic life has been evaluated. A unicellular freshwater alga (*Chlorella pyrenoidosa*) exposed to 1 mg/L of Aroclor 1268 for 191 hr was characterized by a population growth that was 94% of control growth, as contrasted to 61% for Aroclor 1242 and 100% for Aroclor 1254 (Hawes et al., 1976). A freshwater copepod (*Daphnia magna*) exposed to Aroclor 1268 under static test conditions (Nebeker and Puglisi, 1974) exhibited a three-week Lethal Concentration (LC) 50 of 253 µg/L and 50% reproductive impairment at 206 µg/L. This was the least toxicity observed for eight evaluated Aroclors. (For example, Aroclor 1254 was characterized by an LC50 of 31 µg/L and 50% reproductive impairment at 28 µg/L.)

Toxicity of Aroclor 1268 to several species of domestic and wild birds has been assessed. Chickens exposed to 2 mg/kg Aroclor 1268 in the diet produced normal embryos, whereas chickens exposed to several other Aroclors (Aroclors 1232, 1242, 1248, and 1254) produced fewer, and often abnormal, embryos (Cecil et al., 1974). White leghorn hens exposed to 20 mg/kg Aroclor 1268 in the diet for nine weeks displayed no adverse effects on survival, body weight, food consumption, fertility, egg production, hatchability of eggs, egg weight, or thickness of egg shell (Lillie et al., 1974). However, many of these vital processes were deleteriously affected by other evaluated Aroclors, including Aroclor 1254. Lastly, several species of birds - Japanese quail, mallards, pheasants, and bobwhite quail (which ultimately proved to be the most sensitive species) - exposed to various Aroclors in food were least sensitive to Aroclor 1268 and most sensitive to the less chlorinated Aroclors (Heath et al., 1972).

Mammals evaluated for sensitivity to Aroclor 1268 are primarily rodents and rabbits. Rats orally exposed to a single dose of Aroclor 1268 were characterized by Lethal Dose (LD) 50 of 2.5 - 11.3 grams per kilogram (g/kg) (NAS, 1979), whereas Aroclor 1254 (Hudson et al., 1984) was substantially more toxic (LD50: 0.5-1.4 g/kg). In vitro fertilization of mice eggs was impaired at Aroclor 1268 concentrations as low as one µg/mL, while impairment by Aroclor 1254 occurred as low as 0.1 µg/mL (Kholkute et al., 1994). Both Aroclors caused an increased incidence of degenerative ova and abnormal embryonic development at concentrations as low as 1 µg/mL. Finally, rabbits dermally exposed to a single dose of Aroclor 1268 were characterized by a LD50 of 10.9 grams per kilogram (g/kg) (EPA, 1980).

3.6.3 Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are ubiquitous in the environment. In general, PAHs exhibit high lipid solubility, although degree of solubility is, as in most other characteristics of PAHs, compound-specific. Unsubstituted, low-molecular-weight PAHs exhibit substantial acute toxicity, but are noncarcinogenic (Eisler, 1987b). Low-molecular-weight PAHs contain two to three benzene rings (e. g., 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene). Alternatively, high-molecular-weight PAHs containing four-to-seven benzene rings are significantly less toxic, but many (e. g., benzo[a]anthracene, benzo[a]pyrene, and chrysene) are carcinogenic, mutagenic, or teratogenic to a wide variety of organisms, including fishes and other aquatic life, birds, and mammals. In addition to the ones already mentioned, high-molecular weight PAHs include benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene. PAHs, despite their generally high lipid solubility, show little potential to biomagnify in the ecological food web, probably because most PAHs are rapidly metabolized by vertebrates and some invertebrates. (For example, the biological half life of benzo[a]pyrene in blood and livers of rats is initially on the order of 5 to 10 minutes.)

Most PAHs present in natural waters are associated with particulate matter, with only about one-third present in dissolved form (Eisler, 1987b). The most important degradation processes for PAHs in these waters are photooxidation, chemical oxidation, and biological transformation by bacteria and animals. PAHs may also become incorporated into bottom sediments, where their ultimate fate is believed to be biotransformation and biodegradation by benthic organisms. However, degradation of PAHs in sediments may occur very slowly in the absence of penetrating radiation and oxygen and may never occur in anoxic sediments. Photoactivation of PAHs in shallow waters can increase their toxicity to aquatic organisms.

Acute toxicity has been reported for aquatic life exposed to approximately a dozen PAHs (Eisler, 1987b). The 96-hr LC50s reported for marine organisms exposed to PAHs that are COPCs ranged from 320 µg/L of naphthalene presented to grass shrimp vs. > 1,000 µg/L of benzo[a]pyrene and, also, chrysene presented to sandworms. Sublethal toxicity of PAHs to aquatic organisms includes inhibition of photosynthesis in algae and macrophytes exposed to various concentrations of anthracene, fluorene, naphthalene, phenanthrene, and pyrene.

Elevated levels of PAHs in sediments tend to be of most concern for the potential to affect benthic communities. PAHs tend not to accumulate to high levels in upper-trophic level aquatic organisms due to the ability of these to break down and eliminate these compounds. Among fish, only those such as flounder, which bury themselves within the sediments, have been found to accumulate detectable levels of PAHs. PAHs can accumulate in polychaetes and mussels. However, PAHs do not biomagnify up the food chain. Sediment screening levels have been reported for PAHs in sediments. PAHs bind to organic carbon in sediments, a mechanism that reduces their bioavailability and reduces the exposure to benthic organisms. The low-molecular-weight PAH compounds have a greater water solubility and tend to be more toxic to benthic communities than the high-molecular-weight PAH compounds.

3.7 Complete and Potentially Complete Exposure Pathways and Receptors

The primary origin of the COPCs - mostly mercury, PCBs (particularly Aroclor 1268), lead, and PAHs is from the industrialized part of the LCP Site. In the pre-regulatory period, wastewater was discharged directly to the estuary and, during both the pre-regulatory and regulatory periods, process wastes were disposed of in the upland part of the Site (GeoSyntec Consultants, 1996). These upland sources of COPCs served as a secondary source of COPCs to both groundwater and, via erosion and surface-water runoff, to surface water in the estuary. However, removal actions in the upland source areas are now complete and risk assessments for the Site’s uplands are being conducted.

In the estuary, COPCs can be transferred between abiotic media by adsorption and sedimentation (surface water to sediment) and dissolved flux (sediment pore water to surface water). COPCs in water can be transferred to both water-column and benthic organisms (e.g., plankton, benthic invertebrates, and fishes) via direct contact and, secondarily, by direct or ancillary ingestion. Aquatic organisms can be directly exposed to contaminants dissolved in surface water and to contaminants bound to sediment particles suspended in the water column (Bosch et al. 2009).

COPCs in sediment can be transferred by the same routes to benthic organisms. In addition, all COPCs can be transferred among water-column organisms and benthic organisms by ingestion of prey. Most importantly, some COPCs (e. g., mercury and PCBs) have the potential, through food-chain transfer, to accumulate - i.e., biomagnify – at substantially higher concentrations in tissues of high-trophic-level aquatic organisms. Finally, indigenous estuarine wildlife may be exposed to COPCs. Wildlife exposure may involve all of the environmental pathways described above. Routes of wildlife exposure for all COPCs include direct contact with surface water and surface sediment, ingestion of water and sediment, and uptake from food. However, for mercury and PCBs, dietary intake as a result of biomagnification in the food web is the dominant wildlife exposure route. Wildlife exposed at the Site consists of dietary guilds such as herbivores, insectivores, piscivores, carnivores, and omnivores. Exposure to piscivores and carnivores is expected to be significant in OU1 because PCBs and mercury accumulate to high levels in the tissues of fish, especially in the larger finfish.

3.8 Assessment and Measurement Endpoints

Assessment endpoints are the ecological resources or receptors whose protection from adverse effects is the goal of risk management actions. Measurement endpoints are environmental parameters that can be measured through field and laboratory analysis, and provide a good indication of the condition of an assessment endpoint.

The initial Problem Formulation (Honeywell International, 2001a) and “Study Design and Data Quality Objectives” Phase (Honeywell International, 2001b) of the BERA provided the basis for developing the endpoints which are summarized below.

Assessment Endpoint 1 – Viability of the benthic estuarine community is evaluated by three measurement endpoints: 1) comparisons of concentrations of COPCs in surface sediment to site-specific effects levels; 2) results of toxicity tests conducted with sensitive life stages of benthic biota exposed to surface sediment; and 3) evaluation of the indigenous benthic community.

Assessment Endpoint 2 – Viability of omnivorous reptiles utilizing the estuary, as evaluated by hazard quotients (HQs) derived from food-web exposure models for diamondback terrapins (*Malaclemys terrapin*).

Assessment Endpoint 3 – Viability of omnivorous avian species utilizing the estuary, as evaluated by two basic measurement endpoints: 1) HQs derived from food-web exposure models for red-winged blackbirds (*Agelaius phoeniceus*); and 2) HQs derived from food-web exposure models for clapper rails (*Rallus longirostris*).

Assessment Endpoint 4 – Viability of piscivorous avian species utilizing the estuary, as evaluated by HQs derived from food-web exposure models for green herons *(Butorides striatus*).

Assessment Endpoint 5 – Viability of herbivorous mammalian species utilizing the marsh, as estimated by HQs derived from food-web exposure models for marsh rabbits *(Sylvilagus palustris*).

Assessment Endpoint 6 – Viability of omnivorous mammalian species utilizing the estuary, as estimated by HQs derived from food-web exposure models for raccoons *(Procyon lotor*).

Assessment Endpoint 7 – Viability of piscivorous mammalian species utilizing the estuary, as estimated by HQs derived from food-web exposure models for river otters *(Lutra canadensis*).

Assessment Endpoint 8 – Viability of finfish utilizing the estuarine system, as evaluated by five measurement endpoints: 1) comparisons of concentrations of COPCs in surface water to general literature-based effects levels; 2) results of toxicity tests conducted with early (and sensitive) life stages of aquatic biota exposed to COPCs in surface water; 3) tissue residue HQs derived from finfish bioaccumulation models; 4) tissue residue HQs derived from field-collected finfish; and 5) evaluation of the benthic community as a food source for juvenile and adult fish.

The above-identified assessment and measurement endpoints were evaluated by a sampling framework that distinguished between creek and marsh habitats of the estuary. The creek habitat consists of four major creeks – the Main Canal (or LCP Ditch), Eastern Creek (or North-South Tributary), Western Creek Complex, and Purvis Creek (Figure 3-1). The marsh habitat consists of four domains separated from each other by major hydrological features.

The basic experimental design for the BERA is reviewed in Table 3-1. Years during which various studies (measurements) were conducted are documented in the table, as well as in the figures and tables contained in this document. Surface sediment was considered to be sediment between 0 and 15 cm in depth. Body burdens of COPCs in biota were determined for “whole bodies” of organisms.

Locations of sampling stations in the LCP estuary for surface water and associated biota of the four major creeks are illustrated in Figure 3-3, with details of sampling efforts presented in Table 3-2. Similar information for surface sediment and biota in the four creeks is contained in Figure 3-4 and Table 3-3. Information for marsh in the four domains is presented in Figure 3-5 and Table 3-4. This figure and table also present information for Blythe Island, a marsh area that was evaluated to allow environmental information generated at the LCP Site to be interpreted in a broader geographic context. Reference locations for the investigation were primarily the Crescent River (located west of Sapelo Island) and Troup Creek (on the eastern side of the Brunswick Peninsula).

4.0 ECOLOGICAL EXPOSURE AND EFFECTS EVALUATION

This section of the document addresses temporal trends of COPCs in surface sediment of the estuary at the LCP Site during 2000 – 2007; the presence of chemicals in various environmental media of the LCP estuary; laboratory- and field-based chronic toxicity of environmental media; characteristics of the benthic macroinvertebrate community; and development of HQs for finfish and wildlife.

Environmental conditions are frequently presented for Blythe Island and areas near point-source discharges from non-LCP sources, which are not part of the LCP Site. These data are often included because they increase the sample size employed to generate various relationships between selected environmental variables and, together with reference data, provide a context for evaluating environmental conditions in the LCP estuary.

4.1 Temporal Trends in Concentrations of Chemicals of Potential Concern in Surface Sediment during 2000 – 2007

A temporal evaluation of COPCs concentrations during the period of 2000 – 2007 (after remediation of selected parts of the LCP estuary in 1998 and 1999) is of primary importance from the general perspective of evaluating ecological risk. This primary objective, in turn, is predicated on selection of the most contemporary ecological baseline generated during this eight-year time period consistent with maximizing the number of samples (or years) that constitute the baseline.

Attenuation of selected COPCs (all COPCs except total PAHs, which exhibited concentrations of extreme variability) in surface sediment at continuously monitored sentinel stations in major creeks of the LCP estuary did not appear to occur (Figure 4-1). In the case of sentinel marsh stations (Figure 4-2), the only possible COPCs to exhibit attenuation was total mercury, in the Marsh Grid of Domain 1. Aroclor 1268 did not show any trends in the Marsh Grid, as there were much higher levels in 2002 and 2005 than other years (Figure 4-2).

At the AB Seep Station, concentrations of all COPCs, except for occasional high “spikes” of lead and, to a lesser degree, total mercury, were relatively low. A high “spike” of lead also characterized the station near the old oil-processing Site in Domain 3.

Since attenuation of COPCs in sediment, water, or biota is not readily apparent over the last several years, this baseline risk assessment incorporates data generated throughout the entire 2000 – 2007 time period.

4.2 Presence of Chemicals in Environmental Media

Creek surface water, creek and marsh surface sediment, and associated biota in the estuary at the LCP Site are sequentially evaluated to provide estimates of COPCs concentrations in each media and each exposure area by using standard statistics for the major COPCs based on all data from 2000 through 2007, i.e., minimum, maximum, average, 95UCL. In addition, data are also presented as yearly average concentrations in each medium and exposure area. Non-detects were treated as half the detection limit. Tables in the “a” series provide summary statistics of individual data by exposure area for use in the risk assessment. “Grand means” that were identified in a-series tables were calculated by assigning weights to individual exposure area means based on the size of the exposure area. Tables in the “b” series show COPCs concentrations based on annual means (averages). PAHs were not included in a-series tables for biota because they were for the most part not detected in biota and therefore were not evaluated for exposure to wildlife via bioaccumulation.

4.2.1 Creek Surface Water

General water quality characteristics for Purvis Creek were relatively consistent for the duration of the field study (fall of all years) and were similar to characteristics observed at the reference locations (Table 4-1). Some notable differences include low salinities in 2004 and especially in 2007. Hypoxic conditions (2.3 – 3.0 mg O_2/L) occurred in Purvis Creek in 2004, and elevated creek temperatures (>30 degree Celsius [ºC]) in 2002.

The highest concentration of total mercury in surface water of major creeks at the Site (Table 4-2a) was 188 ng/L (in the Eastern Creek during 2000), which was less than the EPA recommended chronic water quality criterion of 940 ng/L. Concentrations of total mercury in all evaluated creeks at the Site often exceeded the State of Georgia water quality criterion 25 ng/L, but that ecological screening value (ESV) pertains to marketability of fish as contrasted to health of marine biota. Table 4-2b shows yearly average concentrations at the major creek stations.

Methylmercury concentrations in water at the Site ranged from 0.15 to 2.2 ng/L and were usually greater than levels at reference locations (0.008 – 0.22 ng/L). The logarithmic relationship between total mercury and methylmercury concentrations in creek surface water was defined by a coefficient of determination (r^2) of 0.23 (Figure 4-3). (Values of r^2 indicate the amount of variation in one variable [in this case methylmercury] that can be explained in terms of variation in the other variable [i.e., total mercury]. Determination of statistical significance of non-linear r^2 values are problematic, especially for small sample sizes, and not addressed in this document.) Mean and maximum ratios of methylmercury/total mercury were, respectively, 3.05 and 10.1 percent.

Aroclor 1268 was detected in 47 percent of the creek samples and in 23 percent of the reference samples (Table 4-2a). The highest mean concentration (0.83 µg/L) occurred in the Main Canal in 2005 (Table 4-2b). The State water quality criterion for total PCBs in coastal and marine estuarine waters is 0.03 µg/L. Dissolved lead concentrations in creek samples never exceeded the State water quality standard of 8.1 µg/L.

In summary, mercury and total PCBs (mostly Aroclor 1268) in surface water of the LCP estuary generally exceeded their respective State criteria for protection of aquatic life.

4.2.2 Creek and Marsh Surface Sediment

Table 4-3a provides summary statistics on the concentrations of mercury, Aroclor 1268 and lead in all sediment samples (2000 – 2007) collected in each exposure area. (Area A includes the Main Canal, Eastern Creek, and Domain 1). The lowest mean concentration of total mercury in surface sediment at the Site (0.63 mg/kg [dw], in Domain 4) was higher than the highest mean concentration at the Troup Creek reference location (0.08 mg/kg). The highest mean total mercury concentrations in surface sediment at the Site were found in Eastern Creek (20.28 mg/kg) and the Main Canal (7.40 mg/kg). Mean concentration of total mercury in creek sediment generally exceeded those found in marsh sediment. Similar relative concentrations are observed for Aroclor 1268 (Table 4-3a). The highest yearly mean total PAHs generally occurred in Domain 2 and in Eastern Creek (range of 0.35 to 14 mg/kg); whereas, the total PAHs in Troup Creek were usually

< 0.12 mg/kg (Table 4-3b). For lead, the highest mean lead concentration (90.7 mg/kg) was observed in Domain 3 (North Marsh). The next highest levels were observed in Domain 2 (40.9 mg/kg) and the adjacent Eastern Creek (35.7 mg/kg). Mean concentrations of lead in the remaining areas of the Site ranged between 17.4 mg/kg (Purvis Creek) and 29.0 mg/kg (Western Creek Complex). Mean lead concentration at the Troup Creek reference location was 17.6 mg/kg.

The overall Site mean for silt/clay content was 77.6 percent, compared to the Troup Creek/Crescent River mean of 58.2 (Table 4-3b). Total organic carbon in Site sediment (that included creek and marsh sediment) ranged from 0.1% to 14.9 % with a mean of 4.6%; whereas the range TOC of Troup Creek and Crescent River sediment ranged from 0.2% to 6.0% with a mean of 2.9%. Sediment TOC is important in the context of highly organic sediments often complexing with chemicals causing them to have limited bioavailability.

Based on 31 paired creek sediment samples and 27 paired marsh sediment samples, statistically significant linear r^2 values characterized the relationship between silt/clay content and TOC content of surface sediment of major creeks ($r^2 = 0.43$) and marsh ($r^2 = 0.41$) at the Site (Table 4-4). Total mercury and Aroclor 1268 appeared to exhibit similar patterns of distribution throughout the Site (and possibly origin) as evidenced by statistically significant r^2 values for both creeks ($r^2 = 0.13$) and marsh ($r^2 = 0.27$). A similar pattern was suggested for lead and total PAHs, with an r^2 value of 0.42 for both creek and marsh habitats.

The relationship between total mercury and methylmercury concentrations in surface sediment was defined by an r^2 value of 0.12 (Figure 4-4) where the data are highly skewed toward the origin. Mean and maximum ratios of methylmercury/total mercury were, respectively, 0.08 and 11 percent.

The coloration scheme in Table 4-3b provides an comparison of the yearly averages of concentrations of COPCs in surface sediment with initial site-specific effects benchmarks based solely on amphipod and grass shrimp toxicity test results (Tables 4-20 and 4-22). The TEL below which harmful effects are considered unlikely; and the probable effect level (PEL) above which harmful effects are considered likely. The significance of these initial effect levels will be evaluated in more detail in Section 4.6. At all areas in the Site, mean concentrations of total mercury and Aroclor 1268 were greater than their respective conservative literature-based TELs of 0.13 mg/kg and 0.022 mg/kg, respectively. However, mercury and Aroclor 1268 did not exceed their site-specific TELs in Domains 3 and 4 or in Purvis Creek and Blythe Island. Lead exceeded benchmarks in the Eastern Creek, Domains 1, 2, and 3 (and the FS locations). In the case of total PAHs, its PEL was exceeded in Eastern Creek, Domain 2, Domain 3, and the FS locations. Both reference locations exhibited mean levels that were less than their TEL for all COPCs except Aroclor 1268 in surface sediment.

Table 4-5 provides summary data of other metals associated with selected sediment samples collected from 2004 through 2006. As discussed in Section 3.4.1, arsenic, chromium, copper, nickel, and zinc slightly exceeded their screening-level EEVs and may contribute some risk: however, quantifying such risks would likely be masked by the primary COPCs. Chromium and nickel were elevated at or above their conservative EEVs in approximately 50 percent and 30 percent of the samples listed in Table 4-5, respectively. Many of the arsenic samples were within background levels. Copper was elevated in about 10 percent of the samples and zinc in one percent of the samples.

4.2.3 Biota

Body burdens (residue) of COPCs in key biota of the estuarine ecosystem at the Site are addressed. Special attention is directed toward those biota that are later employed in food-web exposure models for upper-trophic level fish and wildlife (Section 4.6 of this document). In these cases, body burdens of selected COPCs that have the potential to biomagnify in the ecological food web (mercury, Aroclor 1268, and to a lesser degree, lead) are presented. Exposure (body burden) statistics are provided and the a-series tables for each Site area where data were available and then prorated according to size of the areas to identify estuary-wide (OU-1) Site means. Additional body burden information based on year-specific averages, are presented in the b-series tables.

4.2.3.1 Cordgrass

Cordgrass (*Spartina alterniflora*) was characterized by concentrations of total mercury that ranged from a mean of 0.02 mg/kg (dw) in the Purvis Creek area to a mean of 0.147 mg/kg (dw) in the Main Canal area vs. 0.005 mg/kg in the Troup Creek reference location (Table 4-6a). Methylmercury frequently could not be detected in cordgrass and, when detected, averaged just 9.93 percent of concentration of total mercury (Appendix F).

Aroclor 1268 concentrations in cordgrass from the Site ranged from a mean of 0.096 to 0.261 mg/kg, in comparison to 0.0134 mg/kg at the reference location. The maximum concentration of 0.614 mg/kg occurred in Domain 1 at the AB Seep Location.

Lead concentrations in cordgrass from the Site ranged from a mean of 1.98 to 3.51 mg/kg (in Domain 3) vs. a mean of 1.6 mg/kg in the Troup Creek reference location. Lead often was not detected in cordgrass (Tables 4-6a and 4-6b).

4.2.3.2 Eastern Oysters

Eastern oysters (*Crassostrea virginica*) collected from the Site in 2006 contained mean body burdens of total mercury that ranged from 0.187 to 2.367 mg/kg (dw) vs. 0.089 to 0.097 mg/kg in oysters at the Troup Creek reference location (Table 4-7). About 70 percent of total mercury in oysters was reported to be in the form of methylmercury (NOAA, 1998). Mean body burdens of Aroclor 1268 in Site oysters ranged from 0.048 to 0.853 vs. 0.00783 to 0.00807 mg/kg at Troup Creek. For lead, Site oysters contained mean body burdens that varied from 0.357 to 1.167 mg/kg vs. 0.333 to 0.523 mg/kg at Troup Creek.

There were no statistically significant differences in concentrations of mercury or Aroclor 1268 in young-of-year (Year 0) vs. older (Year I – II) oysters, as determined by parametric paired “t” tests of differences in mean values for all sampling stations. However, lead concentrations were significantly greater in young oysters. This difference in lead concentrations may be the result of “dilution” of lead levels in young oysters by an increase in body mass as they grow (Kennedy *et al.*, 1996). Consequently, the mass of lead in both age groups of oysters could well be similar.

In addition to the 2006 data discussed above, oyster data were collected in 1997 and 2007. The Table below compares the 2006 and 2007 data. The concentrations of mercury were greater in 2007 than 2006 which may be reflective of relatively higher mercury sediment concentrations at these stations in 2007. Aroclor 1268 levels were also higher in 2007 at the NOAA-3 and NOAA-5 stations. The long-term trend in oyster

COPCs levels and the effects of these elevated concentrations to the reproductive health of oysters are unknown.

Comparison of 2006 and 2007 Oyster data in LCP estuary

		Age	Mercury		Aroclor 1268		Lead	
Station	**Location**	**Class**	**2006**	**2007**	**2006**	**2007**	**2006**	**2007**
NOAA 4/25	Main Ditch @ E. Creek junction	YOY	0.773	1.433	0.230	0.223	0.767	0.603
		Year I-II	1.013		0.167		0.580	
NOAA 5	Main Ditch (near mouth)	YOY	0.390	1.067	0.223	0.213	0.647	0.600
		Year I-II	0.520		0.183		0.450	
NOAA 3	E. Creek - mid reach	YOY	2.367	2.433	0.853	1.400	1.167	1.167
		Year I-II	1.733		0.630		0.743	
NOAA 10/28	Purvis Creek - near mouth	YOY	0.187	0.350	0.048	0.254	0.633	0.523
		Year I-II	0.187		0.063		0.357	
Troup Creek	Reference area	YOY	0.089	0.127	0.008	<0.193	0.523	0.637
		Year I-II	0.097		0.008		0.333	

YOY – Young of Year

4.2.3.3 Fiddler Crabs

Fiddler crabs (Uca *spp.*) from the Site were characterized by concentrations of total mercury that ranged from a mean 0.13 mg/kg dw in Purvis Creek to 0.95 in Domain 1 relative to 0.04 mg/kg at the reference location (Table 4-8a). Methylmercury averaged about 68 percent of concentration of total mercury (Appendix F).

Aroclor 1268 concentrations in fiddler crabs from the Site ranged from a mean of 0.61 mg/kg dw in Domain 4 to 2.86 mg/kg in the Main Canal vs. 0.22 mg/kg at the Troup Creek reference location. The highest concentration of 17 mg/kg was collected in 2004 at Station 5-NOAAG.

Lead concentrations in fiddler crabs from the Site ranged from a mean of 0.5 to 7.93 mg/kg (in Domain 1) compared to 0.71 mg/kg at the reference location. However, lead often was not detected in fiddler crabs. There was no discernable trend in COPCs body burdens in fiddler crabs over time in any area (Table 4-8b).

4.2.3.4 Blue Crabs

Blue crabs (*Callinectes sapidus*) from both north and south Purvis Creek were characterized by concentrations of total mercury with a mean of 1.59 mg/kg (dw) vs. 0.15 mg/kg at Troup Creek (Table 4-9a). Methylmercury constituted about 100 percent of concentration of total mercury (Appendix F). Table 4-9b shows that the total mercury concentrations from blue crabs in North Purvis Creek was virtually the same as crabs collected from South Purvis Creek.

Aroclor 1268 concentrations in blue crabs from Purvis Creek had a mean of 1.61 mg/kg compared to 0.13 mg/kg at the reference location.

Lead concentrations in blue crabs from Purvis Creek had a mean of 0.82 mg/kg vs. 0.73 mg/kg at the reference location. Lead often was not detected in blue crabs.

4.2.3.5 Mummichogs

Mummichogs (*Fundulidae heteroclitus*) from the Site were characterized by concentrations of total mercury that ranged from a mean 0.2 (Domain 4) to 0.87 mg/kg (dw) (Area A) vs. 0.09 mg/kg at the reference location (Table 4-10a). The maximum individual-sample mummichog concentration of 9.1 mg/kg occurred in Eastern Creek which contributed to the mean value of 0.87 mg/kg in Area A (Table 4-10a). Methylmercury constituted about 92 percent of concentration of total mercury (Appendix F).

Aroclor 1268 concentrations in mummichogs from the Site ranged from a mean of 1.01 to 6.06 mg/kg vs. 0.15 mg/kg at the reference location. The highest mean concentration of 6.06 mg/kg occurred for the Eastern Creek. A mean value of 4.28 mg/kg occurred in the Main Canal (Table 4-10a).

Lead concentrations in mummichogs from the Site ranged from a mean of 0.43 in Domain 4 to 2.41 mg/kg in Domain 3 vs. 0.87 mg/kg at the Troup Creek reference location (Table 4-10a). There were no discernable body burden differences between years for the three COPCs (Table 4-10b).

4.2.3.6 Large Finfish

Silver perch (*Bairdiella chrysoura*), red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), spotted seatrout (*Cynoscion nebulosus*), and striped mullet (*Mugil cephalus*) captured in Purvis Creek displayed mean whole body burdens of total mercury that were elevated in comparison to levels in Troup Creek reference fishes (Table 4-11a). Comparative mean values of total mercury (mg/kg dw) in fishes from Purvis Creek vs. reference fishes from Troup Creek and the Crescent River are provided below, along with the percentage of total mercury that occurred in the form of methylmercury:

	Site Mean (mg/kg dw)	Reference Areas	% Methylmercury
Silver perch	1.6	0.16 - 0.29	100
Red drum	1.14	0.18 - 0.30	89
Black drum	0.84	0.05 - 0.11	91
Spotted seatrout	2.27	0.11 - 0.34	100
Striped mullet	0.23	0.02 - 0.05	37

See Appendix F for the calculation of percent methylmercury content.

The same basic differences described above for mercury in finfish from Purvis Creek compared to reference fishes occurred for Aroclor 1268. Comparative mean values of Aroclor 1268 in fishes from Purvis Creek vs. reference fishes were:

	Site Mean (mg/kg dw)	Reference Areas
Silver perch	5.67	0.02 - 0.19
Red drum	1.43	0.02 - 0.10
Black drum	5.51	0.02 - 0.10
Spotted seatrout	4.92	0.02 - 0.16
Striped mullet	13.2	0.02 - 0.18

There were no clearly discernable patterns in lead body burdens of finfish from Purvis Creek relative to reference fishes. Lead frequently was not detected in the fishes and therefore no meaningful statistics for lead are presented in Table 4-11a.

A review of yearly averages presented in Table 4-11b suggest no discernable increase or decrease in finfish COPCs body burdens.

4.3 Surface Water Toxicity Studies

Mysids and sheepshead minnows were evaluated for chronic toxicity of surface water.

4.3.1 Mysids

Mean survival of mysids (*Mysidopsis bahia*) exposed in the laboratory for seven days to surface water collected from four sampling stations at the Site and two reference locations (Table 4-12) ranged from 92.4 to 100 percent, which was greater than the minimum acceptable survival for control organisms (80%). Mean growth (weight) of mysids exposed to Site and reference waters was from 0.41 to 0.84 mg (dw), which was greater than weight of control organisms (0.48 mg).

4.3.2 Sheepshead Minnows

Mean survival of sheepshead minnows (*Cyprinodon variegatus*) exposed for seven days to surface water obtained from the same four above-described sampling stations at the Site and two reference locations (Table 4-13) ranged from 80 to 100 percent, which was greater than the minimum acceptable survival for control organisms (80%). Mean growth (weight) of fish exposed to Site water near the old oil-processing Site (Station C-33) was statistically different from the control and the Crescent River reference station. Although mean survival at this same station was 80%, two of the four replicates exhibited survival less than 80%.

4.4 Annual Sediment Toxicity Tests with Amphipods

This section provides an overview of the laboratory-based evaluation of sediment toxicity conducted with amphipods followed by a detailed description of the annual toxicity test results, relationships to sediment chemistry, and probable causes.

Amphipod toxicity tests with *Leptocheirus plumulosus* were conducted each year during 2000 – 2006, with the exception of 2001. Measurement endpoints were survival, growth (weight), and reproductive response (calculated as one-half of the number of juveniles produced in a replicate divided by the number of surviving adult females). These annual tests followed method EPA/600/R-01/020. In general, sediment was collected from several of the same stations each monitoring year and analyzed for COPCs, other metals, and occasionally for other parameters such as TOC. The toxicity test reports are presented in Appendix C.

Table 4-14 summarizes the results of the annual sediment toxicity tests with *Leptocheirus plumulosus*. In 2000, the average control survival was only 71 percent which did not meet the test acceptability requirement of ≥ 80 percent. In 2002, reproductive response was statistically different than controls at all stations, including the reference areas. Five of the eight tests for the survival endpoint were also considered toxic.

The 2003 reproductive endpoint control did not meet the test acceptability requirement where there was no response in one of the control replicates. Survival and growth were statistically different than controls at all eight test stations. Survival at the Troup Creek reference area was also significantly different from the control (Table 4-14).

The amphipod toxicity test results from 2004 indicated that survival was the most sensitive endpoint and growth, the least sensitive. It is unclear why survival at the two reference stations were approximately 40 percent, their associated reproduction and growth did not suggest toxicity.

In 2005, the amphipod toxicity tests were expanded to 25 locations, plus the two reference stations (Table 4-14). The three test endpoints at both reference stations were significantly less than controls. Again, it is unclear what factors may contribute to the observed effect in these two areas. All test stations were toxic to the reproductive endpoint relative to the control (Table 4-14).

The 2006 annual toxicity test results indicate that the percent survival was better in this year than in the previous tears. This 2006 study is evaluated in more detail below than previous years because of its importance in the special set of studies to assess probable causes of sediment toxicity in the 2006 samples, and to detail the statistical protocols employed to interpret results of amphipod tests. An evaluation of potential exposure-response relationships from all years are quantified in Section 4.6.

4.4.1 Evaluation of 2006 Amphipod Toxicity Tests

This subsection evaluates the results of the survival, growth, and reproduction endpoints, and provides some overall conclusions from the 2006 tests.

Survival

Survival of amphipods (*Leptocheirus plumulosus*) exposed in 2006 to control sediment for the 28-day testing period (Table 4-15; Part A) averaged 95% (19 individuals / 20 individuals at start of test), which was greater than the 80% criterion for acceptability of test results. Survival of amphipods exposed to reference sediment collected from Crescent River and Troup Creek averaged, respectively, 88% and 72%. The Troup Creek sediment was statistically different from the control and the Crescent River.

Survival of amphipods exposed to surface sediment collected from 22 sampling stations at (or in the vicinity of) the Site was lowest at FS Areas 1 and 2. Survival at 15 of the 22 Site stations was statistically similar to survival at the Crescent River reference location. These 15 stations included four FS areas (Areas 3, 4, 5, and 6), the AB seep location, the station in the mouth of the Main Canal (C-5), one of two stations in the Eastern Creek (C-7; the mid-stretch station), the station in the mouth of the Western Creek Complex (C-15), all three stations in Purvis Creek (C-16, C-29, and C-36), station D in the northwest inlet of the Turtle River, and the three Blythe Island stations (C-103, C-104, and C-105).

Growth

Growth (mean weight**)** of amphipods employed in the test (at Day 0) was 0.140 mg (dw). Mean weight of control organisms at the end of the 28-day exposure period was 0.740 mg. The 60% lower confidence interval for the controls was 0.687 mg, and growth had occurred in all control replicates (Table 4-15; Part B) except in Area 2. Growth in the two reference stations was significantly different from the control. Those stations similar to the control that have both high survival and high average mass are Mouth of Main Canal (C-5), Eastern Creek Mid-stretch (C-7), Mouth of Western Creek complex (C-15), Blythe Island Northern Boundary (C-103), and FS Area 4. Amphipods from other stations that had growth greater than the reference stations could be explained by the relatively low survival at these stations, which may have resulted in greater resources for surviving organisms. Other areas that are similar to FS Area 2 (in terms of having both low survival and low growth) are stations FS Area 1, Domain 4 Southeastern boundary (C-45), and marsh grid H7.

Reproduction

Reproductive response (mean response) of control amphipods at the end of the tests was 0.562 (Table 4-15; Part C; refer to Footnote "e" for definition of this unit of measurement); and the 60% lower confidence interval was 0.453. Four of the five replicates in the Troup Creek reference location did not show any reproductive response, which prevents reliable comparisons to Troup Creek data.

Cochran's Test (C) for homogeneity of variances of amphipod reproduction data indicated heteroscedasticity, and the nonparametric test subsequently performed on the data (Kruskal-Wallis Test) identified statistically significant differences among data. However, this test (and many other nonparametric tests) is incapable of identifying the specific sources (causes) of such "overall" differences. Consequently, the Site stations judged to have deleteriously impacted amphipod reproduction were those stations at which reproduction was substantially less than reproduction at the Crescent River reference location.

Use of the above-described criterion to determine reproductive success of amphipods identified deleterious impacts at the upstream station in the Eastern Creek (C-6), the mid-stretch station in Purvis Creek (C-29), the three stations in Domain 1 (the AB seep location and the two stations in the Marsh Grid; K7 and H7), the station at the southeastern boundary of Domain 4 (C-45), one of three stations at Blythe Island (C-103), and four FS areas (Areas 1, 2, 4, and 6). Conversely, five other stations were characterized by mean amphipod reproduction that was greater than reproduction observed at the Crescent River reference location.

2006 Amphipod Toxicity Test Conclusions

Based on a collective evaluation of three above-identified measurement endpoints, and largely governed by the reproduction endpoint, 12 of the 22 evaluated Site sediments affected amphipod reproduction in a harmful manner as being statistically different than the Crescent River reference. Ten (10) of these stations were located in areas where impacts from COPCs might be anticipated: upstream Eastern Creek (C-6), mid-stretch in Purvis Creek (C-29), the AB seep location, Stations K7 and H7 in the Marsh

Grid, the southeastern boundary of Domain 4 (C-45), and FS Areas 1, 2, 4, and 6. Alternatively, two of the 13 stations were located in an area where COPCs reproductive-related impacts might not be expected at Blythe Island (C-103 and C-104).

From the opposite perspective, seven of the 22 Site sediments that did not harm amphipods were from stations located in areas where COPCs reproductive-related impacts might be expected: the mouth of the Main Canal (C-5), mid-stretch of Eastern Creek (C-7), upstream and mouth of Purvis Creek (C-36 and C-16), an area near the old oil-processing Site in Domain 1 (C-33), and FS Areas 3 and 5.

4.4.2 Probable Causes of 2006 Amphipod Toxicity

Probable causes of toxicity of sediment to amphipods were evaluated by a detailed assessment of the above-presented survival data (as contrasted to statistical comparisons of Site sediments to reference sediments), a TIE conducted with a different cohort of amphipods exposed to subsamples of two (2) of the 22 samples of Site sediment employed in the above-discussed amphipod tests, and an equilibrium partitioning study of selected metals present in sediment samples employed in the above-discussed amphipod tests.

4.4.2.1 General Statistical Relationships between Amphipod Survival and Chemical Data

The role of COPCs in affecting survival of amphipods exposed to the above-identified 22 samples of sediment was evaluated with and without consideration of other metals or other factors present in sediment because of statistical reasons pertaining to variance inflation factors (VIFs).

Evaluation of Chemicals of Potential Concern and other Metals

Linear r^2 values for COPCs and various metals (also, silt/clay content) in surface sediment were compared to survival of amphipods (Table 4-16; Part A.3). The attempt to define a relationship between a chemical variable in sediment and the toxicological response of an organism by linear techniques can be problematic, in great part, because of differences in bioavailability of the chemical in sediment (e. g., Dillon, 2006a). Consequently, linear r^2 values may have more usefulness in suggesting the general “direction” of chemical-toxicological relationships (i.e., a positive or negative correlation between chemical concentration in sediment and toxicological response of organism) in underlying "r" value. For cadmium, copper, and lead (Table 4-16), a negative statistical significant linear relationship is shown to exist. Cadmium is not considered a COPC (Section 3.4.1) and the elevated levels of copper and lead at FS-Areas 2 and 3 (relative to the other 20 samples) contributed to the statistical outcome (see Table 4-17).

Survival of amphipods (Table 4-16; Part A.4) could not be explained as a function of all 22 independent chemical variables considered collectively when evaluated by a parametric analysis of variance (ANOVA). Consequently, the associated squared multiple correlation coefficient (R^2) is not statistically significant, despite its seemingly high value (Table 4-16; Part A.5)

Kruskal's test for index of importance (Table 4-16; Part A.6) evaluates the effect of each independent variable with the other variables held constant and does not address statistical significance. Although Kruskal's test also identified cadmium, copper, and lead as potential contributors to reduced amphipod survival, the concentrations of these chemicals were all lower than their respective threshold benchmarks except in FS Areas 2 and 3 (see Table 4-17).

Evaluation of Chemicals of Potential Concern Independent of Other Metals

This evaluation was performed, in addition to the above-presented evaluation, because results of multiple regression involving numerous independent variables can be substantially biased because of intercorrelations among the independent variables. This potential for bias is generally of concern if VIFs – which would bias unexplained (or error) variance on the high side, thereby decreasing the probability of detecting real effects on the dependent variable – are in excess of 100 (Snee, 1973). The largest VIF in the preceding assessment was an extremely high 14,330 (which occurred for cadmium and total PAHs), while all VIFs in the following evaluation were less than about 10.

In this evaluation, linear r^2 values for COPCs (i.e., total mercury, Aroclor 1268, lead, and total PAHs) in surface sediment vs. survival of amphipods are naturally the same as r^2 values presented in the preceding assessment, with only lead generating a statistically significant value (Table 4-16; Part B.3), which is due to the high lead concentrations in FS Areas 2 and 3.

Survival of amphipods is also tested as a function of concentrations of COPCs in the 22 sediment samples when evaluated by a parametric ANOVA (Table 4-16; Part B.4). However, only lead contributed to this statistical significance. The associated R^2, which pertains to “overall” explained variation, was also statistically significant (Table 4-16; Part B.5).

Kruskal’s test for index of importance (Table 4-16; Part B.6) also identified lead as an important contributor to reduced amphipod survival in this 2006 study. Again, due to the high concentrations of lead in only two of the 24 samples (Table 4-17).

Table 4-17 shows the concentrations of the more important constituents that may contribute to the observed effect on survival and reproductive response of the amphipods. It appears that high sulfide content and TOC ameliorate the toxic effects at C-5, FS-Area 3, and at FS-Area 5. Low sulfide content, particularly at C-6, FS-Area 1, and FS-Area 6, appears to have contributed to the toxic responses. It is well known that sulfides tend to bind metals and can play a significant role in the bioavailability of metals (e.g., U.S. EPA, 2005). Higher levels of TOC are also well known to bind PAHs in sediments and limit their bioavailability (U.S. EPA, 2003).

Unfortunately, sulfide was not analyzed in most of the other sediment toxicity tests, including the AET tests described in Section 4.5, nor was sulfide included in the Kruskal’s test for importance. Other factors potentially affecting the toxicity test results may include TOC, sediment pH, ammonia, grain size, bacteriological contamination, and algal toxins.

4.4.2.2 Toxicity Identification Evaluation and Pore Water Analysis

The TIE study was conducted with subsamples of two samples of surface sediment (sediment from Stations C-6 and C-7 in the Eastern Creek) that were characterized by relatively high concentrations of COPCs and, in one case (C-6), relatively high toxicity when chronically tested with amphipods (Table 4-15). However, when the two subsamples of sediment were tested for toxicity in acute (10-day tests) with amphipods (*Leptocheirus plumulosus*), they were essentially nontoxic (mean survival of organisms = 88.0 – 93.0% and mean reburial responses = 86.0–92.0%). Under these conditions (absence of toxicity of bulk sediment), TIEs are normally terminated.

However, in this TIE, pore water from the sediments was also analyzed for chemical characteristics. These analytical results were then compared to State of Georgia chronic water quality criteria (refer to following embedded table). The detected metals in pore water suggest a potential route of exposure to biota. Many other metals were not detected in pore water, suggesting that, except possibly at concentrations below their detection limits, they are bound to sediment and are biologically unavailable via pore water.

Concentration of chemicals in pore water of sediment as compared to State of Georgia water quality criteria			
Chemical (µg/L)	**Pore Water C-6** **Bulk sediment characteristics (mg/kg dw) – total mercury: 9.9; Aroclor 1268: 26; lead: 35; total PAHs: 0.44; sulfide: 380**	**Pore Water C-7** **Bulk sediment characteristics (mg/kg dw) – total mercury: 3.0; Aroclor 1268: 13; lead: 27; total PAHs: 0.49; sulfide: 367**	**Georgia Water Quality Criterion (µg/L)**
Total mercury	<0.20	<0.20	0.025 (for food-web) 0.94 ***** (excludes food-web uptake)
Aroclor 1268	**1.0**	**0.65**	**0.03** (total PCBs)
Lead	<1.0	<1.0	8.1
Total PAHs	0.175 (total for 7 detected PAHs) and <0.011 (for each of 17 nondetected PAHs)	<0.022 (for each of 24 PAHs)	-------
Aluminum	<250	<250	-------
Antimony	<2.5	2.8	-------
Arsenic (total)	19	14	36 (total As)
Barium	31	<1.0	-------
Beryllium	<1.0	<1.0	-------
Cadmium	<1.0	<1.0	8.8
Calcium	330,000	340,000	-------
Chromium	<1.0	<1.0	50 (Cr^{+6})
Cobalt	<1.0	<1.0	-------
Copper	**4.2**	**4.0**	**3.1**
Iron	<100	<100	-------
Magnesium	1,000,000	1,000,000	-------
Manganese	9,000	12,000	-------
Nickel	<2.0	<2.0	8.2
Potassium	270,000	300,000	-------
Selenium	<0.56	<0.56	71 (excludes food-web uptake)

Concentration of chemicals in pore water of sediment as compared to State of Georgia water quality criteria			
Chemical (µg/L)	**Pore Water C-6** **Bulk sediment characteristics (mg/kg dw) – total mercury: 9.9; Aroclor 1268: 26; lead: 35; total PAHs: 0.44; sulfide: 380**	**Pore Water C-7** **Bulk sediment characteristics (mg/kg dw) – total mercury: 3.0; Aroclor 1268: 13; lead: 27; total PAHs: 0.49; sulfide: 367**	**Georgia Water Quality Criterion (µg/L)**
Silver	<0.50	<0.50	-------
Sodium	8,200,000	8,300,000	-------
Thallium	<0.50	<0.50	-------
Vanadium	<020	<20	-------
Zinc	<20	**90**	**81**
Note: Concentrations of most metals and associated water quality criteria pertain to dissolved metals. * - EPA National recommended criterion.			

These TIE results suggest that Aroclor 1268, copper, and zinc in pore water emanating from the two sediment samples may represent a potential hazard to benthic biota. Although this analysis suggests that pore water may contribute to chronic amphipod toxicity, data from these two samples (C-6 and C-7) is statistically insufficient to apply to the estuary. In addition, the actual magnitude or extent of pore water toxicity is unknown because no pore water toxicity tests were conducted.

4.4.2.3 Equilibrium Partitioning of Selected Metals

Protocols employed in the equilibrium partitioning study are presented, followed by results of the study and a discussion of the reliability of results.

Protocols

The equilibrium partitioning study addressed the collective relationships of six metals (cadmium, copper, lead, nickel, silver, and zinc) simultaneously extracted with weak hydrochloric acid from surface sediment (∑SEM) and the acid volatile sulfide (AVS) content of the sediment. The study was performed with all samples of sediment tested for chronic toxicity to amphipods (Table 4-17), with the objective of providing an additional LOE, to be interpreted in the context of other studies, regarding potential contributors to sediment toxicity.

One criterion for evaluating if the six metals collectively contributed to direct toxicity of amphipods (or any benthic biota) is based on the ratio of ∑SEM) / AVS. If this ratio ≤ 1, it can generally be assumed that toxicity from these metals is unlikely to occur. However, if the ratio >1, the opposite conclusion can only tentatively be drawn since factors other than sulfide (e. g., organic materials, carbonates) can also bind these metals to sediment, causing them to be biologically unavailable.

Another criterion for assessing the toxicological potential of the six metals relates to the difference between ∑SEM and AVS. If ∑SEM is ≤ 5 µmol/g of AVS, the absence of direct toxicity is supported (Science Applications International Corp. (SAIC), 2003). A difference of > 5 µmol/g allows only a tentative conclusion of toxicity for the reason stated above (SAIC, 2003). The rationale for use of this "difference" criterion is that the "ratio" method tends to misrepresent available concentrations of ∑SEM at low AVS levels (SAIC, 2003).

Results

Use of the "ratio" method (Table 4-18) suggests that the combination of the six metals in sediment from five stations – C-6, C-16, K7, H7, and FS Area 6 – were influenced by low sulfide content and were likely sufficiently bioavailable to contribute to the toxic responses to amphipods. Indeed, sediment from four of these five stations (all but C-16) was judged to be toxic in the chronic amphipod toxicity tests. (Table 4-15; Part C). At FS-Area 4, the concentration of Aroclor 1268 of 5.8 mg/kg was toxic in the presence of low TOC and low concentrations of mercury and lead (Table 4-17). Higher concentrations in Table 4-17 of Aroclor 1268 that were non-toxic (C-5 and FS-Area 5) appear to be associated by high sulfide content and TOC. Hence, a value of between 3 and 6 mg/kg is an initial professional judgment assumption for an effects range in Table 4-17. Similarly, for samples where mercury appears to be the source of toxicity, the range of mercury in toxic samples is 1.82 mg/kg at H-7, 2.03 mg/kg at FS Area 6, and 2.36 mg/kg at Station K-7. Stations having mercury above about 2 mg/kg that were non-toxic can be explained by the presence of high levels of sulfides, such as at stations FS Area 3 and FS Area 4, or C-7. Therefore, in absence of ameliorating factors, such as high TOC or sulfides, an initial effects range for mercury based only on this study would be about 2-5 mg/kg. Furthermore, the data in Table 4-18 is consistent with Table 4-17 in that toxicity should be interpreted in terms of sulfides, especially with the fact that lead was likely a cause for toxicity at FS-Area 2 but not at FS-Area 3.

Reliability of ∑SEM/AVS Approach

The following bullets list several factors that confound interpretation of the ∑SEM/AVS approach for identifying causes of sediment toxicity:

- The approach collectively addresses just the six above-identified metals, as recommended by the U. S. EPA (2005). However, other studies (e. g., Patton and Crecelius, 2001) have additionally included mercury in the evaluation and numerous references are made in the scientific literature to “divalent metals.” If additional metals can justifiability be included as ∑SEMs, there is an increased probability of identifying toxicity.
- The approach considers only AVS as an agent capable of binding metals to sediment, thereby increasing the probability of identifying overall toxicity.
- The ∑SEM/AVS approach does not account for antagonistic, additive, or synergistic effects of other sediment contaminants acting in combination with the metal mixtures.
- The approach is based on a theory that toxicity of metals to benthos is controlled primarily by concentrations of metals in pore water of sediment, as contrasted to an empirical approach in which benthos are exposed to contaminants in whole sediment, thereby accounting for all direct routes of contaminant exposure.
- The ∑SEM/AVS approach is “calibrated” on results of acute toxicity tests with benthos. Consequently, there is an uncertain relationship regarding the chronic amphipod toxicity tests conducted during this investigation, which often identified sediment toxicity.

4.5 2006 Amphipod Apparent Effects Threshold Study

Protocols employed in the site-specific AET study are presented, followed by results of the study, a discussion of the reliability of the results, and an assessment of the relative contribution of evaluated chemicals to sediment toxicity.

4.5.1 Protocols

This specific study conducted in 2006 was based on chronic (28-day) toxicity tests derived for amphipods (*Leptocheirus plumulosus*) exposed to a total of 150 samples of surface sediment collected from three areas of the LCP Site – the Main Canal, Eastern

Creek, and Western Creek Complex. These 150 sediment samples were analyzed for concentrations of COPCs and, as recommended by Region 4 of the EPA (Thoms, 2006b), the ∑SEM/AVS metals (cadmium, copper, lead, nickel, and zinc). This separate amphipod toxicity study followed the same EPA method mentioned in Section 4.4 above except that only one replicate (one set of 20 organisms) was used instead of five replicates as used in the other annual studies.

The AET protocol provides one measurement endpoint that identifies the sediment concentration above which a particular adverse biological effect (e.g., survival rate, embryo development rate) is always toxic relative to appropriate reference conditions (Cubbage, et. al, 1997). To determine if toxicological responses of amphipods were statistically significant, the responses of amphipods exposed to Site sediment were compared to responses of control organisms. Control organisms, which were evaluated with 10 replicates of 20 organisms each, generated the following statistics: (1) mean survival = 97.5% with a lower limit of the 60% confidence interval (CI) at 96.4%; (2) mean growth (i.e. weight) = 0.444 mg (dw) with a lower 60% CI of 0.418 mg; and (3) mean reproductive response (i.e., one half the number of observed juveniles ÷ number of females) = 1.836 with a lower 60% CI of 1.55.

Values for growth and reproduction of amphipods exposed to each sample of Site sediment were compared to the lower limit of the 60% CI for the mean values for control sediment, after correction for the random component associated with single values (Steel and Torrie, 1980), to determine if statistically significant toxicity characterized Site sediment. A 60% CI was selected for use because it encompassed the majority (~2/3 or 1 standard error) of control data and was a more conservative approach for determining AETs than would be the case if, for example, a 95 or 99% CI were employed (i.e., a fewer number of toxic sediment samples would have been identified with use of the wider CIs). The lower limit of the 60% CI for survival of amphipods exposed to control sediment was unusually high (93.6%). Consequently, survival of organisms exposed to Site sediment was considered poor if it was ≤85%.

4.5.2 Results

The 2006 site-specific AETs derived for COPCs in sediment are 19 mg/kg (dw) for total mercury, 28 mg/kg for Aroclor 1268, 37 mg/kg for lead, and 2.534 mg/kg for total PAHs (Table 4-19a).

Sediment AETs derived for the other analyzed metals are (concentrations in sediment): 0.295 mg/kg (dw) for cadmium, 18.4 mg/kg for copper, 22.1 mg/kg for nickel, 0.272 mg/kg for silver, and 90.5 mg/kg for zinc (Table 4-19b).

4.5.3 Reliability of Results

The AET approach for specifying concentrations of chemicals in sediment at which toxicological effects on benthos are identified is an empirically based approach in that it accounts for all direct routes of contaminant exposure by benthos. Additional advantages of the AET approach are (Jones *et al.*, 1997):

- all types of chemicals and biological effects can be evaluated;
- combined effects of all chemicals are considered;
- non-contradictory evidence of biological effects is generated because toxic effects always occur above the AET; and
- the potential for toxicological hazard is evaluated on a site-specific basis.

Disadvantages to the AET approach are (Jones *et al.*, 1997):

- likely to be under-protective when biological effects occur at chemical concentrations below the AET.
- the inability to isolate single chemical effects from combined chemical effects;
- the need for a large data base (sample size); and
- the site-specific characteristics.

This study was predicated upon a relatively large data base (150 samples of sediment) and intended to be site-specific in character. Accordingly, isolation of effects associated with a single chemical, acting in the absence of other chemicals, was not an objective.

A review of Table 4-19a indicates that for each COPCs, over 80 percent of the samples less than their respective AETs for reproduction and survival were toxic. This suggests that other chemical and physical factors in the sediment such as other chemicals, sulfide content, TOC, grain size, sediment pH, and sediment oxidization-reduction potential, may be affecting bioavailability and contributing to toxic expression. The 150 AET samples were not analyzed for sulfides, TOC, or grain size.

The AET results do not provide a reliable means to assess the numerous toxic responses below the AET levels. Given the high number of toxicity tests performed, it would be expected that an exposure-response relationship (sediment concentration related to the measured toxic effect) could be obtained for at least one of the COPCs. This is explored in the next section.

4.6 Sediment Effect Concentrations for Amphipods

In this section, all available amphipod (*Leptocheirus plumulosus*) toxicity test results are evaluated relative to the concentrations of COPCs in the sediment, in an effort to obtain exposure-response relationships and to derive SECs, in addition to the 2006 AET study described in the previous section.

The test results were used to develop several SECs for prediction of toxicity to the amphipod. These SECs consist of the following:

- Effects Range-Low (ER-L): 10th percentile of the sediment concentration distribution for the effects data (Long and Morgan, 1990).
- Effects Range-Median (ER-M): Median of the sediment concentration distribution for the effects data (Long and Morgan, 1990).
- Threshold Effect Level (TEL): The geometric mean of the 15th percentile of the concentration distribution for the no-effects data (MacDonald et al., 1996).
- Probable Effects Level (PEL): Geometric mean of the ER-M and the 85th percentile of the concentration distribution for the no-effects data (MacDonald et al., 1996).
- Apparent Effects Threshold (AET): The sediment concentration above which a particular adverse biological effect (e.g., survival rate, embryo development rate) is always toxic relative to appropriate reference conditions (Cubbage, et. al, 1997).

The effects data set for each COPC is defined as those stations at which the biological effect is observed (statistically different from controls) and the associated COPCs concentration is greater than or equal to twice the mean concentration of the no-effect stations. It is desirable for both the effects and no-effects distributions to include at least 20 data entries (MacDonald et al., 1996).

A major distinction between the various SECs is the manner in which effects and no-effects data are used. As shown by the definitions above, the ER-L and ER-M values are based only on the effects data set; whereas, the TEL and PEL values are based on both the effects and no-effects data. The AETs are based only on the no-effects data.

The ER–L and TEL represent a lower level below which adverse effects are not expected. The ER-M and PEL represent levels above which effects are likely to occur, and the AET represents the threshold where adverse effects would always be expected.

All of the amphipod toxicity test endpoint results (i.e., survival, reproductive response, and growth weight) were paired with the COPCs concentrations in the test sediment samples. Table 4-14 shows the results of the amphipod toxicity tests and they indicate that 85 percent of the sediment samples were toxic to the reproductive endpoint and that amphipod growth was least sensitive with 55 percent of the samples considered toxic. Next, the data were sorted by those samples that were considered toxic (significantly different from the controls at p=0.05). Then, the effects data sets were then generated and the SECs calculated per their definitions above. Appendix D provides the calculation of SECs for each COPCs for each effect endpoint.

In order to assess the accuracy with which the various sets of SECs predict the presence or absence of toxic effects to amphipods, the following performance criteria were also calculated:

- False Positives (Type I Error): The percentage of stations predicted to have effects (based on exceedance of a SEC) that actually had no observed effects.
- False Negatives (Type II Error): The percentage of stations predicted to have no effects (based on exceedance of a SEC) that actually had observed effects.
- Overall Accuracy: The percentage of all samples that were correctly predicted to have effects or not to have effects based on the SEC.

The SEC calculations in Appendix D also provide the associated error types and accuracies.

The SECs for each endpoint are summarized in Table 4-20 and Appendix D provides the detail. A reliability rank was calculated to adjust for the accuracy based on a few samples in the effects data set relative to numerous samples in the effects data set. The higher the rank, the more reliable the results are. Based on the SEC concentrations and reliability rank, the data in Table 4-20 indicate that the survival endpoint is more sensitive than the reproductive response endpoint.

Organic carbon normalized SECs for Aroclor 1268 and PAHs demonstrated low reliability relative to total Aroclor 1268 and total PAHs, in large part due to the lower number of samples in the effects data set. The reliability of the lead SECs is also low due to the low number of samples in the effects data set (≤ 10 samples out of 240).

It can be concluded that no one of the SEC methodologies accurately describes or predicts threshold concentrations of toxicity in the sediments. The data further confirms that various factors may be influencing the tests such as multiple contaminant effects, redox conditions, sulfides, TOC, sediment pH, grain size, pathogens in the test chambers, lack of replicates in some samples, or other chemical and physical factors.

Figures 4-5 and 4-6 show the exposure-response relationship for reproductive responses of amphipod exposure to total mercury and Aroclor 1268, respectively. The figures also show their respective TELs for the reproductive endpoint (4.9 mg/kg for total mercury and 6.5 mg/kg for Aroclor 1268). The TELs were selected for comparative purposes based on their relatively greater accuracies. Due to the highly variable toxic responses, the approximate sediment concentration where 20 percent of the samples are toxic (excluding toxic reference samples) is also shown. For example, the concentration of mercury that results in 20 percent of the samples being toxic is approximately 1.5 mg/kg, which is substantially lower than the TEL.

Based on the exposure-response relationships and the relatively poor SEC accuracies, the ability to predict sediment concentrations that result in adverse effects to *Leptocheirus plumulosus* is highly limited. It appears that the levels of mercury and Aroclor 1268 are likely major contributors to amphipod toxicity (refer to Table 4-3b), particularly in Domain 1, Eastern Creek, and the Main Canal. Lead and total PAHs also contribute to toxicity; however, their predictability is much less than mercury and Aroclor 1268.

4.7 Grass Shrimp Toxicity

4.7.1 Toxicity to Laboratory Cultured Grass Shrimp

The two month chronic test to the grass shrimp (*Palaemonetes pugio*) was based on the protocols outlined in Lee et al., (2000) using three replicates for each sediment station. Measurement endpoints included embryo development rate, embryo hatching rate, ovary maturation rate, survival, and DNA strand damage in embryos. In general, sediment was collected from several of the same stations each monitoring year (2000, 2002, 2003, 2004, 2005). Toxicity test reports from all the years are presented in Appendix C.

Table 4-21 shows the results of the tests. The data indicate that toxic effects to reproductive and survival endpoints ranged from 26 to 69 percent of all tests. Embryo hatching was least sensitive with 26 percent of the samples considered toxic. The embryo development rate endpoint was most sensitive.

Based on the SEC concentrations and reliability rank, the data in Table 4-22 indicate that the embryo development endpoint is more sensitive and reliable than the other endpoints.

Organic carbon normalized SECs for Aroclor 1268 and PAHs demonstrated comparable reliability relative to total Aroclor 1268 and total PAHs. The reliability of the lead SECs is very low due to only one sample in the effects data set (out of 77 samples).

The data indicate that overall reliability of the tests is low. Similar to the amphipod tests, this also suggests a variety of factors may be influencing the grass shrimp tests such as multiple contaminant effects, other stressors such as pathogens in the test chambers, redox conditions, sulfides, TOC, grain size, or other chemical and physical factors.

The mercury and Aroclor 1268 SECs for grass shrimp are slightly lower than for amphipods, suggesting that grass shrimp are more sensitive to these COPCs levels in the sediment.

To visualize the potential exposure-response relationship for grass shrimp, the reproductive endpoint results for embryo development rates are compared to the concentrations of mercury and Aroclor 1268 in the sediment and presented in Figures 4-7 and 4-8, respectively. These figures also show their respective TELs for embryo development rate: 1.4 mg/kg for total mercury and 3.2 mg/kg for Aroclor 1268, and the approximate sediment concentration where 20 percent of the samples are toxic (excluding toxic reference samples). No discernable exposure-response relationships for these two COPCs were obtained. Exposure-response relationships for the other COPCs (total PAHs and lead) have similar distributions with even less reliability. Therefore, the power to predict sediment concentrations that result in adverse effects to grass shrimp is highly limited.

Table 4-23 compares the concentrations of the primary COPCs to the embryo development endpoint. The data indicate that mercury and Aroclor 1268 likely contribute to most of the effects, although there were several stations that displayed toxic effects but did not have elevated concentrations of COPCs. For example, embryo development toxicity was observed in reference tests: at Troup Creek in 2000 and 2005; and at the Crescent River station in 2003. This again suggests other stress factors or variables associated with the tests contributed to the observed effects.

4.7.2 Toxicity to Field-Collected Indigenous Grass Shrimp

The same chronic toxicity tests were conducted on grass shrimp (*Palaemonetes pugio*) indigenous to the LCP estuary and Blythe Island during 2002 – 2007 (Table 4-24), except using only two measurement endpoints – hatching success of embryos of adult female shrimp, and DNA strand damage of the embryos. Throughout this 2002-2007 time period, the only cases in which these measurement endpoints deviated statistically (and adversely) from reference conditions (Skidaway River sediment) were in the Main Canal, the bank of the Main Canal, and the Eastern Creek.

In 2006, concentrations of COPCs in surface sediment and adult shrimp were measured (Table 4-24), thereby permitting identification of BAFs and, also, relationships between body burdens of COPCs in shrimp and associated biological responses. For total mercury, a logarithmic r^2 of 0.5955 for sediment and shrimp levels was associated with a mean BAF of x0.11.

In the case of Aroclor 1268, an r^2 of 0.3584 for sediment and shrimp levels was related to a mean BAF of x0.050. Lead generated an r^2 of 0.346 for sediment and shrimp levels and a mean BAF of x0.0075.

4.8 Comparison of SECs to Literature-Based Effect Levels

The embedded table below compares the site-specific SECs for reproductive responses to literature-based effect levels. Except for mercury and Aroclor 1268, the SECs appear reasonable when compared to the other toxicological benchmarks. However, the mercury and Aroclor 1268 TEL/PEL range is comparable to the Dillon (2006a) benchmarks which were threshold concentrations identified from "scatterplots" developed for the amphipod and grass shrimp bioassays conducted between 2000 and 2004. Thus, the values are more analogous to TELs than to PELs. The mercury and Aroclor EEVs and screening quick reference table ("SQuiRT") benchmarks include potential food chain effects to consumers of benthic organisms. Although the literature-based Aroclor benchmarks are primarily based on studies with Aroclor 1254, invertebrates generally do not possess the Ah receptor that would otherwise tend to influence greater toxicity of Aroclor 1254 relative to Aroclor 1268 as observed in many vertebrates.

Toxicological benchmarks derived for benthos exposed to chemicals of potential concern (COPCs in Sediment (mg/kg, dw)

	Generic Benchmarks		**Site-Specific Benchmarks**		
COPCs	**EEVs (Region 4, EPA)**	**NOAA "SQuiRT" TEL / PEL Marine Values**	**"Scatterplot" Interpretation (Dillon, 2006a; n = 22)**	**Amphipod SECs [a] TEL / PEL**	**Grass Shrimp SECs [b] TEL / PEL**
Total mercury	0.13	0.13 / 0.696	~ 1 - 5	4.2 / 15.4	1.4 – 4.8
Aroclor 1268	0.022 (based on other PCBs)	0.022 / 0.189 (for other PCBs)	~ 5 - 10	6.2 / 20.3	3.2 – 12.8
Lead	30.2	30.2 / 112	~ 40 - 50	41 / 88	139 – 189
Total PAHs	1.684	1.684 / 16.77	~ 1 - 2	0.8 / 2.1	1.6 – 4.8

Note: TEL = Threshold Effect Level; PEL = Probable Effect Level; EEV = Ecological Effects Value; SECs = sediment Effect Concentrations

[a] – based on most sensitive endpoint (survival) [b] - based on most sensitive endpoint (embryo development)

For total PAHs, the TEL/PEL SECs are not substantially different from the other generic and the Dillon benchmarks. The amphipod SEC for lead is comparable to the literature effect benchmarks. The grass shrimp SEC for lead had poor reliability due to the very low number of effects data used to calculate the lead SEC.

It is noteworthy that SECs could not be calculated for any of the five ∑SEM/AVS metals (cadmium, copper, nickel, silver, and zinc) due to the lack of a defined effects data set. This suggests that these particular metals do not significantly affect overall sediment toxicity in the estuary, but may occasionally contribute to localized effects.

Another alternative look to see if other metals may have substantially contributed to amphipod toxicity in the 2006 tests is presented in Appendix I, Table 1, where various sediment metal concentrations are presented along with their respective effect concentrations. In this analysis, cadmium, silver, and zinc are not considered to contribute any risk; whereas, lead, nickel, and copper appear to contribute some risks but none of their concentrations were above their respective literature-based PELs. Most of the risk appears to be driven by mercury and Aroclor 1268 (Appendix I, Table 1). Therefore, the site-specific SEC approach indicates that the major COPCs are likely the cause of sediment toxicity; whereas,, the other metals, appear to play a limited role in causing direct toxicity to benthos.

4.9 Characteristics of Benthic Macroinvertebrate Community

Community characteristics of macrobenthos are described, followed by a preliminary evaluation of abundance of fiddler crabs in the LCP estuary. The above-presented evaluation of grass shrimp is also a measurement of the impact of COPCs on the benthic macroinvertebrate community.

4.9.1 Community Characteristics

This study of the benthic invertebrate community was based on a one-time sampling of macrobenthos in surface sediment (0 - ~15 cm in depth) at four stations at the Site and at two reference locations (Crescent River and Troup Creek) in 2000. Three replicate samples were collected at each station. Table 4-25 summarizes the data. There was wide variation in the substrate type (from <10% to 90% silt and clay) and for TOC content (from 0.33% to 6.5%) across the six stations. This alone likely affects the taxonomic composition between stations. There also was considerable variation in the density of organisms in the replicate samples as evidenced by the large mean standard deviation for diversity.

Potentially negative major differences in the macrobenthos community between Site and reference areas (Table 4-25) were a lesser number of taxa, individuals, and density of individuals at two of the four Site stations (C-5 and C-33). Polychaetes were the dominant group at all sites; however, oligochaetes were substantially less in the reference samples compared to Site samples. Given the relatively high variability of substrate type, TOC, and density among replicates, it cannot be ascertained if any “shifts” in the benthic community between stations have actually occurred from this one study.

Since benthic community data were not collected during the long-term monitoring program (2002 – 2007), any potential contaminant-related effects are unknown.

Other studies that assessed potential impacts to the LCP estuary included Wall et al., (2001) that evaluated the health of cordgrass microbes (fungal biomass) and grass shrimp; and the Newell et al., (2000) study that assessed the relationship between fungal biomass and contaminants in the LCP estuary. These are briefly described in Appendix J

4.9.2 Fiddler Crab Abundance

This section provides some background of the crab abundance preliminary study, protocols used, and the results.

Background

The objective of this study was to determine if the numerous fiddler crabs (*U.* spp.) observed to inhabit the M-AB seep location (Figure 3-5) were present in numbers that might be expected to occur in a relative pristine marsh despite being characterized by the highest mean body burdens of total mercury (1.00 mg/kg dw), Aroclor 1268 (2.54 mg/kg), and lead (8.78 mg/kg) observed in biota indigenous to the LCP Site (Table 4-8b).

The pristine marsh constituting the baseline for this study was the Duplin Estuary Marsh, located on Sapelo Island, Georgia. Populations of fiddler crabs (mud fiddlers, *Uca pugnax*) in that marsh were estimated for several types of habitats (Wolf *et al.*, 1975).

The greatest mean number of crabs, 196 individuals / m^2 of substrate, was reported in a habitat characterized by medium-sized *Spartina* (0.5 -1.49 m in height), while 176 and 94 individuals / m^2 were observed, respectively, in short *Spartina* (<0.5 m tall) and on essentially barren substrate (absence of vegetation). The habitat at the M-AB seep location was a combination of short *Spartina* and barren substrate.

Protocols

At the M-AB seep location, fiddler crabs were collected and counted as described below. A 1-m^2 sampling frame with high sides constructed of metal was inserted several centimeters into the marsh to prevent crabs from escaping during and between sampling efforts. It was initially intended to excavate sediment within the sampling frame down to 1 m in depth, as was done in the Sapelo Island investigation. However, this plan was modified when a tough webbed plastic membrane (installed during removal activities at the Site) was encountered about 40 cm below the marsh surface and when it became apparent that numerous crabs could be collected by excavating just part of the upper 30 cm of sediment or by capturing them as they emerged at the surface of the marsh.

Results

Two hundred (200) fiddler crabs, ranging in size from about 2 to 20 millimeters (mm) in carapace width, were ultimately collected from the sampling frame, at which time the study was terminated. This number of crabs is marginally greater than the maximum number of crabs (196 individuals) encountered during the Sapelo Island investigation, and many more crabs are likely to have been collected if a complete 1 m^2 of marsh sediment had been sampled. This large number of fiddler crabs, which consisted of about 75% small (young) crabs, indicates that the AB seep location may be characterized by a normal standing crop of crabs. However, the webbed plastic membrane encountered at the sampling station may have affected fiddler crab exposure to contaminated sediment and/or surface water. Uncertainties of this preliminary study were:

- the study did not address the ability of these particular crabs to reproduce;

- the use of only a single sampling location (although it was situated in the center of the area where fiddler crabs generally displayed the highest body burdens of COPCs);
- the comparison of standing crops of several species of fiddler crabs in this study (mostly sand fiddlers, *Uca pugilator*) to the single species (mud fiddlers, *Uca pugnax*) in a study of the Duplin Estuary Marsh, Georgia by Wolf *et al.* (1975); and,
- the lack of co-located surface water and sediment chemistry to assess potential exposures.

4.10 Development of Hazard Quotients for Finfish

Hazard quotients (HQs) for upper trophic-level finfish based on modeling studies are initially presented, followed by HQs for field-collected finfish.

4.10.1 Modeling Studies

Methylmercury Model

To model higher trophic level finfish exposure to methylmercury, the bioaccumulation model developed by Evans and Engel (1994) for the red drum was modified for use in this BERA. Details of this model and input parameters are provided in Appendix H - Finfish Worksheet. The results of the model are provided in Table 4-28. The mean LOAEL-based HQ was 2.9, indicating a potential for aquatic hazard (Table 4-28). The estimated environmental exposure (EEE) generating this HQ was 0.87 mg/kg ww of methylmercury (3.48 mg/kg dw) in whole bodies of red drum. Service loss for red drum and other finfish associated with this level of mercury residue has been estimated to be 20% (Dillon, 2006b).

The mean LOAEL-based methylmercury HQ for red drum from the Troup Creek reference location was 0.4. Since this value was ≤ than unity (1), both the suitability of Troup Creek for reference purposes and ability to discriminate between reference and "treatment" conditions was documented.

Aroclor 1268 Model

To model higher trophic level finfish exposure to Aroclor 1268, the bioaccumulation model developed by Gobas (1993) for Great Lake salmonids was modified for use in this BERA. Details of the model and the input parameters are described in Appendix H –

Finfish Worksheet. Three variations of the model are provided to account for different assumptions in the estimation of certain input parameters. Results of the three variations of the Aroclor 1268 bioaccumulation model are provided in Table 4-28. Approaches 1 and 2 generated similar mean NOAEL-based HQs of 2.3 and 2.1, respectively for finfish exposed to Aroclor 1268 in the LCP estuary, (both of which have been related to a service loss of 10% (Dillon, 2006b). Approach 3 resulted in HQs about twice as high (NOAEL HQs approximately 5) as the other two approaches (Table 4-28). The associated mean EEE for Approach 3 was 1.767 mg/kg ww (7.07 mg/kg dw).

4.10.2 Field-Collected Finfish

Finfish captured in Purvis Creek and analyzed for body burdens of mercury and Aroclor 1268 (Tables 4-11a,b) were assessed for potential hazards (Table 4-29). In this assessment, mean and 95UCL LOAEL-based HQs for exposure to methylmercury in the LCP estuary exceeded unity (1) in the case of the silver perch (*Bairdiella chrysoura*) and spotted seatrout (*Cynoscion nebulosus*). These HQs ranged from 1.33 to 2.21 (Table 4-29).

For Aroclor 1268 in field-collected finfish, 95UCL LOAEL-based HQs greater than unity occurred for the silver perch (1.36); black drum, *Pogonias cromis* (1.24); spotted seatrout (1.14); and striped mullet, *Mugil cephalus* (4.04). Mean HQs for these finfish were slightly lower.

None of the above-indicated cases of potential hazard were confounded by hazard also being identified at reference locations. The use of a NOAEL TRV derived for other Aroclors to represent the toxicity of Aroclor 1268 is a source of uncertainty that may over-predict the hazard. The TRVs for finfish were derived from a conservative growth endpoint for Aroclor 1268.

4.10.3 Comparison of Modeled Finfish with Field-Collected Finfish

The relationships between mean EEEs generated by the bioaccumulation models relative to the field-collected tissue residues are presented in the following embedded table, and the following points emerge from the information presented in the data table:

Modeled Estimated Environmental Exposure (EEE) generated by the bioaccumulation models for higher trophic level fish compared to residues observed in 5 species of fish collected in the LCP estuary and Troup Creek reference location

COPCs	Location	Mean Modeled EEE [a] mg/kg dw	Mean Residues in Field-Collected Finfish (mg/kg dw) (Table 4-29)				
			Spotted Seatrout	Silver Perch	Red Drum	Black Drum	Striped Mullet
Methylmercury	Troup Creek	0.44	0.34	0.20	0.10	0.10	0.02
	LCP estuary	3.48	2.27	1.60	1.01	0.76	0.09
A 1268	Troup Creek	0.31 - 0.34	0.16	0.19	0.10	0.10	0.18
	LCP estuary	2.86 - 7.07	4.92	5.67	1.43	5.51	13.2

a - From Table 4-28 originally modeled in wet weight and converted to dry weight assuming 75% fish moisture content.

- Predicted or modeled tissue concentrations are not too different from residues observed in most field-collected finfish with the mercury model over-predicting by a modest amount.
- Both the mercury and the PCB models over-predict residues in fish from the reference area. This is probably driven by the preponderance of analytical results frequently below detection limits from that location.
- Both the mercury and the PCB models appear better at predicting concentrations in seatrout.
- The mercury and PCB models grossly over- and under-predict, respectively, residues in field-collected striped mullet. It appears these models, which were designed for higher trophic level fish, are not appropriate for estimating mullet bioaccumulation.
- About twice as high Aroclor 1268 tissue concentration is predicted when Approach 3 is used relative to Approaches 1 or 2. This appears to be the related to estimates of aqueous dissolved PCB concentrations.

The finfish collected from Purvis Creek during the field study did not exhibit gross abnormalities, and fish kills have not been reported in the LCP estuary during many years of intensive interest and monitoring at the LCP Site. However, based on the HQs, reproductive impairment appears to be occurring in the LCP estuary, but the actual extent of such impairment is unknown.

4.11 Development of Hazard Quotients for Wildlife

HQs based on food-web exposure models were developed for seven representative species of wildlife – diamondback terrapin (*Malaclemys terrapin)*, red-winged blackbird (*Agelaius phoeniceus*), clapper rail (*Rallus longirostris*), green heron (*Butorides striatus*), marsh rabbit (*Sylvilagus palustris*), raccoon (*Procyon lotor*), and river otter (*Lontra canadensis*) – that might frequent the LCP Site.

The basic equation used to calculate HQs (employed most directly for wildlife) was:

$$HQ = \frac{\{[(CF1 \times P1) + (\ldots \times \ldots) + (CF4 \times P4)]\ [FIR] + [CS]\ [SIR] + [CW]\ [WIR]\}\ \{AUF\}\ \{TUF\} / BW}{TRV}$$

with CF1, ..., CF4 = concentrations of COPCs in various food items of wildlife (mg/kg, dw); P1, ..., P4 = percentage of each food item in diet of wildlife (total for all food items = 100%); FIR = food ingestion rate (kg dw/day); CS = concentration of COPCs in sediment (mg/kg, dw); SIR = sediment ingestion rate (kg dw/day); CW = concentration of COPCs in water (mg/L); WIR = water ingestion rate (L/day); AUF = area-use factor; TUF = time-use factor; BW = body weight of wildlife (kg ww); and TRV = toxicity reference value (mg/kg BW/day).

Exposure assumptions on which food-web models are based are presented in Table 4-26, and TRVs are presented in Table 4-27. Life histories of selected species employed as food items in modeling studies are reviewed in Appendix E, and life histories of red drum and wildlife are contained in Appendix G. Work sheets employed in the modeling efforts are presented in Appendix H. COPCs exposure concentrations for each area were based on the mean and 95UCL concentrations presented in the a-series tables described in Section 4.2.

All HQs for diamondback terrapins exposed to three COPCs (methylmercury, Aroclor 1268, and lead) at various parts of the LCP Site were substantially less than unity in all cases, denoting the absence of potential risk (Table 4-30). Although the terrapins had some of the highest levels in COPCs in liver tissue samples, this did not translate to any apparent reproductive effects.

Birds (red-winged blackbirds, clapper rails, and green herons) exposed to COPCs at the Site exhibited a basic similarity, in that none generated HQs for inorganic mercury, Aroclor 1268, or lead that indicated a potential for risk. For methylmercury, red-winged blackbirds were characterized by one Site NOAEL and LOAEL HQs of 1.0 and 0.33, respectively in the Domain 1 exposure area. For clapper rails modeled for exposure to methylmercury, Site NOAEL HQs (1.74 – 2.96) could be discriminated from the associated reference HQ (0.16). LOAEL HQs for the clapper rail were all less than 1. All Site NOAEL HQs generated by the green heron modeled for exposure to methylmercury were in excess of 1 (1.39 – 10.6) being most clearly distinguishable from reference HQ (0.61). Comparative LOAEL HQs for green herons modeled for methylmercury exposure at the Site and reference area ranged from 0.46 at Blythe Island to 3.53 in the Eastern Creek area (Table 4-30).

In the case of mammals, potential risk occurred for marsh rabbits exposed to Aroclor 1268 in Area A (inclusive of Domain 1, Main Canal, and Eastern Creek) with a NOAEL HQ of 3.31. All of the LOAEL HQs for the marsh rabbit were less than 1. Similarly, LOAEL HQs for raccoons were less than 1 and the NOAEL HQ in Area A was 3.53. For the river otters, none of the COPCs exceeded a HQ of 1, suggesting no risk in specific areas. This is primarily due to the large area use factor for the otters of 729 acres as a feeding range. The highest NOAEL HQ for Aroclor 1268 was 3.94 in Domain 4. These HQs were also based on Aroclor 1254, which is considered more toxic to mammals than Aroclor 1268 (Section 6.2.1 of this document).

The wildlife species most sensitive to Aroclor 1268 was the river otter (*Lontra canadensis*). The species judged to be most sensitive to mercury was the green heron (*Butorides striatus*). The green heron was also considered the most sensitive to lead, particularly in Domain 3; however the maximum lead HQ was 0.95.

Food-web modeling and associated HQs for wildlife can vary dramatically as a function of:

- Assumptions used to estimate environmental exposure to chemicals (e. g., Table 4-26);
- Aggregation of data to represent exposure concentrations of chemicals in environmental media (i.e., food items, sediment, and water); and
- Selection of TRVs (e. g., Table 4-27).

Probably the greatest level of uncertainty in the modeling study for mammals is the TRV that is based on Aroclor 1254. This Aroclor is generally accepted to be more toxic to mammals through the Ah receptor pathway than Aroclor 1268 (Section 6.2.1). However, it is unknown what the level of non-Ah toxic effects from Aroclor 1268 may be.

5.0 RISK CHARACTERIZATION

This risk estimation for the LCP estuary addresses each of the eight previously identified assessment endpoints by a “strength-of-evidence” approach, in which different measurement endpoints or lines of evidence may be accorded different levels of ecological significance depending on the types and quality of the data. The importance of different measurement endpoints is judged to be least in the case of generic, laboratory-based and/or theoretical studies and greatest for site-specific, empirical studies.

This risk characterization is based solely on studies conducted for the LCP estuary by Honeywell during 2000 - 2007 and reported in Section 4 of this document. Studies of the LCP estuary conducted by other investigators are reviewed in Appendix J of this document since they contribute substantially to a full and reliable understanding of potential risk in the estuary. The uncertainty of the results of both sets of studies is addressed in Section 6 of this document.

5.1 Benthic Estuarine Community (Assessment Endpoint 1)

Three basic measurement endpoints were employed to evaluate the viability of the structure and function of the benthic estuarine community in the LCP estuary. These endpoints were: 1) comparisons of concentrations of COPCs in surface sediment with site-specific effects levels; 2) results of toxicity tests conducted with sensitive life stages of benthic biota exposed to surface sediment; and 3) evaluation of the indigenous benthic community. For this BERA, there is a plethora of sediment chemistry and sediment toxicity data available for many locations in the LCP marsh during eight years of field investigations. In contrast, the benthic community information is limited to a single study conducted in 2000 at four tidal creek stations in the LCP marsh.

Concentrations of total mercury and Aroclor 1268 in creek and marsh surface sediment exceeded their site-specific SECs in most segments of the Eastern Creek, the Main Canal, and Domain 1. Levels of lead in surface sediment exceeded the overall site-specific survival ER-L of 60 mg/kg (Table 4-20) in portions of Domain 2 and in Domain 3, including some FS Areas. Total PAHs occurred in excess of their site-specific survival ER-L of 1.5 mg/kg in the Eastern Creek, and in portions of Domains 2 and 3.

In a comprehensive chronic (28-day) toxicological study detailed in this document, survival, growth, and/or reproduction of amphipods (*Leptocheirus plumulosus*) exposed to surface sediment obtained throughout the LCP estuary were often significantly reduced relative to controls and some reference areas (e.g., Table 4-14). This toxicity appeared to be caused by COPCs, and to a limited extent, other metals. Toxic expression also appears to be substantially influenced by other factors including TOC, sulfide, grain size, and other factors. This conclusion supports the findings of others (EPA, 2001; Dillon, 2006a) who have noted the toxicological importance of COPCs and other stressors in the LCP estuary.

Toxicity test results with lab-cultured grass shrimp (*Palaemonetes pugio*) evaluated with collocated COPCs sediment concentrations suggest that grass shrimp may be more sensitive than amphipods. For example, reproductive TELs for embryo development and hatching success from exposure to mercury in sediments ranged from 1.4 to 3.9 mg/kg; whereas, the reproductive TEL for amphipods exposed to mercury was 4.9 mg/kg (Tables 4-20 and 4-22).

Hatching success and DNA strand damage of embryos produced from indigenous grass shrimp throughout the 2002-2007 time period deviated statistically (and adversely) from control conditions in the Main Canal, the bank of the Main Canal, and the Eastern Creek (Table 4-24). Finally, in a preliminary unreplicated study of fiddler crabs characterized by relatively high body burdens of COPCs abundance of crabs was similar to that reported over 30 years ago in the Duplin Estuary Marsh, Georgia (Wolf *et al.*, 1975).

A single field evaluation of the indigenous benthic community in the LCP estuary was conducted in 2000 (Table 4-25). Potential differences of the macrobenthos community between Site and reference areas were a lesser number of taxa, individuals, and density of individuals at two of the four Site stations. However, substantial variability was observed between substrate types, TOC, and number of organisms per replicate (Section 4.9.1). Since benthic community data were not collected during the long-term monitoring program (2002 – 2007), potential contaminant-related effects associated with benthic community structure are unknown.

Based on the primary LOE (sediment chemistry and toxicity tests) the viability of the structure and function of the benthic estuarine community in the LCP estuary is at risk from COPCs, especially in the southeastern part of the estuary (in particular, the Main Canal and Eastern Creek).

5.2 Omnivorous Reptiles (Assessment Endpoint 2)

The single measurement endpoint available for evaluating the viability of omnivorous reptilian species utilizing the LCP marsh consisted of HQs derived from food-web exposure models for diamondback terrapins (*Malaclemys terrapin*).

In the modeling study (Table 4-30), all HQs derived for diamondback terrapins indigenous to the LCP estuary were substantially less than unity (1). Consequently, there is no potential risk to the viability of omnivorous reptiles utilizing the LCP estuary.

5.3 Omnivorous Birds (Assessment Endpoint 3)

There were two measurement endpoints generated to evaluate the viability of omnivorous avian species utilizing the LCP estuary. These LOE were: 1) HQs derived from food-web exposure models for red-winged blackbirds (*Agelaius phoeniciceus*); and 2) HQs derived from food-web exposure models for clapper rails (*Rallus longirostris*).

Red-winged blackbirds and clapper rails exposed to COPCs at the Site exhibited a basic similarity in that none generated HQs for inorganic mercury, Aroclor 1268, or lead that indicated a potential for risk (Table 4-30). For methylmercury, red-winged blackbirds were characterized by a NOAEL HQ of 1.00 in Domain 1. All of the LOAEL HQs were less than 1.0, suggesting no risk to red-winged blackbirds.

For clapper rails modeled for exposure to methylmercury, all Site LOAEL HQs were less than 1.0; however, NOAEL HQs were slightly greater than 1.0 (1.74 – 2.96) in Domain 1, Eastern Creek, and the Main Canal. The overall potential for adverse risk to omnivorous birds in the LCP estuary is judged to be minimal.

5.4 Piscivorous Birds (Assessment Endpoint 4)

Only one measurement endpoint was available to evaluate the viability of piscivorous avian species utilizing the LCP estuary: HQs derived from food-web exposure models for green herons *(Butorides striatus*).

Green herons modeled for exposure to inorganic mercury, Aroclor 1268, and lead at the Site presented no potential for risk (Table 4-30). However, all Site NOAEL HQs generated by the green heron modeled for exposure to methylmercury were in excess of unity (1), with NOAEL HQs (1.39 – 10.6) being distinguishable from the reference HQ (0.61). LOAEL HQs for green herons modeled for methylmercury exposure at the Site were greater than 1.0 in Domain 1 (2.77), Eastern Creek (3.53), and the Main Canal (1.48).

The above-referenced methylmercury HQs suggest that potential adverse risk to the viability of piscivorous avian species in the LCP estuary is moderate.

5.5 Herbivorous Mammals (Assessment Endpoint 5)

The single measurement endpoint available for evaluating the viability of herbivorous mammalian species utilizing the LCP marsh consisted of HQs derived from food-web exposure models for marsh rabbits *(Sylvilagus palustris*).

The modeling study for marsh rabbits generated a site-related NOAEL HQ for Aroclor 1268 of 3.01 in Domain 1 (Table 4-30). No LOAEL-based HQ for Aroclor 1268 was greater than unity (1). In addition, no risk potential was associated with mercury or lead.

Consequently, risk to the viability of herbivorous mammals utilizing the LCP estuary is judged to be minimal.

5.6 Omnivorous Mammals (Assessment Endpoint 6)

The only measurement endpoint generated for assessing the viability of omnivorous mammals utilizing the LCP estuary consisted of HQs derived from food-web exposure models for raccoons *(Procyon lotor*).

In the modeling study (Table 4-30), all HQs for inorganic mercury, methylmercury, and lead derived for raccoons indigenous to the LCP estuary were less than unity (1). NOAEL

HQs for Aroclor 1268 of 2.61 and 1.11 were estimated for Domain 1 and Domain 2, respectively. None of the LOAEL HQs exceeded unity. Consequently, risk to the viability of omnivorous mammals utilizing the LCP estuary is judged to be minimal.

5.7 Piscivorous Mammals (Assessment Endpoint 7)

The sole measurement endpoint for evaluating the viability of piscivorous mammals utilizing the LCP estuary consisted of HQs derived from food-web exposure models for river otters *(Lontra canadensis).*

The modeling study for river otters generated site-related NOAEL HQs for Aroclor 1268 (based on a TRV for Aroclor 1254) that ranged from 0.01 to 3.94 (Table 4-30). No LOAEL-based HQ for Aroclor 1268 was greater than unity (1). In addition, no potential for risk was associated with mercury or lead.

The potential for adverse risk to the viability of piscivorous mammalian species utilizing the LCP estuary is judged to be minimal.

5.8 Finfish (Assessment Endpoint 8)

There were five basic measurement endpoints available for evaluating the viability of finfish utilizing the LCP estuary. These endpoints were:

- comparisons of concentrations of COPCs in surface water to general literature-based effects levels;
- results of toxicity tests conducted with early (and sensitive) life stages of aquatic biota exposed to surface water;
- HQs derived from food-web exposure models for upper trophic-level fish;
- HQs derived from measured residues in field-collected finfish; and
- evaluation of the benthic macroinvertebrate community (as a food source for juvenile and adult fishes).

The highest concentration of total mercury measured in surface water of the LCP estuary was 188 ng/L in the Eastern Creek during 2000 (Table 4-2b), as compared to the EPA chronic ambient water quality criterion of 940 ng/L. The highest detected concentration of dissolved lead in water was 1.9 µg/L at the mouth of Purvis Creek during 2000, as contrasted to the EPA chronic criterion of 8.1 µg/L. (No criteria have been developed specifically for Aroclor 1268.)

Laboratory toxicity tests designed to evaluate chronic toxicity of “whole” surface water from the LCP estuary to mysids (*Mysidopsis bahia*) and sheepshead minnows (*Coleonyx variegatus*) generated similar results (Tables 4-12 and 4-13). Mean survival of mysids exposed to surface water from the Site and two reference locations ranged from 92.4 to 100%, which was greater than the minimum acceptable survival for control organisms (80%). Mean growth (weight) of mysids exposed to Site and reference water was from 0.50 to 0.84 mg (dw), which exceeded the weight of control organisms (0.48 mg). Survival of sheepshead minnows exposed to the same surface water ranged from 80 to 100%, which was at least equal to the minimum acceptable survival for control organisms (80%). Mean growth (weight) of fish exposed to Site water was statistically similar to weight observed for at least one reference location.

Finfish methylmercury bioaccumulation modeling generated a mean LOAEL-based HQ of 2.9 for methylmercury (Table 4-28) which is over-predictive relative to field collected finfish from the LCP estuary (Table 4-29). However, LOAEL HQs exceeded 1 in silver perch (HQ=1.3) and spotted seatrout (HQ=1.9) collected from the field.

Based on three modeled approaches to finfish for effects attributable to Aroclor 1268 in the LCP estuary, generated mean LOAEL-based HQs ranged from 0.5 to 1.4 (Table 4-28). The mean LOAEL HQ for field collected finfish was 1.1 for silver perch and black drum, and 0.95 for spotted seatrout, suggesting relatively comparable results with the modeled HQs. The mean HQ for striped mullet was 2.5. The HQs are all higher when the 95UCL exposure concentration is used.

Since the fish TRVs were largely based on reproductive and growth endpoints to assess potential chronic problems and/or long-term decline in viability of fish populations, the LOAEL HQs suggest chronic risk. The absence of gross abnormalities in finfish collected from Purvis Creek during the empirical study and the absence of reported fish kills during many years of intensive interest and monitoring at the LCP Site suggest that there are no acute toxicity concerns to finfish.

Evaluation of the benthic macroinvertebrate community in the LCP estuary did not identify a limitation of this source of food to finfish (refer to information presented for Assessment Endpoint 1), although toxicity to benthic organisms may limit food for fish in portions of the Main Canal, Eastern Creek, and Western Creek.

The overall conclusion derived from the five above-discussed measurement endpoints is that there is no potential for risk to finfish in the LCP estuary from direct exposure to COPCs in water. The modeling and field data for finfish suggest that chronic risk to viability of finfish indigenous to the LCP estuary is of concern.

6.0 UNCERTAINTY ANALYSIS

A discussion of the major potential sources of uncertainty in the BERA provides a means to further evaluate ecological conditions and risks in the LCP estuary. This includes the extent to which results of the BERA may be consistent with results of other independent investigations of the estuary. These issues are addressed in the following subsections, followed by overall conclusions pertaining to uncertainty associated with both sources of information related to ecological conditions in the estuary.

6.1 Uncertainties in the Baseline Ecological Risk Assessment

Uncertainty associated with the formal BERA pertains to the conceptual model for the assessment, as well as the experimental design and interpretation of the assessment, including the modeling studies.

6.1.1 Conceptual Model

The conceptual model for the BERA is not likely to contribute any substantial uncertainty that would tend to over-estimate or under-estimate exposure pathways and risks. The LCP estuary has been the subject of numerous investigations. COPCs are well known, as are exposure pathways, and biota at potential risk. The eight assessment endpoints comprehensively addressed the various taxonomic and trophic categories of biota that are indigenous to the estuary. Measurement endpoints LOE employed to evaluate the assessment endpoints included, whenever possible, a combination of field, laboratory, and modeling studies.

The conceptual model for the BERA, which is the product of numerous detailed discussions among many private and government scientists, is based on environmental data collected over the 2000 – 2007 time period. The approach employed to present these data in a coherent format included the development of area-specific values for environmental variables during this period, followed by grand mean values for the whole estuary (Dillon, 2008).

6.1.2 Experimental Design and Interpretation

Implementation of the experimental design of the BERA introduced a number of mostly unavoidable uncertainties. The most basic uncertainty is the extent to which sampling data, which were generated by authoritative (not random) sampling over the 2000 –

2007 time period, are representative of (not biased indicators of) environmental conditions in the LCP estuary.

Integration of environmental data over the 2000 – 2007 time period introduces some temporal uncertainty as to whether the combined data are always representative of the most contemporary environmental baseline. Similarly, the selection of only one year of data vs. several monitoring years may not adequately define the contemporary baseline.

The number of environmental samples collected during the BERA is a source of uncertainty as it affects the statistical precision of resulting data. Other sources of uncertainty, as discussed in detail in Section 4 of this document, include interpretation of the equilibrium-partitioning, AETs, SEC calculations, benthic macroinvertebrate, and fiddler-crab abundance studies.

6.1.3 Modeling Studies

The preponderance of uncertainty in this BERA is associated with results of food-web modeling studies, as best evidenced by the different approaches taken in the wildlife modeling detailed in this document and that employed by Thoms (2006a). Within each approach, important uncertainties pertain to selection of various exposure-related statistics (in particular, composition of the diet of fish and wildlife, as well as AUFs) and, additionally, selection of LOAEL and NOAEL TRVs.

Three TRV-related uncertainties are of particular importance. First, TRVs used for avian exposure to methylmercury were based on values for growth effects to captive great egrets (LOAEL and NOAEL TRVs of, respectively, 0.06 and 0.02 mg/kg BW/day; Spalding et al., 2000) and are relatively comparable to the Heinz (1979) paper (LOAEL of 0.051 mg/kgBW/day) which was based on a three-generation reproductive study of mallard ducks; and also comparable to the LOAEL and NOAEL TRVs of, respectively, 0.078 and 0.013 mg/kg BW/day based on U.S. EPA (1995). Slightly different risks would occur depending on the selected TRV. For example, using the methylmercury LOAEL TRV of 0.06 mg/kgBW/day results in a HQ of 2.77 in Domain 1 for piscivorous birds (Table 4-30); whereas, with a TRV of 0.078 mg/kgBW/day, the HQ would be 2.13.

Second, TRVs utilized for exposure of reptiles and mammals to Aroclor 1268 are surrogate values that actually pertain to Aroclor 1254, which is generally more toxic than Aroclor 1268 (refer to Appendix J, Section J.2.1).

A "hidden" uncertainty in wildlife food-web exposure models was the need to sometimes employ prey species collected at nearby but different areas when prey did not occur in the targeted area. Also, the diet of a wildlife species in a particular area was sometimes altered from its hypothetical diet if one (or more) of its food items could not be obtained in the targeted area. Furthermore, AUFs less than unity (1) were employed for just the raccoon (based on its primarily upland habitat preference) and river otter (based in its large territory in comparison to all areas in the Site).

Some of the major uncertainties associated with the upper trophic level finfish bioaccumulation modeling studies included:

- sensitivities in the numerous model input parameters;
- use of different estimates of aqueous dissolved PCB (Aroclor 1268) concentrations;
- a tendency to over-predict tissue concentrations, particularly from reference areas, which is somewhat attributable to non-detected data (especially in the water column);
- assumptions of dry weight to wet weight conversions, that assume fixed percentages of tissue solids in each prey item and in the finfish;
- the application of single model outputs to several different species of finfish; and
- the difficulty of chronic effects interpretation to finfish (reproduction and growth) relative to actual impacts on the long-term viability of fish communities and populations in the LCP estuary.

6.1.4 Other COPCs Not Quantified

As mentioned in Section 3.4, and Section 4.4, a few metals slightly and infrequently exceeded screening-level EEVs (e.g., chromium, copper, and nickel). When elevated above their EEVs, these metals may contribute additional risks to benthic organisms, especially in sediment with low sulfide content. In addition, it appears that other parameters have substantially affected the sediment toxicity test results and may include pathogens, TOC, substrate type, sediment pH, and redox condition. Several of these parameters were either measured occasionally or not measured at all.

Other chemicals that are generally associated with chlor-alkali facilities include pesticides such as hexachlorobenzene, 4,4' Dichlorodiphenyltrichloroethane (DDTs), and chlordanes and on occasion laboratories erroneously identify PCBs as other chlorinated compounds (e.g., Bosch et al, 2009). Although these chemicals were infrequently detected in the estuary sediments, they were not quantified because they were indirectly assessed through the risk assessment of polychlorinated biphenyls, namely Aroclor 1268.

Dioxins and furans were identified as COPCs in sediment based on 3 samples from the LCP estuary collected in 2000. All 3 samples exceeded the screening-level EEV. However, no further data were collected. The Toxicological Profile for PCBs (Table 4-6, pg. 465, and Section 5.1, pg. 467) states that "During production, Aroclor mixtures were contaminated by small amounts of polychlorinated dibenzofurans (PCDFs) as impurities," (ATSDR, 2000). In addition, Aleiandro et al., (2006) states that some of the Clapper Rail effects observed may be attributable to "organochlorides other than PCBs (e.g. dioxins)." Kannan et al., (1998a,b) also associate dioxin-like compounds to the Site. These papers suggest dioxins/furans may be associated with the Aroclors at LCP. The magnitude of the TEC-dioxin concentrations particularly in Eastern Creek suggests co-located contamination with Aroclor 1268. In the absence of TEC-dioxin data in sediment elsewhere in the estuary or in biota samples, the potential contribution of TEC dioxins to existing risk is unknown.

6.2 Independent (Other) Investigations

The other investigations of the estuary (Appendix J) addressed the relative toxicity of Aroclor 1268 and five of the eight assessment endpoints that constituted the basis of this BERA. Although differences between this BERA and other independent investigations do not necessarily imply uncertainty, they may provide additional lines of evidence that relate to the assessment endpoints. Each of the independent studies has its own unique uncertainties and direct comparisons may either add support to, or conflict with the BERA data.

6.2.1 *Relative Toxicity of Aroclor 1268*

The following embedded table (2008b) reviews dioxin-like toxicity of Aroclor 1268 as compared to Aroclor 1254, an Aroclor on which PCB TRVs presented in this document for fishes and mammals are based:

Relative Potency (REP) of Aroclor 1268 vs. Aroclor 1254 for fish, birds, and mammals based on dioxin-like total toxic equivalents (TEQs) (U. S. Environmental Protection Agency – Region 4, 2008; from Burkhard and Lukasewycz, 2008)								
Aroclor 1254			**Aroclor 1268**			**Relative Potency (REP) of Aroclor 1268 vs. Aroclor 1254**		
Fishes	Birds	Mammals	Fishes	Birds	Mammals	Fishes	Birds	Mammals
4.18E-07	2.00E-05	7.87E-06	3.14E-07	2.5E-06	4.89E-07	0.75	0.125	0.06

The relative potency (REP) factors referenced above indicate that Aroclor 1268 is substantially less toxic to biota than Aroclor 1254. However, dioxin-like toxicity is only a measure of the extent to which dioxin-like congeners (non-ortho and mono-ortho coplanar PCBs) bind with and disrupt the aryl hydrocarbon (Ah) receptor in cells of organisms, resulting in toxicological responses that include dermal toxicity, immunotoxicity, carcinogenicity, and adverse effects on endocrine, development, and reproduction functions.

Modes of toxicity other than that affecting the Ah receptor include effects on calcium, ion (Ca^{2+}) homeostasis and subsequent neurotoxic effects caused by congeners such as di-*ortho* non-coplanar PCBs, which have the potential to be evaluated by a Neurotoxic Equivalent (NEQ) scheme being developed by Simon *et al.* (2007). These authors noted that the congeners present in Aroclor 1268, in addition to possessing a low Ah receptor binding affinity, have a limited ability to interfere with Ca^{2+}– dependent intracellular signaling pathways. The authors also stated that reduced PCB toxicity to fishes, birds, and mammals has been observed at the extremes of mean mixtures of chlorination (i.e., lowly and highly chlorinated Aroclors). They specifically concluded that Aroclor 1268 is approximately 22 times less toxic than Aroclor 1254 in terms of NEQs.

Several uncertainties characterize the degree to which Aroclor 1268 is less toxic than Aroclor 1254 to biota. Chlorinated naphthalenes have been identified in PCBs (Ruzo *et al.*, 1976) and can affect the Ah receptor. However, the World Health Organization (WHO) has not established TEQ factors for these chemicals. Also, the relative potency of the two Aroclors after weathering in the environment is uncertain. In particular, the octa-, nona- and deca-PCB congeners in Aroclor 1268 are especially resistant to weathering. Some of these congeners, in particular di-*ortho* congeners, have relatively little affinity for the Ah receptor, but may have non-dioxin-like toxicity (Sajwan *et al.* 2008).

6.2.2 Assessment Endpoints

The investigations reviewed in Appendix J are of particular importance in evaluating the uncertainty inherent in assessment endpoints based on limited (often single) and theoretical LOE; in particular, food-web exposure models for wildlife. In some cases, these investigations evaluated ecological conditions in the LCP estuary prior to the 1998 - 1999 remediation of parts of the estuary and, consequently, are likely to represent "worst-case" conditions with regard to the present environmental baseline.

6.2.2.1 Benthic Estuarine Community (Assessment Endpoint 1)

Acute toxicity tests (Sprenger *et al.*, 1997) were conducted before the 1998-1999 remediation of the LCP estuary with brown shrimp (*Penaeus vannamei*) and amphipods (*Leptocheirus plumulosus*) acutely exposed (for 10 days) to sediment from the most contaminated part of the Site. These tests did not identify statistically significant harmful effects on either organism. In another set of acute toxicity tests conducted before the estuarine remediation (Horne *et al.*, 1999), amphipods (*Leptocheirus plumulosus*) exposed for 14 days to sediment from the same part of the Site exhibited no statistically significant adverse effects. In the final pre-remediation acute toxicity study, Winger *et al.* (1993) reported that another species of amphipod (*Hyalella azteca*) exposed for 10 days to sediment from various locations throughout the Site exhibited no statistically significant mortality, but displayed reduced feeding rates. In the same study, amphipods exposed to pore water from the sediment displayed statistically significant mortality, as well as reduced feeding rates; and low median effective concentration (EC50) values appeared to characterize bacteria (*Photobacterium phosphoreum*) exposed to pore water from the sediment.

The indigenous benthic community in the LCP estuary has been studied in several investigations, with results often suggesting a hazard less than that predicted by laboratory-based studies. In studies conducted before the 1998-1999 estuarine remediation, Wall *et al.* (2001) concluded that, despite high levels of contamination, there were few effects on microbes (primarily fungal standing crop), cordgrass (*Spartina alterniflora*), or grass shrimp (*Palaemonetes pugio*). Newell *et al.* (2000) also noted the resistance of fungi and cordgrass to potentially toxic pollutants. Horne *et al.* (1999) reported that the density of individual macrobenthos species showed no consistent patterns in response to pollutants, but noted contamination-related shifts of macrobenthos at higher taxonomic levels and a shift in feeding habits of the benthos. (However, these two shifts were not observed in a similar study detailed in Section 4.5.1 of this document).

6.2.2.2 Omnivorous Reptiles (Assessment Endpoint 2)

In a study conducted in 1995 (Sprenger *et al.*, 1997), eggs taken from three female diamondback terrapins obtained in the LCP estuary were characterized by apparently elevated mean concentrations of mercury and Aroclor 1268. Although eggs from one of the females did not hatch; eggs from the other females, which contained higher concentrations of mercury (in one case) and Aroclor 1268 (in both cases), did hatch. Consequently, elevated concentrations of mercury and Aroclor 1268 in terrapin eggs (even levels that existed in 1995) cannot be implicated as causing failed reproduction in terrapins. Also, histopathological examinations of terrapins did not indicate any degeneration or abnormality known to be associated with COPCs.

In a study not referenced in Appendix J (Cobb and Wood, 1997), the eggs of loggerhead sea turtles (*Caratta caratta*) from South Carolina were evaluated for body burdens of several higher-chlorinated homolog groups characteristic of Aroclor 1268 (octa- and deca- homologues). The presence of these homolog groups was significantly correlated ($P \leq 0.05$) with length of resulting embryos. However, the authors reported the relationships to be highly uncertain.

The results of these independent investigations support the results of the BERA that there is no potential risk to the viability of omnivorous reptiles

6.2.2.3 Omnivorous Birds (Assessment Endpoint 3)

Livers of clapper rails collected in 1995 from the southern part of the LCP estuary (Sprenger *et al.*, 1997) contained a mean mercury concentration of 3.84 mg/kg (ww), as compared to the following liver-based concentrations that have been reported to cause mortality in omnivorous birds: 126.5 mg/kg for red-winged blackbirds, and 54.5 mg/kg for grackles. In addition, histopathological examinations did not indicate specific toxicity or specific uniform degeneration of tissues of clapper rails. In particular, myelin sheath and axonal degeneration, characteristic of mercury toxicity, were not observed except in one case, which was reported to be a possible artifact. Also, liver necrosis and fatty change, typical of PCB toxicity, were not noted.

The above-referenced mean mercury concentration of 3.84 mg/kg in livers of clapper rails can also be compared to the mercury values (3 to 13.7 mg/kg) reported by Barr (1986) to decrease hatchability of eggs of the common loon (*Gavia immer*).

Finally, in a study of the mineral chemistry of bones of clapper rails (Aleiandro *et al.*, 2006), exposure to contaminants in the LCP marsh did not affect the length or weight of leg bones of clapper rails evaluated in 2000. However, bone maturation was accelerated as evidenced by a high calcium/phosphorous ratio and lower carbonate and acid-phosphate content of the bones. The authors noted the difficulty in determining the specific toxicant(s) that caused these effects although they specifically referenced Aroclor 1268, organochlorides other than PCBs (e. g., dioxins), and heavy metals including mercury.

The results of these independent investigations do not contradict the judgment reached in the BERA that potential risk to omnivorous avian species is minimal.

6.2.2.4 Piscivorous Birds (Assessment Endpoint 4)

The independent studies are of particular importance in addressing this assessment endpoint since only a single LOE – food-web exposure models for the green heron (*Butorides striatus*) – was employed in the BERA to evaluate the potential risk to piscivorous birds. It is important to note that a food-web exposure model for the green heron, which is a wading bird, was initially employed (EPA, 2001) to establish a preliminary remedial sediment goal for mercury in the LCP estuary of 4 mg/kg. This sediment goal was then lowered to 1 mg/kg to provide protection for the federally-endangered wood stork (*Mycteria americana*).

However, a survey of wading birds (PTI and CDR Environmental Specialists, 1998), which was conducted in 1996, indicated that most wading birds that utilized the LCP estuary were found at the extreme northern boundary of the estuary (including tributaries of the Turtle River), far distant from the center of the LCP estuary. In a survey of wood storks (*Mazama americana*) inhabiting inland and coastal areas of Georgia during 1997 – 1999, Gariboldi *et al.* (2001) reported that the highest observed reproductive success (mean number of wood stork fledglings per nest) occurred in the St. Simons colony and that storks typically forage for food within 10 to 15 km of their colony. (The St. Simons colony is located at least 20 km from the LCP Site.)

The results of these independent investigations support the conclusion reached in the BERA of a moderate ecological risk to piscivorous avian species in the LCP estuary.

6.2.2.5 Piscivorous Mammals (Assessment Endpoint #7)

Preliminary data from NOAA have indicated that PCBs have been detected in bottlenose dolphins (*Tursiops truncatus*) from the Turtle/Brunswick River Estuary at high concentrations (geometric mean of 401 µg/g lipid) relative to dolphins sampled from Beaufort, North Carolina (31.7 µg/g lipid) or from Charleston, South Carolina (42.1 µg/g lipid)(Sanger et al. 2008). In addition, the same research suggested that the PCB congener profiles from the Turtle/Brunswick Estuary were indicative of an Aroclor 1268 signature, with a high prevalence of octa- and nonachlorobiphenyls. Further research is being conducted by NOAA to determine how the elevated levels of these PCBs may affect dolphin health (Schwacke, 2010). An important source of uncertainty associated with this assessment endpoint is how well the river otter exposure model that represents a top-level piscivorous mammal could be extrapolated to dolphins and whether the TRV (based on Aroclor 1254 effects to mink) could reasonably be applied to dolphins. Based on PCB toxicity equivalency, the octa- and nonachlorobiphenyls are generally less toxic; however, specific effects to marine mammals are largely unknown. Consequently, risks to piscivorous marine mammals cannot be estimated at this time.

6.2.2.6 Finfish (Assessment Endpoint 8)

An acute laboratory toxicity study was conducted (Sprenger *et al.*, 1997) in which embryos of Japanese medaka (*Oryzias latipes*) were exposed to sediment obtained from the most contaminated areas of the LCP estuary during 1995 (before the 1998-1999 remediation). These embryos were reported to have developed lesions known to be associated with dioxins, furans, PCBs, and, possibly, mercury.

In a laboratory study that addressed the effects of contaminated food on fish (Matta *et al.*, 2001), three generations of mummichogs (*Fundulidae heteroclitus*) evaluated for 13 possible effects attributable to Aroclor 1268 exhibited, from a statistical perspective, only an increase in growth by the second (F_1) generation. In the case of fish assessed for 13 possible effects associated with mercury-contaminated food, the only statistically significant effects were increased mortality of F_0 fish (just males), increased weight of F_1 fish, altered sex ratios of F_1 fish, and reduced fertilization success of F_1 fish. No statistically significant effects occurred in the F_2 generation. Of the 26 possible effects evaluated in the three generations of fish, only three (3) effects, all associated with mercury-contaminated food (mortality of male F_0 fish, as well as altered sex ratios and reduced fertilization success of F_1 fish), appear to have possible ecological significance. These effects (and all mercury-related effects) were associated with a "worst-case" (lowest) MATC in bodies of F_0 fish of 1.2 mg/kg (dw) mercury. The highest mean and 95UCL body burdens of total mercury measured in mummichogs from the LCP estuary over the 2000-2007 time period was 0.71 and 2.03 mg/kg, respectively (in the Eastern Creek - Table 4-10a).

The results of these independent investigations are basically consistent with the judgment reached in the BERA that potential risk to the viability of finfish indigenous to the LCP estuary is of concern. Although the study by Matta *et al.* (2001) provides information that directly addresses the impact of contaminated food on lower-trophic-level fish (i.e., mummichogs), the biomagnification of mercury and Aroclor-1268 in upper-trophic-level finfish from the LCP estuary and potential associated effects has not been studied to confirm the model predictions. Field fish may respond differently if burdened with both Aroclors and mercury (and other COPCs) over the long term. Such long-term exposure may result in sufficient stress to induce negative effects on reproductive fitness.

6.3 Uncertainty Conclusions

The convergence of risk estimates generated by the BERA and the independent investigations provides a basis for concluding that the evaluation of ecological conditions in the LCP estuary is not characterized by gross uncertainty and is basically reliable. This is to be expected since the ecology of the estuary has been investigated over a period of at least 15 years by numerous organizations and scientists. The importance of the independent investigations is especially noteworthy in those cases where evaluation of an assessment endpoint would otherwise have been based on a single LOE involving food-web exposure modeling.

The ultimate judgments of the risk posed by COPCs to the vitality of the benthic estuarine community, wildlife, and finfish are broad and qualitative – ranging from no risk to moderate risk for modeled receptors, and from zero percent to 100 percent survival of benthic organisms. Since there is a broad range of risk to various ecological receptors, this necessitates an evaluation of sediment and surface water concentrations that should be protective of benthic invertebrates, fish, and wildlife that inhabit the LCP estuary.

7.0 DEVELOPMENT OF ECOLOGICALLY PROTECTIVE MEDIA CONCENTRATIONS

This section provides a link between risk assessment and risk management and includes the development of a range of COPCs concentrations that are protective of ecological receptors. The ecological risks from hazardous substances released to the LCP estuary, as assessed in the previous sections, create a need to evaluate measures that would reduce the incidence of adverse growth and reproductive effects to benthic organisms, fish, and wildlife.

In this section, the food chain bioaccumulation models and the TRVs were used to "back-calculate" the COPCs sediment concentrations considered protective for each receptor of concern (i.e., those receptors where a hazard quotient exceeded 1 [from Tables 4-29 and 4-30]). This back calculation necessitates the need to establish the relationship between field-collected biota and sediment (i.e., BAFs), which is described in detail below. The NOAEL and LOAEL HQs are also used in the back calculation to provide a range of concentrations protective of each receptor. Finally, a "rule of 5" approach is discussed that enables one to look across the results for all receptors of concern to identify sediment remedial goal options (RGOs).

7.1 Sediment to Biota Bioaccumulation Factors

The development of protective sediment concentrations and RGOs is relatively complex and usually requires the use of sediment to BAFs. This section presents the methodology for deriving BAFs and their eventual use in developing RGOs for those receptors considered at risk (i.e., those receptors that had HQs ≥ 1, refer to Sections 4.10.2 and 4.11):

- fish from methylmercury and Aroclor 1268;
- omnivorous and piscivorous birds from methylmercury;
- herbivorous, omnivorous, and piscivorous mammals from Aroclor 1268;
- benthic invertebrates from methylmercury, Aroclor 1268, lead, and PAHs;

Since lead did not contribute to risk in wildlife or fish, calculation of lead BAFs is unnecessary.

A bioaccumulation factor is an operationally defined relationship between the concentration in the biota and the concentration in the sediment. It is assumed that the concentration in biota can be expressed as a function of the sediment concentration.

Concentration in biota C_{biota} = Function of the sediment concentration f (C_{sed})

A linear function results in a simple ratio:

$$BAF = C_{biota}/C_{sed}$$

This ratio is commonly used where average biota concentrations are divided by the average sediment concentrations. Non-linear BAFs can also be developed based on site-specific relationships between the biota and sediment data.

For organic chemicals that strongly partition to organic carbon (OC) and tissue lipids such as PCBs, a biota sediment accumulation factor (BSAF) may provide a better measure of chemical bioaccumulation to sediment-dwelling organisms depending on Site conditions and data quality.

The BSAF is only used to assess Aroclor-1268 and is provided by the following ratio:

$$BSAF = C_{biota} \div \%Lipid / C_{sed} \div \%\ OC$$

Plots of the concentration in biota versus the concentration measured in sediments are typically used to assess bioaccumulation. These plots require measurements of biota over a gradient of contamination in sediments. Methods of treating the data and estimating a BAF are discussed by Burkhard (2006).

Graphing data in this manner and fitting a standard curve assumes perfect knowledge of the sediment concentrations to which biota were exposed. Unfortunately, this is seldom possible. Biota are often collected in the field over transects or within an area to obtain sufficient mass. Biota can be mobile and move in and out of sample transects. Also, sediment concentrations can vary substantially over the sampling transect or within the area to which biota are exposed and complicated by factors affecting bioavailability (e.g., TOC and sulfides).

Long-term monitoring at the LCP estuary has revealed a high degree of variability in sediment concentrations measured at the same locations over multiple years, with no discernable temporal trends. The variability can confound estimates of the bioaccumulation factor by causing scatter in the bioaccumulation plots. Scatter arises when a single sediment sample is taken to represent the concentration in sediment to which a biota sample was exposed. Biota collected at a hotspot might not have been exposed entirely to the hot spot, if the hot spot is small relative to the foraging area of the organism. Hot spots can also cause scatter in the bioaccumulation plots. Furthermore, the scatter in bioaccumulation plots can be caused by mobile biota; however, the high degree of variability in the sediment concentrations may mask this effect.

The approach to derive bioaccumulation factors of organisms in the LCP estuary focuses on addressing the variability in sediment concentrations while attempting to maximize the biota tissue data relative to habitat use areas for each of the receptors. This was done by averaging sufficient sediment chemistry data for stations near biota sampling stations. Spatial polygons were selected throughout the estuary based on professional judgment to maximize relevant exposure data in various habitat areas of the estuary. At least 10 polygons were needed to provide adequate statistical data to develop BAFs and to ensure reasonable coverage of the estuary. For mummichogs there were some years where intensive sampling of creeks resulted in sufficient sediment data for yearly estimates. Sediment near most fiddler crab stations were sampled less densely and therefore it was necessary to average sediment concentration over all years in order to obtain enough data to estimate the sediment concentrations that the fiddler crabs would be exposed to. Because most of the sampling stations were non-random and biased toward pre-selected areas, these exposure areas or “polygons” with higher data density tend to skew overall exposure concentrations. To account for spatial and temporal influences on exposure within a polygon, all individuals at a sample station were averaged to "normalize" the spatial and temporal effects between stations within a polygon. This spatial and temporal averaging provides a more useful evaluation of exposure within a polygon relative to combining all data irrespective of these factors.

The BAF curve fits were selected based on the highest reasonable r^2 value. Most of the best BAF curve fits were based on the power distribution, more so than the linear or logarithmic distribution.

7.1.1 Fiddler Crab Bioaccumulation Factors

The data for mercury and Aroclor-1268 bioaccumulation in fiddler crabs were evaluated in several ways to maximize exposure relevance and reduce the scatter in the bioaccumulation plots. Fiddler crabs were collected annually in all sampling years. There was insufficient sediment data in the vicinity of fiddler crab collection stations in most years to obtain an estimate of the exposure concentration by averaging stations within a fixed radius, averaging data within customized polygons taking into account spatial features in data, or by separately evaluating marsh and creek stations. Therefore, data for fiddler crabs and sediments from all years were grouped together and averaged within polygons that represented sample collection areas. Sometimes the polygons included multiple fiddler crab sampling stations. Multiple biota sampling stations within a polygon were averaged. Larger polygons containing multiple biological sampling stations were used when spatial variation in biota and sediment concentrations was minimal, as was observed as distance from secondary sources increased. Creek sediment and marsh sediments were also combined to more fully assess exposure.

Ten polygons were used to average fiddler crab data and are shown in Figure 7-1. In areas where clusters of sampling stations were spatially separated from other sampling locations, e.g., Blythe Island and reference stations, the size and shape of the polygons was irrelevant as long as all samples in the cluster were included in the polygon. Some sample points were used in more than one average when polygons overlapped. The fiddler crab and sediment sampling stations within each polygon are listed in Table 7-1. Although data were collected at the M-AB seep area, this station was not included in the analysis because of extremely variable sediment mercury concentrations (e.g., in 2003 sediment mercury was 0.03 mg/kg and 29 mg/kg in 2005) relative to other years and other stations within the polygon. In addition, exposure to the water pathway appears to dominate at this seep relative to sediments and the polygon only represents a very small area adjacent to the upland.

All concentration data were obtained from the baseline Ecological Risk Assessment Database dated October 5, 2009 obtained from Honeywell. Appendix K includes a data CD with a file entitled “Fiddler Crab BAFs” and provides all of the relevant database information for calculating the BAFs. Table 7-2 provides the arithmetic mean concentrations for total mercury and Aroclor 1268 in wholebody fiddler crab tissue and sediment (in mg/kg dry weight) for each polygon. In addition, percent tissue lipids in biota and percent TOC in sediments are provided to evaluate the BSAF results relative to the BAF results.

Figures 7-2 through 7-4 show the fiddler crab BAFs for mercury and Aroclor 1268 and the BSAF curve for Aroclor 1268. The graphs show that the BSAF approach (with an r^2 value of 0.326) does not appear to be a good predictor of Aroclor 1268 bioaccumulation relative to the BAF (r^2 = 0.917). This is primarily due to the lack of lipid data from some of the monitoring events, which precluded the use of BSAFs for data from those events. Therefore, the BSAF approach is not adopted; whereas, the fiddler crab BAF correlations are considered usable for estimating sediment/tissue relationships.

7.1.2 Mummichog Bioaccumulation Factors

The development of polygons for mummichogs was very similar to the methods described above for fiddler crabs. Thirteen exposure polygons were selected to maximize exposure relevance with respect to available mummichog tissue and co-located or nearby sediment data. The relative home ranges were considered and the Creek and marsh sediment stations were combined in some areas to more fully assess exposure. Figure 7-5 shows the locations and data points used for each polygon and Table 7-3 lists the sediment and mummichog sampling stations within each polygon. These data were spatially and temporally averaged to assess BAFs to the mummichog. All of the relevant data used to calculate BAFs for these polygons are provided in the file “Mummichog BAFs” on the attached CD in Appendix K.

Figures 7-6 and 7-7 show the BAF curve plots for Aroclor 1268 and mercury, respectively. Two of the more Aroclor 1268-contaminated polygons (C-6 and C-9) tend to bend the curves downward to the right; however, this is somewhat counter-balanced by some of the less contaminated polygons and contributes to overall r^2 of 0.812 for Aroclor 1268 and 0.884 for mercury, respectively.

Although the BSAF approach was also applied to the mummichogs, the curves and correlation coefficients were poor relative to the BAFs and consequently not shown. In summary, the mummichog BAFs are considered usable for estimating sediment/tissue relationships for these fish.

7.1.3 Blue Crab Bioaccumulation Factors

The development of polygons for the blue crab is much more problematic than with fiddler crabs or mummichogs in that there were only a few stations from which to plot data. Therefore, two approaches were evaluated. The first "yearly average approach" plots the yearly sediment and blue crab tissue averages from all of stations (including reference stations) resulting in 16 data pairs for Aroclor 1268 and 20 data pairs for mercury. The second "grand mean approach" calculates grand mean sediment concentrations for mercury and Aroclor 1268 from all Purvis Creek stations sampled between 2000-2007 (71 samples – see Table 4-3a). Grand mean blue crab tissue concentrations for mercury and Aroclor 1268 in all Purvis Creek samples are also calculated (91 samples – see Table 4-9a). A single BAF is calculated for mercury and Aroclor 1268 based on these grand means. Below is a summary of the results of the grand mean approach.

Media	n	Grand Mean Hg (mg/kg dw)	Hg BAF	Grand Mean A-1268 (mg/kg dw)	Aroclor 1268 BAF
Blue crab tissue	91	1.59	1.30	1.61	0.43
Sediment	71	1.22		3.78	

Figures 7-8 and 7-9 show the BAF plots for the "yearly average approach" which generated r^2 values of 0.674 and 0.606 for Aroclor 1268 and mercury, respectively. Included in these figures is a linear line representing the grand mean BAFs extending throughout the range of concentrations used to calculate the yearly average BAFs. Although both approaches produce similar curves, the grand mean BAFs were selected to be more representative of blue crab exposure in Purvis Creek, relative to the yearly average approach that included more reference area data. All of the sediment and blue crab tissue data are provided in Appendix K.

7.1.4 Finfish Bioaccumulation Factors

Two approaches were considered for the development of field-collected finfish BAFs. The first "area-weighted approach" was based on the following assumptions:

- that the fish are highly mobile and that they may visit various portions of the affected estuary (creek tributaries),
- that fish do not feed in the marsh interior during high tides,
- that the source of all Aroclor 1268 and mercury in finfish is from Site sediment (regardless of exposure route),
- assume that exposure is based on an area-weighted average for each major creek in the LCP estuary.

The sediment concentrations in the affected area were developed by averaging the concentrations in each of the major creeks and multiplying by the percent of the total creek area. For example, Purvis Creek represents 87 percent of the exposure habitat. Table 7-4 shows the area-weighted sediment concentrations of the LCP estuary that is assumed to be the source of contaminants acquired in finfish that were collected in the LCP estuary (from Purvis Creek).

The finfish BAFs are calculated by dividing the measured tissue concentrations in each fish species by the area-weighted sediment concentration and are also presented in Table 7-4.

The second "yearly average approach" calculated mean sediment and tissue concentrations from Purvis Creek, Troup Creek, and the Crescent River, resulting in 8 to 11 data pairs for Aroclor 1268 and mercury, depending on fish species. Table 7-5 summarizes the data used to develop the BAF curve plots. Supporting finfish tissue data are provided on the data CD in Appendix K with a file entitled "Finfish Tissue Data". Figures 7-10 through 7-19 show the resulting curves and r^2 values for each fish. The r^2 values are relatively good, ranging between 0.721 and 0.913.

Both of these approaches have their inherent uncertainties. The area-weighted approach results in lower BAFs because approximately 60 percent of the sediment concentration comes from only 13 percent of the total exposure area. In addition, the average sediment concentrations particularly in the Main Canal and Eastern Creek are driven by a few highly contaminated samples. The BAF curves derived from the yearly average approach result in higher BAFs because one-third to one-half of the finfish data pairs are from the reference area, rather than from the affected areas of the LCP estuary where exposure is most relevant. Because of these uncertainties, both approaches will be used to provide a range of protective sediment concentrations to finfish.

7.1.5 Cordgrass Bioaccumulation Factors

Sediment to cordgrass BAFs are used to estimate Aroclor 1268 exposures to herbivorous mammals as represented by the marsh rabbit. Mercury BAFs are not developed as mercury did not result in any risk to the rabbit. Figure 7-20 shows the Aroclor 1268 BAF and the data are provided in Appendix K. The best r^2 value that could be obtained was 0.085 which was deemed unusable. Instead, a mean BAF derived from 35 data pairs was calculated to be 0.022 (Figure 7-20).

7.2 Protective Sediment Concentrations for Receptors at Risk

This section presents estimates of the concentrations in sediment that are considered protective of ecological receptors of concern (Section 7.1) that use the LCP estuary and are based on the NOAEL and LOAEL toxicological reference values.

7.2.1 Wildlife

For the food-web assessment endpoints, the protective sediment concentrations or RGOs are calculated as follows:

$$RGO = \{[IR * (C_{sed} * BAF * f_{food}) + (IR_{sed} * C_{sed})] / BW\} \div TRV$$

Where: RGO = remedial goal option

TRV = toxicity reference value

BW = body weight of receptor

IR = Ingestion rate of COPCs

f_{food} = dietary food fraction of each prey item

BAF = bioaccumulation factor(s) of each prey item

IR_{sed} = Ingestion rate of COPCs from sediment

C_{sed} = concentration in sediment

Table 7-6 summarizes the bioaccumulation factors as derived above. The second set of fish BAFs in this table are based on the area-weighted method. Table 7-7 provides the food chain model intake parameters and Table 7-8 lists the TRVs. Table 7-9 is the percent of methylmercury in each receptor and originates from Appendix F.

Tables 7-10 through 7-15 show the calculated sediment concentrations that would result in various hazard quotients for the modeled wildlife receptors. When a hazard quotient of 1 is obtained, the table row is highlighted in yellow and the resulting sediment concentration is considered protective.

Table 7-16 provides an overall summary of the protective sediment concentrations for each receptor. The most sensitive modeled wildlife from exposure to mercury are piscivorous birds as represented by the green heron, with protective sediment concentrations ranging from about 0.44 to 2.7 mg/kg dw. The least sensitive receptors to mercury are omnivorous birds (clapper rail). Although the piscivorous river otter was not considered to be at risk from any specific exposure area (all HQs were less than 1), overall exposure to the entire Site (approximately 790 acres) results in protective sediment mercury concentrations between 1.7 and 4.2 mg/kg dw.

With respect to wildlife exposure to Aroclor 1268, the river otter was most sensitive with protective sediment concentrations ranging from 0.27 to 4.6 mg/kg dw. The least sensitive wildlife receptors to Aroclor 1268 are herbivorous mammals (e.g., marsh rabbit).

7.2.2 Finfish

Table 7-16 provides a summary of finfish HQs based on modeled EEEs and on residues observed in field-collected fish. Tables 7-17 (mercury) and 7-18 (Aroclor 1268) provide detailed calculation results and identify the protective sediment concentrations based on the models. Based on the mercury model, protective sediment concentrations are lower than those of field-collected finfish, which is consistent with the general over-prediction of mercury residues as discussed in Section 4.10.3. The finfish model for

Aroclor 1268 predicted protective sediment concentrations ranging from 1.5 to 10 mg/kg and is relatively comparable to the field-collected finfish results.

Tables 7-19 through 7-28 provide detailed calculation results for HQs based on mercury and Aroclor 1268 residues in field-collected fish. Protective mercury and Aroclor 1268 sediment concentrations based on field-collected fish generally ranged from about 1 to 3 mg/kg and from about 1 to 8 mg/kg, respectively. Protective concentrations based on field-collected striped mullet tend to fall outside these general ranges because mercury residues were lower and Aroclor 1268 residues higher compared to the other four species of fish. The reason why mullet residues vary from the other species is currently unknown but may be related to different feeding strategies, feeding behaviors and in situ exposure scenarios.

7.2.3 Benthic Invertebrates

Due to the lack of significant COPCs exposure-response relationships based on the results of over 200 sediment toxicity tests (Figures 4-5 through 4-8), the establishment of "safe" levels for benthic organisms is highly uncertain. It appears that the interactions between COPCs, organic carbon, sulfides, grain size, and other factors such as oxidization/ reduction changes in sediment chemistry, collectively confound the toxicity test results. Based on the amphipod and grass shrimp SECs (Tables 4-20 and 4-22, respectively), and in consideration of their low accuracy and predictability of adverse effects, conservatism is used to develop a range of COPCs sediment concentrations protective of invertebrates. These protective levels are weighted to the most sensitive endpoint TELs even though up to approximately 30 percent of the Site samples below the TEL still demonstrated toxicity (see Figures 4-5 through 4-8). The most sensitive endpoint for grass shrimp was embryo development rate; whereas the most sensitive endpoint for amphipods was survival. The protective sediment COPCs ranges are presented in Table 7-29. The higher end of the range is based either on the PEL or the ER-L, whichever was lowest.

Given the chemical mixtures in sediment and the confounding factors mentioned above, it is concluded that concentrations between 1.4 and 3.2 mg/kg of mercury; 3.2 to 12.8 mg/kg of Aroclor 1268; 0.8 to 1.5 mg/kg of total PAHs; and 41 to 60 mg/kg lead should be protective of benthic invertebrates.

7.3 Remedial Goal Options for Wildlife and Aquatic Receptors

7.3.1 RGOs for Wildlife

To help facilitate the selection of sediment RGOs that would be protective of the assessment endpoints, a "rule of 5" approach is used (Charters and Greenburg, 2004). This approach is based on dividing the broad range between the NOAEL and LOAEL concentrations (as presented in Table 7-16) into five intervals based on a logarithmic progression as follows:

$x1 = NOAEL * a$

$x2 = NOAEL * a^2$

$x3 = NOAEL * a^3$ = geometric mean between NOAEL and LOAEL

$x4 = NOAEL * a^4$

$x5 = NOAEL * a^5$

Where: $a = \exp[(\ln LOAEL - \ln NOAEL) / 6]$

Table 7-30 and also imbedded with the text below, provides the results of the "rule of five" approach for sediment. Ideally, the mid-point between the NOAEL and LOAEL concentrations would be a starting point as a potential cleanup value. However, a higher or lower concentration is usually selected depending on the weight of evidence and uncertainties associated with the receptor groups exposed to each medium and a variety of risk management factors such as criteria used to evaluate remedial alternatives and the potential for remedial actions themselves to cause adverse ecological impacts. For this risk assessment, the selected RGOs to protect wildlife are recommended for application to each of the specific exposure areas or domains. The selected RGOs for finfish are recommended as area-wide averages as defined in Table 7-4 (i.e., the Main Canal, Eastern Creek, the Western Creek complex and Purvis Creek combined).

For wildlife exposed to mercury, piscivorous birds and mammals are the most affected receptors. Sediment mercury concentrations from the midpoint within the "rule of 5" for piscivorous birds (e.g., herons and wood storks) are considered protective. For exposure to Aroclor 1268, piscivorous mammals are considered most sensitive. The RGO range was identified at the LOAEL and above because of the uncertainty of the less toxic effects of Aroclor 1268 relative to Aroclor 1254 from which the TRV was based (refer to Section 6.2.1 and Appendix J.2.1). Although Aroclor 1268 alone is less toxic than Aroclor 1254, it is unknown what the combined toxic effect of Aroclor 1268 with mercury and other chemical stressors would be to piscivorous mammals.

The two approaches used to estimate protective sediment concentrations in field-collected finfish (i.e., using the BAF curves and the area-weighted BAFs) resulted in a reasonable range of protective sediment concentrations between the NOAEL and LOAEL for mercury (RGO between 1 and 3 mg/kg). For Aroclor 1268, the RGO was selected near the LOAEL due to the uncertainty associated with the growth endpoint TRV relative to reproductive endpoints. Striped mullet appears to be sensitive to Aroclor 1268 and the selected RGO may not be fully protective of this species.

Sediment Remedial Goal Options
for Protection of Wildlife and Finfish
LCP Chemical, Brunswick, GA

COPCs Receptor Group	**NOAEL**	**Rule of 5 Range**					**LOAEL**	**Selected RGO Range**
Mercury mg/kg								
Omnivorous Birds	2.2	3.2	4.7	7	10	15	22	***1 - 3***
Piscivorous Birds	0.44	0.6	0.8	1.1	1.5	2.0	2.7	
Piscivorous Mammals	1.7	2.0	2.4	2.8	3.3	3.9	4.2	
Aroclor 1268 mg/kg								
Herbivorous Mammals	8	12	17	25	37	55	80	***5 - 10***
Omnivorous Mammals	4.3	6	10	14	21	32	47	
Piscivorous Mammals	0.27	0.4	0.7	1.1	1.8	2.9	4.6	
Mercury mg/kg								
Red Drum	0.73	1.0	1.3	1.7	2.2	3.0	3.95	***1 - 3***
Black Drum	0.85	1.1	1.5	2.0	2.6	3.5	4.65	
Silver Perch	0.43	0.6	0.8	1	1.4	1.9	2.55	
Spotted Seatrout	0.42	0.5	0.7	0.9	1.1	1.4	1.85	
Striped Mullet	11	14	17	21	26	32	39	
Aroclor 1268 mg/kg								
Red Drum	2.5	3.7	5.6	8.3	12.4	18.4	27.6	***3 - 6***
Black Drum	0.55	0.8	1.3	2	3	4.6	7.1	
Silver Perch	0.58	0.9	1.3	2	3.1	4.6	7	
Spotted Seatrout	0.67	1	1.5	2.3	3.5	5.3	8	
Striped Mullet	0.39	0.5	0.8	1.1	1.5	2.1	3	

Finfish RGOs are based on residues in field-collected finfish.

7.3.2 RGOs for Benthic Invertebrates

Benthic invertebrates in the LCP estuary provide important ecological structure and function. Based on the discussion in Section 7.2.3, the recommended RGOs (in mg/kg dw) are:

• Mercury	1.4 – 3.2	(2.1)
• Aroclor 1268	3.2 – 12.8	(6.4)
• Total PAHs	0.8 – 1.5	(1.1)
• Lead	41 – 60	(50)

The values in parentheses represent the geometric mean on the range.

As mentioned previously, the development of protective levels and RGOs for benthic invertebrates is highly uncertain with poor accuracies. Consequently only conservative assumptions were used to estimate protective levels.

Final implementation or modification of the wildlife and/or finfish RGOs to reduce ecological risks will be dependent on the feasibility study of remedial alternatives.

Of primary concern to the LCP estuary is the reduction of long-term chronic risks to fish populations and consumers of fish. Because mercury and Aroclor 1268 tend to biomagnify up the food chain, predictions of protective sediment concentrations necessitate conservatism. The TRVs applied to methylmercury and Aroclor 1268 (which is largely based on other more toxic forms of aroclors) are conservative. These TRVs, along with other conservative assumptions used in this risk assessment, are expected to minimize the high uncertainties of biotransformation (in the case of methylmercury) and biomagnification to the highest sensitive trophic levels that may utilize the LCP estuary.

Continued long-term monitoring of fish tissues should provide trends related to risk-reduction activities. Sediment toxicity tests may continue every few years as they could demonstrate trends in toxic effects; however, such tests should be accompanied by a full suite of sediment chemistry that includes other chemical/physical parameters (e.g., sulfides, TOC, paste pH, oxidation/reduction potential, grain size) to assist in better interpretative value. Although benthic community monitoring has not been performed on a regular basis, it could, if properly designed and well executed, provide another line of evidence for community recovery.

7.4 Protective Surface Water Concentrations

Mercury and Aroclor 1268 in surface water of the LCP estuary occasionally exceed their respective State water quality standards and may pose a risk to aquatic life (Section 4.2.1). The risk to wildlife from the surface water pathway is minimal relative to prey and sediment ingestion (Section 4.11). Although there may be seeps or contaminated groundwater upwelling into the estuary, there is no indication that State of Georgia water quality standards would not be protective of aquatic life. Therefore, it is unnecessary to establish an RGO for surface water that would be more protective than the State standards.

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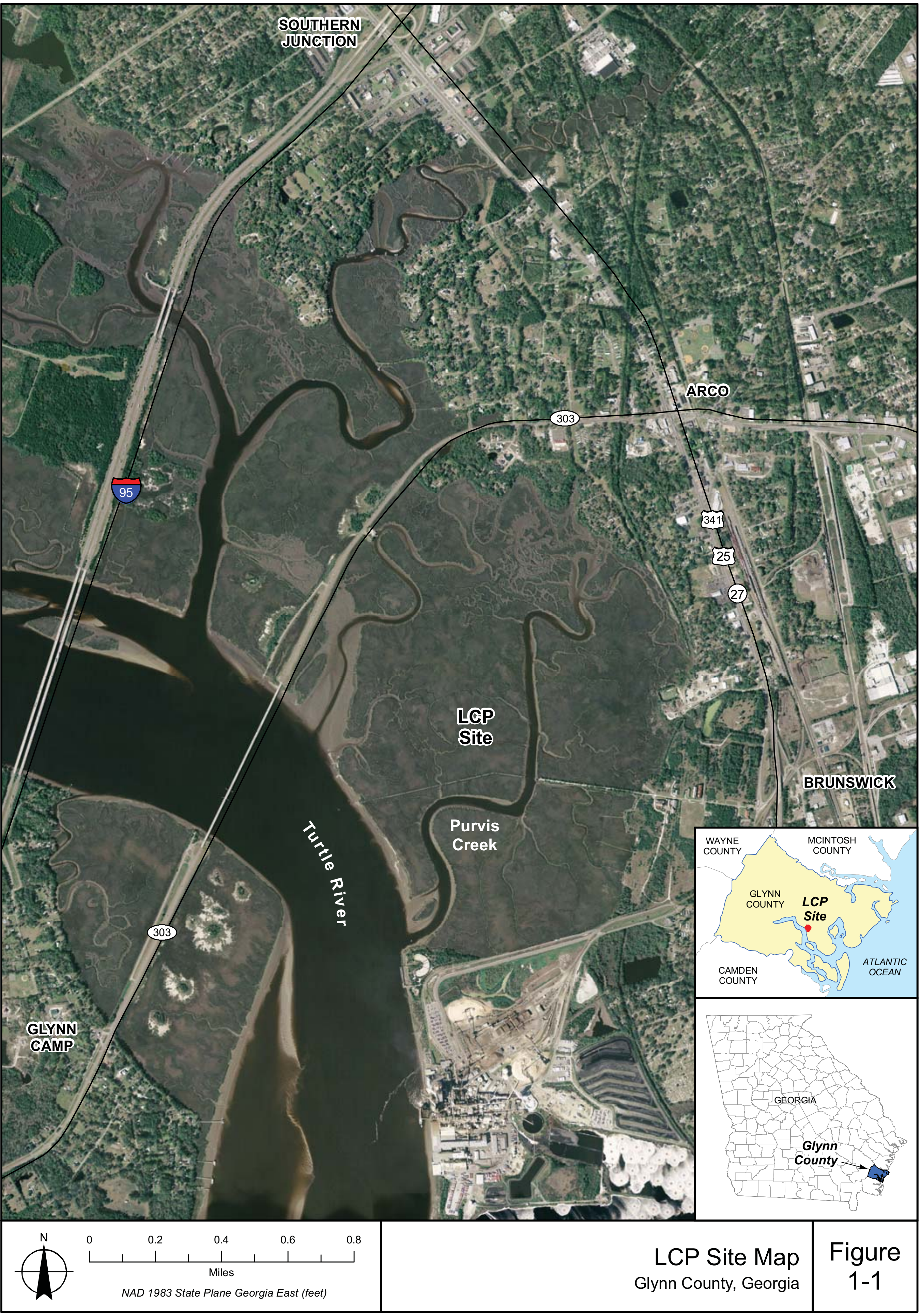
FIGURES

November 8, 2010



LCP Site Map
Glynn County, Georgia

Figure 1-1

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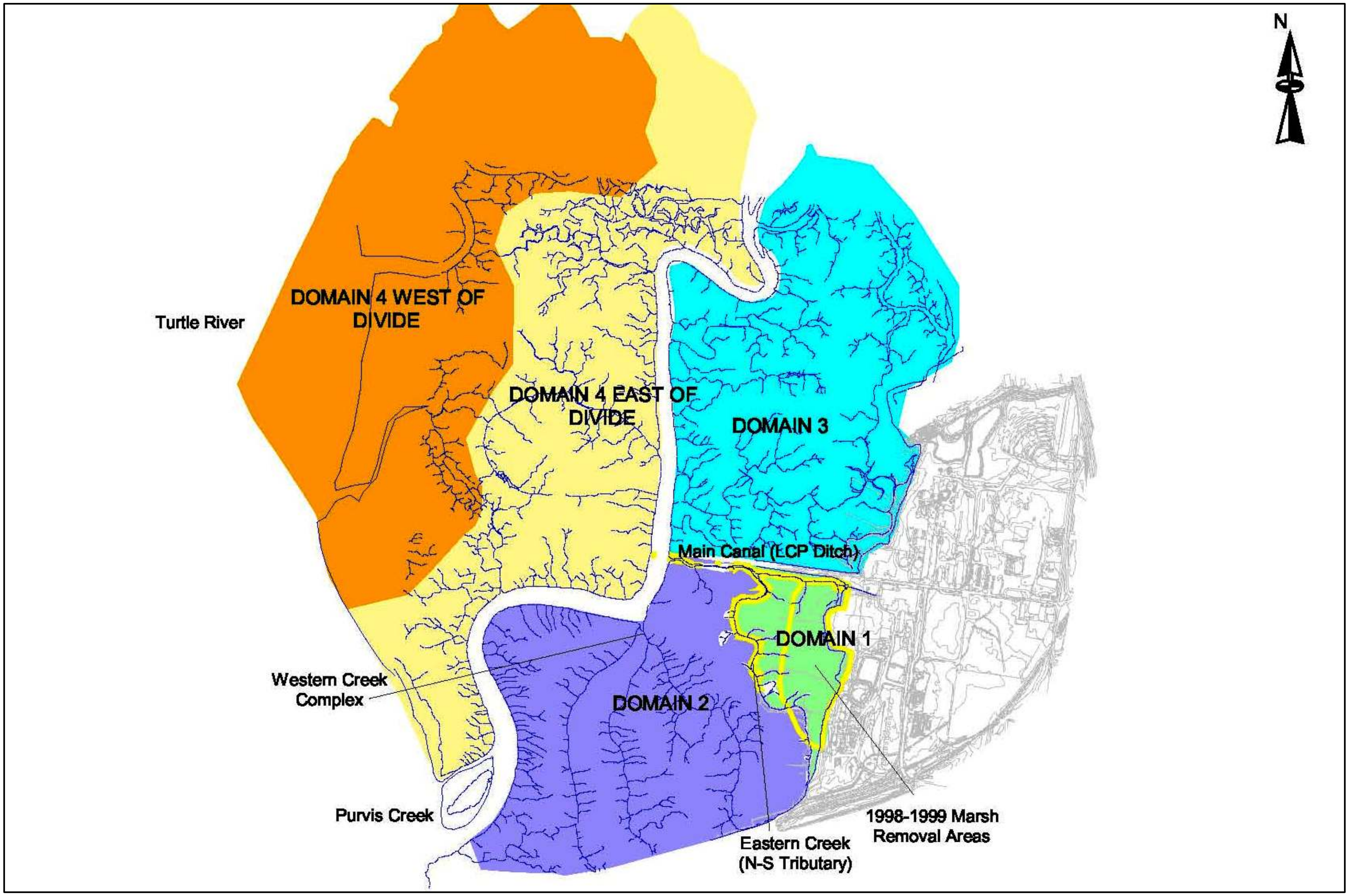


Figure 3-1_ Domains and selected features of estuary at LCP Site.

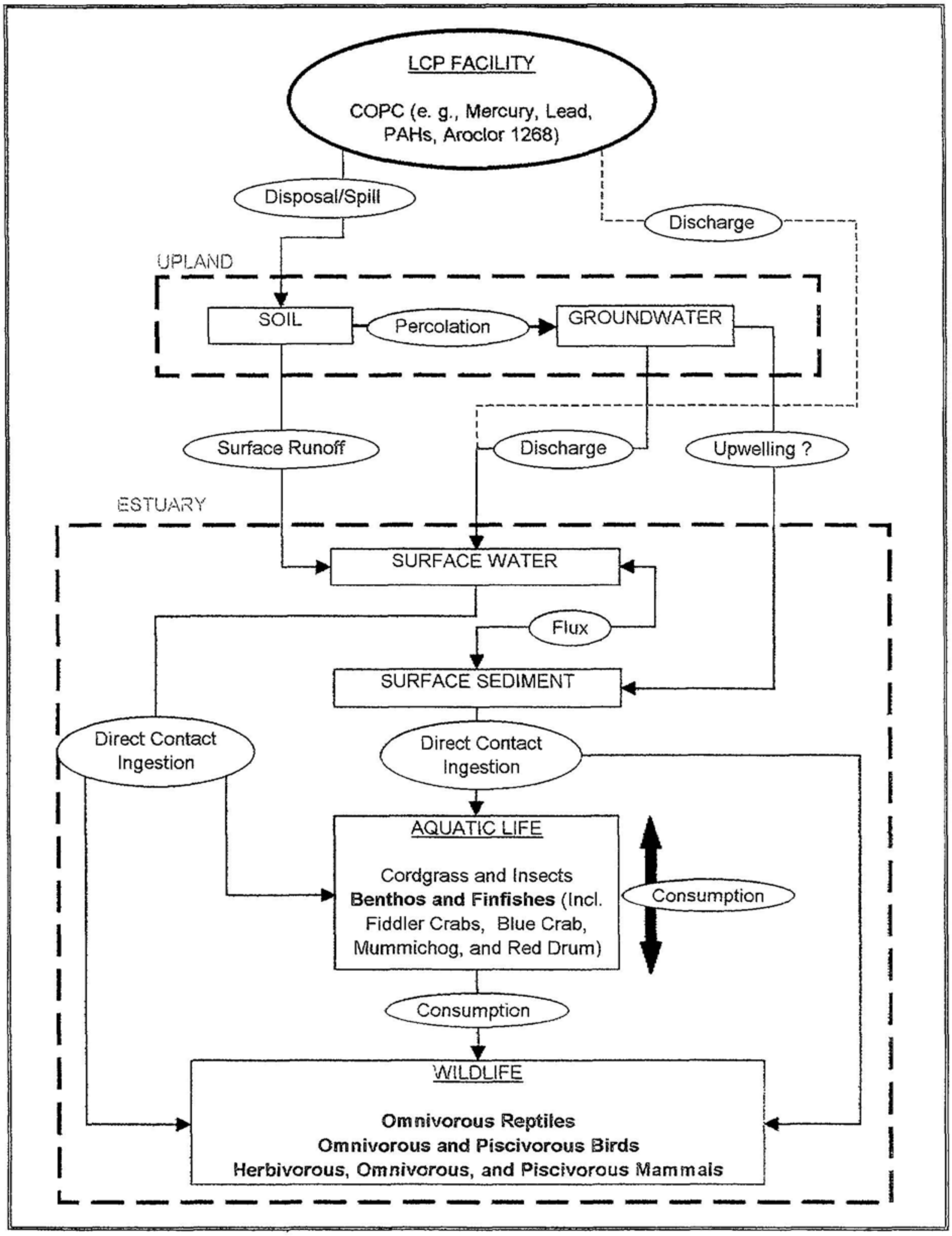
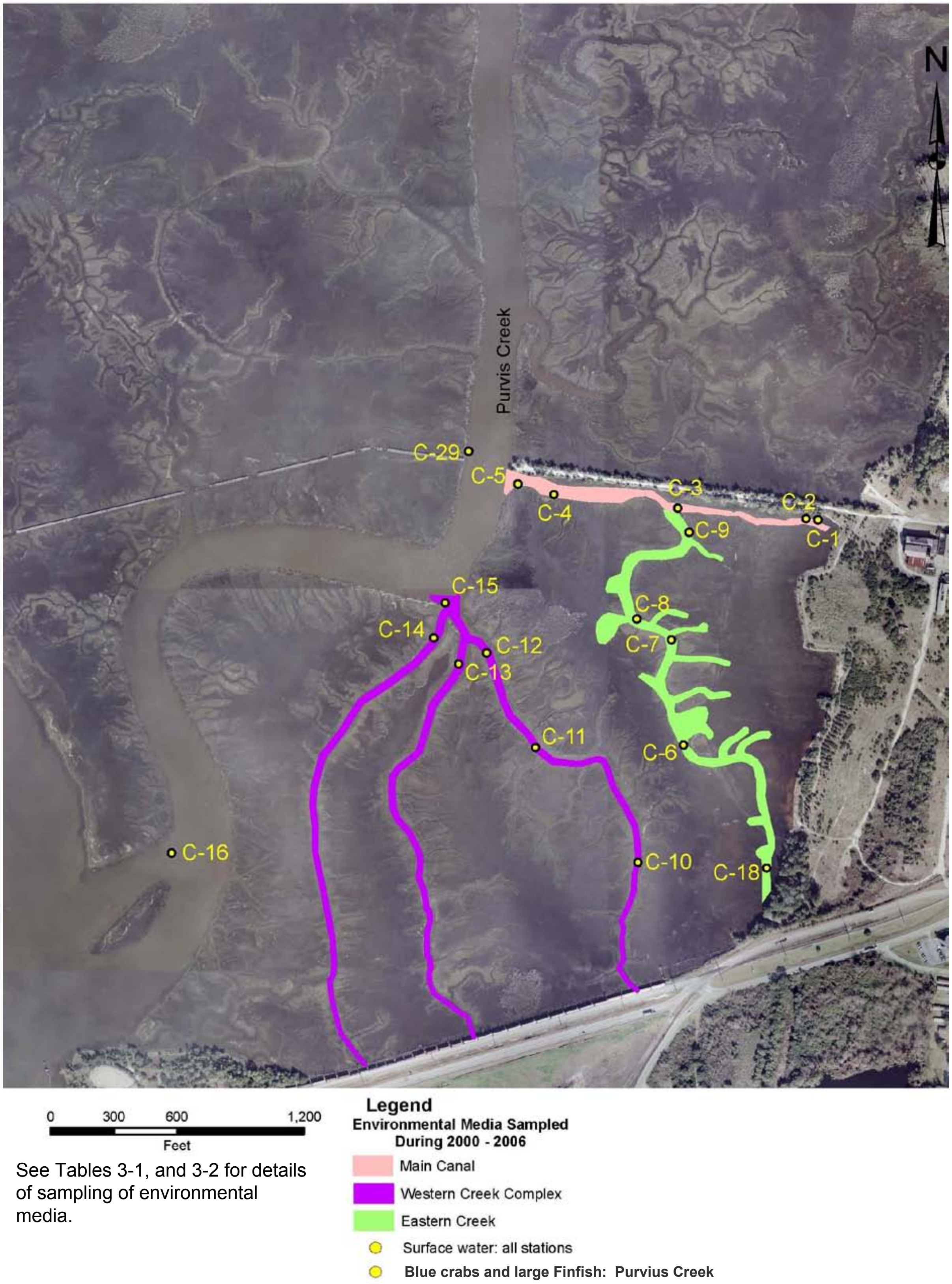


Figure 3-2. Historical conceptual site model (including exposure pathways) for chemicals of potential concern (COPC) in the estuary at LCP Site.

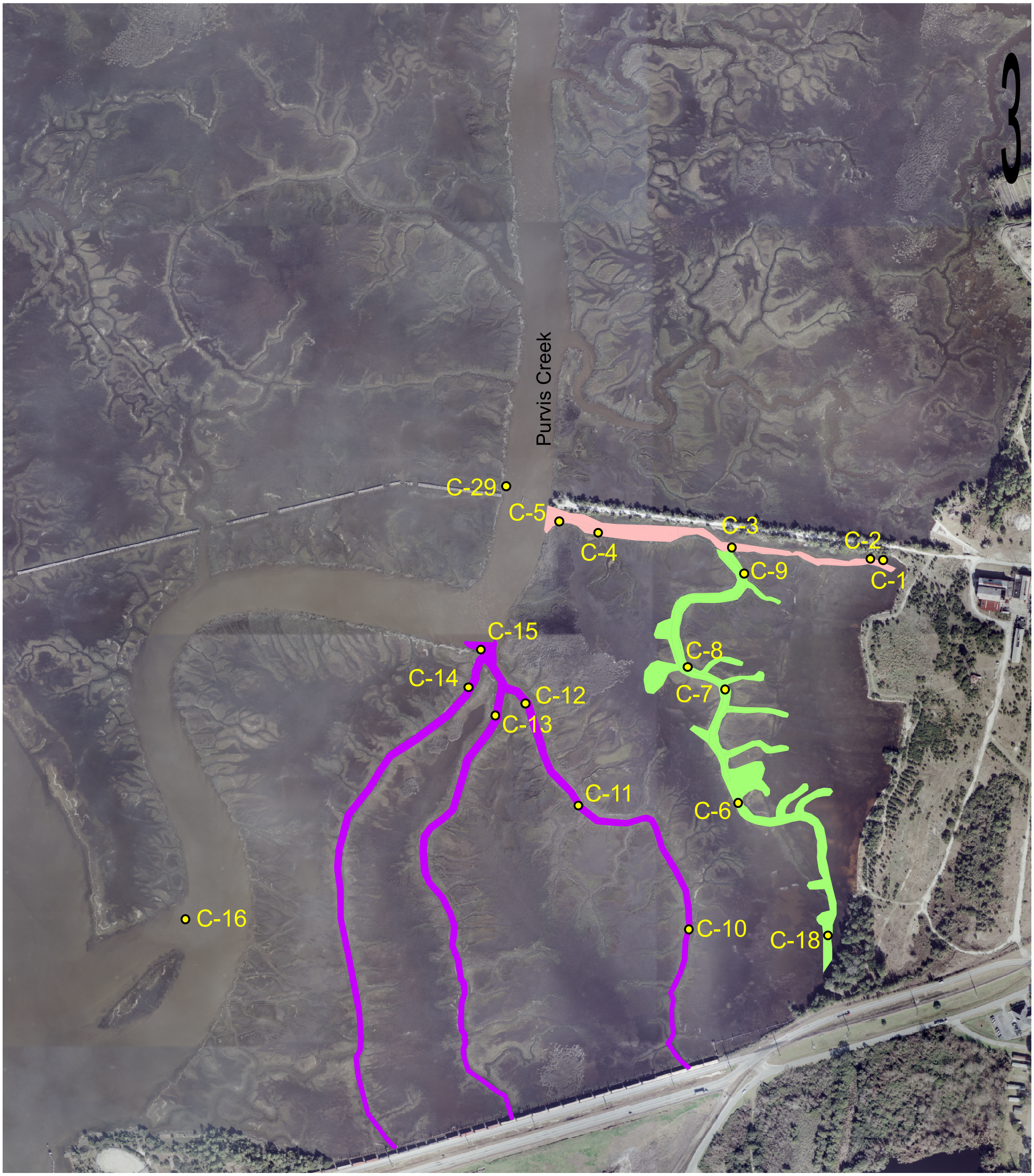
Aquatic life and wildlife identified by regular print will be directly evaluated for their relationship to assessment endpoints, which are reflected in bold print.

Figure 3-3. Locations of sampling stations for surface water of major creeks and associated biota in estuary at LCP Site.



See Tables 3-1, and 3-2 for details of sampling of environmental media.

Figure 3-4. Locations of sampling stations for surface sediment water of major creeks and associated biota in estuary at LCP Site.



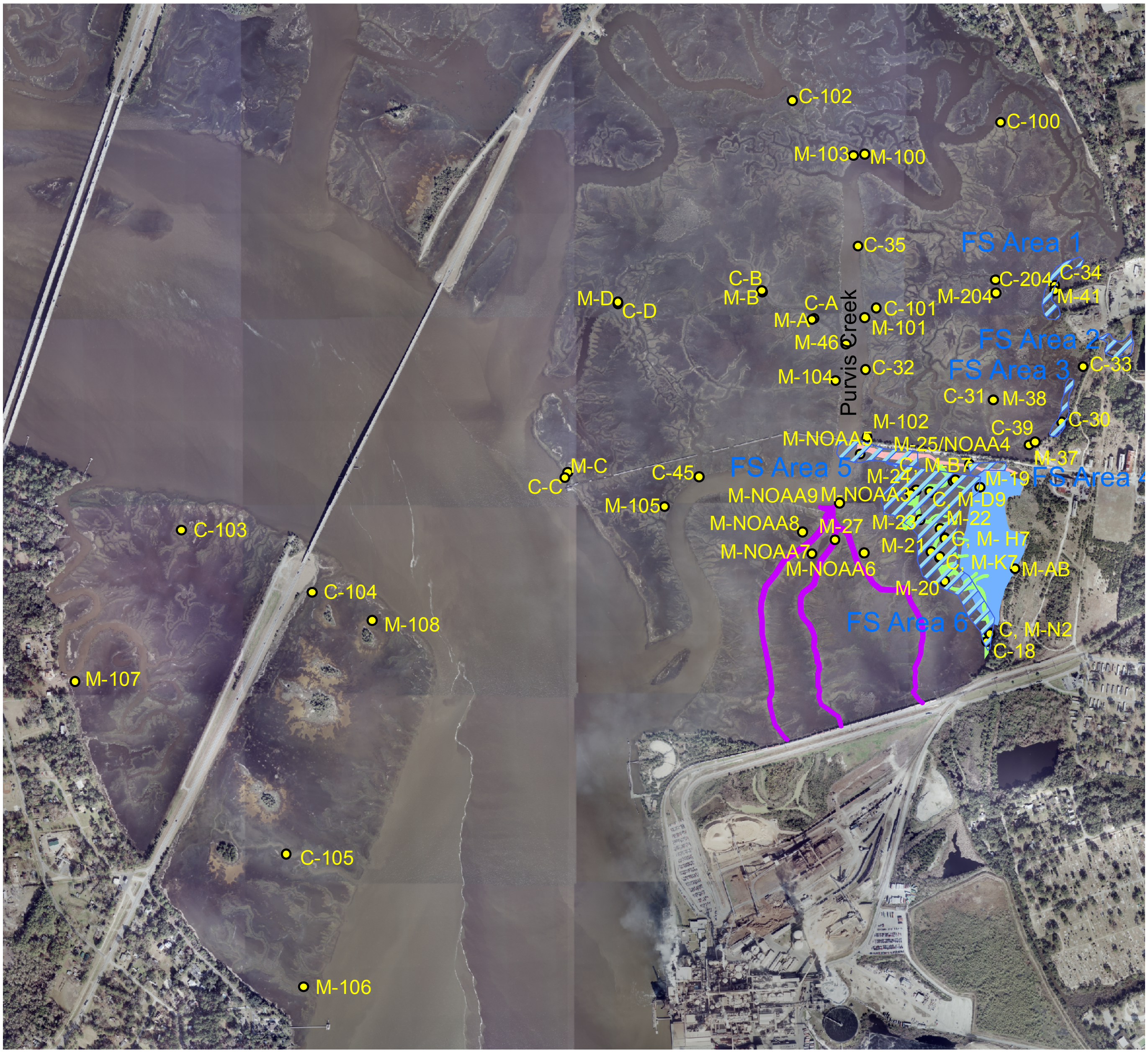
See Table 3-1 for details of sampling of environmental media.

Legend

Environmental Media Sampled During 2000 - 2006

- 🟥 Main Canal
- 🟪 Western Creek Complex
- 🟩 Eastern Creek
- ● Surface water: all stations
- ● Blue crabs and large Finfish: Purvis Creek
- ● Mummichogs: selected stations

Figure 3-5_Locations of sampling stations for surface sediment of marsh creeks and associated biota in estuary at LCP Site.



See tables 3-1, 3-3 and 3-4 for specific stations where biota were collected annually

Legend

Environmental Media Sampled During 2000 - 2006

- 🟥 Main Canal
- 🟪 Western Creek Complex
- 🟩 Eastern Creek
- 🟦 March Grid
- ▨ FS Areas

- ● Surface sediment: all stations
- ● Benthic macroinvertebrates: selected stations
- ● Cordgrass: selected stations
- ● Eastern oysters: selected stations
- ● Fiddler crabs: selected stations
- ● Grass shrimp: selected stations

Figure 4-1_Concentrations of total organic carbon (TOC) and chemicals of potential concern (COPCs) in surface sediment at continuously monitored sentinel stations in major creeks of estuary at LCP Site (2000 - 2007 data)

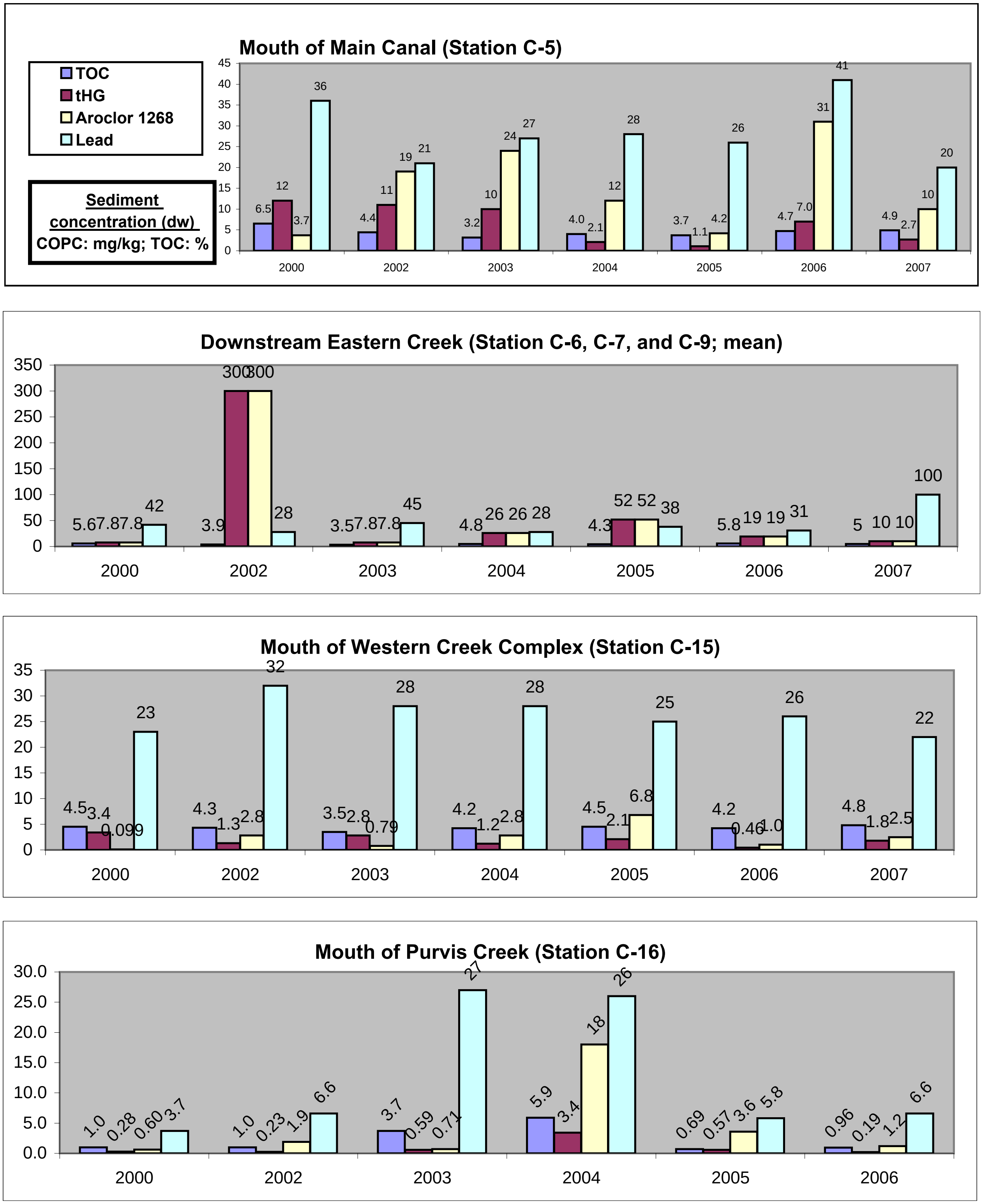
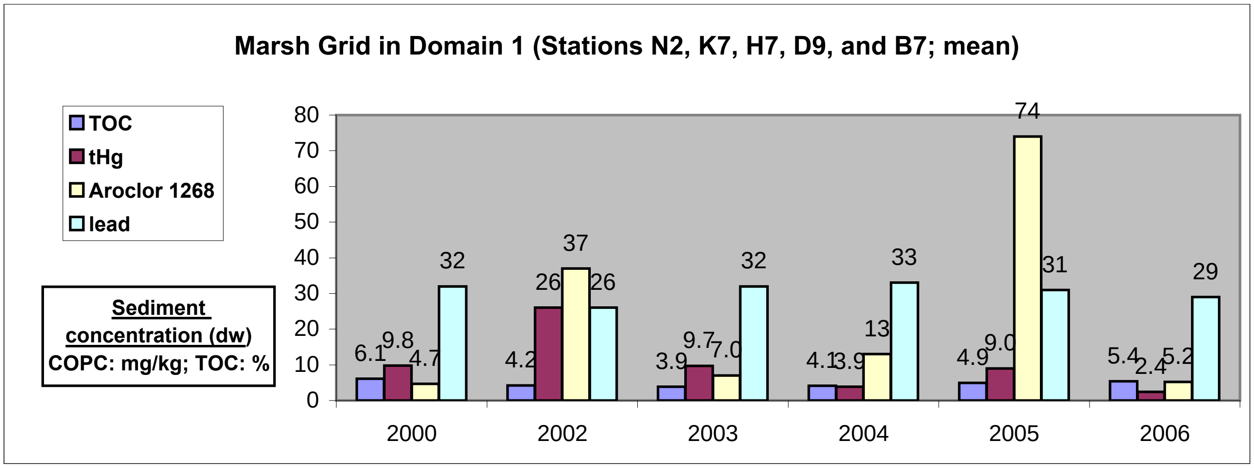
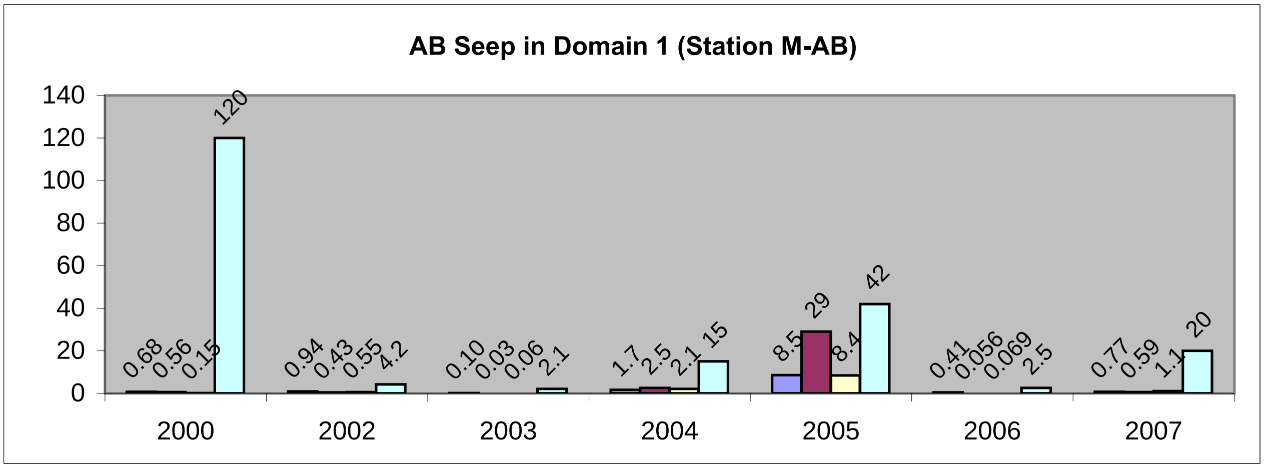


Figure 4-2_Concentrations of total organic carbon (TOC) and chemicals of potential concern (COPCs) in surface sediment at continuously monitored sentinel stations in marsh of estuary at LCP Site (2000 - 2007 data)


Marsh Grid in Domain 1 (Stations N2, K7, H7, D9, and B7; mean)

Sediment concentration (dw)
COPC: mg/kg; TOC: %


AB Seep in Domain 1 (Station M-AB)

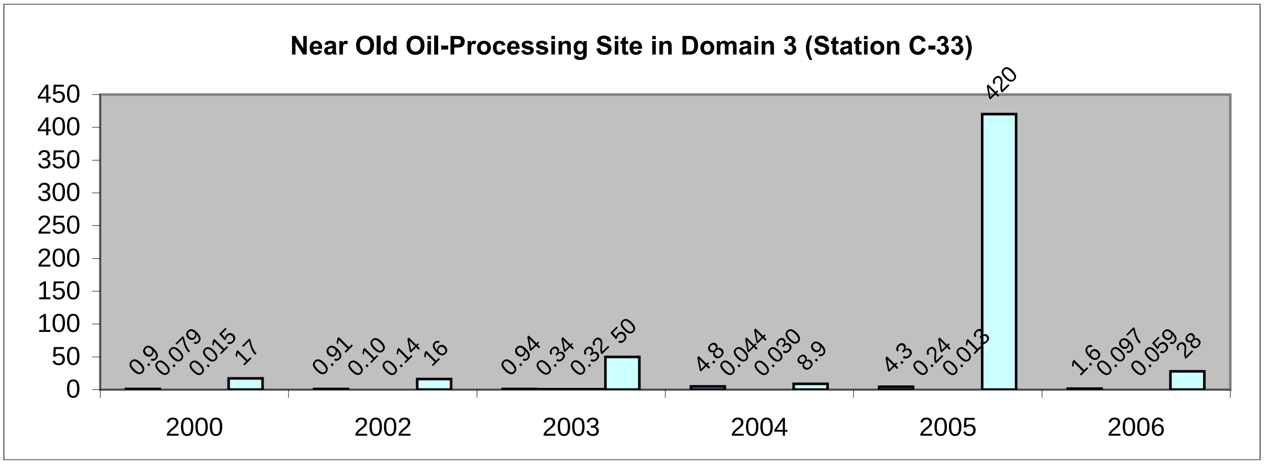
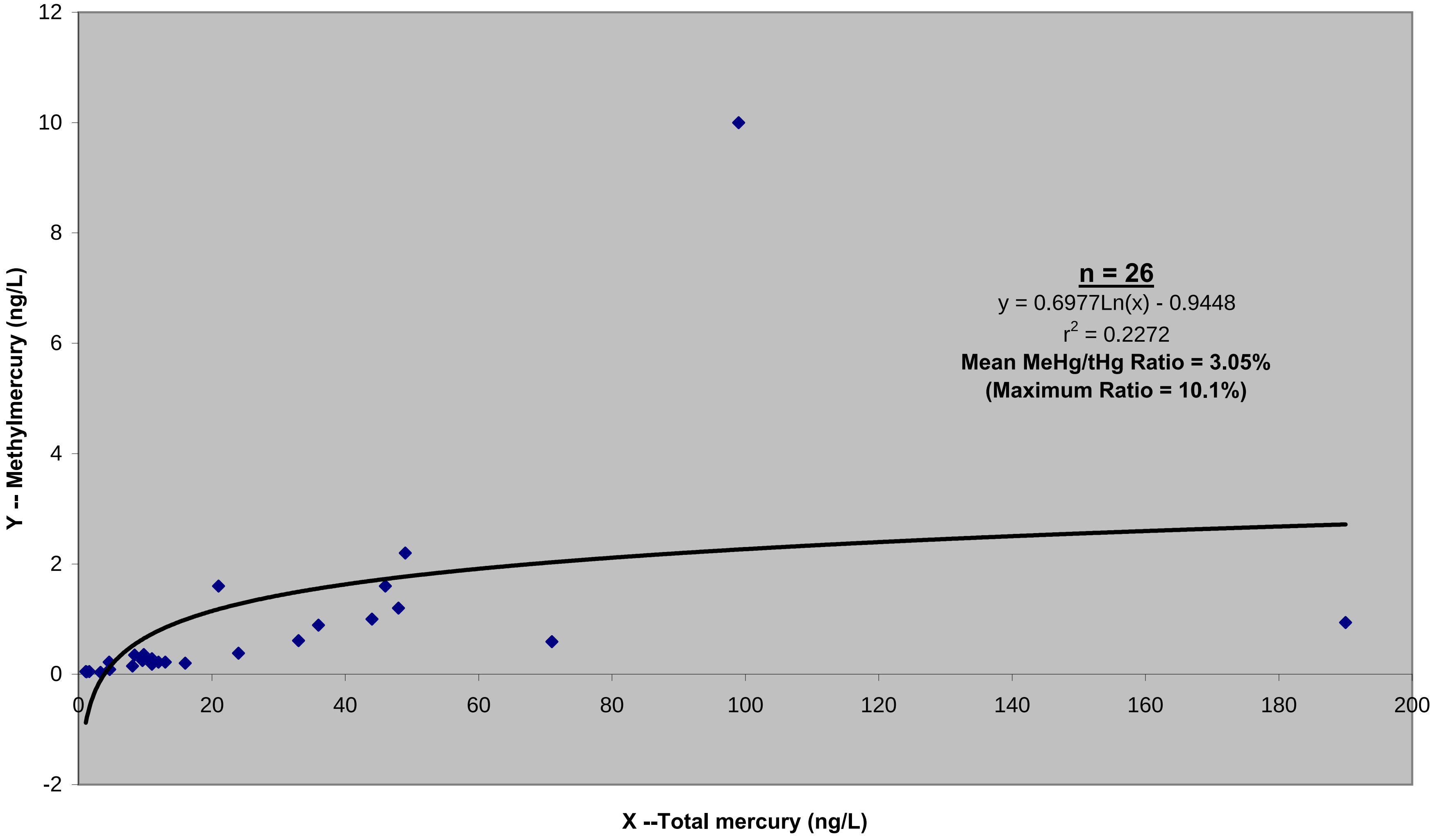

Near Old Oil-Processing Site in Domain 3 (Station C-33)

Figure 4-3_ Relationship between concentrations of total mercury and methylmercury in surface water of major creeks of estuary at LCP Site (2000 - 2005 data)



n = 26

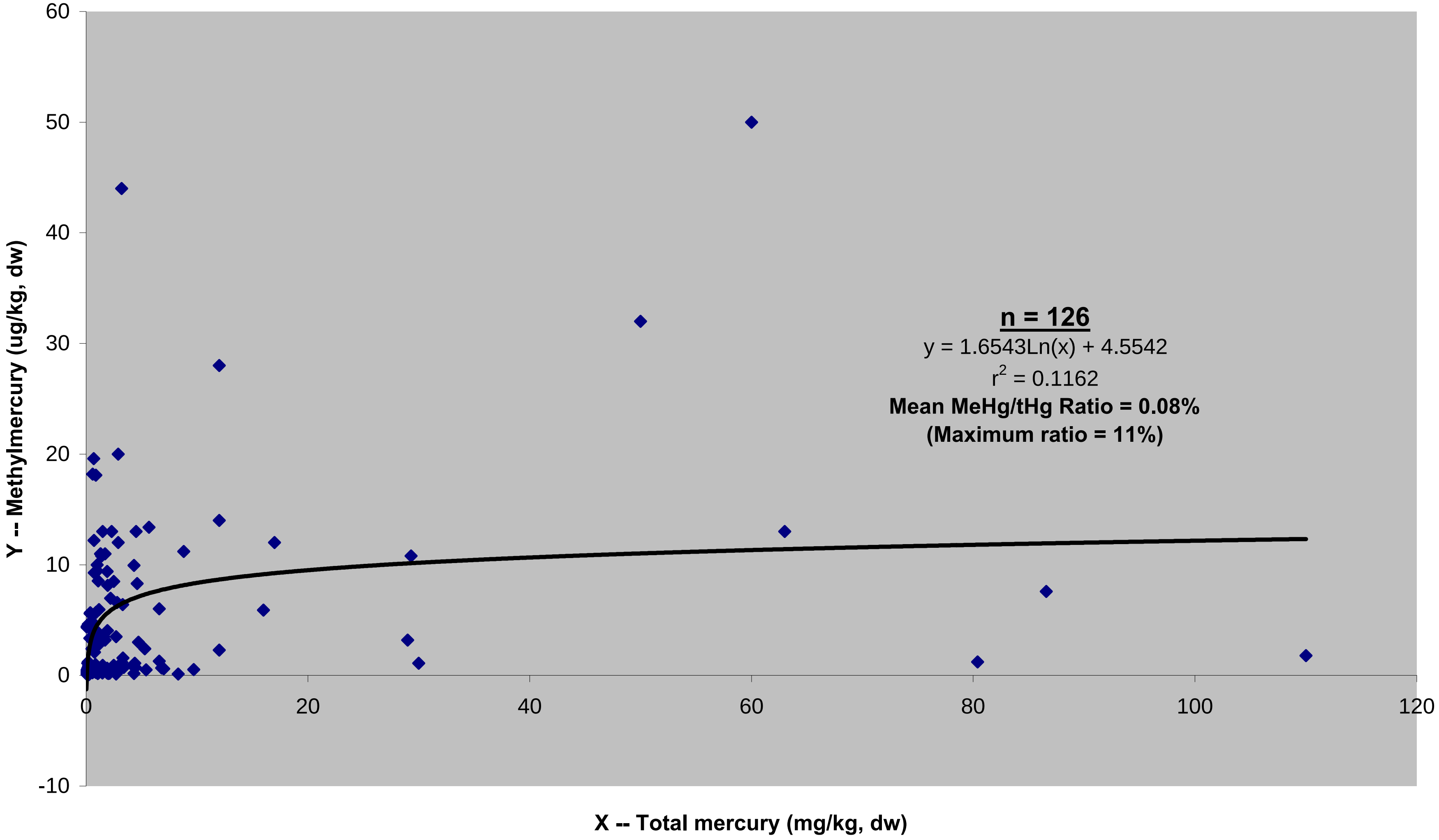
y = 0.6977Ln(x) - 0.9448

$r^2 = 0.2272$

Mean MeHg/tHg Ratio = 3.05%

(Maximum Ratio = 10.1%)

Figure 4-4_ Relationship between concentrations of total mercury and methylmercury in creek and marsh surface sediment of estuary at LCP Site (2000, 2005 and 2007 data)



n = 126

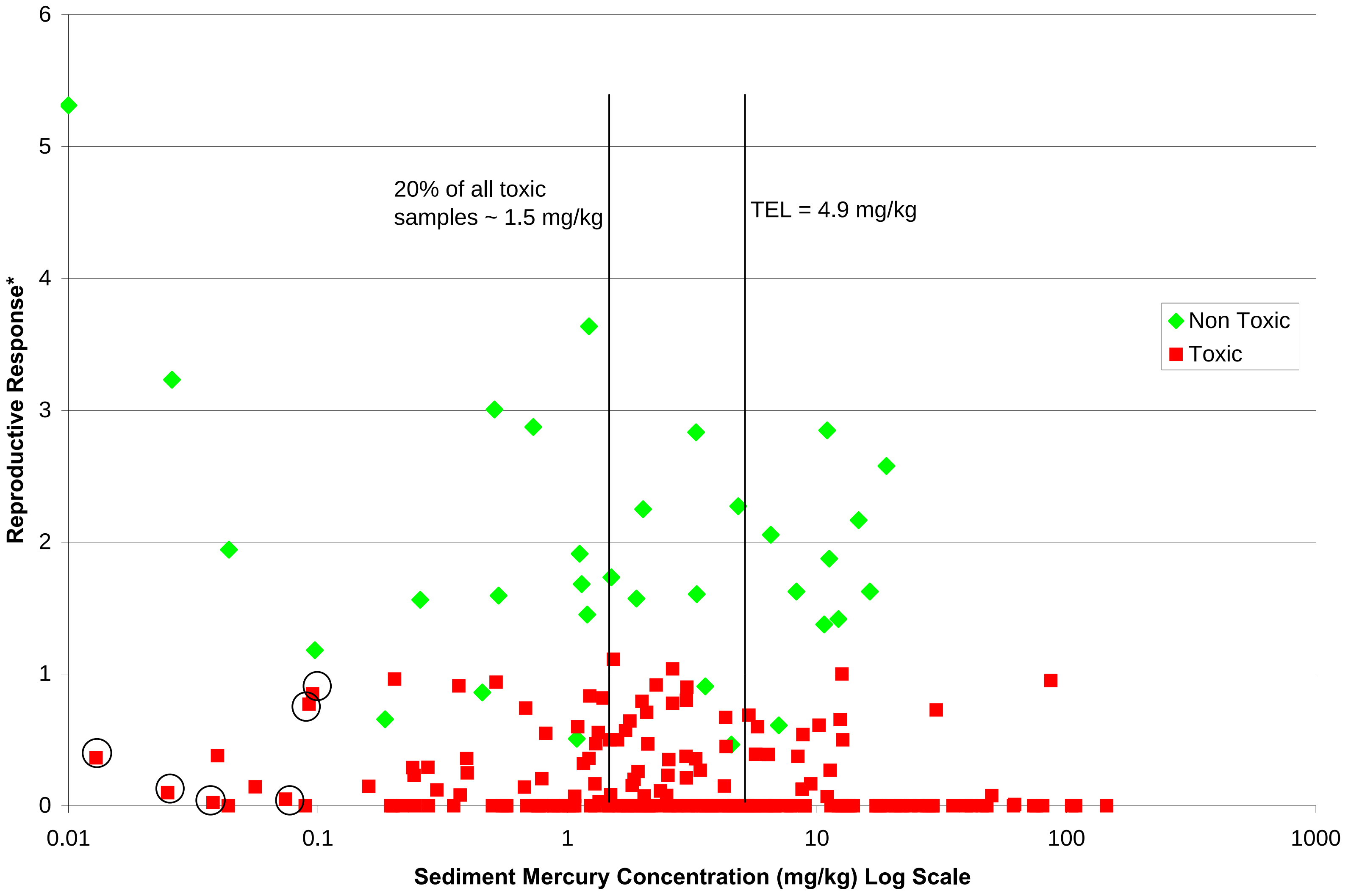
$y = 1.6543\ln(x) + 4.5542$

$r^2 = 0.1162$

Mean MeHg/tHg Ratio = 0.08%

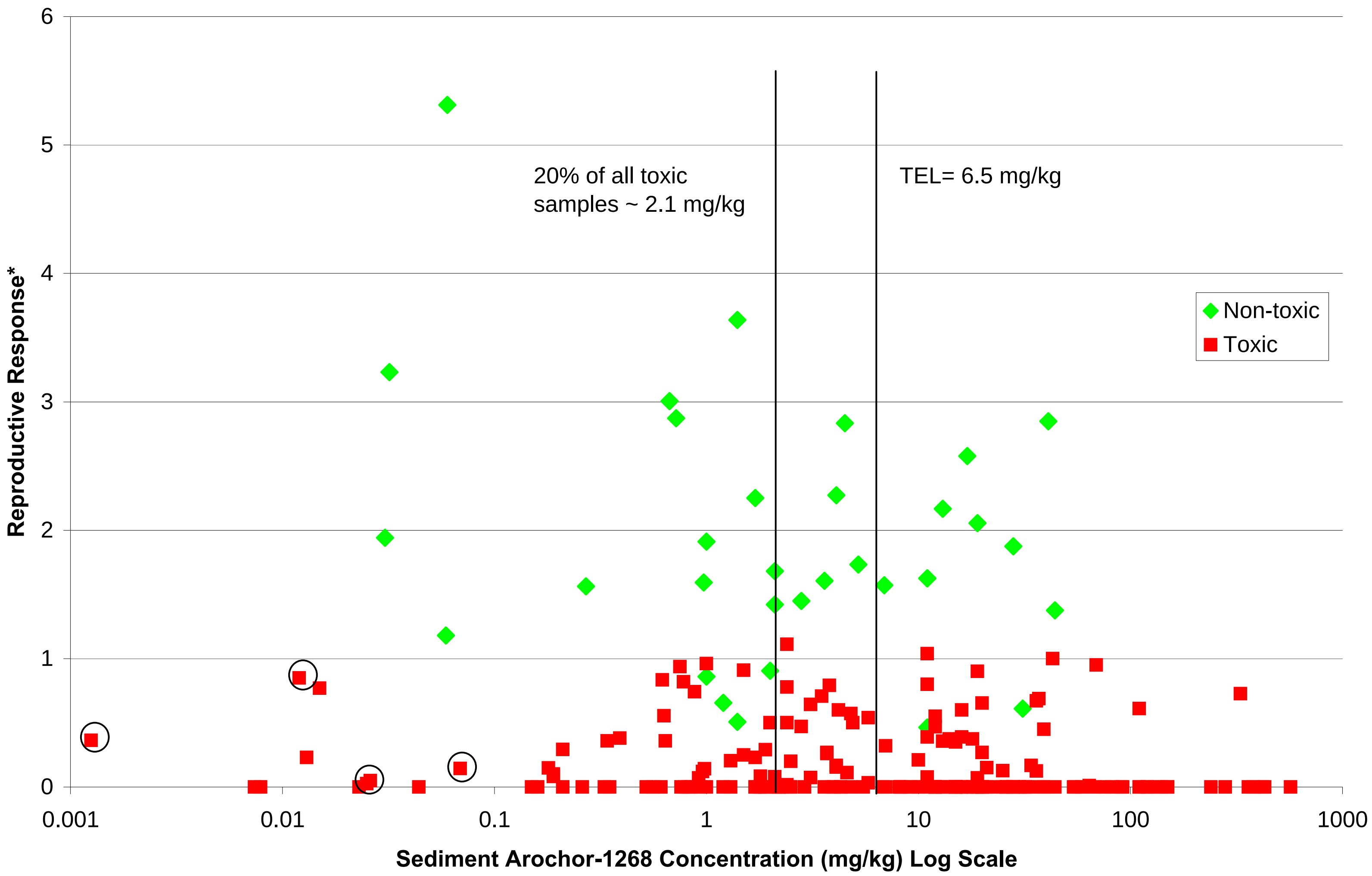
(Maximum ratio = 11%)

Figure 4-5
Amphipod reproductive response - mercury exposure



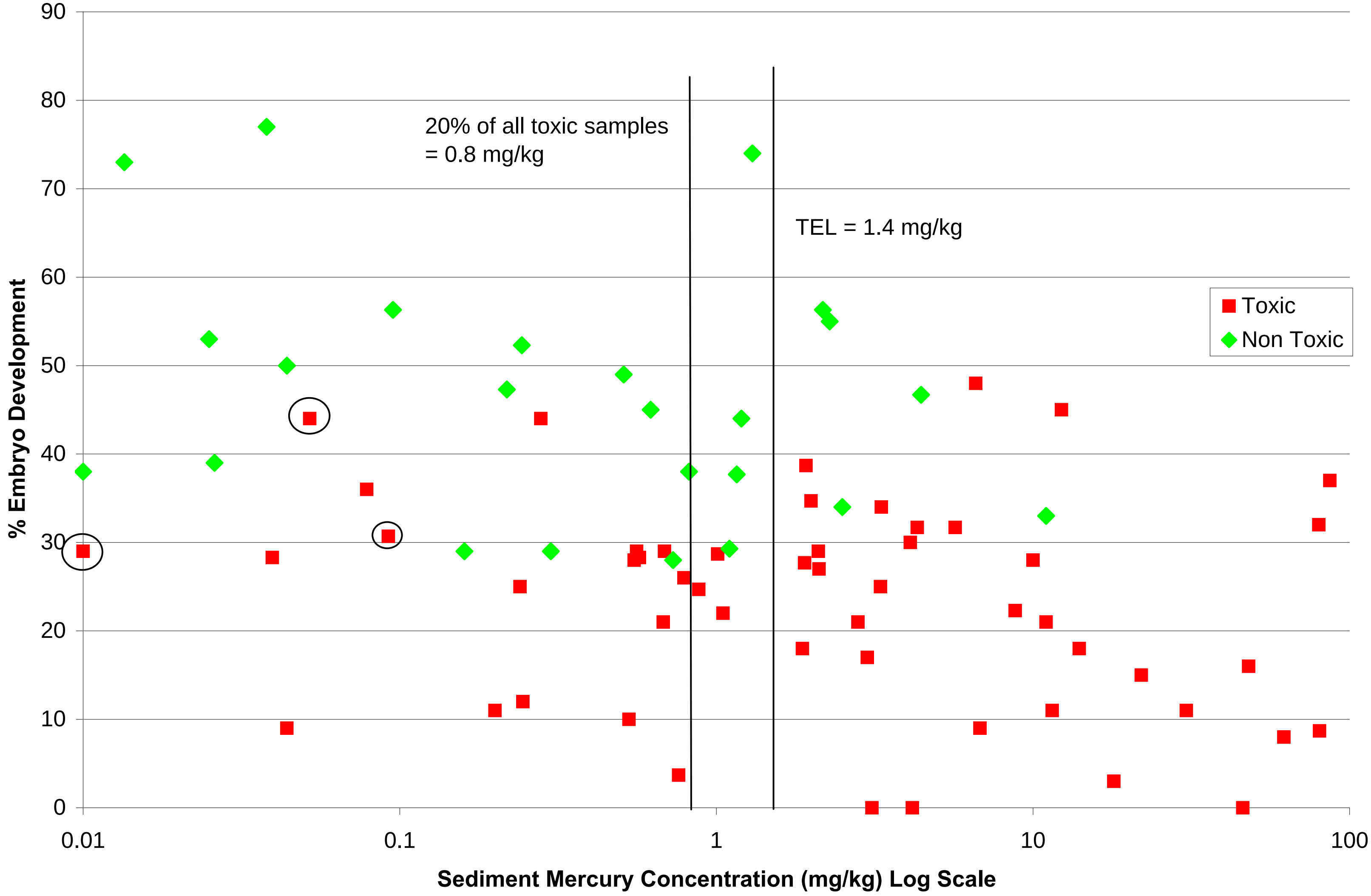
* Reproductive response is calculated as 1/2 the number of juveniles produced divided by the number of surviving adult females.
** The circles represent toxic reference stations.

Figure 4-6
Amphipod reproductive response - Aroclor 1268



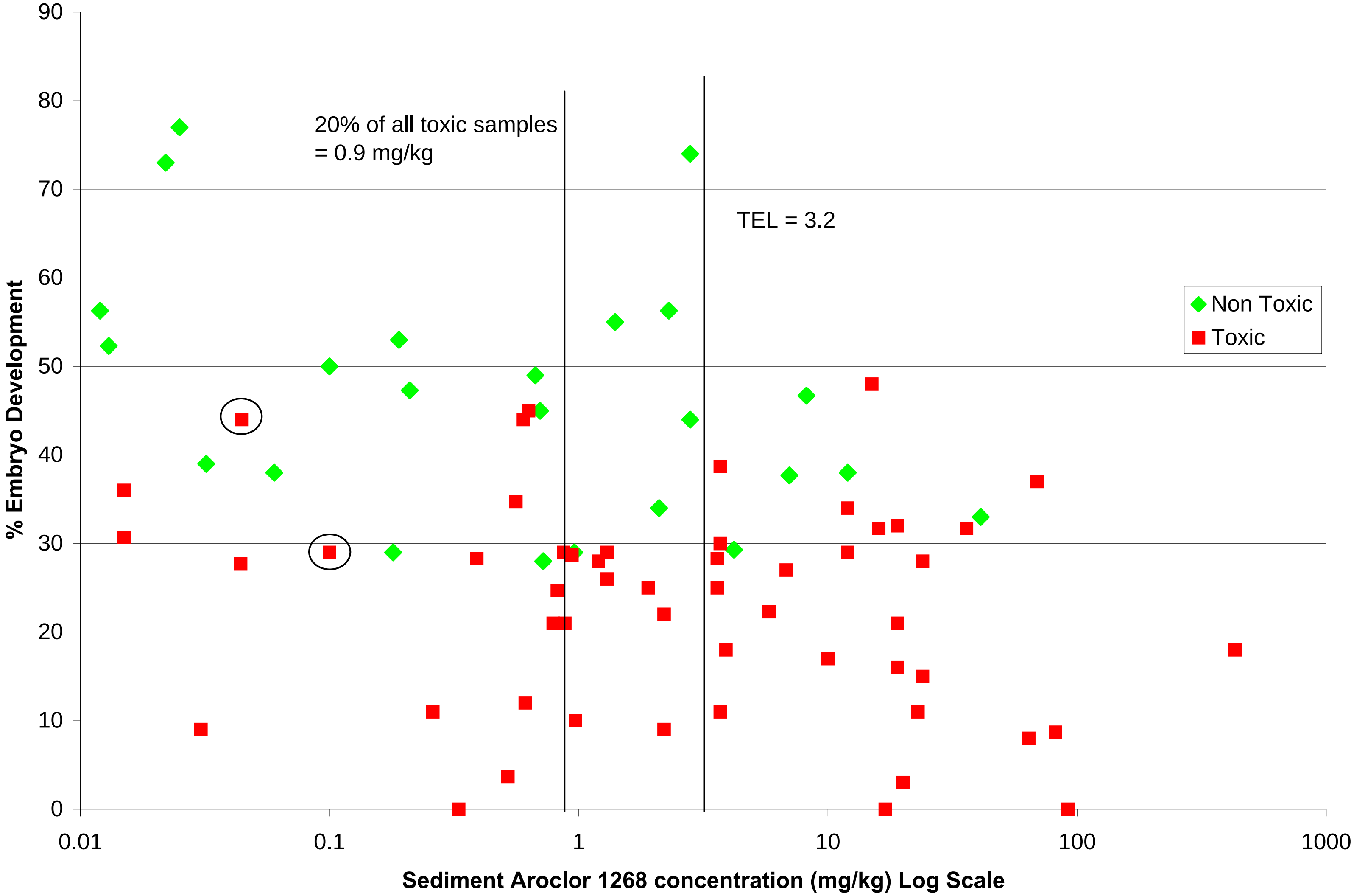
* Reproductive response is calculated as 1/2 the number of juveniles produced divided by the number of surviving adult females.
** The circles represent toxic reference stations.

Figure 4-7
Grass shrimp embryo development rate - mercury exposure



* The circles represent toxic reference stations.

Figure 4-8
Grass shrimp embryo development rate - Aroclor 1268 exposure



* The circles represent toxic reference stations.

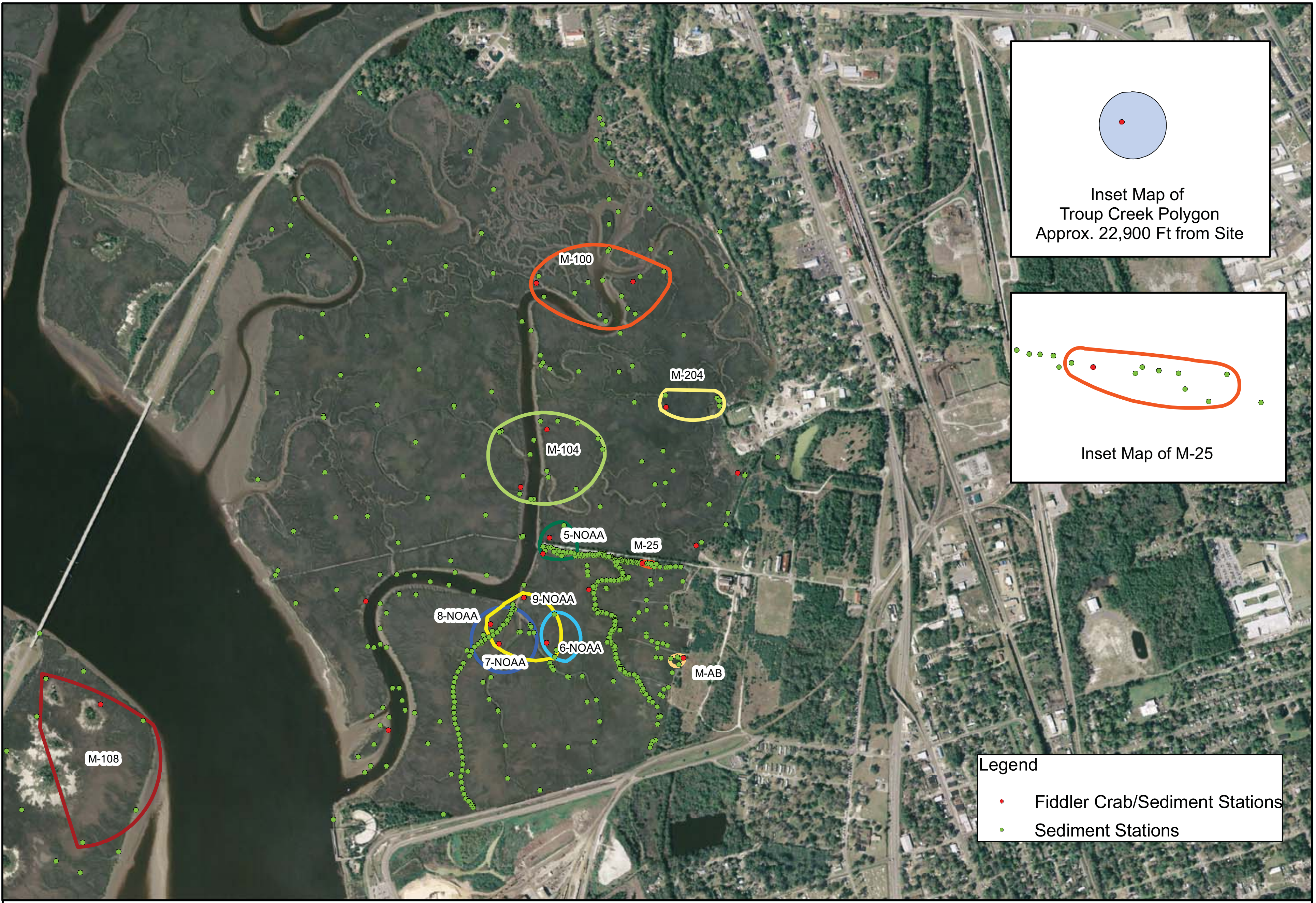


Figure 7-1 - LCP estuary sampling stations for fiddler crab polygons

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Figure 7-2
Fiddler crab mercury BAF

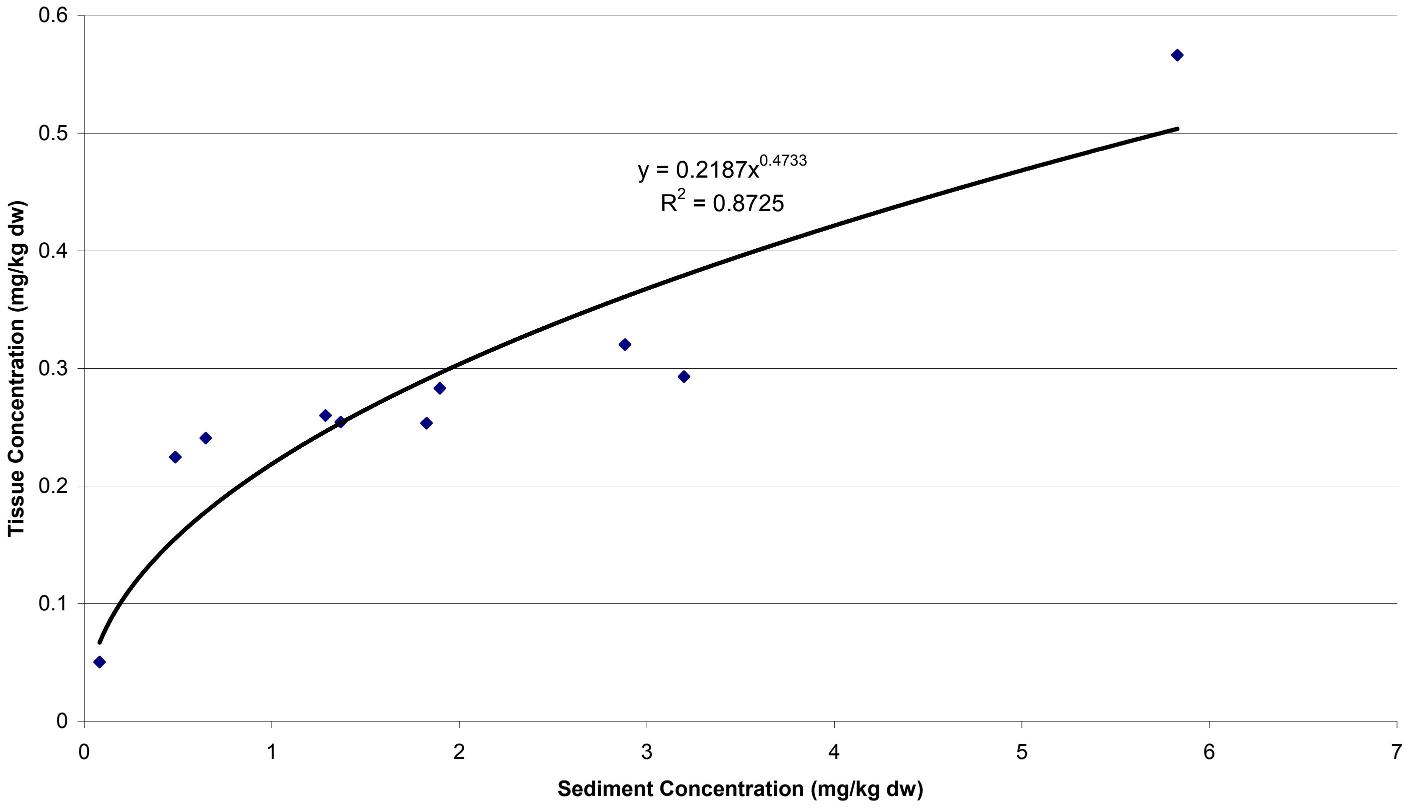


Figure 7-3
Fiddler crab Aroclor 1268 BAF

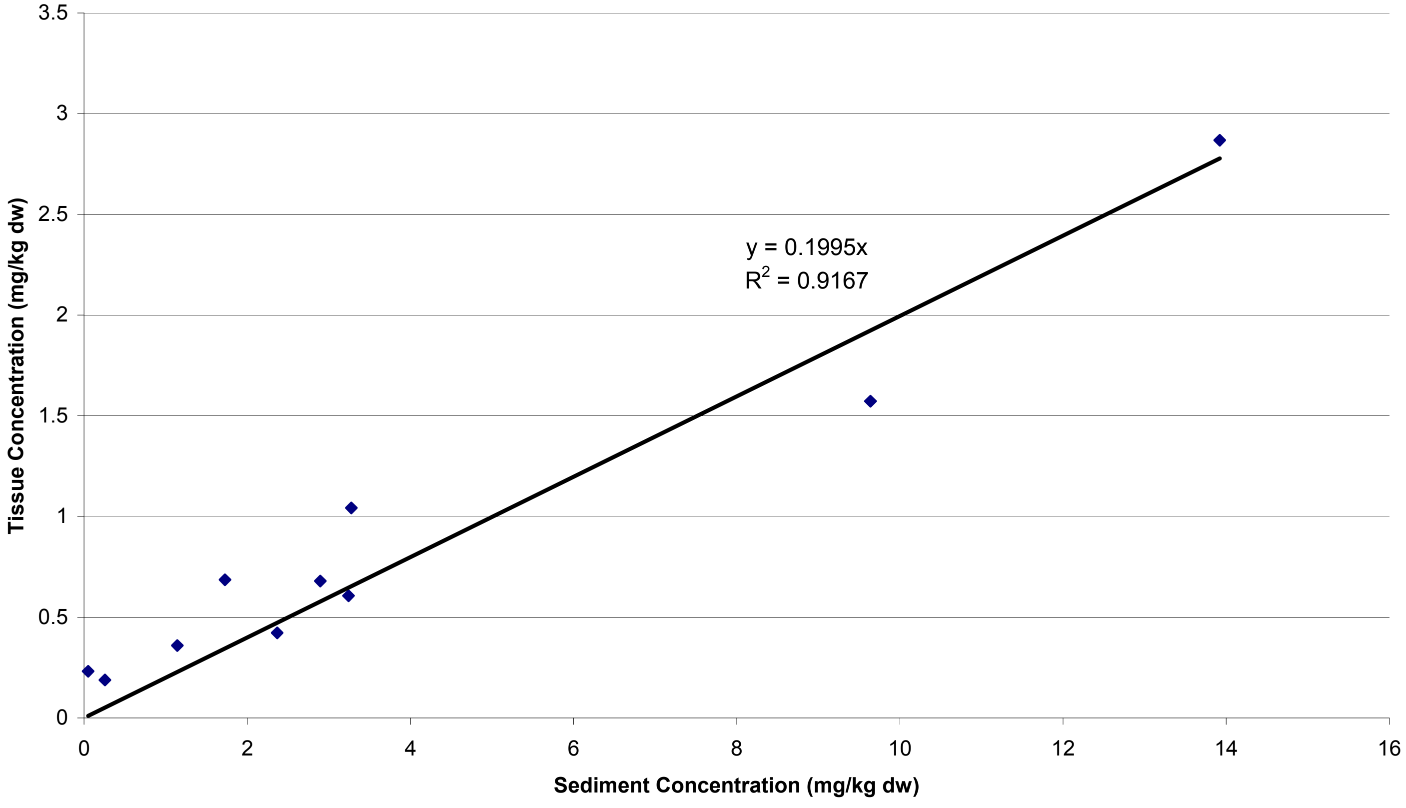
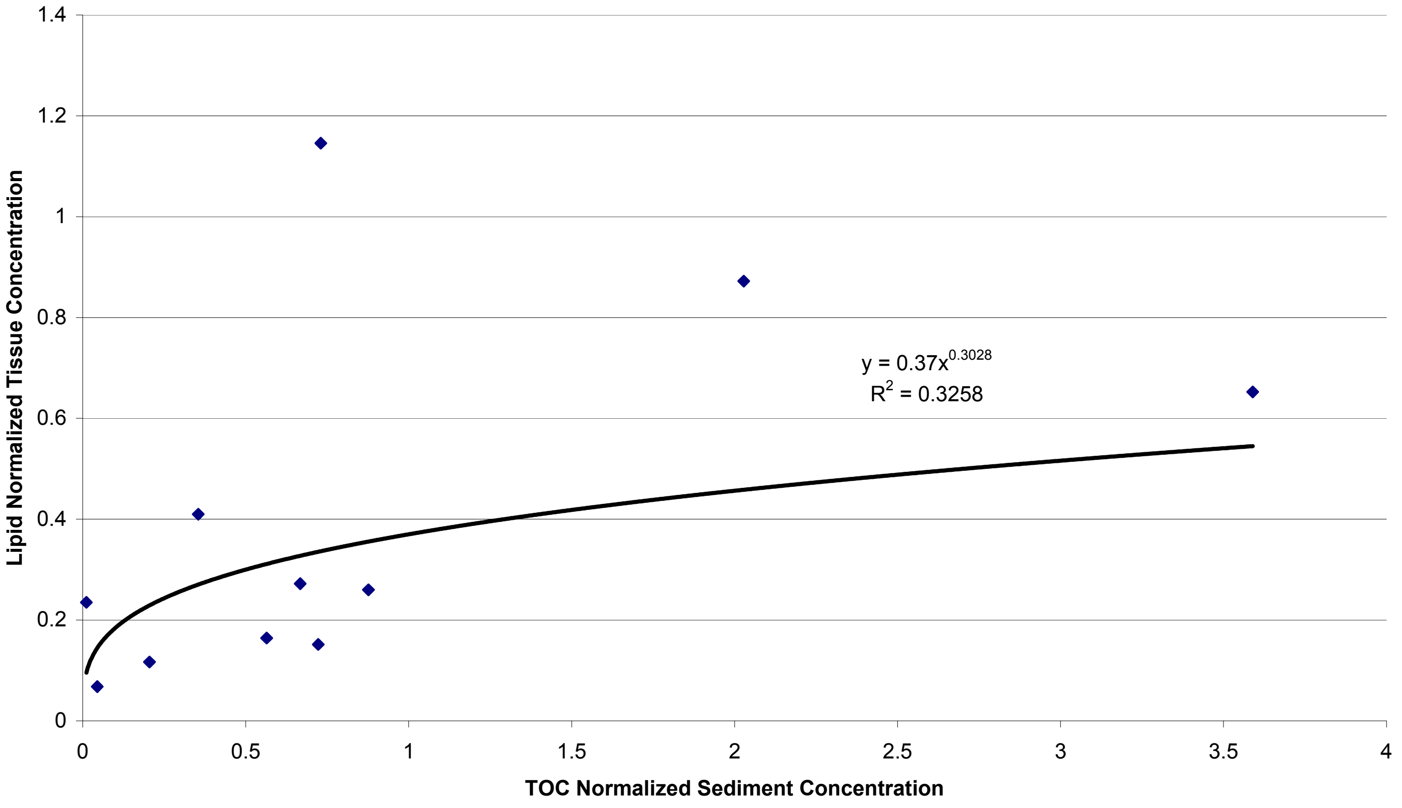


Figure 7-4
Fiddler crab Aroclor 1268 BAF



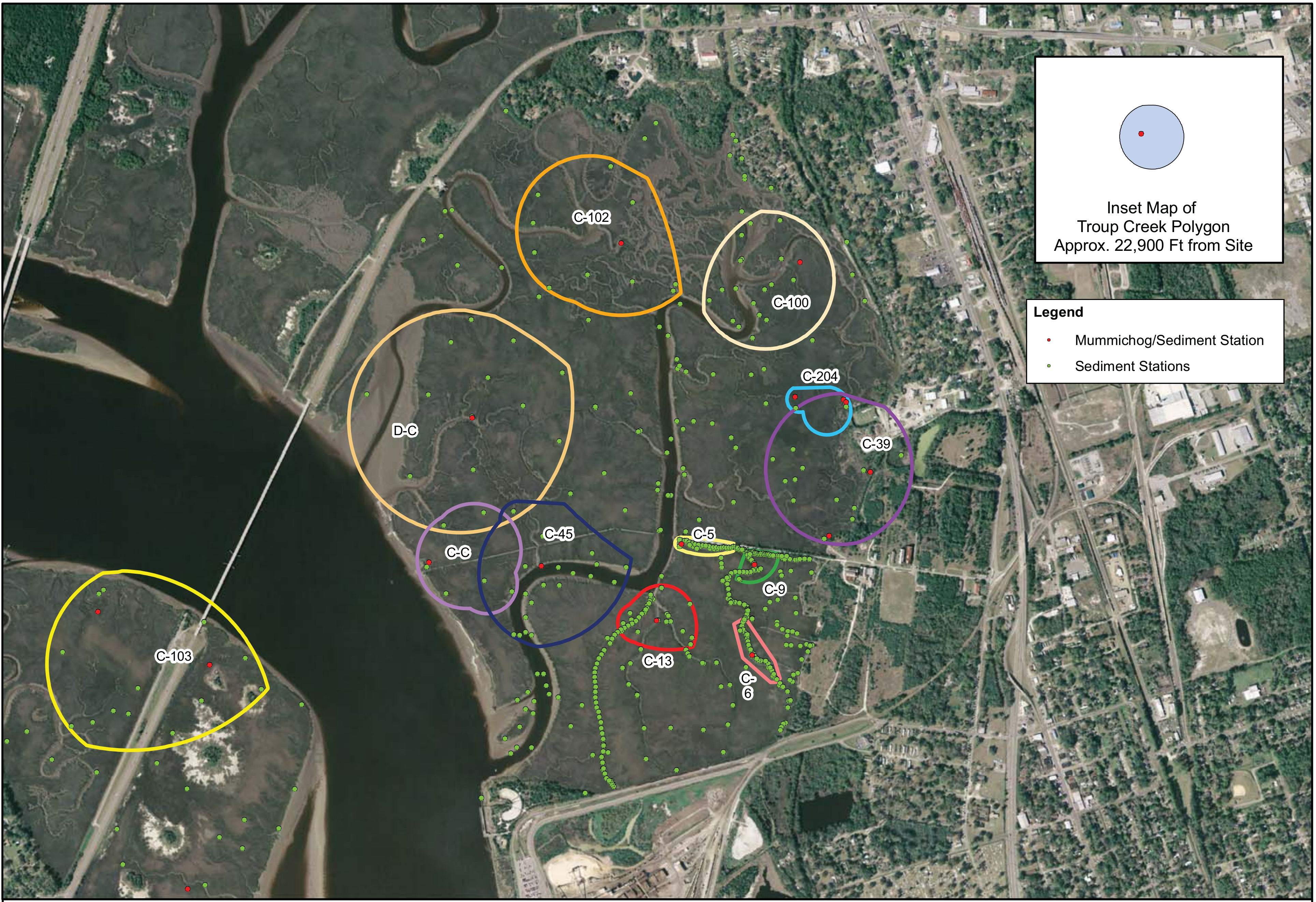


Figure 7-5 LCP estuary sampling stations for mummichog polygons

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Figure 7-6
Mummichog Aroclor 1268 BAF

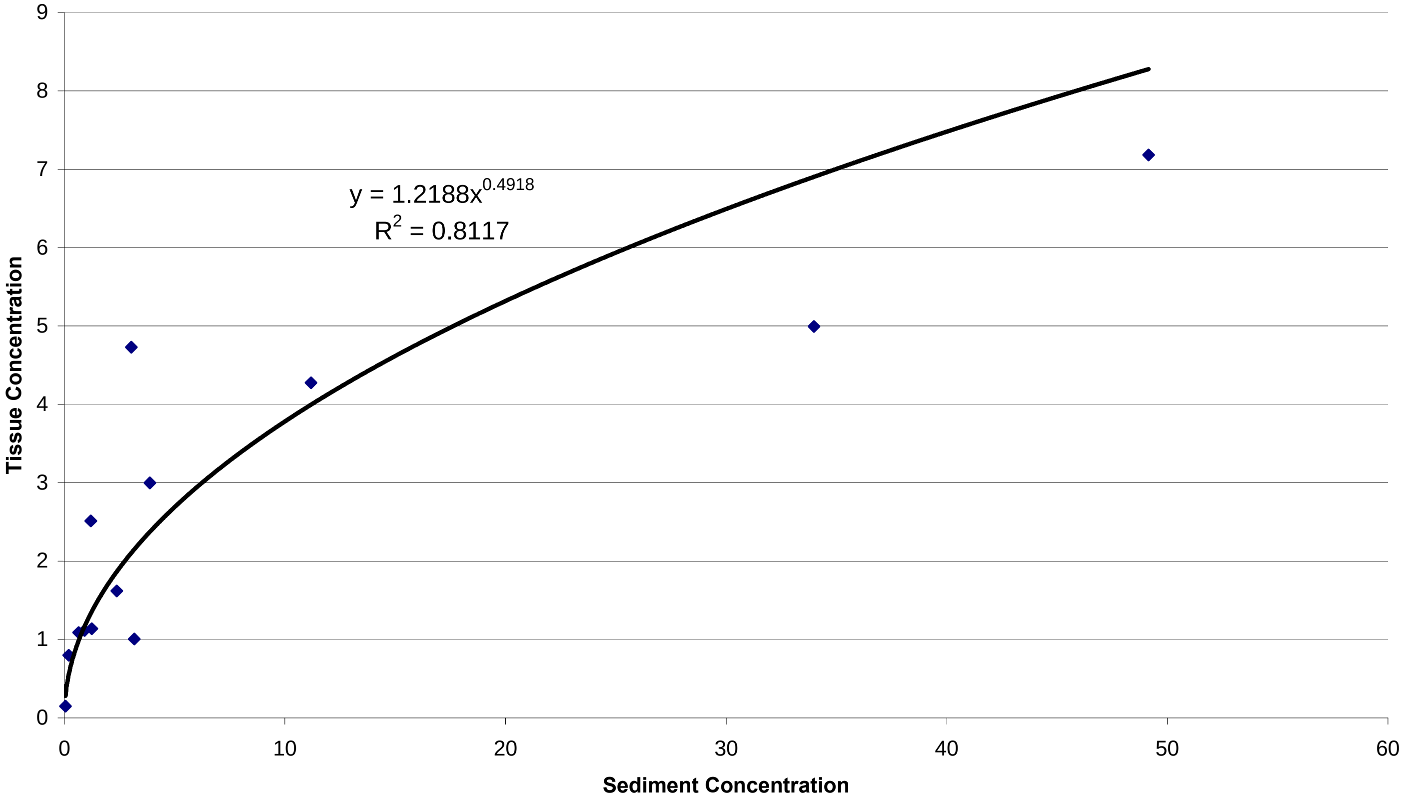


Figure 7-7
Mummichog mercury BAF

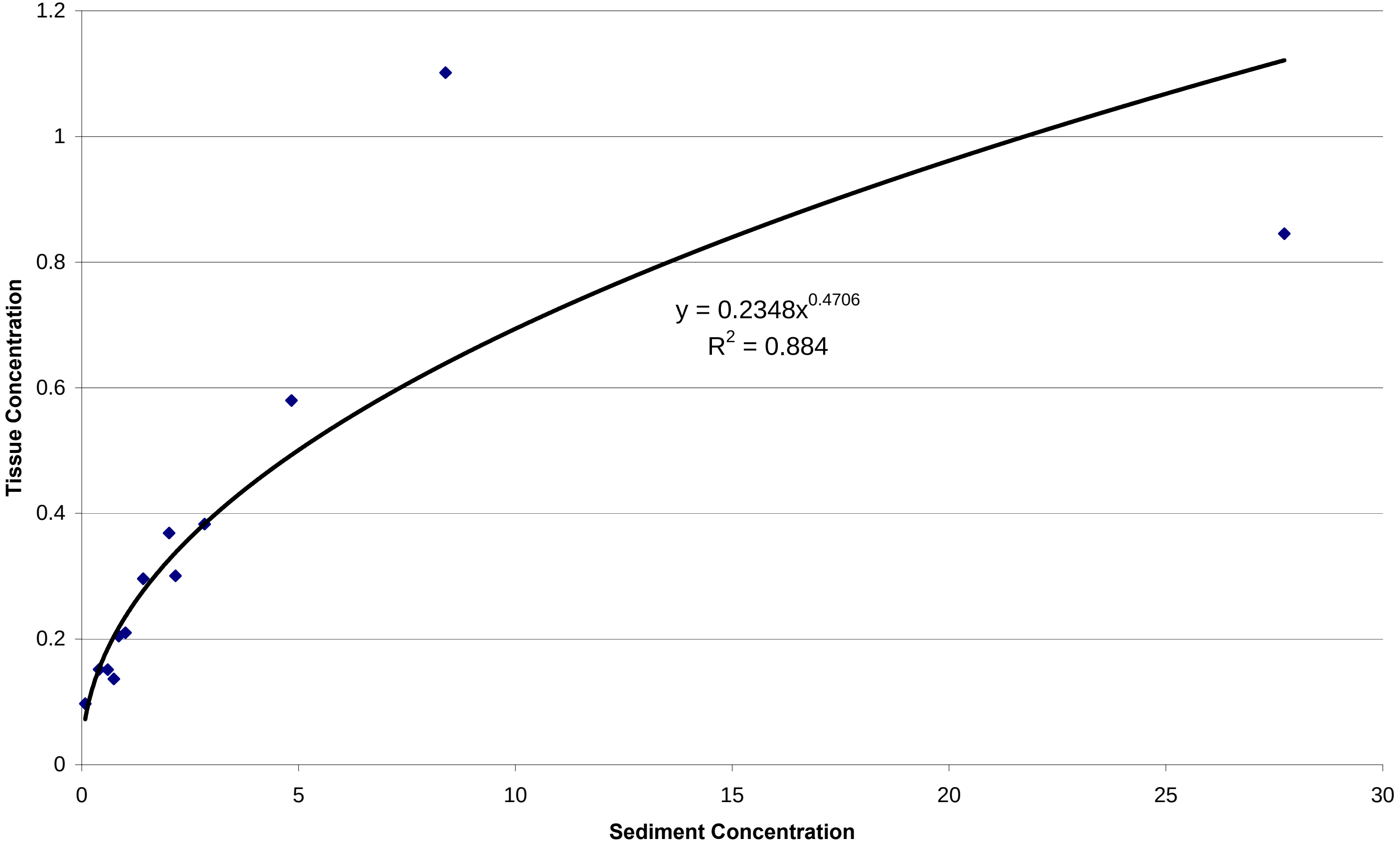


Figure 7-8
Blue crab Aroclor 1268 BAF

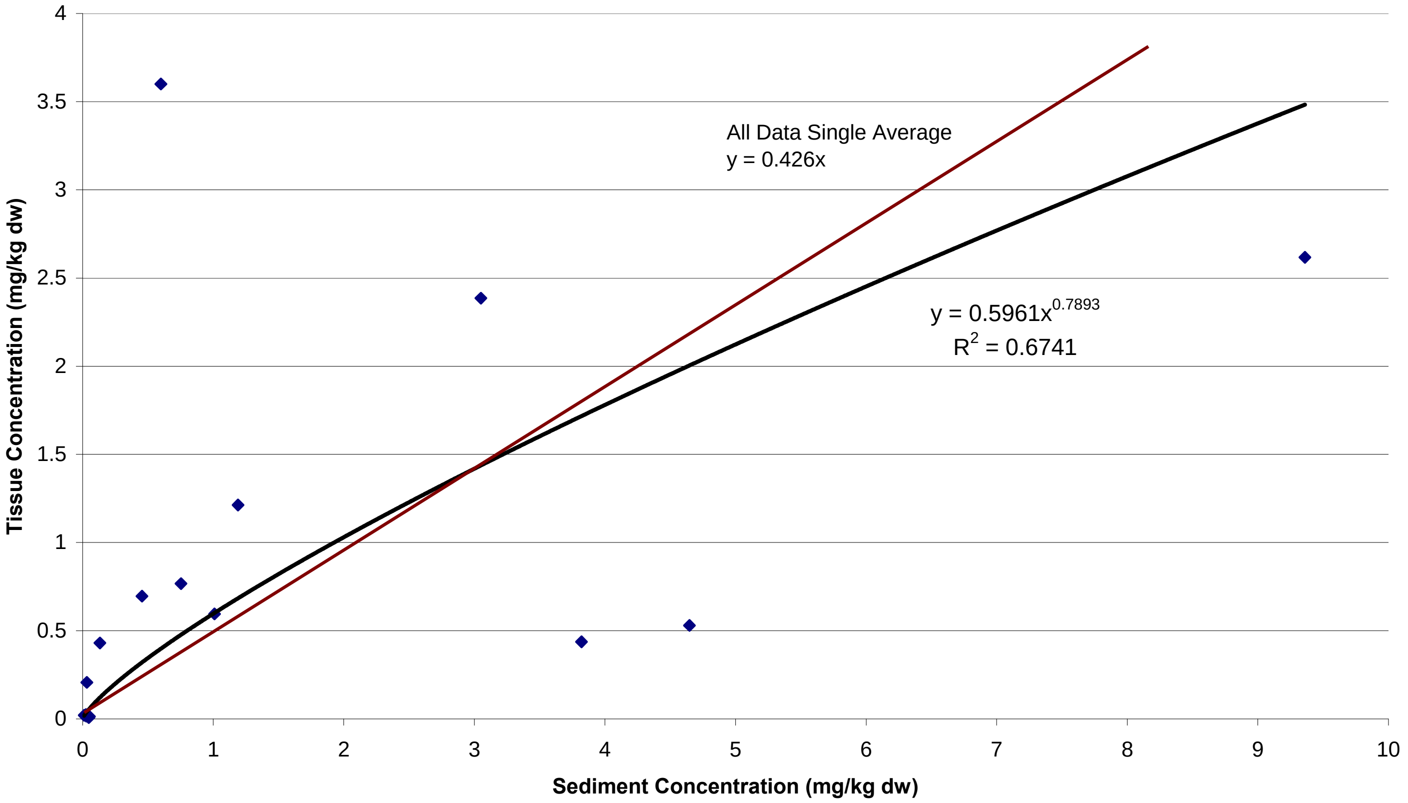


Figure 7-9
Blue Crab mercury BAF

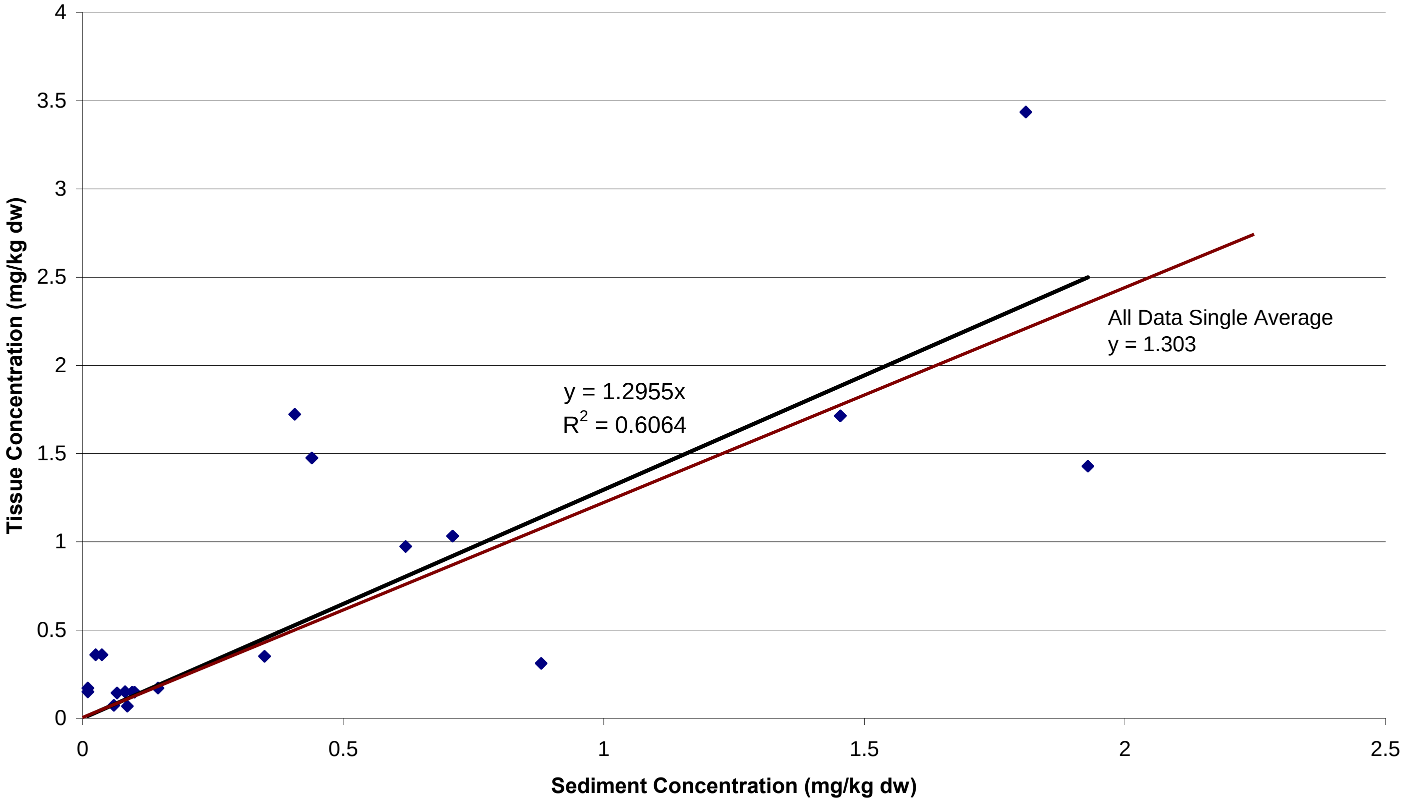


Figure 7-10
Red drum Aroclor 1268 BAF

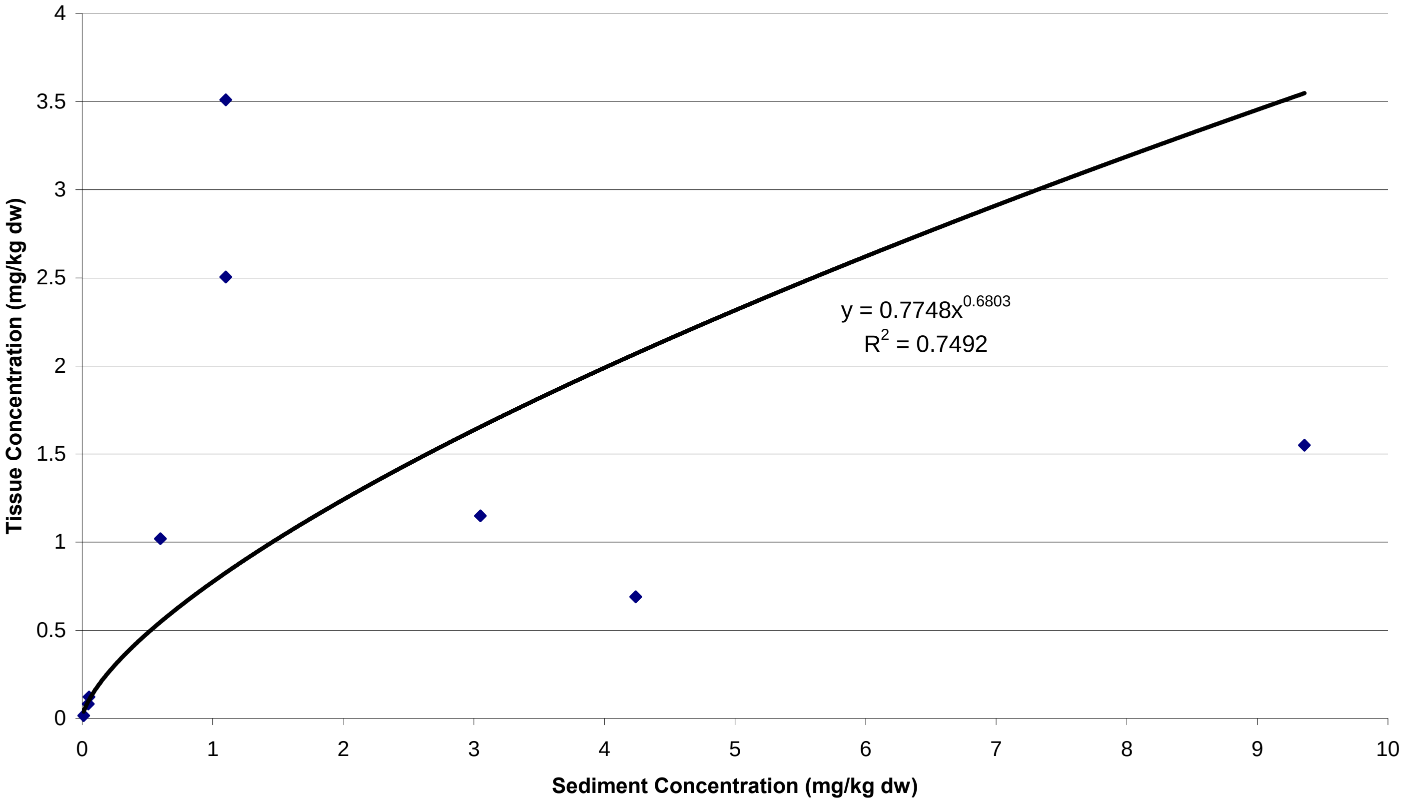


Figure 7-11
Red drum mercury BAF

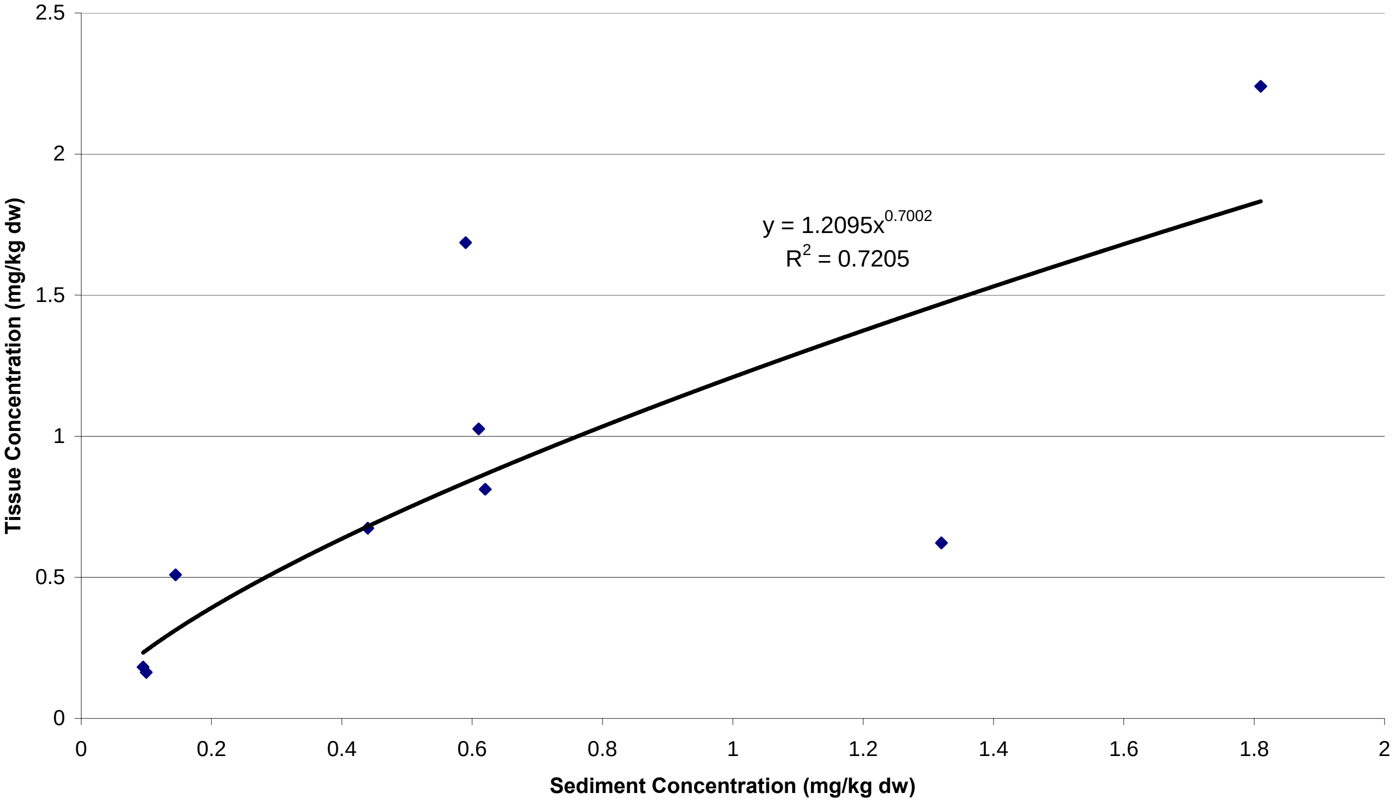


Figure 7-12
Black drum Aroclor 1268 BAF

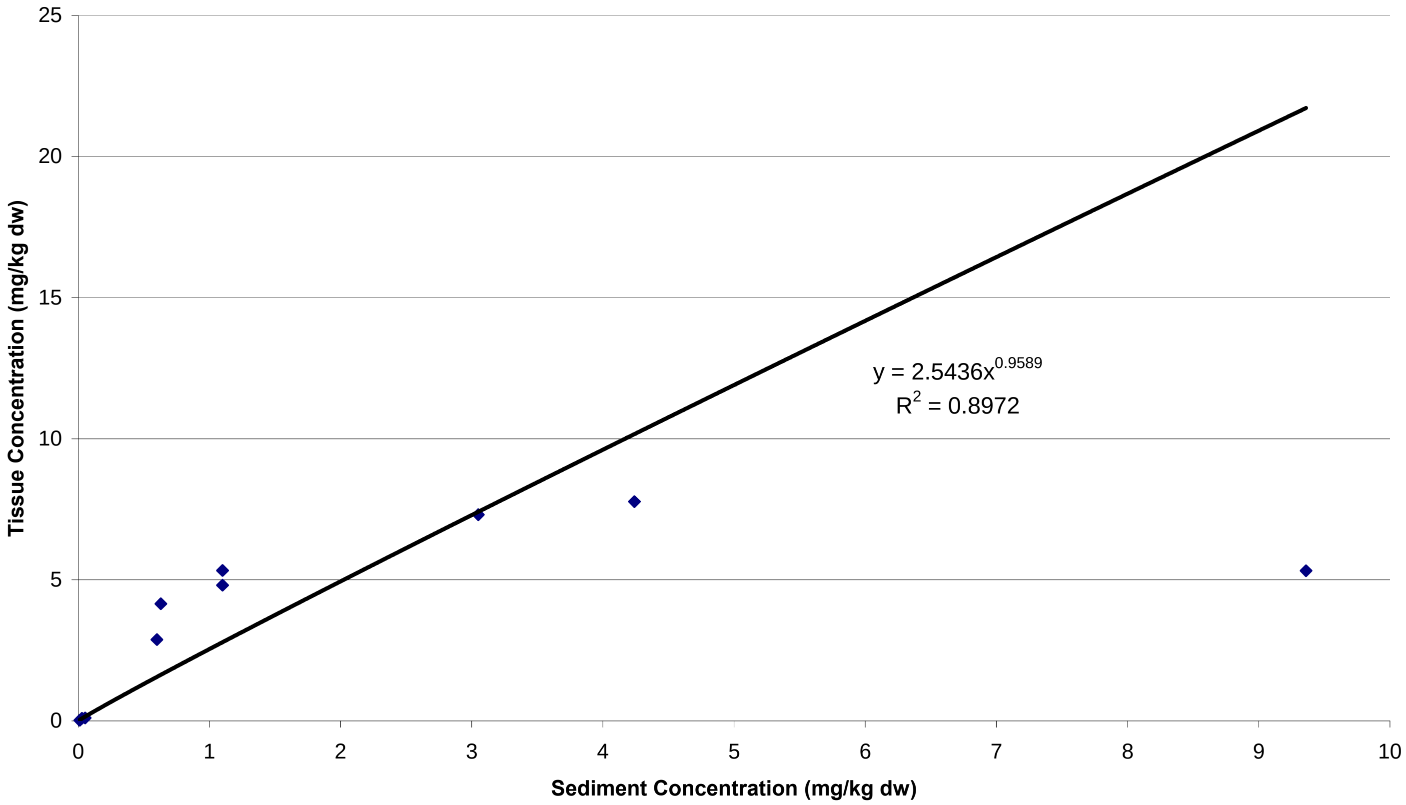


Figure 7-13
Black drum mercury BAF

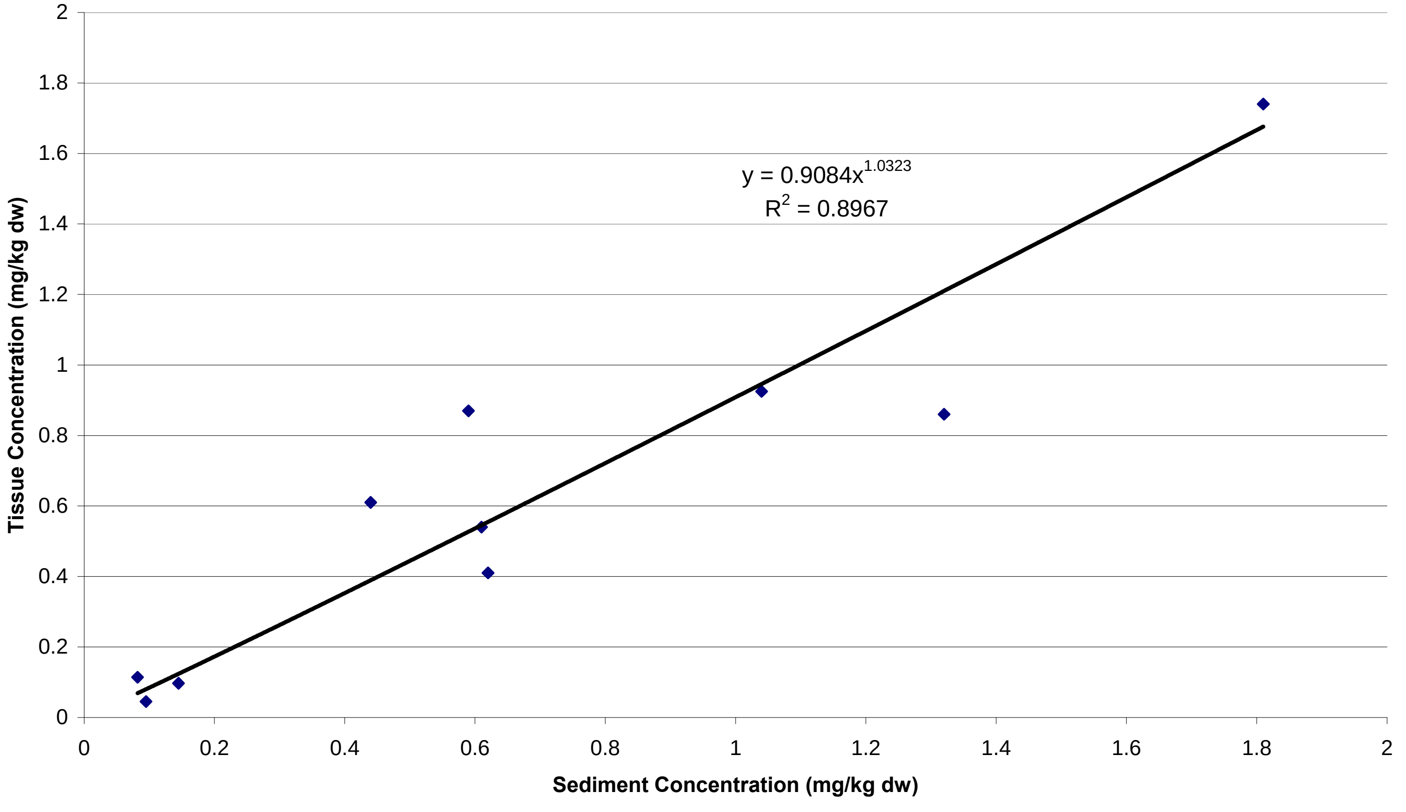


Figure 7-14
Silver perch Aroclor 1268 BAF

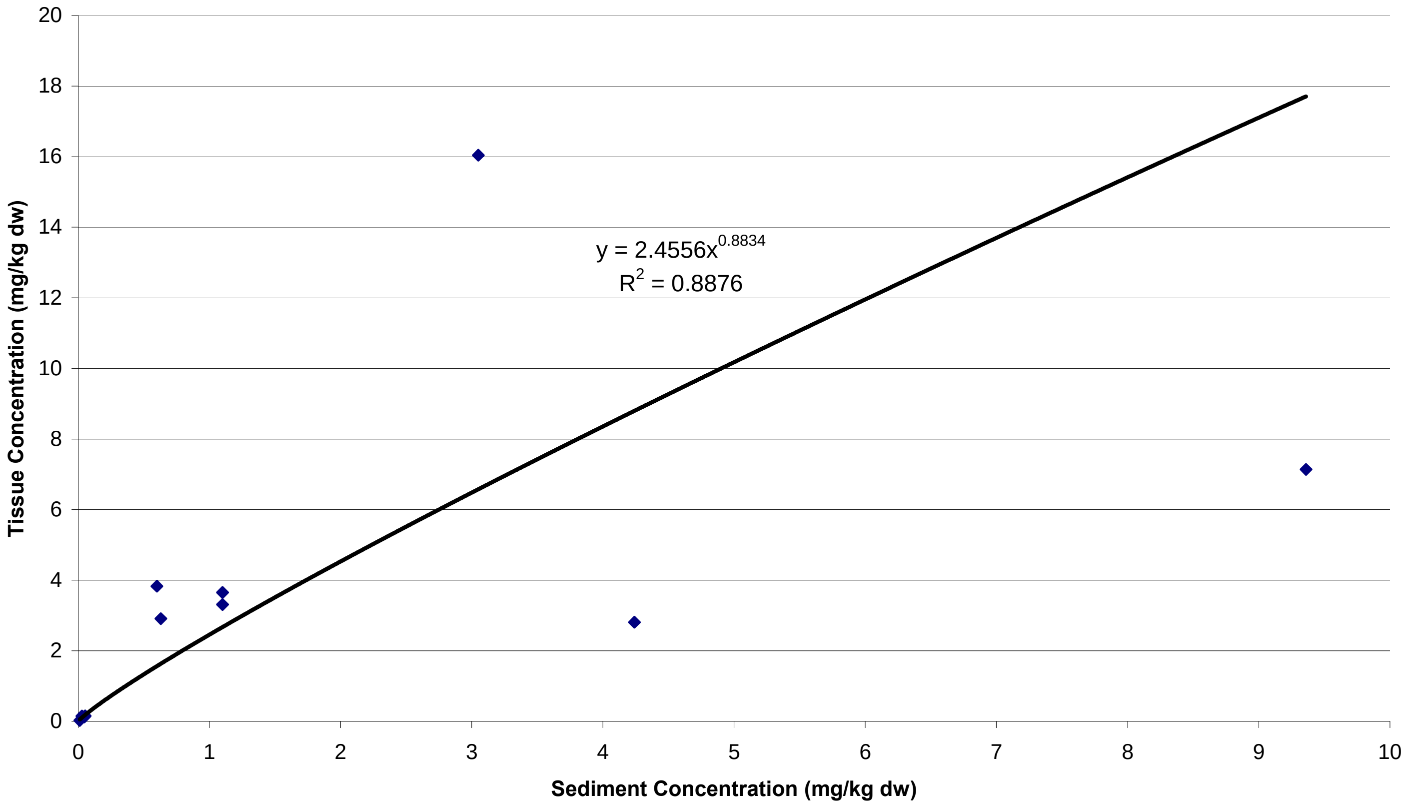


Figure 7-15
Silver perch mercury BAF

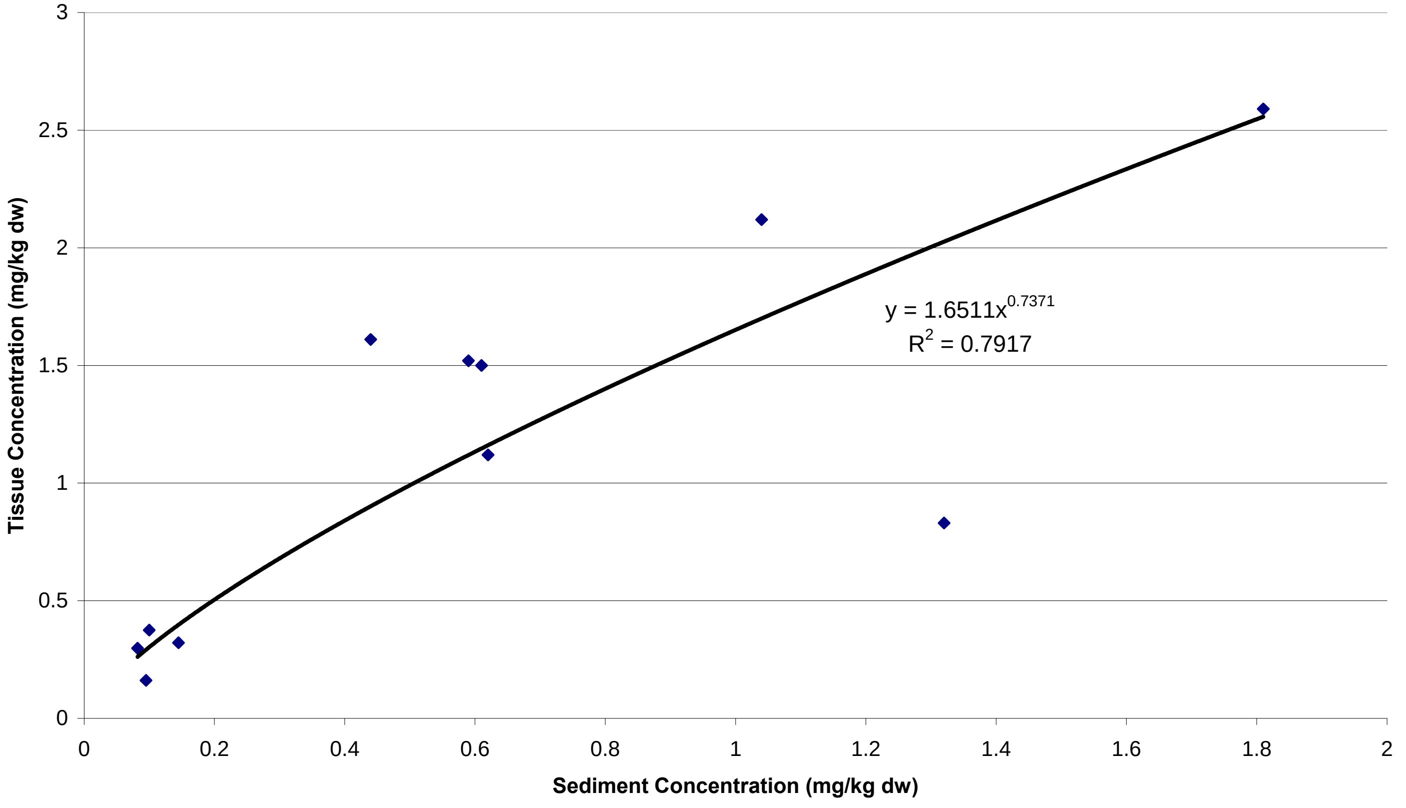


Figure 7-16
Spotted seatrout Aroclor 1268 BAF

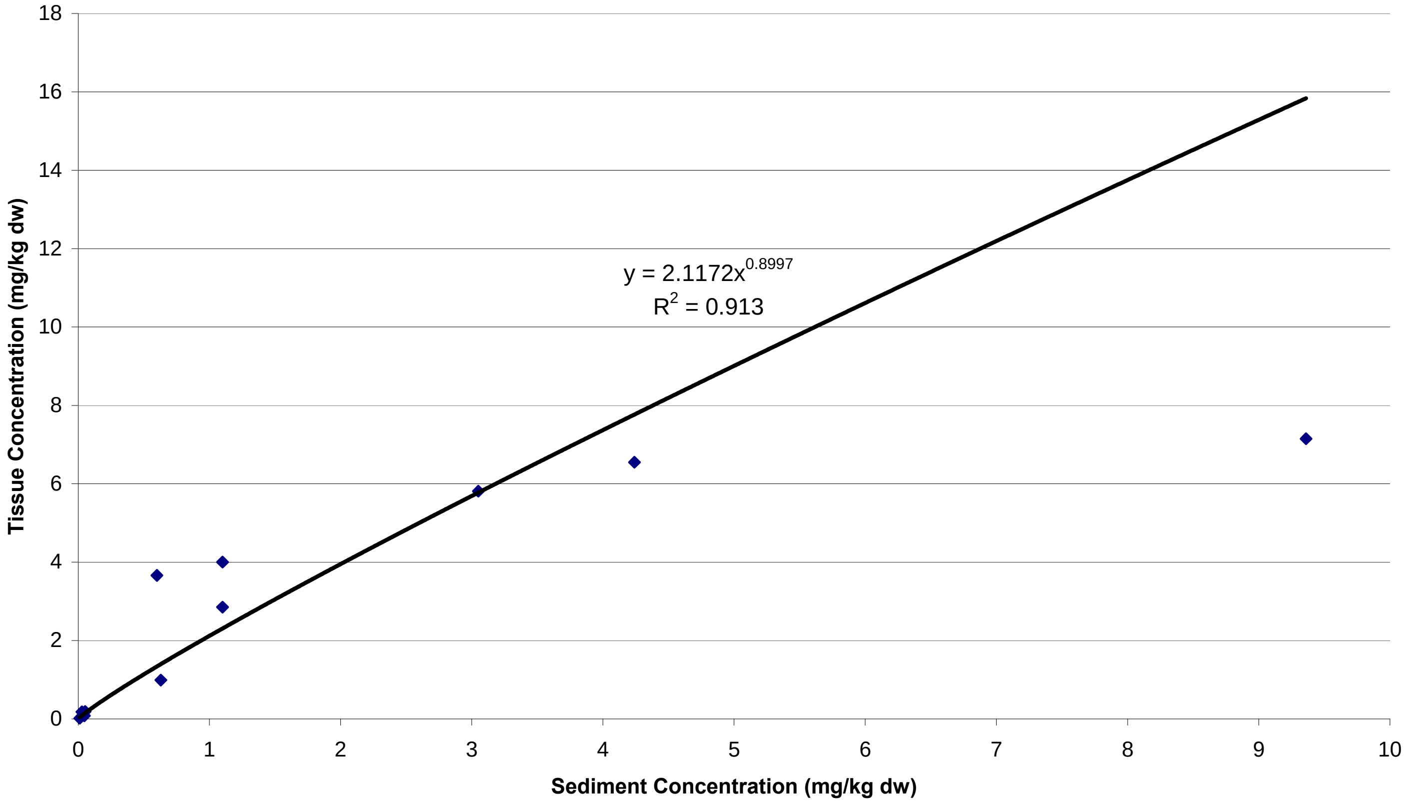


Figure 7-17
Spotted seatrout mercury BAF

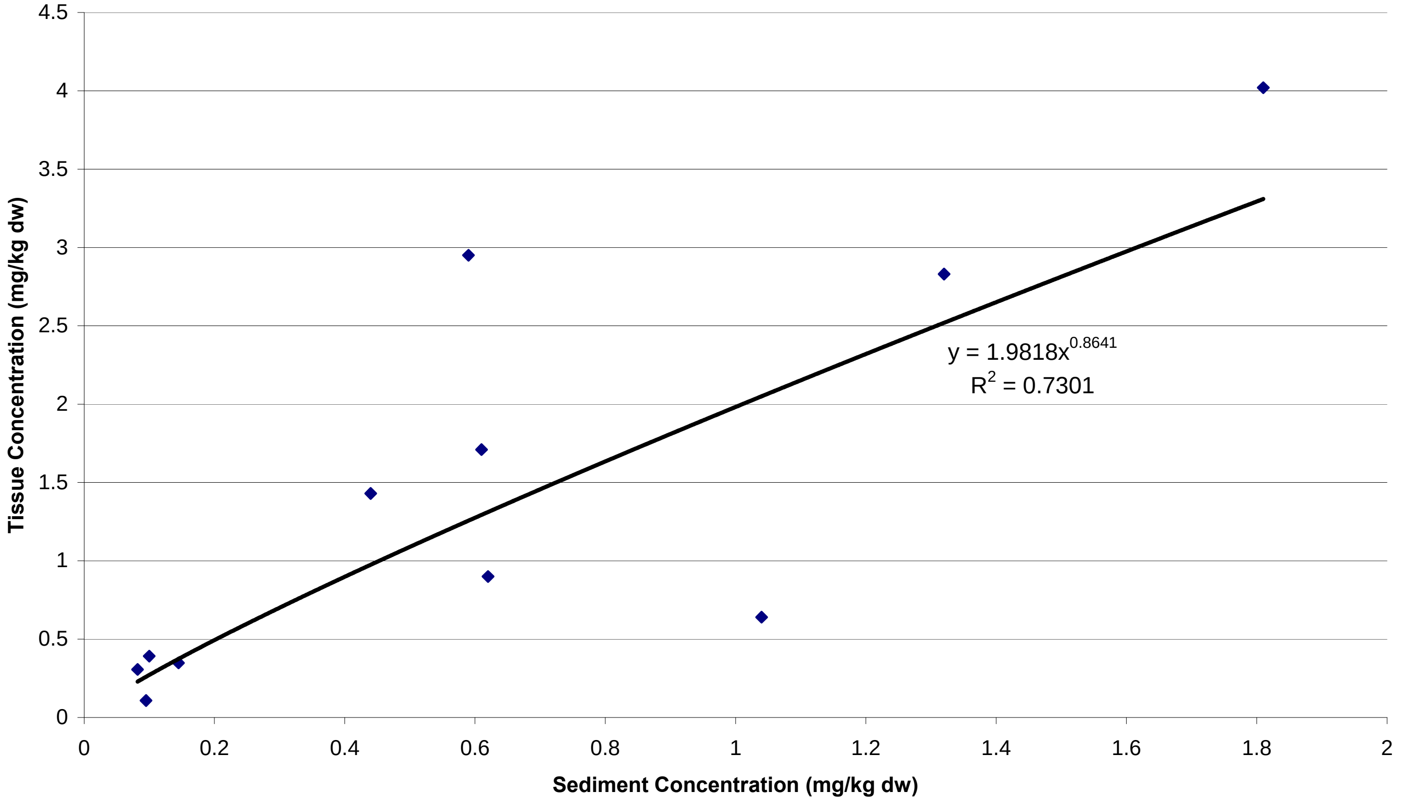


Figure 7-18
Striped mullet Aroclor 1268 BAF

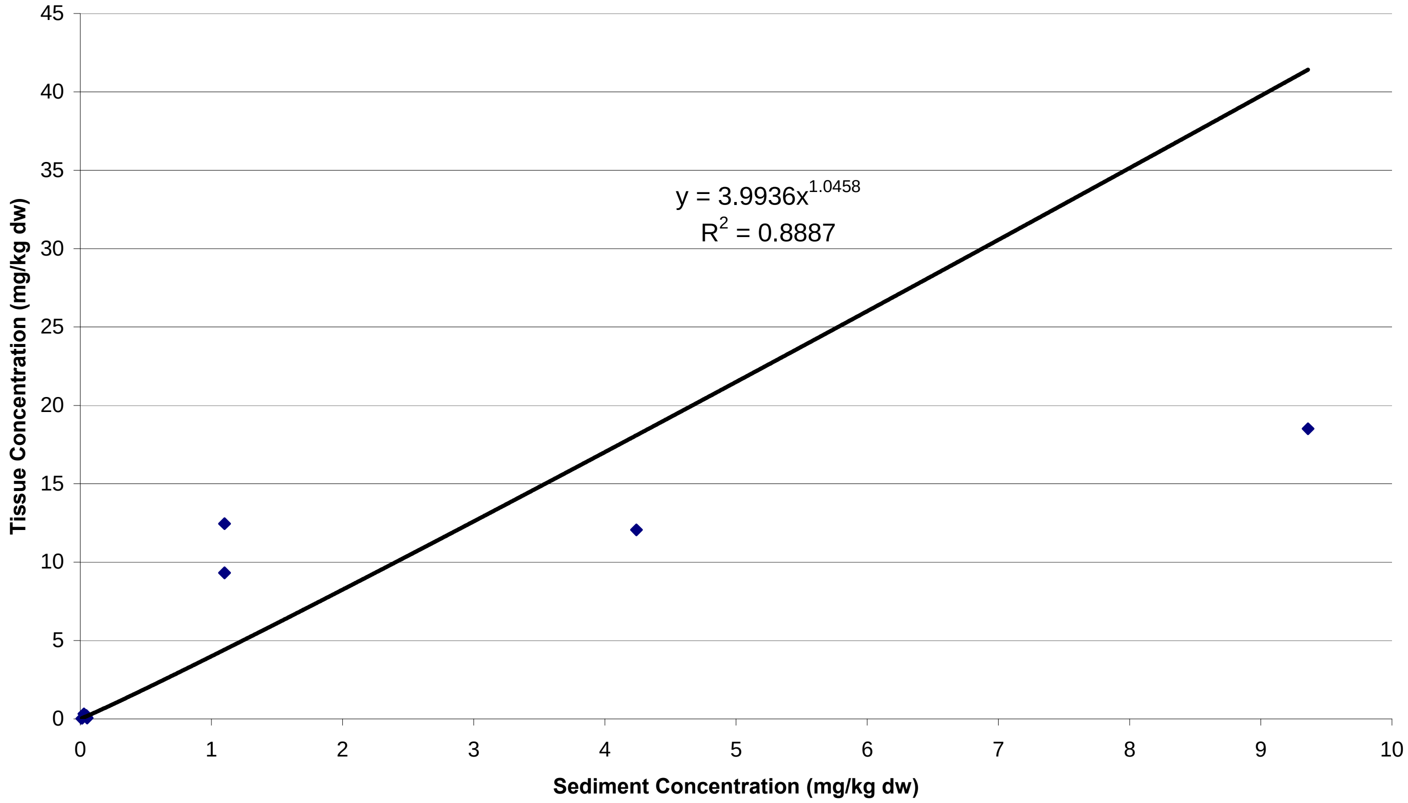


Figure 7-19
Striped mullet mercury BAF

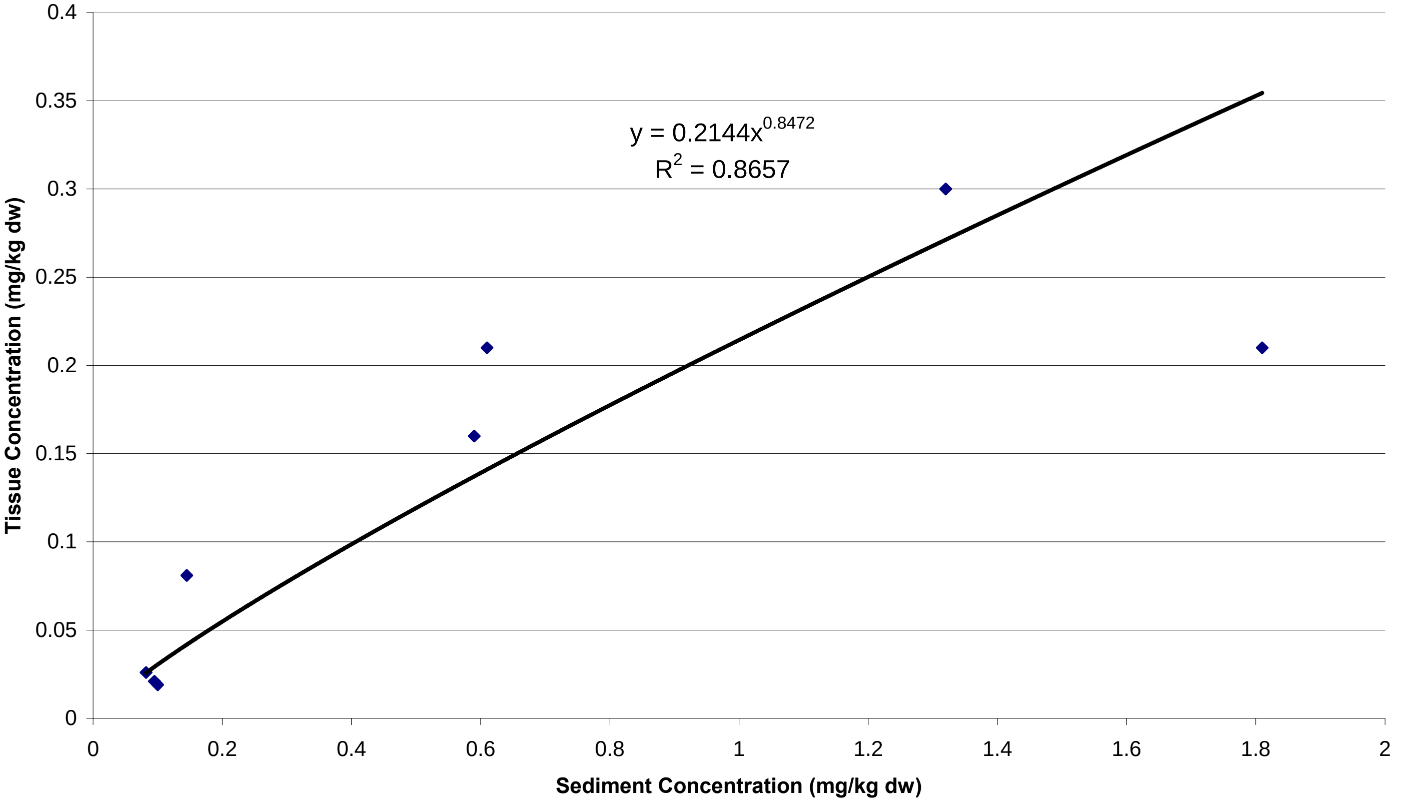
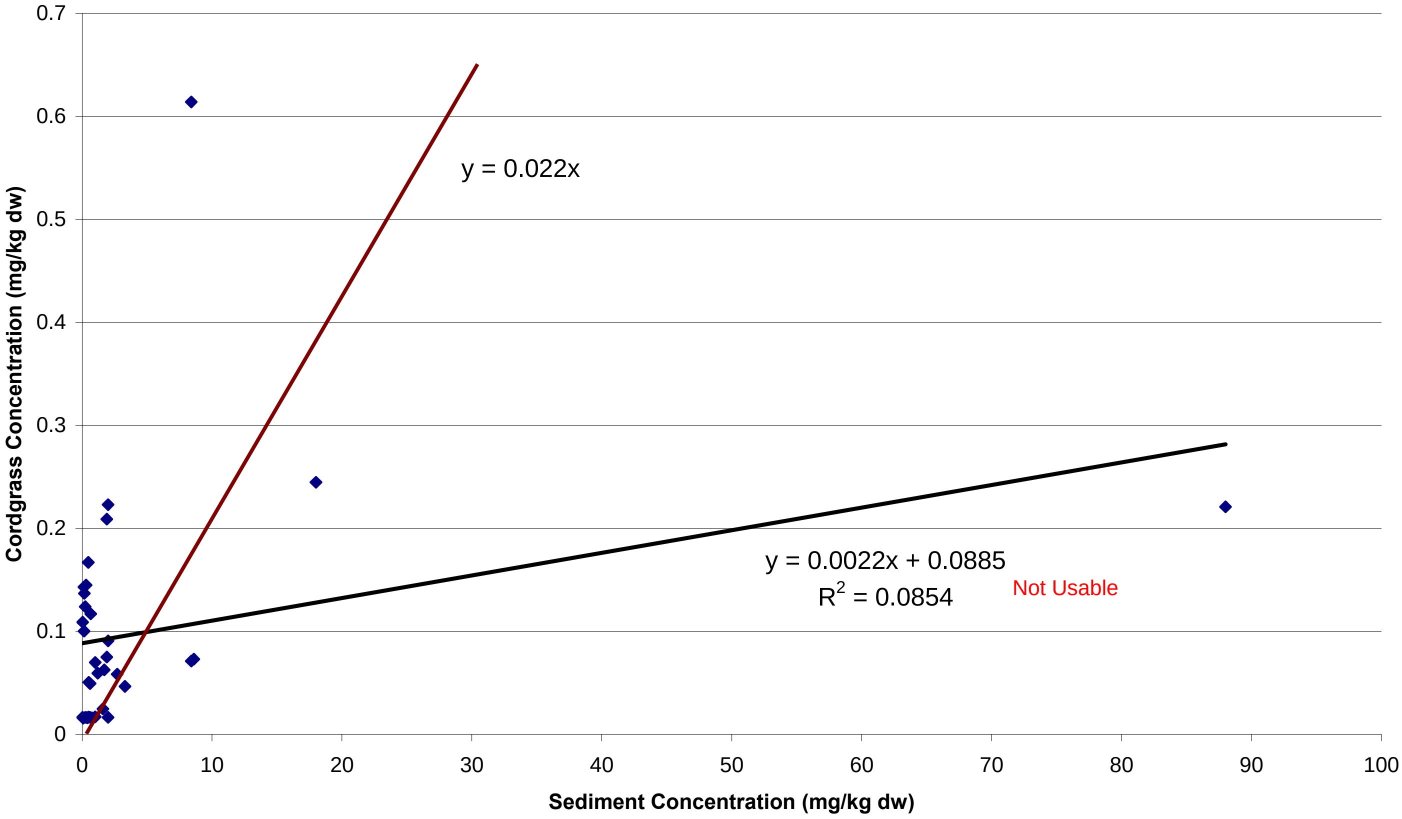


Figure 7-20
Cordgrass Aroclor 1268 BAF



TABLES

Table 3-1_Basic experimental design for data generation and analysis in baseline ecological risk assessment (BERA) of estuary at LCP Site (2000 - 2007)

Study (measurement)	Year(s) of study	Analytica method[a]	Typical detection limit	Other details (for each sampling station)
		Surface Water Chemistry		
General water quality characteristics	2000 - 2007	Hydrolab	-----	Temperature, salinity, specific conductance, turbidity, pH, and dissolved oxygen evaluated
Total mercury	2000 - 2007	1631E	0.07 ng/L	Evaluated by "clean-hands" technique
Methylmercury	2000 - 2005	Bloom, 1989	0.02 ng/L	Evaluated by "clean-hands" technique
Aroclor 1268	2000 - 2007	8082	0.001 ug/L	-----
Lead	2000 - 2007	200.8	0.002 ug/L	-----
		Surface Water Toxicity		
Mysids	2000	1007	-----	7-day test designed to evaluate chronic effects; 8 replicates per sampling station; evaluation of survival and growth of mysids exposed to water in laboratory
Sheepshead minnows	2000	1004	-----	7-day test designed to evaluate chronic effects; 4 replicates per sampling station; evaluation of survival and growth of fish exposed to water in laboratory
		Surface Sediment Chemistry[b]		
Grain-size distribution	2000-2007	ASTM D-422	1% passing sieve	-----
Total organic carbon	2000-2007	ASTM D4129-82M	0.02% (dry wt)	-----
Total mercury	2000-2007	1631E	0.001 mg/kg (dry wt)	-----
Methylmercury	2000, 2005, and 2007	Bloom, 1989	0.008 µg/kg (dry wt)	-----
Aroclor 1268	2000-2007	8082	0.003 mg/kg (dry wt)	-----
Lead	2000-2007	6020	0.02 mg/kg (dry wt)	-----
Total PAHs	2000-2007	8270C	0.001 mg/kg (dry wt)	18 different PAHs evaluated
Secondary metals	2004 - 2006	6010B/6020	<1 mg/kg (dry wt)	21 different metals evaluated
Simultaneously extracted metals (SEM)	2006	6010B-SEM	1 mg/kg (dry wt)	6 different metals (Cd, Cu, Pb, Ni, Ag, and Zn) evaluated
Acid-volatile sulfide (AVS)	2006	EPA (1991)	0.5 mg/kg (dry wt)	-----
		Surface Sediment Toxicity[b]		
Amphipods	2000 - 2006	EPA/600/R-01/020	-----	Main Amphipod Study: 28-day chronic test; 5 replicates per sampling station; evaluation of survival, growth, and reproduction of amphipods exposed to sediment in laboratory
	2006	EPA/600/R-01/020	-----	Apparent Effects Threshold (AET) Study: As above except only 1 replication per sampling station
	2006		-----	Equilibrium Partitioning Study: evaluation of SEM/AVS ratio in the context of 2006 amphipod toxicity
	2006	Metals: usually 6020A; Arolors: 8082; Total	Various	Toxicity Identification Evaluation (TIE) Analytical methods pertain to pore-water analyses
Grass shrimp	2000 - 2005	Special Lee laboratory test	-----	Evaluation of survival, reproduction (three different measurements and DNA strand damage (Comet test) of shrimp exposed for 2 months in the laboratory to estuarine sediment
	2002 - 2007	Special Lee field test	-----	Direct evaluation of reproduction and DNA strand damage (Comet test) of embryos of gravid female shrimp collected in field

Table 3-1_Continued

Study (measurement)	Year of study	Analytical method[a]	Typical detection limit	Other details (for each sampling station)
Benthic Community -- Surface Sediment[b]				
Benthic macro-invertebrates	2000	Relative numerical abundance	-----	Evaluation of number of taxa, taxonomic groups, and individuals; density of individuals; diversity and equitability indices
Biota Collected for Evaluation of Chemical Body Burdens (Residue)				
Insects	2000	-----	-----	1 replicate (11 g) of combined grasshoppers, butterflies, and moths (from southwestern corner of Domain 3)
Cordgrass	2005	-----	-----	1 replicate (>100 g) per sampling station collected above 15 cm from ground
Eastern oysters	2006	-----	----- .	3 replicates of about 100 composited young-of-year (Year 0) oysters and 20 composited older (Years I and II) oysters
Fiddler crabs	2000-2007	-----	-----	2 - 7 replicates of about 8 - 50 composited crabs (mostly males) replicate weight = about 7 - 63 g
Grass shrimp	2000-2007	-----	-----	3 replicates of individual gravid female shrimp plus about 50 composited male and female shrimp shrimp for body burden analysis (performed only in 2006)
Blue crabs	2000-2007	-----	----- .	6 - 7 replicates of individual male crabs; crab length (point-to-point on carapace) = about 70 - 240 mm (32 - 375 g)
Mummichogs	2000-2007	-----	-----	1 to 4 replicates of 1 - 40 composited fish (about 35 - 110 mm in length); replicate weight = 5 - 100 g
Silver perch	2000-2007	-----	-----	8 replicates of individual silver perch; fish length (total length) = 113 - 207 mm (15 - 122 g)
Red drum	2000-2007	-----	-----	1 - 8 replicates of individual red drum; fish length (total length) = 320 - 475 mm (431 - 1,083 g)
Black drum	2000-2007	-----	-----	8 replicates of individual black drum; fish length (total length) = 155 - 320 mm (52 - 541 g)
Spotted seatrout	2000-2007	-----	-----	8 replicates of individual spotted seatrout; fish length (total length) = 210 - 450 mm (100 - 852 g)
Striped mullet	2004 - 2007	-----	-----	2 - 8 replicates of individual striped mullet; fish length (total length) = 200 - 340 mm (106 - 568 g)
Chemical (Residue) Analyses Performed on Biota (Whole Bodies Typically Analyzed)				
Total mercury	2000 - 2007	1631E	0.0001 mg/kg (wet wt)	-----
Methylmercury	2000, 2005, and 2007	1630 (mod)	0.0004 mg/kg (wet wt)	-----
Aroclor 1268	2000 - 2007	8082	0.0006 mg/kg (wet wt)	-----
Lead	2000 - 2007	6020	0.001 mg/kg (wet wt)	-----
Lipids	2000 - 2007	NOAA NOS ORCA 71	0.05% (wet wt)	Evaluated in just blue crabs and large finfishes (not reported).

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[a] Analytical methods are U. S. EPA methods unless otherwise indicated.

[b] Surface sediment is defined as between 0 and 15 cm in depth.

Table 3-2_Sampling stations and associated environmental media for surface water of major creeks of estuary at LCP Site during 2000 - 2007[a]

Environmental media	2000	2002	2003	2004	2005	2006	2007
Main Canal							
Surface water (for chemistry and/or toxicity testing in 2000)	C-1 to C- 5	----------	----------	----------	C-1 to C- 5	C-5	C-5
Mummichogs (for body burden analysis)	----------	C-5	C-5	C-5	C-5	C-5	C-5
Eastern Creek							
Surface water (for chemistry and/or toxicity testing in 2000)	C-6 to C-9	----------	----------	----------	C-6 to C-9	C-9	C-9
Mummichogs (for body burden analysis)	C-6, C-9	C-6, C-9	C-6, C-9	C-6, C-9	C-6, C-9	C-6, C-9	C-6, C-9
Western Creek Complex							
Surface water (for chemistry)	C-10 to C-15	----------	----------	----------	C-10 to C-15	C-15	C-15
Mummichogs (for body burden analysis)	C-13	C-13	C-13	C-13	C-13	----------	----------
Purvis Creek							
Surface water (for chemistry and/or toxicity testing in 2000)	C-16, C-29, C-36	C-16, C-29, C-36	C-16, C-29, C-36	C-16, C-29, C-36	C-16, C-29, C-36	C-16, C-29, C-36	C-16, C-29, C-36
Blue crabs (for body burden analysis)	-------------------------------------North and South Purvis Creek ---------------------------------------						
Large finfishes (for body burden analysis)	-- Purvis Creek --						

[a] These creek locations are illustrated in Figure 3-3. Coordinates of the locations are presented in Appendix A.

Table 3-3_ Sampling stations and associated environmental media for surface sediment of major creeks of estuary at LCP Site during 2000 - 2007[a, b]

Environmental media	2000	2002	2003	2004	2005	2006	2007
Main Canal							
Surface sediment (for chemistry and/or toxicity testing)	C-1 to C- 5	C-1 to C- 5	C-1 to C- 5	C-1 to C- 5	C-5	C-5	C-5
Benthic macroinvertebrates (for community study)	C-5	----------	----------	----------	----------	----------	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	C-5	C-5	C-5	C-5	C-5	C-5
Eastern Creek							
Surface sediment (for chemistry and/or toxicity testing)	C-6 to C-9	C-6 to C-9	C-6 to C-9	C-6 to C-9	C-6, C-7, C-9	C-6, C-7, C-9	C-6, C-9
Benthic macroinvertebrates (for community study)	C-7	----------	----------	----------	----------	----------	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	----------	----------	----------	C-6	C-6	C-6
Western Creek Complex							
Surface sediment (for chemistry and/or toxicity testing)	C-10 to C-15	C-13, C-15	C-13, C-15	C-13, C-15	C-10, C-12 to C-15	C-15	C-15
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	----------	----------	----------	C-15	C-15	C-15
Purvis Creek[c]							
Surface sediment (for chemistry and/or toxicity testing)	C-16, C-29, C-36, M-44, M-28/NOAA10	C-16, M-28/NOAA10	C-16, M-28/NOAA10	C-16, M-28/NOAA10	C-16, C-29, C-36, M-44, M-28/NOAA10	C-16, C-29, C-36, 28/NOAA10	M M-28/NOAA10
Benthic macroinvertebrates (for community study)	C-16	----------	----------	----------	----------	----------	----------
Cordgrass (for body burden analysis)	M-28/NOAA10	----------	----------	----------	----------	----------	----------
Eastern oysters (for body burden analysis)	----------	----------	----------	----------	----------	M-28/NOAA10	----------
Fiddler crabs (for body burden analysis)	M-28/NOAA10	M-28/NOAA10	M-28/NOAA10	M-28/NOAA10	----------	M-28/NOAA10	M-28/NOAA10

[a] These creek locations are illustrated in Figure 3-4. Coordinates of the locations are presented in Appendix A.

[b] In addition to these sampling stations for surface sediment in major creeks, 50 sediment samples were collected in 2006 from the Main Canal, Eastern Creek, and Western Creek Complex (a total of 150 samples; refer to Appendix G) to derive apparent effects thresholds (AETs) for chemicals of potential concern (COPC).

[c] Locations identified as marsh stations (M-44 and M-28/NOAA10) reflect conditions in Purvis Creek.

Table 3-4_Sampling stations and associated environmental media for surface sediment of marsh in estuary at LCP Site during 2000 - 2007[a, b]

Environmental media	2000	2002	2003	2004	2005	2006	2007
				Domain 1			
Surface sediment (for chemistry and/or toxicity testing)	C-18, C-B7, C-D9, C-H7, C-K7, C-N2, M-25/NOAA4, M-19, M-AB, M-B7, M-D9, M-H7, M-K7, M-N2	C-B7, C-D9, C-H7,C-K7, C-N2, M-25/NOAA4, M-AB	C-B7, C-D9, C-H7, C-K7, C-N2, M-25/NOAA4, M-AB	C-B7, C-D9, C-H7, C-K7, C-N2, M-25/NOAA4, M-AB	M-25/NOAA4, M-B7, M-D9, M-H7, M-K7, M-N2, M-AB	M-25/NOAA4, M-B7, M-D9, M-H7, M-K7, M-N2, M-AB	M-25/NOAA4, M-AB
Cordgrass (for body burden analysis)	M-25/NOAA4, M-19	----------	----------	----------	M-25/NOAA4, M-AB	----------	----------
Eastern oysters (for body burden analysis)	----------	----------	----------	----------	----------	M-25/NOAA4	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	M-25/NOAA4	M-25/NOAA4	M-25/NOAA4	M-25/NOAA4	M-25/NOAA4	M-25/NOAA4
Fiddler crabs (for body burden analysis and/or population estimate)	M-25/NOAA4, M-AB	M-25/NOAA4, M-AB	M-25/NOAA4, M-AB	M-25/NOAA4, M-AB	M-25/NOAA4, M-AB	M-25/NOAA4, M-AB	M-25/NOAA4, M-AB
				Domain 2			
Surface sediment (for chemistry and/or toxicity testing)	M-20 to M-24, M-27	M-21, M-23, M-27	M-21, M-23, M-27	M-21, M-23, M-27, M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9	M-20, M-22, M-24, M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9	M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9	M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9
Cordgrass (for body burden analysis)	M-22, M- 27	----------	----------	----------	M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9	----------	----------
Eastern oysters (for body burden analysis)	----------	----------	----------	----------	----------	M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA9	----------
Fiddler crabs (for body burden analysis)	----------	----------	----------	M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9	M-NOAA3, M-NOAA5, M-NOAA6, M-NOAA7, M-NOAA8, M-NOAA9	M-NOAA3, M-NOAA5, M-NOAA8	M-NOAA3, M-NOAA5, M-NOAA8

Table 3-4_Continued

Environmental media	2000	2002	2003	2004	2005	2006	2007
Domain 3							
Surface sediment (for chemistry and/or toxicity testing)	C-30 to C-35, M-26, M-37 to M-43	C-33	C-33	C-33, C-100, C-101, M-100, M-101, M-102	C-30, C-32 to C-35, C-39, C-100, C-204, M-37, M- 38, M-41, M-100, M-101, M-102, M-204	C-30,C-33, C-34, C-39, C-100, M-37, M-41, M-100, M-204	C-33, C-34, C-39, M-37
Benthic macroinvertebrates (for community study)	C-33	----------	----------	----------	----------	----------	----------
Cordgrass (for body burden analysis)	M-26, M-40, M-42	----------	----------	----------	M-37, M-100, M-101, M-102, M-204	----------	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	----------	----------	----------	C-100	C-100	----------
Fiddler crabs (for body burden analysis)	----------	----------	----------	M-100, M-101, M-102	M-37, M-100, M-101, M-102, M-204	M-37, M-100, M-204	M-37
Mummichogs (for body burden analysis)	C-33	C-33	C-33	C-33, C-100	C-33, C-39, C-100, C-204	C-33, C-34, C-39, C-100	C-33, C-34, C-39,
Domain 4[c]							
Surface sediment (for chemistry and/or toxicity testing)	C-45, M-46	C-45, C-A, C-B, C-C, C-D, M-46, M-A, M-B, M-C, M-D	C-45, C-A, C-B, C-C, C-D, M-46, M-A, M-B, M-C, M-D	C-45, C-A, C-B, C-C, C-D, C-102, M-46, M-A, M-B, M-C, M-D, M-103, M-104, M-105	C-45, C-C, C-D, C-102, M-103, M-104, M-105	C-45, C-C, C-D, C-102, M-103, M-104	----------
Cordgrass (for body burden analysis)	M-46	----------	----------	----------	M-103, M-104	----------	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	----------	----------	----------	C-D	C-D	----------
Fiddler crabs (for body burden analysis)	----------	----------	----------	M-103, M-104, M-105	M-103, M-104	M-103, M-104	----------
Mummichogs (for body burden analysis)	----------	C-45, C-C	C-45, C-C	C-45, C-C, C-102	C-45, C-C, C-D, C-102	C-C, C-D	----------

Table 3-4_Continued

Environmental media	2000	2002	2003	2004	2005	2006	2007
				Blythe Island			
Surface sediment (for chemistry and/or toxicity testing)	----------	----------	----------	C-103, C-104, C-105, M-106, M-107, M-108	C-103, C-104, C-105, M-106, M-107, M-108	C-103, C-104, C-105, M-106, M-107, M-108	----------
Cordgrass (for body burden analysis)	----------	----------	----------	----------	M-106, M-107, M-108	----------	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	----------	----------	----------	C-103, C-104, C-105	C-103, C-104, C-105	----------
Fiddler crabs (for body burden analysis)	----------	----------	----------	M-106, M-107, M-108	M-106, M-107, M-108	M-106, M-107, M-108	----------
Mummichogs (for body burden analysis)	----------	----------	----------	C-103, C-104	C-103, C-104, C-105	C-103, C-104, C-105	----------
				Feasibility Study (FS) Locations			
Surface sediment (for chemistry and/or toxicity testing)	----------	----------	----------	----------	Areas C-1 to C-5, Area M-6	Areas C-1 to C-5, Area M-6	Areas C-1 to C-5, Area M-6
				Discharges from Local Sources			
Surface sediment (for chemistry and/or toxicity testing)	----------	----------	----------	----------	C-200 to C-203, M-200 to M-203	----------	----------
Cordgrass (for body burden analysis)	----------	----------	----------	----------	M-200 to M-203	----------	----------
Grass shrimp (for toxicity testing and/or body burden analysis)	----------	----------	----------	----------	----------	----------	Areas C-2 to C-5, Area M-6
Fiddler crabs (for body burden analysis)	----------	----------	----------	----------	M-200 to M-203	----------	----------
Mummichogs (for body burden analysis)	----------	----------	----------	----------	C-200 to C-203	----------	----------

[a] These marsh locations, with the exception of those for other local sources (Glynn County Landfill, Brunswick Cellulose, Georgia Power Company, and Academy Creek Wastewater Treatment Plant) and the FS locations, are illustrated in Figure 3-5. Coordinates of the locations are presented in Appendix A.

[b] Marsh locations identified by the "C" prefix, unlike those identified by the "M" prefix, exhibited drainage from creek water at time of sampling.

[c] An additional 50 sediment samples were collected from Domain 4 to determine differences in concentrations of chemicals of potential concern (COPC) between eastern and western parts of the domain (refer to Appendix I).

Table 4-1_ General water quality characteristics of Purvis Creek in estuary at LCP Site (2000 - 2007 data)[a] - yearly averages

Year	Temperature (^{0}C)	Salinity (ppt)	Specific conductance (mS/cm)	Turbidity (NTU)	pH (pH units)	Dissolved oxygen (mg/L)
			Upper Purvis Creek (Station C-36)			
2000	22.1	29.3	42.4	-------	-------	5.8
2002	31.2	29.8	46.4	-------	6.9	4.2
2003	24.6	21.0	33.3	-------	7.1	6.1
2004	24.2	11.5	19.4	-------	6.6	2.4
2005	20.1	24.7	27.3	3.2	7.4	6.9
2006	22.8	31.6	48.4	14.1	7.3	4.4
2007	25.8	1.2	19.3	>10	7.4	4.6
Mean:	**24.40**	**21.30**	**33.79**	**>9.10**	**-------**	**4.91**
			Mid-stretch of Purvis Creek (Station C-29)			
2000	22.4	29.3	45.5	-------	-------	6.4
2002	31.0	30.0	47.2	-------	7.0	4.5
2003	24.8	21.0	33.7	-------	7.0	6.9
2004	24.3	11.6	19.6	-------	7.0	2.8
2005	19.9	25.7	28.0	7.8	7.4	6.6
2006	23.0	31.6	48.0	25.5	7.6	4.2
2007	25.7	1.2	19.3	10	7.3	5.0
Mean:	**24.44**	**21.49**	**34.47**	**>14.43**	**-------**	**5.20**
			Mouth of Purvis Creek (Station C-16)			
2000	22.4	25	33.3	-------	-------	7.2
2002	30.8	30.3	47.6	-------	7.0	4.1
2003	25.2	22.0	34.2	-------	7.2	7.4
2004	24.2	11.9	20.1	-------	7.1	3.0
2005	20.1	27.6	30.4	8.6	7.5	6.8
2006	22.8	31.6	48.4	21.3	7.6	4.2
2007	25.7	1.2	19.4	>10	7.4	3.5
Mean:	**24.46**	**21.37**	**33.34**	**>13.30**	**-------**	**5.17**
			Troup Creek (Reference)			
2000	19.1	16.8	27.4	-------	7.5	6.7
2002	30.2	25.0	39.6	-------	7.0	4.6
2003	22.9	10.0	18.4	-------	6.6	6.5
2004	23.4	2.8	5.1	-------	7.4	4.1
2005	19.4	15.5	17.3	24.1	7.1	6.6
2006	22.7	25.3	39.6	83.0	7.8	4.2
2007	23.35	0.91	15.6	>10	7.2	3.6
Mean:	**23.01**	**13.76**	**23.29**	**>39.03**	**-------**	**5.19**
			Crescent River (Reference)			
2000	18.5	34.3	52.0	-------	7.5	5.5
2002	30.0	30.6	48.1	-------	7.1	3.2
2003	23.0	25.0	39.5	-------	6.9	6.2
2004	23.9	17.0	27.7	-------	7.0	4.2
2005	19.3	24.1	27.0	64.4	7.0	6.8
2006	19.8	32.6	49.8	16.6	7.7	6.0
Mean:	**22.42**	**27.27**	**40.68**	**40.50**	**-------**	**5.32**

[a] Creek surface water was typically collected during ebb tide.

Table 4-2a_Concentrations of chemicals of potential concern (COPCs) in surface water in OU-1 LCP estuary (2000 - 2007 data) for exposure estimates

OU-1 Stations [a]

	Total Mercury (ng/L)	Dissolved Mercury (ng/L)	Methyl Mercury (ng/L)	Total Lead (ug/L)	Dissolved Lead (ug/L)	Aroclor-1268 (ug/L)
Count	33	15	20	30	15	30
Min	8.08	0.1	0.15	0.22	0.01	0.01
Max	188	5	2.23	2.50	2.50	1.0
Mean	43.68	3.15	0.70	1.33	0.49	0.30 (0.26) [c]
Std Dev	43.88	1.68	0.55	0.95	0.95	0.28
Coeff Var.	1.00	0.54	0.79	0.72	1.95	0.92
95 UCL	57.24	3.8	0.96	1.60	0.87	0.38
	Approx. Gamma	95% Bootstrap	Approx. Gamma	95% Bootstrap	95% Bootstrap	95% Bootstrap
Non-Detects	0	3	0	14	0	16

Reference Stations [b]

	Total Mercury (ng/L)	Dissolved Mercury (ng/L)	Methyl Mercury (ng/L)	Total Lead (ug/L)	Dissolved Lead (ug/L)	Aroclor-1268 (ug/L)
Count	13	5	10	11	5	13
Min	0.7	0.01	0.01	0.21	0.01	0.0005
Max	78	2.5	0.22	25.0	2.50	1.45
Mean	7.9	1.01	0.05	5.66	1.01	0.422 (0.0018) [c]
Std Dev	21.1	1.36	0.06	9.61	1.36	0.38
Coeff Var.	2.7	1.35	1.16	1.7	1.35	0.90
95 UCL	17.43	1.13	0.10	10.08	1.8	0.6
	Standard Bootstrap	Students	Approx Gamma	95% Bootstrap	95% Bootstrap	95% Bootstrap
Non-Detects	0	2	3	8	2	10

a - Includes stations C-5 mouth of Main Canal
C-9 mouth of Eastern Creek
C-15 mouth of Western Creek Complex
C-16 mouth of Purvis Creek
C-29 mid Purvis Creek
C-36 upper Purvis Creek

b - Includes Troup Creek and Cresent River

c - mean of detected values used in exposure calculations.

Table 4-2b_Chemicals of potential concern (COPCs) in surface water of major creeks in estuary at LCP Site (2000 - 2007 data)[a, b] - yearly averages

	Mercury (ng/L)		Methylmercury		Aroclor 1268	Lead (µg/L)	
Year	Total[c]	Dissolved	(ng/L)	% of total mercury	Total (µg/L)[d,e]	Total	Dissolved[f]
				Mouth of Main Canal (C-5)			
2000	59	0.1	-------	-------	0.50	2.5	2.5
2002	-------	-------	-------	-------	-------	-------	-------
2003	-------	-------	-------	-------	-------	-------	-------
2004	-------	-------	-------	-------	-------	-------	-------
2005	71	-------	0.59	0.83	0.83	-------	-------
2006	37	4.4	-------	-------	0.082	0.393	0.046
2007	120	4.2	-------	-------	0.79	1.0	0.026
				Mouth of Eastern Creek (C-9)			
2000	188	-------	0.94	0.49	0.19	2.5	-------
2002	-------	-------	-------	-------	-------	-------	-------
2003	-------	-------	-------	-------	-------	-------	-------
2004	-------	-------	-------	-------	-------	-------	-------
2005	13	-------	0.22	1.7	-------	-------	-------
2006	160	5.0	-------	-------	0.18	0.449	0.027
2007	43	3.4	-------	-------	0.44		0.079
				Mouth of Western Creek Complex (C-15)			
2000	12	-------	0.22	1.8	0.50	2.5	-------
2002	-------	-------	-------	-------	-------	-------	-------
2003	-------	-------	-------	-------	-------	-------	-------
2004	-------	-------	-------	-------	-------	-------	-------
2005	36	-------	0.89	2.5	-------	-------	-------
2006	15	3.8	-------	-------	0.026	0.441	0.025
2007	49	2.9	-------	-------	0.22	1.1	0.021
				Upper Purvis Creek (Station C-36)			
2000	99	0.1	10	10	0.50	2.5	0.50
2002	11	-------	0.28	2.6	0.50	25	-------
2003	48	-------	1.2	2.5	0.25	2.5	-------
2004	49	-------	2.2	4.5	0.60	0.60	-------
2005	8.4	-------	0.35	4.2	0.010	0.58	-------
2006	12	4.6	-------	-------	0.021	0.363	0.014
2007	23	3.2	-------	-------	0.024	0.41	0.018
				Mid-stretch of Purvis Creek (Station C-29)			
2000	24	-------	0.38	1.6	0.50	2.5	-------
2002	8.1	-------	0.15	1.9	0.50	25	-------
2003	44	-------	1.0	2.3	0.25	2.5	-------
2004	46	-------	1.6	3.5	0.60	0.60	-------
2005	9.8	-------	0.36	3.7	0.010	0.22	-------
2006	17	3.7	-------	-------	0.044	0.575	0.019
2007	29	4.7	-------	-------	0.031	0.50	0.029

Table 4-2b_Continued

	Mercury (ng/L)		Methylmercury		Aroclor 1268	Lead (µg/L)	
Year	Total[c]	Dissolved	(ng/L)	% of total mercury	Total (µg/L)[d,e]	Total	Dissolved[f]
Mouth of Purvis Creek (Station C-16)							
2000	16	0.1	0.20	1.2	0.50	1.8	1.9
2002	11	-------	0.18	1.6	0.50	25	-------
2003	33	-------	0.61	1.8	1.0	2.5	-------
2004	21	-------	1.6	7.6	0.60	0.60	-------
2005	9.6	-------	0.25	2.6	0.010	0.56	-------
2006	25	3.4	-------	-------	0.029	0.561	0.022
2007	50	3.6	-------	-------	0.037	1.2	0.15
Troup Creek (Reference)							
2000	3.3	0.1	0.036	1.1	0.50	2.5	2.5
2002	1.1	-------	0.050	4.5	0.50	25	-------
2003	2.1	-------	0.012	-------	0.25	2.5	-------
2004	4.6	-------	0.22	4.8	0.60	0.60	-------
2005	4.7	-------	0.088	1.9	0.50	-------	-------
2006	1.8	1.0	-------	-------	0.0012	0.213	0.010
2007	78	1.3	-------	-------	0.0024	0.43	0.025
Crescent River (Reference)							
2000	1.7	0.1	0.012	-------	0.33	2.5	2.5
2002	1.2	-------	0.043	3.6	0.50	25	-------
2003	1.2	-------	0.012	-------	0.25	2.5	-------
2004	1.6	-------	0.047	2.9	0.60	0.60	-------
2005	1.2	-------	0.008	-------	1.4	-------	-------
2006	0.70	0.60	-------	-------	0.0005	0.371	0.010

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[a] Creek surface water was typically collected during ebb tide.

[b] Concentrations of COPC identified by underlining were non-detected values that were assigned a value of 1/2 of detection limit.

[c] The U. S. EPA chronic ambient water quality criterion for mercury (total mercury) is 940 ng/L. (This value does not account for food-web uptake by biota.) The State of Georgia chronic ecological screening value (ESV) is 25 ng/L (based on marketability of fishes).

[d] The State of Georgia water quality standard for total PCBs in coastal and marine estuarine waters is 0.03 µg/L.

[e] There are no U. S. EPA or Region 4 toxicological benchmarks for Aroclor 1268.

[f] The State of Georgia water quality standard for lead (dissolved lead) is 8.1 µg/L.

Table 4-3a_Concentrations of COPCs in sediment for major areas in estuary at LCP Site (2000 - 2006 data) for exposure estimation

All concentrations in mg/kg dw

Domain 1

	Mercury	Aroclor-1268	Lead
Count	63	63	37
Min	0.01	0.053	2.1
Max	62	300	210
Mean	4.85	11.45	31
Std Dev	10.69	39.83	32.5
CoVariation	2.205	3.478	1.046
95 UCL	11.51	23.43	40.7
UCL Statistic	H-UCL	H-UCL	95% Bootstrap
Non-Detects	1	1	0

Main Canal

	Mercury	Aroclor-1268	Lead
Count	111	111	86
Min	0.196	0.25	3.9
Max	55	570	69.9
Mean	7.40	27.64	26.1
Std Dev	8.951	70.67	11.18
CoVariation	1.21	2.556	0.429
95 UCL	8.72	41.71	28.1
UCL Statistic	Approx gamma	H-UCL	Students-t
Non-Detects	0	0	0

Blythe Island

	Mercury	Aroclor-1268	Lead
Count	48	48	48
Min	0.01	0.028	2.6
Max	1.99	0.67	38
Mean	0.30	0.20	16.5
Std Dev	0.37	0.166	7.27
CoVariation	1.232	0.829	0.441
95 UCL	0.39	0.25	18.3
UCL Statistic	95% Bootstrap	Approx gamma	Students-t
Non-Detects	2	14	0

Domain 2

	Mercury	Aroclor-1268	Lead
Count	71	71	71
Min	0.18	0.0465	11
Max	62.9	65	765
Mean	3.85	3.75	40.9
Std Dev	9.247	8.784	108.8
CoVariation	2.4	2.324	2.663
95 UCL	5.84	5.05	63.0
UCL Statistic	95% Bootstrap	H-UCL	95% Bootstrap
Non-Detects	0	2	0

Eastern Creek

	Mercury	Aroclor-1268	Lead
Count	116	114	90
Min	0.0437	0.0074	5.74
Max	145	460	238
Mean	20.28	49.57	35.7
Std Dev	29.43	98.8	30.95
CoVariation	1.451	1.993	0.867
95 UCL	25.04	65.28	41.5
UCL Statistic	95% Bootstrap	95% Bootstrap	95% Bootstrap
Non-Detects	0	1	0

Troup Creek Reference

	Mercury	Aroclor-1268	Lead
Count	14	14	14
Min	0.026	0.015	8
Max	0.197	0.165	27.1
Mean	0.08	0.05	17.6
Std Dev	0.0438	0.0416	5.838
CoVariation	0.533	0.819	0.331
95 UCL	0.10	0.08	20.4
UCL Statistic	Students-t	H-UCL	Students-t
Non-Detects	0	9	0

Domain 3

	Mercury	Aroclor-1268	Lead
Count	90	90	90
Min	0.044	0.013	8.9
Max	8.37	9	1590
Mean	1.88	1.67	90.7
Std Dev	1.747	1.949	234.9
CoVariation	0.928	1.17	2.589
95 UCL	2.23	2.04	133
UCL Statistic	Approx gamma	Approx gamma	95% Bootstrap
Non-Detects	0	1	0

Western Creek Complex

	Mercury	Aroclor-1268	Lead
Count	101	101	101
Min	0.043	0.0079	13
Max	16.3	25	51.8
Mean	2.75	3.18	29.0
Std Dev	3.288	4.02	6.802
CoVariation	1.194	1.266	0.235
95 UCL	3.31	3.84	30.1
UCL Statistic	95% Bootstrap	Approx gamma	Students-t
Non-Detects	0	2	0

Area A

	Mercury	Aroclor-1268	Lead
Count	290	288	213
Min	0.01	0.0074	2.1
Max	145	570	238
Mean	12	32.78	31
Std Dev	21.13	79.51	25.5
CoVariation	1.761	2.426	0.823
95 UCL	14.05	40.14	34.1
UCL Statistic	95% Bootstrap	95% Bootstrap	95% Bootstrap
Non-Detects	1	2	0

Domain 4

	Mercury	Aroclor-1268	Lead
Count	99	99	99
Min	0.03	0.0445	8.8
Max	4.62	8.8	52.7
Mean	0.63	1.14	21.7
Std Dev	0.756	1.323	7.338
CoVariation	0.856	1.161	0.339
95 UCL	1.07	1.36	22.9
UCL Statistic	H-UCL	95% Bootstrap	Students-t
Non-Detects	0	11	0

Purvis Creek

	Mercury	Aroclor-1268	Lead
Count	71	71	71
Min	0.00711	0.007	2.03
Max	6.83	28	34.6
Mean	1.22	3.78	17.4
Std Dev	1.283	5.479	10.96
CoVariation	1.056	1.451	0.629
95 UCL	1.53	5.07	23.1
UCL Statistic	Approx gamma	Approx gamma	95 Chebyshev
Non-Detects	0	5	0

Estuary Area Weighted Grand Mean and UCL

	Mercury	Aroclor-1268	Lead
Mean	1.70	2.49	38.6
95UCL	2.56	3.42	52.0

CoVariation - Coefficient of Variation
Area A = Main Canal, Eastern Creek, and Domain 1

Concentrations of COPC greater than site-specific most sensitive threshold effects levels (TELs) but less than probable effects levels (PELs). (Table 4-3b and Sections 4.6, 4.7) are indicated by **yellow** background; and concentrations greater than PELs are identified by **red** background.

Table 4-3b_General sediment quality characteristics and initial chemicals of potential concern (COPCs in surface sediment for major areas and years in estuary at LCP Site (2000 - 2007 data)[a, b, c - yearly averages]

	Size of areas in LCP Estuary		Silt and clay		Total organic carbon		Total mercury		Aroclor 1268		Lead		Total PAHs	
Major area	(total area of 789.26 acres)	Year	Conc. % (dw)	Sample size (n)	Conc. % (dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)
Domain 1	20.28 acres	2000	76.1	14	5.1	14	11	14	3.4	13	35	14	1.3	13
(marsh)	(2.6%)	2002	61.5	7	3.3	7	20	7	32	7	21	7	0.40	7
		2003	74.4	7	3.5	7	7.2	7	5.5	7	26	7	1.7	7
		2004	62.5	7	3.4	7	3.3	7	10	7	27	7	2.2	7
		2005	71.9	7	5.8	7	12	7	66	7	38	7	0.89	7
		2006	60.0	7	4.4	7	1.8	7	3.9	7	24	7	0.29	7
		2007	20.1	2	1.6	2	0.44	2	0.58	2	12	2	0.49	2
Main Canal	1.54 acres	2000	60.0	5	3.4	5	4.5	5	5.8	5	23	5	0.95	5
(creek)	(0.2%)	2002	50.4	5	2.4	5	4.8	5	14	5	17	5	0.84	5
		2003	65.6	5	2.6	5	6.7	5	10	5	23	5	0.82	5
		2004	60.3	5	4.1	5	3.9	5	12	5	23	5	2.5	5
		2005	87.7	1	3.7	1	1.1	1	4.2	1	26	1	1.1	1
		2006	70.8	1	4.7	1	7.0 (9.2*)	1 (50)	31 (51*)	1 (50)	41* (28)	1 (50)	2.2* (.98)	1 (50)
		2007	85.7	1	4.9	1	2.7	1	10	1	20	1	0.60	1
Eastern Creek	4.42 acres	2000	96.0	4	5.7	4	37	4	6.4	4	47	4	3.0	4
	(0.6%)	2002	73.1	4	3.5	4	20	4	230	4	23	4	1.5	4
		2003	83.3	4	3.7	4	34	4	14	4	43	4	3.5	4
		2004	80.0	4	4.3	4	10	4	22	4	27	4	4.8	4
		2005	75.6	3	4.3	3	57	3	52	3	38	3	2.7	3
		2006	67.9	3	5.8	3	5.0 (21*)	3 (50)	18 (54*)	3 (50)	31 (34*)	3 (50)	0.84 (1.6*)	3 (50)
		2007	79.9	2	5.0	2	4.8	2	10	2	110	2	4.4	2
Western	2.15 acres	2000	97.7	6	5.5	6	5.5	6	0.70	6	26	6	0.23	6
Creek	(0.3%)	2002	97.5	2	4.6	2	1.4	2	2.4	2	32	2	0.098	2
Complex		2003	89.9	2	3.6	2	1.6	2	1.0	2	26	2	2.0	2
		2004	92.6	2	4.4	2	1.4	2	2.6	2	27	2	0.23	2
		2005	87.4	5	4.0	5	1.6	5	4.5	5	28	5	1.0	5
		2006	92.1	1	4.2	1	0.46 (3.5*)	1 (50)	1.0 (3.9*)	1 (50)	26 (33*)	1 (50)	0.43 (0.91*)	1 (50)
		2007	91.2	1	4.8	1	1.8	1	2.5	1	22	1	0.32	1
Domain 2	130.12 acres	2000	91.0	6	4.0	6	22	6	2.5	6	32	6	0.35	6
(marsh)	(16.5%)	2002	95.4	3	5.1	3	9.0	3	27	3	25	3	0.50	3
		2003	95.0	3	4.2	3	13	3	10	3	31	3	1.4	3
		2004	81.7	9	5.3	9	1.4	9	2.5	9	27	9	0.41	9
		2005	77.3	9	6.1	9	2.3	9	6.2	9	87	9	9.6	9
		2006	67.0	6	5.8	6	1.1	6	3.7	6	29	6	0.21	6
		2007	73.2	6	6.7	6	0.88	6	1.2	6	140	6	14	6

Table 4-3b_Continued

			Silt and clay		Total organic carbon		Total mercury		Aroclor 1268		Lead		Total PAHs	
Major area	Size of areas in LCP Site (total area of 789.26 acres)	Year	Conc. % (dw)	Sample size (n)	Conc. % (dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)
Domain 3 (marsh)	156.21 acres (19.8%)	2000	76.6	14	5.2	14	1.5	14	0.53	14	110	14	2.6	14
		2002	12.3	1	0.91	1	0.10	1	0.14	1	16	1	0.12	1
		2003	9.0	1	0.94	1	0.34	1	0.32	1	50	1	0.67	1
		2004	75.8	6	4.6	6	0.97	6	1.5	6	17	6	0.37	6
		2005	74.4	11	5.2	15	2.8	15	3.3	15	74	15	2.2	15
		2006	58.7	9	5.4	9	2.5	9	2.4	9	75	9	0.49	9
		2007	68.5	4	7.9	4	3.9	4	2.4	4	490	4	9.50	4
Domain 4 (marsh)	417.24 acres (52.9%)	2000	97.5	2	4.6	2	0.42	2	0.12	2	19	2	0.16	2
		2002	81.1	10	4.7	10	0.80	10	1.8	10	15	10	0.29	10
		2003	89.6	10	3.6	10	1.3	10	0.72	10	22	10	0.66	10
		2004	95.0	14	5.1	14	0.63	14	1.5	14	19	14	0.95	14
		2005	81.7	7	6.3	7	0.99 (1.3*)	7 (25)	1.6 (1.7*)	7 (25)	28* (28*)	7 (25)	2.2* (0.67)	7 (25)
		2006	74.4	6	5.8	6	0.77	6	0.64	6	26	6	2.0	6
North Purvis Creek	31.27 acres (4.0%)	2000	66.7	3	4.6	3	1.4	3	0.75	3	22	3	0.41	3
		2002	---	---	---	---	---	---	---	---	---	---	-----	0
		2003	---	---	---	---	---	---	---	---	---	---	-----	0
		2004	---	---	---	---	---	---	---	---	---	---	-----	0
		2005	86.5	3	4.6	3	1.4 (2.0*)	3 (25)	2.6 (4.9*)	3 (25)	27* (21)	3 (25)	0.95* (0.72)	3 (25)
		2006	82.6	2	5.0	2	0.89	2	1.2	2	28	2	0.54	2
South Purvis Creek	26.03 acres (3.3%)	2000	54.5	2	3.0	2	0.40	2	0.46	2	13	2	0.13	2
		2002	51.4	2	2.4	2	0.62	2	3.0	2	16	2	0.30	2
		2003	63.4	2	3.7	2	0.44	2	0.60	2	18	2	0.20	2
		2004	57.4	2	3.4	2	1.8	2	9.4	2	16	2	0.12	2
		2005	48.7	2	2.7	2	0.76* (0.71)	2 (25)	2.8 (3.9*)	2 (25)	16* (12)	2 (25)	0.61 (0.93*)	2 (25)
		2006	49.4	2	3.5	2	0.35	2	1.0	2	18	2	1.4	2
		2007	82.2	1	5.8	1	0.59	1	1.1	1	20	1	0.20	1

Table 4-3b_Continued

Major area	Size of areas in LCP Site (total area of 789.26 acres)	Year	Silt and clay		Total organic carbon		Total mercury		Aroclor 1268		Lead		Total PAHs	
			Conc. % (dw)	Sample size (n)	Conc. % (dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)	Conc. (mg/kg, dw)	Sample size (n)
Blythe Island	----------	2004	66.3	6	5.0	6	0.28	6	0.36	6	17	6	0.089	6
		2005	83.7	6	5.5	6	0.84	6	0.38	6	24	6	0.80	6
		2006	67.0	6	5.2	6	0.38	6	0.23	6	21	6	0.18	6
Feasibility Study (FS) Locations	----------	2005	49.4	5	4.5	6	2.8	6	4.8	6	280	6	11	6
		2006	52.0	6	5.1	6	2.3	6	3.9	6	96	6	1.0	6
		2007	43.5	5	4.8	6	2.3	6	3.0	6	59	6	-----	0
Point Source Discharges from Non-LCP Sources	----------	2005	62.70	3	6.6	8	1.1	8	1.6	8	48	8	1.28	8
Troup Creek (reference)	----------	2000	71.5	2	3.4	2	0.26	2	0.038	2	18	2	0.84	2
		2002	81.0	2	3.4	2	0.066	2	0.048	2	19	2	0.060	2
		2003	66.8	2	2.8	2	0.060	2	0.13	2	15	2	0.080	2
		2004	69.8	2	2.9	2	0.037	2	0.034	2	10	2	0.060	2
		2005	76.2	2	4.4	2	0.15	2	0.045	2	20	2	0.12	2
		2006	51.6	2	4.0	2	0.082	2	0.028	2	22	2	0.040	2
		2007	82.3	2	4.2	2	0.10	2	0.047	2	19	2	0.039	2
Crescent River (reference)	----------	2000	21.1	2	0.30	2	0.0054	2	0.022	2	4.0	2	0.31	2
		2002	87.6	2	3.6	2	0.028	2	0.11	2	14	2	0.060	2
		2003	47.3	2	1.4	2	0.024	2	0.11	2	9.8	2	0.079	2
		2004	3.9	1	0.2	1	0.010	1	0.060	1	2.2	1	0.060	1
		2005	---	0	2.7	2	0.062	2	0.00050	2	12	2	0.128	2
		2006	46.2	2	1.4	2	0.031	2	0.0018	2	12	2	0.032	2

Table 4-3b_Continued

[a] Minor creeks (creeks other than Main Canal, Eastern Creek, Western Creek Complex, North Purvis Creek, and South Purvis Creek) are considered part of the marsh in Domains 1, 2, 3, and 4 of LCP estuary. For North Purvis Creek and South Purvis Creek, creek and associated "marsh" stations are combined.

[b] Non-detected concentrations of COPC (primarily PAHs) identified by underlining consisted of at least one non-detected value that was assigned a value of 1/2 of detection limit.

[c] Concentrations of COPC greater than or equal to the most sensitive site specific threshold effect level (TEL) but less than the site-specific probable effect levels (PELs) or effects range low (ER-L) based on toxicity test results are indicated by **yellow** background; and concentrations greater than site-specific PELs or ER-Ls are identified by **red** background.

	Literature TEL (mg/kg, dw)[1]	Literature PEL (mg/kg, dw)[2]	Site-specific TEL (mg/kg, dw)	Site-specific PEL or ER-L (mg/kg, dw)
●Total mercury:	0.13	0.7	1.4[3]	3.2[3a]
● Aroclor 1268:	0.022 (derived for other PCBs)	0.189 (Total PCBs)	3.2[3]	12.8[3b]
● Lead:	30.24	112	41[4]	60[4a]
● Total PAHs:	1.684	6.68	0.8[4]	1.5[4a]

TEL - Threshold Effect Level

1 EPA Region 4 Sediment Screening Levels

2 McDonald et al., 1996

3 Most sensitive endpoint - embryo development of grass shrimp (See Table 4-22) a - based on ER-L; b - based on PEL

4 Most sensitive endpoint - survival of amphipods (See Table 4-20) a - based on ER-L

Table 4-4_Linear coefficients of determination (r^2) for basic physical/chemical characteristics and initial chemicals of potential concern (COPCs) in surface sediment of major creeks and marsh in estuary at LCP Site (2000 - 2007 data)[a,b]

Major Creeks (from Table 4-3b; n = 31, Special Study data excluded)

	Silt/clay content[c]	Total organic carbon (TOC)	Total mercury	Aroclor 1268	Lead	Total PAHs
Silt/clay content:		**+0.43 ****	+0.026 ns	+0.00015 ns	+0.099 ns	+0.014 ns
Total organic carbon (TOC):			+0.016 ns	- 0.0097 ns	**+0.15 ***	+0.018 ns
Total mercury:				**+0.13 ***	+0.081 ns	**+0.28 ****
Aroclor 1268:					+0.00015 ns	+0.029 ns
Lead:						**+0.42 ****
Total PAHs:						

Marsh (from Table 4-3b; n = 27, Special Study data excluded)

	Silt/clay content[c]	Total organic carbon (TOC)	Total mercury	Aroclor 1268	Lead	Total PAHs
Silt/clay content:		**+0.41 ****	+0.069 ns	+0.0088 ns	-0.000066 ns	+0.0062 ns
Total organic carbon (TOC):			-0.0000017 ns	+0.0090 ns	**+0.26 ****	**+0.28 ****
Total mercury:				**+0.27 ****	-0.0026 ns	+0.0036 ns
Aroclor 1268:					-0.0088 ns	-0.013 ns
Lead:						**+0.42 ****
Total PAHs:						

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[a] Surface sediment is from 0 - 15 cm in depth.

[b] Linear coefficients of determination (r^2) are statistically nonsigificant (based on "t" tests) when associated with the symbol "ns."Statistical significance at P criterion = 0.05 and 0.01 is indicated, respectively, by the symbols"*" and "**." The r^2 values are preceded by a positive or negative sign to indicate the "direction" of the underlying "r" values.

[c] Silt/clay was considered to be particles less than 75μ in size.

Table 4-5_Other metals (including some COPCs) in surface sediment for major areas and years in estuary at LCP Site (2004 - 2006 data)

Sampling station		Metals (mg/kg, dw)[a, b]																				
		Aluminum	Antimony	**Arsenic**	Barium	Beryllium	Cadmium	Calcium	**Chromium**	Cobalt	**Copper**	Iron	Magnesium	Manganese	**Nickel**	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	**Zinc**
Domain 1 (Marsh)																						
K7 in Marsh Grid	2004	33,000	**2.7**	**12**	33	1.6	0.25	2,300	50	7.1	13	28,000	6,200	320	14	3,700	0.5	0.5	11,000	2.5	65	65
	2005	45,000	0.5	**11**	45	1.8	0.5	3,100	**92**	7.1	17	24,000	7,700	190	**19**	4,400	0.5	0.5	14,000	0.5	95	80
	2006	25,000	0.07	**11**	28	1.6	0.14	3,700	**62**	6.3	12	23,000	8,000	330	12	4,000	0.82	0.13	22,000	0.23	73	72
	Mean:	34,000	1.1	**11**	35	1.7	0.30	3,000	**68**	6.8	14	25,000	7,300	280	15	4,000	0.61	0.38	16,000	1.1	78	72
H7 in Marsh Grid	2004	36,000	1.0	**14**	36	1.9	0.25	2,400	**57**	7.6	12	33,000	7,600	300	**16**	4,800	0.5	0.5	15,000	1.2	77	63
	2005	46,000	0.5	**12**	47	1.8	0.5	9,800	**76**	9.6	17	29,000	9,200	280	**20**	4,600	0.5	0.5	15,000	0.5	89	89
	2006	22,000	0.06	**9.9**	24	1.4	0	3,600	**56**	5.2	11	21,000	7,800	260	11	3,600	0.70	0.12	24,000	0.20	66	64
	Mean:	35,000	0.52	**12**	36	1.7	0.29	5,300	**63**	7.5	13	28,000	8,200	280	**16**	4,300	0.57	0.37	18,000	0.63	77	72
AB Seep	2004	8,000	1.0	4.9	17	0.54	0.25	770	14	2.6	3.5	7,600	1,700	45	4.8	960	0.5	0.5	3,600	0.5	22	22
	2005	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2006	940	0.11	0.84	6.3	0.07	0.01	460	1.9	0.24	0.470	1,000	1,300	11	0.59	400	0.16	0.0035	8,700	0.01	2.8	2.7
	Mean:	4,500	0.56	2.9	12	0.31	0.13	620	8.0	1.4	2.0	4,300	1,500	28	2.7	680	0.33	0.25	6,200	0.26	12	12
Main Canal (Creek)																						
Mouth (C-5)	2004	30,000	**2.5**	**13**	35	1.6	0.25	6,100	**68**	7.5	12	28,000	7,700	510	**16**	4,100	0.5	0.5	16,000	2.0	75	84
	2005	49,000	0.5	**14**	51	1.9	0.5	15,000	**82**	10	16	36,000	9,800	640	**22**	4,300	0.5	0.5	12,000	5.3	92	86
	2006	23,000	0.02	**10**	28	1.3	0.23	8,600	**57**	6.6	11	25,000	8,600	450	13	4,000	0.39	0.13	28,000	0.26	53	70
	Mean:	34,000	1.0	**12**	38	1.6	0.33	9,900	**69**	8.0	13	30,000	8,700	530	**17**	4,100	0.46	0.38	19,000	2.5	73.3	80
Eastern Creek																						
Upstream (C-6)	2004	19,000	1.0	**7.5**	34	1.1	0.25	8,400	50	6.1	11	19,000	3,700	260	11	2,100	0.5	0.5	9,400	3.4	44	59
	2005	42,000	0.5	**13**	41	1.7	0.5	2,800	**120**	10	**27**	32,000	7,200	380	**21**	3,700	0.5	0.73	12,000	4.6	86	89
	2006	16,000	0.06	**12**	23	1.3	0.22	5,700	50	6.2	13	22,000	8,200	330	11	3,800	0.59	0.14	29,000	0.22	56	72
	Mean:	26,000	0.52	**11**	33	1.4	0.32	5,600	**73**	7.4	17	24,000	6,400	320	14	3,200	0.53	0.46	17,000	2.7	62	73
Mid-stretch (C-7)	2004	34,000	**2.5**	**9.3**	34	1.6	0.25	3,100	**100**	8.0	18	28,000	7,900	410	**16**	4,400	0.5	0.5	20,000	2.5	79	86
	2005	49,000	0.5	**16**	47	1.8	0.69	3,600	**63**	9.2	**20**	37,000	7,300	360	**21**	4,000	0.5	0.83	12,000	3.8	85	72
	2006	21,000	0.06	**11**	26	1.4	0.19	7,200	50	6.4	12	23,000	8,600	400	12	4,000	0.62	0.12	25,000	0.26	58	73
	Mean:	35,000	1.0	**12**	36	1.6	0.38	4,600	**71**	7.9	17	29,000	7,900	390	**16**	4,100	0.54	0.48	19,000	2.2	74	77
Western Creek Complex (in Domain 2)																						
Mouth (C-15)	2004	36,000	**2.5**	**14**	40	1.8	0.25	7,300	**94**	8.8	15	33,000	9,200	780	**18**	5,000	1.0	0.5	20,000	3.6	87	96
	2005	44,000	0.5	**14**	44	1.8	0.5	6,800	**110**	8.8	15	35,000	8,700	840	**20**	4,500	0.5	0.86	20,000	0.5	86	80
	2006	24,000	0.03	**11**	31	1.5	0.21	12,000	**55**	7.6	12	25,000	10,000	730	14	4,600	0.18	0.12	35,000	0.28	57	76
	Mean:	35,000	1.0	**13**	38	1.7	0.32	8,700	**86**	8.4	14	31,000	9,300	780	**17**	4,700	0.56	0.49	25,000	1.5	77	84

Table 4-5_Continued

Sampling station		Metals (mg/kg, dw)[a, b]																				
		Aluminum	Antimony	**Arsenic**	Barium	Beryllium	Cadmium	Calcium	**Chromium**	Cobalt	**Copper**	Iron	Magnesium	Manganese	**Nickel**	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	**Zinc**
Domain 3 (Marsh)																						
Near old oil-processing site (C-33)	2004	970	1.0	0.5	3.0	0.20	0.25	360	2.1	0.50	1.0	330	200	5.5	2.0	50	0.5	0.5	950	0.5	1.8	4.9
	2005	5,000	0.5	0.5	11	0.16	0.15	1,400	9.8	1.4	5.4	2,900	730	40	2.4	320	0.5	0.5	1,400	0.5	9.1	32
	2006	2,500	0.02	0.89	9	0.18	0.12	1,100	5.4	0.63	4.8	1,600	940	14	1.8	260	0.14	0.02	4,400	0.05	5.0	27
	Mean:	2,800	0.51	0.63	7.7	0.18	0.17	950	5.8	0.84	3.7	1,600	620	20	2.1	210	0.38	0.34	2,200	0.35	5.3	21
Northern domain (C-100)	2004	27,000	1.0	**8.1**	27	1.3	0.52	2,300	**130**	5.9	13	23,000	5,800	340	13	3,300	0.5	0.5	12,000	1.9	58	71
	2005	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	27,000	1.0	**8.1**	27	1.3	0.52	2,300	**130**	5.9	13	23,000	5,800	340	13	3,300	0.50	0.50	12,000	1.9	58	71
Mid-western domain (C-101)	2004	26,000	1.0	**10**	24	1.2	0.51	1,700	38	5.6	10	24,000	4,700	220	11	3,000	0.5	0.5	9,700	2.3	55	50
	2005	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	26,000	1.0	**10**	24	1.2	0.51	1,700	38	5.6	10	24,000	4,700	220	11	3,000	0.50	0.50	9,700	2.3	55	50
Domain 4 (Marsh)																						
Northern domain (C-102)	2004	21,000	2.5	7.2	21	1.0	0.25	2,300	**53**	4.5	8.8	19,000	4,700	230	10	2,700	0.5	0.5	10,000	1.3	48	55
	2005	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	21,000	2.5	7.2	21	1.0	0.25	2,300	**53**	4.5	8.8	19,000	4,700	230	10	2,700	0.50	0.50	10,000	1.3	48	55
Northwestern Inlet from Turtle River (C-D)	2004	32,000	1.0	**17**	30	1.5	0.25	2,200	51	8.2	14	32,000	6,200	220	15	3,800	0.5	0.5	13,000	2.5	77	58
	2005	56,000	0.5	**14**	52	2.1	0.95	3,300	**84**	11	**21**	40,000	8,800	300	**25**	5,000	0.5	0.62	16,000	4.4	120	90
	2006	17,000	0.07	**11**	19	1.2	0.24	3,800	**87**	5.6	11	23,000	7,500	210	11	3,600	1.1	0.17	28,000	0.23	53	61
	Mean:	35,000	0.52	**14**	34	1.6	0.48	3,100	**74**	8.3	15	32,000	7,500	240	**17**	4,100	0.70	0.43	19,000	2.4	83	70
Northeastern stretch of "U" creek (C-A)	2004	21,000	1.0	**8.1**	21	1.0	0.25	2,500	**56**	4.9	8.4	19,000	4,800	240	10	2,800	1.0	0.50	9,900	1.0	50	50
	2005	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	21,000	1.0	**8.1**	21	1.0	0.25	2,500	**56**	4.9	8.4	19,000	4,800	240	10	2,800	1.0	0.50	9,900	1.0	50	50
Southeastern boundary (C-45)	2004	24,000	2.5	**11**	24	1.2	0.25	2,500	52	5.3	7.4	23,000	5,300	360	10	3,300	0.5	0.5	11,000	1.0	55	46
	2005	43,000	0.5	**15**	47	1.8	0.5	22,000	**71**	9.6	16	32,000	9,800	530	**20**	4,400	0.5	0.5	13,000	0.5	83	89
	2006	19,000	0.10	**14**	25	1.5	0.22	6,600	**57**	7.4	12	26,000	8,400	630	13	4,300	0.16	0.15	28,000	0.25	70	72
	Mean:	29,000	1.0	**13**	32	1.5	0.32	10,400	**60**	7.4	12	27,000	7,800	510	14	4,000	0.39	0.38	17,000	0.58	69	69

Table 4-5_Continued

Sampling station		Metals (mg/kg, dw)$^{a, b}$																					
		Aluminum	Antimony	**Arsenic**	Barium	Beryllium	Cadmium	Calcium	**Chromium**	Cobalt	**Copper**	Iron	Magnesium	Manganese	**Nickel**	Potassium	Selenium	**Silver**	Sodium	Thallium	Vanadium	**Zinc**
Purvis Creek																						
Upstream (C-36)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	43,000	0.5	**16**	44	1.8	0.5	12,000	**83**	8.7	18	34,000	9,100	440	**20**	4,100	4.3	0.5	17,000	0.5	80	90
	2006	26,000	0.08	**11**	31	1.5	0.28	9,600	**60**	7.2	13	27,000	10,000	420	14	4,800	0.18	0.16	35,000	0.28	60	79
	Mean:	34,000	0.29	**14**	38	1.7	0.39	10,800	**72**	8.0	16	30,000	9,600	430	**17**	4,400	2.2	0.33	26,000	0.39	70	85
Mid-stretch (C-29)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	50,000	0.5	**14**	48	1.9	0.89	8,400	**88**	10	16	38,000	9,100	580	**22**	4,800	0.5	0.75	18,000	4.4	100	90
	2006	18,000	0.06	**12**	26	1.4	0.24	16,000	50	7.0	12	24,000	10,000	480	13	4,300	0.71	0.12	27,000	0.24	56	79
	Mean:	34,000	0.28	**13**	37	1.7	0.57	12,200	**69**	8.5	14	31,000	9,600	530	**18**	4,600	0.61	0.44	22,000	2.3	78	85
Mouth (C-16)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	9,300	0.5	3.1	10	0.40	0.5	1,900	26	2.1	3.3	7,400	1,800	120	4.2	890	0.5	0.5	4,100	0.5	18	17
	2006	5,700	0.02	2.9	9.8	0.41	0.06	2,400	14	2.0	3.2	6,400	2,200	130	3.8	1,000	0.14	0.02	7,200	0.08	16	18
	Mean:	7,500	0.26	3.0	9.9	0.41	0.28	2,200	20	2.1	3.3	6,900	2,000	120	4.0	940	0.32	0.26	5,600	0.29	17	18
Blythe Island (Marsh)																						
Northern boundary (C-103)	2004	7,000	1.0	1.3	29	0.20	0.25	2,200	15	1.2	2.6	5,700	3,300	66	2.0	1,000	0.5	0.5	9,700	0.5	17	14
	2005	47,000	0.5	**14**	43	1.7	0.30	3,100	**80**	8.8	14	35,000	7,100	230	**20**	4,200	0.5	0.5	14,000	0.5	89	68
	2006	28,000	0.07	**19**	31	1.6	0.19	5,300	**68**	7.8	12	25,000	8,800	220	**16**	4,400	0.42	0.13	27,000	0.31	75	77
	Mean:	27,000	0.52	**11**	34	1.2	0.25	3,500	**54**	5.9	10	22,000	6,400	170	12.7	3,200	0.47	0.38	17,000	0.44	60	53
Northeastern boundary (C-104)	2004	28,000	1.0	**10**	28	1.4	0.25	2,300	**68**	6.2	10	26,000	5,700	250	13	3,400	0.5	0.5	12,000	0.5	69	62
	2005	55,000	0.5	**15**	49	1.9	0.50	2,700	**62**	10	16	36,000	7,100	320	**22**	4,500	0.5	0.5	13,000	0.5	87	70
	2006	15,000	0.12	**11**	16	1.0	0.13	1,900	35	5.2	7.5	21,000	4,300	240	9.6	2,300	0.30	0.08	15,000	0.17	46	43
	Mean:	33,000	0.54	**12**	31	1.4	0.29	2,300	**55**	7.1	11	28,000	5,700	270	15	3,400	0.43	0.36	13,000	0.39	67	58
Southern location (C-105)	2004	18,000	1.0	7	20	0.96	0.25	1,900	42	4.7	6.4	17,000	4,100	190	8.4	2,300	0.5	0.5	8,300	1.2	43	41
	2005	49,000	0.5	**12**	480	1.9	0.50	11,000	**79**	9.7	15	34,000	9,300	450	**21**	4,700	0.5	0.5	13,000	0.5	95	87
	2006	23,000	0.05	**9.4**	23	1.2	0.17	4,100	44	5.8	8.2	22,000	5,800	260	11	3,000	0.72	0.08	18,000	0.25	52	51
	Mean:	30,000	0.52	**9.5**	170	1.4	0.31	5,700	**55**	6.7	9.9	24,000	6,400	300	13	3,300	0.57	0.36	13,000	0.65	63	60

Table 4-5_Continued

Sampling station		Metals (mg/kg, dw)[a, b]																				
		Aluminum	Antimony	**Arsenic**	Barium	Beryllium	Cadmium	Calcium	**Chromium**	Cobalt	**Copper**	Iron	Magnesium	Manganese	**Nickel**	Potassium	Selenium	**Silver**	Sodium	Thallium	Vanadium	**Zinc**
Feasibility-Study (FS) Locations																						
Area 1 (Creek)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	25,000	0.5	**8.9**	33	1.1	0.5	16,000	41	6.0	9.1	22,000	3,600	150	10	2,000	0.5	0.5	4,700	0.5	46	75
	2006	14,000	0.02	6.1	18	0.94	0.15	2,500	27	3.5	6.6	15,000	3,100	120	6.6	1,800	0.30	0.06	6,800	0.14	25	30
	Mean:	19,000	0.26	**7.5**	26	1.0	0.33	9,200	34	4.8	7.9	18,000	3,400	140	8.3	1,900	0.40	0.28	5,800	0.32	36	53
Area 2 (Creek)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	22,000	0.5	4.1	52	1.0	0.79	5,500	31	4.1	**26**	14,000	2,900	97	11	1,400	0.5	0.5	5,800	4.0	42	**130**
	2006	16,000	0.13	6.8	51	0.93	0.75	9,000	27	4.3	**25**	14,000	3,400	110	10	1,300	0.84	0.12	7,200	0.20	38	**130**
	Mean:	19,000	0.32	5.5	52	1.0	0.77	7,200	29	4.2	**26**	14,000	3,200	100	11	1,350	0.67	0.31	6,500	2.1	40	**130**
Area 3 (Creek)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	33,000	0.5	**8.3**	61	1.2	0.40	1,800	31	4.0	**42**	15,000	2,800	99	12	1,800	0.5	0.5	2,100	0.5	43	51
	2006	28,000	0.04	**9.0**	96	1.8	0.40	4,900	**82**	6.8	**21**	29,000	6,300	310	15	3,200	0.20	0.17	20,000	0.33	64	110
	Mean:	30,000	0.27	**8.7**	79	1.5	0.40	3,400	**57**	5.4	**32**	22,000	4,600	200	13.5	2,500	0.35	0.34	11,000	0.42	54	81
Area 4 (Creek)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	30,000	0.5	**7.5**	30	1.1	0.22	4,900	48	6.1	9.5	18,000	5,300	240	12	2,700	0.5	0.5	7,800	0.5	56	54
	2006	14,000	0.02	5.2	17	0.73	0.08	3,400	28	3.5	6.1	12,000	4,200	160	6.9	2,000	0.27	0.05	13,000	0.14	32	36
	Mean:	22,000	0.26	6.35	24	0.92	0.15	4,200	38	4.8	7.8	15,000	4,800	200	9.5	2,400	0.39	0.28	10,000	0.32	44	45
Area 5 (Creek)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	51,000	0.5	**12**	50	1.9	0.5	13,000	**84**	9.6	16	33,000	9,200	550	**21**	4,800	0.5	0.66	15,000	0.5	92	93
	2006	25,000	0.05	**11**	28	1.4	0.21	11,000	**67**	7.0	12	25,000	8,400	430	13	4,000	0.38	0.13	25,000	0.27	58	73
	Mean:	38,000	0.28	**12**	39	1.7	0.36	12,000	**76**	8.3	14	29,000	8,800	490	**17**	4,400	0.44	0.40	20,000	0.39	75	83
Area 6 (Marsh)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	49,000	0.5	**11**	46	1.6	0.37	4,000	**99**	8.8	18	30,000	8,600	280	**21**	4,900	0.5	0.5	18,000	5.8	100	87
	2006	24,000	0.06	**12**	29	1.5	0.18	4,700	**80**	6.3	12	24,000	8,800	360	12	4,400	0.15	0.13	28,000	0.24	70	75
	Mean:	36,000	0.28	**12**	38	1.6	0.28	4,400	**90**	7.6	15	27,000	8,700	320	**16.5**	4,600	0.33	0.32	23,000	3.0	85	81
Point-Source Locations (Creek)																						
Glynn County Landfill (C-200)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	42,000	0.5	**18**	42	1.8	0.5	2,300	**64**	9.5	**19**	44,000	6,400	310	**19**	3,900	0.5	0.5	8,400	0.5	73	92
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	42,000	0.50	**18**	42	1.8	0.50	2,300	**64**	9.5	**19**	44,000	6,400	310	**19**	3,900	0.5	0.5	8,400	0.5	73	92
Georgia-Pacific Pulp and Paper Company (C-201)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	34,000	0.5	**10**	35	1.3	0.5	9,300	46	6.7	10	24,000	6,600	500	15	3,600	0.5	0.5	12,000	0.5	60	50
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	34,000	0.50	**10**	35	1.3	0.50	9,300	46	6.7	10	24,000	6,600	500	15	3,600	0.5	0.5	12,000	0.5	60	50
Georgia Power Company (C-202)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2005	32,000	0.5	**8.6**	30	1.2	0.30	2,300	48	5.9	13	23,000	5,200	180	14	3,000	0.5	0.5	9,700	0.5	56	52
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	32,000	0.50	**8.6**	30	1.2	0.30	2,300	48	5.9	13	23,000	5,200	180	14	3,000	0.5	0.5	9,700	0.5	56	52
Academy Creek Wastewater Treatment Plant (C-203)	2004	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
	2005	51,000	0.5	**16**	59	1.9	0.5	4,000	**120**	10	**27**	41,000	8,600	660	**24**	4,700	0.5	1.0	16,000	0.5	88	120
	2006	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Mean:	51,000	0.50	**16**	59	1.9	0.50	4,000	**120**	10	**27**	41,000	8,600	660	**24**	4,700	0.5	**1.0**	16,000	0.5	88	120

Table 4-5_Continued

Sampling station		Metals (mg/kg, dw)[a, b]																							
		Aluminum	Antimony	**Arsenic**	Barium	Beryllium	Cadmium	Calcium	**Chromium**	Cobalt	**Copper**	Iron	Magnesium	Manganese	**Nickel**	Potassium	Selenium	**Silver**	Sodium	Thallium	Vanadium	**Zinc**
		Reference Locations																						
Crescent River	2004	2,700	1.0	1.3	6.5	0.20	0.25	190	4.7	0.50	1.0	2,300	430	32	2.0	230	0.5	0.5	610	0.5	5.8	4.8
	2005	25,000	0.5	**12**	27	0.98	0.5	2,000	34	5.1	8.4	21,000	4,500	180	10	2,700	0.5	0.5	11,000	0.5	46	38
	2006	3,900	0.02	3.6	6.4	0.30	0.04	800	6.6	1.2	2.5	5,400	1,500	43	1.9	860	0.28	0.012	5,500	0.06	10	11
	Mean:	10,000	0.51	5.6	13	0.49	0.26	1,000	15	2.3	4.0	9,600	2,100	85	4.6	1,300	0.43	0.34	5,700	0.35	21	18
Troup Creek	2004	14,000	1.0	5.3	15	0.70	0.25	2,300	20	3.3	5.3	14,000	2,800	190	6.0	1,400	0.5	0.5	3,400	1.4	28	29
	2005	36,000	0.5	**8.7**	37	1.40	0.5	3,800	43	7.2	14	25,000	5,600	460	14	3,000	0.5	0.60	9,700	0.5	59	56
	2006	18,000	0.02	**9.0**	20	1.10	0.14	3,400	27	5.0	8	23,000	5,000	470	8	2,400	1.4	0.07	12,000	0.20	42	46
	Mean:	23,000	0.51	**7.7**	24	1.1	0.30	3,200	30	5.2	9.2	21,000	4,500	370	9	2,300	0.80	0.39	8,400	0.70	43	44

[a] Concentrations of metals identified by underlining were non-detected values that were assigned a value of 1/2 of detection limit.

[b] Metals for which screening-level ecological effects value (EEV) have been established by Region 4, U. S. EPA, are identified by bold print are concentrations of metals that exceed applicable EEVs (antimony: 12 mg/kg; arsenic: 7.24 mg/kg; cadmium: 1 mg/kg; chromium: 52.3 mg/kg; copper: 18.7 mg/kg; nickel: 15.9 mg/kg; silver: 2 mg/kg; and zinc: 124 mg/kg).

Table 4-6a_Concentrations of chemicals of potential concern (COPCs) in cordgrass for major areas in estuary at LCP Site (2000 - 2006 data) for exposure estimates

All concentrations in mg/kg dw

			Domain 1		
	Total Mercury	**Methyl Mercury(a)**	**Inorganic Mercury(b)**	**Aroclor-1268**	**Lead**
Count	7	--	--	4	4
Min	0.022	0.002	0.02	0.054	1.99
Max	0.453	0.045	0.41	0.614	2.90
Avg	0.097	0.010	0.09	0.261	2.50
Std Dev	0.158	--	--	0.244	0.40
Coefficent of Variation	1.635	--	--	0.935	0.159
95 UCL	0.21	0.02	0.19	0.55	2.88
UCL Statistic	95% Bootstrap	--	--	95% Students	95% Bootstrap
Non-Detects	0	--	--	2	0

			Domain 4		
	Total Mercury	**Methyl Mercury(a)**	**Inorganic Mercury(b)**	**Aroclor-1268**	**Lead**
Count	9	--	--	6	6
Min	0.014	0.001	0.013	0.016	0.38
Max	0.050	0.005	0.045	0.185	3.60
Avg	0.028	0.003	0.025	0.096	1.98
Std Dev	0.010	--	--	0.067	1.385
Coefficent of Variation	0.342	--	--	0.698	0.698
95 UCL	0.034	0.003	0.031	0.151	3.12
UCL Statistic	95% Students	--	--	95% Students	95% Students
Non-Detects	0	--	--	3	2

			Domain 2		
	Total Mercury	**Methyl Mercury(a)**	**Inorganic Mercury(b)**	**Aroclor-1268**	**Lead**
Count	24	--	--	15	15
Min	0.015	0.001	0.014	0.017	0.38
Max	0.210	0.021	0.189	0.360	4.80
Avg	0.049	0.005	0.044	0.152	1.95
Std Dev	0.052	--	--	0.100	1.51
Coefficent of Variation	1.068	--	--	0.655	0.773
95 UCL	0.09	0.01	0.08	0.20	2.74
UCL Statistic	95% Bootstrap	--	--	95% Students	95% Bootstrap
Non-Detects	0	--	--	4	6

			Main Canal		
	Total Mercury	**Methyl Mercury(a)**	**Inorganic Mercury(b)**	**Aroclor-1268**	**Lead**
Count	7	--	--	4	4
Min	0.079	0.008	0.071	0.068	2.612
Max	0.290	0.029	0.261	0.221	4.300
Avg	0.147	0.015	0.132	0.143	3.328
Std Dev	0.095	--	--	0.079	0.709
Coefficent of Variation	0.644	--	--	0.553	0.213
95 UCL	0.759	0.075	0.684	0.236	4.163
UCL Statistic	95% Bootstrap	--	--	95% Students	95% Students
Non-Detects	0	--	--	0	0

			Domain 3		
	Total Mercury	**Methyl Mercury(a)**	**Inorganic Mercury(b)**	**Aroclor-1268**	**Lead**
Count	18	--	--	12	12
Min	0.017	0.002	0.015	0.025	0.38
Max	0.067	0.007	0.060	0.215	10.0
Avg	0.038	0.004	0.034	0.091	3.51
Std Dev	0.014	--	--	0.051	3.09
Coefficent of Variation	0.37	--	--	0.560	0.88
95 UCL	0.04	0.004	0.04	0.122	5.12
UCL Statistic	95% Students	--	--	Approx Gamma	95% Students
Non-Detects	0	--	--	3	2

			Purvis Creek		
	Total Mercury	**Methyl Mercury(a)**	**Inorganic Mercury(b)**	**Aroclor-1268**	**Lead**
Count	7	--	--	4	4
Min	0.02	0.002	0.01	0.02	0.38
Max	0.03	0.003	0.03	0.19	3.1
Avg	0.02	0.002	0.019	0.11	2.02
Std Dev	0.005	--	--	0.08	1.23
Coefficent of Variation	0.23	--	--	0.69	0.61
95 UCL	0.02	0.002	0.022	0.22	3.07
UCL Statistic	95% Students	--	--	95% Bootstrap	95% Bootstrap
Non-Detects	0	--	--	4	1

Table 4-6a._ Continued

	Blythe Island				
	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	3	--	--	3	3
Min	0.013	0.001	0.011	0.016	0.39
Max	0.030	0.003	0.027	0.051	1.83
Avg	0.023	0.002	0.021	0.028	1.08
Std Dev	0.009	--	--	0.020	0.72
Coefficent of Variation	0.401	--	--	0.717	0.668
95 UCL	0.030	0.003	0.027	0.039	1.56
UCL Statistic	95% Bootstrap	--	--	95% Bootstrap	95% Bootstrap
Non-Detects	0	--	--	2	1

Area A				
Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
21	--	--	11	12
0.002	0.0002	0.002	0.02	0.38
0.45	0.04	0.41	0.61	4.30
0.08	0.008	0.074	0.18	2.47
0.12	--	--	0.16	0.96
1.42	--	--	0.88	0.39
0.15	0.014	0.131	0.31	2.97
Approx Gamma	--	--	Approx Gamma	95% Students
0	--	--	0	0

	Troup Creek Reference				
	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	7	--	--	3	4
Min	0.002	0.0002	0.002	0.016	0.38
Max	0.007	0.001	0.01	0.225	2.30
Avg	0.005	0.0005	0.004	0.134	1.60
Std Dev	0.002	--	--	0.107	0.86
Coefficent of Variation	0.456	--	--	0.802	0.54
95 UCL	0.006	0.001	0.006	0.203	2.15
UCL Statistic	95% Students	--	--	95% Bootstrap	95% Bootstrap
Non-Detects	0	--	--	3	1

Estuary Area Weighted Grand Mean and UCL				
Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
0.035	0.003	0.032	0.110	2.30
0.049	0.005	0.044	0.168	3.42

Notes:

Total Mercury was extracted from the database.

a = Methyl Mercury is the total mercury value multiplied by a factor of 0.0993.

b = Inorganic Mercury is the total mercury value minus the methyl mercury value. This is the remaining amount of mercury available for exposure.

Table 4-6b_Yearly average body burdens of chemicals of potential concern (COPCs) in cordgrass (*Spartina alterniflora*) for major areas in estuary at LCP Site (2005 data)[a, b]

		Mercury				
	Size of area (percent of evaluated site of 723.85 acres)	Total mercury	Methylmercury		Aroclor 1268	Lead
Major area		(ug/kg, dw)	(ug/kg, dw)	% of total mercury	(mg/kg, dw)	(mg/kg, dw)
Domain 1	20.28 acres (2.8%)					
Mid-stretch (M-25/NOAA 4)		102	0.85	-----	0.220	2.61
Seep location (M-AB)		450	8.1	1.8	0.600	1.99
Domain 2	130.12 acres (18.0%)					
Mid-stretch (NOAA 3)		41.2	1.85	7.7	0.071	0.39
Mouth (NOAA 5)		44.2	0.47	-----	0.240	0.38
Eastern branch (NOAA6)		24.0	0.86	-----	0.060	0.38
Central branch (NOAA 7		28.0	6.85	24.5	0.016	0.39
Mouth (NOAA 8)		20.6	0.86	-----	0.048	
Northeast of mouth (NOAA 9)		22.3	0.47	-----	0.048	
Domain 3	156.21 acres (21.6%)					
Northern boundary (M-100)		40.3	3.73	9.3	0.071	1.09
Mid-western boundary (M-101)		54.2	5.85	10.8	0.074	1.77
Central location (M-204)		29.2	2.14	7.3	0.057	0.38
Southwestern corner (M-102)		41.1	1.39	3.4	0.075	2.40
Southeastern corner (M-37)		46.9	6.40	13.6	0.090	0.46
Domain 4	417.24 acres (57.6%)					
Northeastern corner (M-103)		49.7	1.34	2.7	0.100	1.74
Mid-eastern boundary (M-104)		24.3	3.07	12.6	0.061	0.38
Crescent River (reference)	-----	3.92	0.47	-----	0.016	0.94
Troup Creek (reference)	-----	7.08	0.47	-----	0.016	0.38

Mean MeHg/tHg ratio: 9.93%

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[a] Each sample of cordgrass consisted of >100 g of grass obtained above 15 cm from ground.

[b] Body burdens of cordgrass identified by underlining were non-detected values that were assigned a value of 1/2 of detection limit.

Table 4-7_ Body burdens of chemicals of potential concern (COPCs) in eastern oysters (*Crassostrea virginica*) for major areas in estuary at LCP Site (2006 data)

Sampling station	Replicate[a]			Mean	Statistical
(Estimated oyster age)	1	2	3	(x)	comparisons[b]
Total Mercury (mg/kg, dry wt)[c]					
Reference Location					
Troup Creek					
Young-of-year (Year 0)	0.11	0.082	0.076	0.089	No statistically significant difference (P = 0.05);
Year I - II	0.10	0.099	0.093	0.097	Parametric "t"$_{(cal.)}$ = 0.75 vs. "t"$_{(tab.)}$ = 2.78
Main Canal					
Mid-stretch (NOAA 4/M-25)					
Young-of-year (Year 0)	0.84	0.86	0.62	0.773	No statistically significant difference (P = 0.05);
Year I - II	0.96	1.1	0.98	1.013	Parametric "t"$_{(cal.)}$ = 2.71 vs. "t"$_{(tab.)}$ = 2.78
Mouth (NOAA 5)					
Young-of-year (Year 0)	0.39	0.35	0.43	0.390	No statistically significant difference (P = 0.05);
Year I - II	0.44	0.54	0.58	0.520	Parametric "t"$_{(cal.)}$ = 2.73 vs. "t"$_{(tab.)}$ = 2.78
Eastern Creek					
Mid-stretch (NOAA 3)					
Young-of-year (Year 0)	2.1	2.6	2.4	2.367	No statistically significant difference (P = 0.05);
Year I - II	1.0	2.1	2.1	1.733	Parametric "t"$_{(cal.)}$ = 1.61 vs. "t"$_{(tab.)}$ = 2.78
Western Creek Complex					
Eastern Branch (NOAA 6)					
Young-of-year (Year 0)	1.6	1.6	1.5	1.567	No statistically significant difference (P = 0.05);
Year I - II	1.3	1.6	1.5	1.467	Parametric "t"$_{(cal.)}$ = 1.06 vs. "t"$_{(tab.)}$ = 2.78
Central Branch (NOAA 7)					
Young-of-year (Year 0)	0.85	0.74	0.72	0.770	No statistically significant difference (P = 0.05);
Year I - II	0.89	0.87	0.98	0.913	Parametric "t"$_{(cal.)}$ = 2.72 vs. "t"$_{(tab.)}$ = 2.78
Northeast of Mouth (NOAA 9)					
Young-of-year (Year 0)	0.51	0.48	0.53	0.507	Statistically significant difference (P = 0.05);
Year I - II	0.70	0.60	0.73	0.677	Parametric "t"$_{(cal.)}$ = 4.06 vs. "t"$_{(tab.)}$ = 2.78
Purvis Creek					
Mouth (NOAA 10/M-28)					
Young-of-year (Year 0)	0.18	0.17	0.21	0.187	No statistically significant difference (P = 0.05);
Year I - II	0.19	0.21	0.16	0.187	Parametric "t"$_{(cal.)}$ = <0.01 vs. "t"$_{(tab.)}$ = 2.78

Parametric Paired "t" Test of Differences in Mean Mercury Content of Year 0 vs. Year I - II Oysters[d]

Mean (x) values: Year 0 = 0.831 mg/kg; Year I - II = 0.826 mg/kg

"t"$_{(cal.)}$ = 0.05 ns vs. t$_{(tab.)}$ = 2.36 for 7 df and P = 0.05

Correlation coefficient (r) = 0.96

Table 4-7_Continued

Sampling station	Replicate[a]			Mean	Statistical
(Estimated oyster age)	1	2	3	(x)	comparisons[b]
Aroclor 1268 (mg/kg, dry wt)					
Reference Location					
Troup Creek					
Young-of-year (Year 0)	0.019	0.0028	0.0024	0.00807	No statistically significant difference (P = 0.05);
Year I - II	0.0029	0.011	0.0096	0.00783	Parametric "t"$_{\text{(cal.)}}$ = 0.04 vs. "t"$_{\text{(tab.)}}$ = 2.78
Main Canal					
Mid-stretch (NOAA 4/M-25)					
Young-of-year (Year 0)	0.19	0.26	0.24	0.230	No statistically significant difference (P = 0.05);
Year I - II	0.13	0.18	0.19	0.167	Parametric "t"$_{\text{(cal.)}}$ = 2.27 vs. "t"$_{\text{(tab.)}}$ = 2.78
Mouth (NOAA 5)					
Young-of-year (Year 0)	0.23	0.25	0.19	0.223	No statistically significant difference (P = 0.05);
Year I - II	0.14	0.23	0.18	0.183	Parametric "t"$_{\text{(cal.)}}$ = 1.27 vs. "t"$_{\text{(tab.)}}$ = 2.78
Eastern Creek					
Mid-stretch (NOAA 3)					
Young-of-year (Year 0)	0.97	0.87	0.72	0.853	No statistically significant difference (P = 0.05);
Year I - II	0.62	0.56	0.71	0.630	Parametric "t"$_{\text{(cal.)}}$ = 2.64 vs. "t"$_{\text{(tab.)}}$ = 2.78
Western Creek Complex					
Eastern Branch (NOAA 6)					
Young-of-year (Year 0)	0.061	0.096	0.068	0.075	No statistically significant difference (P = 0.05);
Year I - II	0.069	0.040	0.059	0.056	Parametric "t"$_{\text{(cal.)}}$ = 1.39 vs. "t"$_{\text{(tab.)}}$ = 2.78
Central Branch (NOAA 7)					
Young-of-year (Year 0)	0.071	0.072	0.071	0.071	Statistically significant difference (P = 0.01);
Year I - II	0.047	0.054	0.055	0.052	Parametric "t"$_{\text{(cal.)}}$ = 7.62 vs. "t"$_{\text{(tab.)}}$ = 2.78
Northeast of Mouth (NOAA 9)					
Young-of-year (Year 0)	0.13	0.26	0.11	0.167	No statistically significant difference (P = 0.05);
Year I - II	0.077	0.062	0.096	0.078	Parametric "t"$_{\text{(cal.)}}$ = 1.84 vs. "t"$_{\text{(tab.)}}$ = 2.78
Purvis Creek					
Mouth (NOAA 10/M-28)					
Young-of-year (Year 0)	0.039	0.060	0.046	0.048	No statistically significant difference (P = 0.05);
Year I - II	0.071	0.076	0.043	0.063	Parametric "t"$_{\text{(cal.)}}$ = 1.25 vs. "t"$_{\text{(tab.)}}$ = 2.78

Parametric Paired "t" Test of Differences in Mean
Aroclor 1268 Content of Year 0 vs. Year I - II Oysters[d]

Mean (x) values: Year 0 = 0.209 mg/kg; Year I - II = 0.155 mg/kg

"t"$_{\text{(cal.)}}$ = 2.05 ns vs. t$_{\text{(tab.)}}$ = 2.36 for 7 df and P = 0.05

Correlation coefficient (r) = 0.99

Table 4-7_Continued

Sampling station	Replicate[a]			Mean	Statistical
(Estimated oyster age)	1	2	3	(x)	comparisons[b]
Lead (mg/kg, dry wt)					
Reference Location					
Troup Creek					
Young-of-year (Year 0)	0.39	0.52	0.66	0.523	No statistically significant difference (P = 0.05);
Year I - II	0.34	0.37	0.29	0.333	Parametric "t"$_{(cal.)}$ = 2.33 vs. "t"$_{(tab.)}$ = 2.78
Main Canal					
Mid-stretch (NOAA 4/M-25)					
Young-of-year (Year 0)	0.67	0.80	0.83	0.767	Statistically significant difference (P = 0.05);
Year I - II	0.55	0.60	0.59	0.580	Parametric "t"$_{(cal.)}$ = 3.63 vs. "t"$_{(tab.)}$ = 2.78
Mouth (NOAA 5)					
Young-of-year (Year 0)	0.60	0.57	0.77	0.647	Statistically significant difference (P = 0.05);
Year I - II	0.43	0.46	0.46	0.450	Parametric "t"$_{(cal.)}$ = 3.12 vs. "t"$_{(tab.)}$ = 2.78
Eastern Creek					
Mid-stretch (NOAA 3)					
Young-of-year (Year 0)	1.1	1.3	1.1	1.167	Statistically significant difference (P = 0.05);
Year I - II	0.82	0.80	0.61	0.743	Parametric "t"$_{(cal.)}$ = 4.48 vs. "t"$_{(tab.)}$ = 2.78
Western Creek Complex					
Eastern Branch (NOAA 6)					
Young-of-year (Year 0)	1.0	1.1	0.83	0.977	No statistically significant difference (P = 0.05);
Year I - II	0.74	1.0	0.94	0.893	Parametric "t"$_{(cal.)}$ = 0.75 vs. "t"$_{(tab.)}$ = 2.78
Central Branch (NOAA 7)					
Young-of-year (Year 0)	0.62	0.64	0.65	0.637	Statistically significant difference (P = 0.01);
Year I - II	0.46	0.52	0.43	0.470	Parametric "t"$_{(cal.)}$ = 5.60 vs. "t"$_{(tab.)}$ = 2.78
Northeast of Mouth (NOAA 9)					
Young-of-year (Year 0)	1.2	0.76	0.71	0.890	No statistically significant difference (P = 0.05);
Year I - II	0.86	0.55	0.56	0.657	Parametric "t"$_{(cal.)}$ = 1.25 vs. "t"$_{(tab.)}$ = 2.78
Purvis Creek					
Mouth (NOAA 10/M-28)					
Young-of-year (Year 0)	0.52	0.97	0.41	0.633	No statistically significant difference(P = 0.05);
Year I - II	0.34	0.45	0.28	0.357	Parametric "t"$_{(cal.)}$ = 1.55 vs. "t"$_{(tab.)}$ = 2.78

Parametric Paired "t" Test of Differences in Mean
Lead Content of Year 0 vs. Year I - II Oysters[d]

Mean (x) values: Year 0 = 0.780 mg/kg; Year I - II = 0.560 mg/kg

"t"$_{(cal.)}$ = 6.26 ** vs. t$_{(tab.)}$ = 3.50 for 7 df and P = 0.01

Correlation coefficient (r) = 0.89

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[a] Each replicate of oysters consisted of about 100 composited young-of-year (Year 0) oysters and 20 composited older (Years I and II) oysters.

[b] All individual "t" tests are two-tailed tests with P criterion = 0.05

[c] Total mercury concentrations are estimated to consist of about 70% methylmercury (NOAA, 1998).

[d] Paired "t" tests are two-tailed tests with the symbol "ns" indicating no statistically significant difference at P criterion = 0.05, and the symbol "**" indicating a significant difference at P criterion = 0.01.

Table 4-8a_Concentrations of chemicals of potential concern (COPCs) in fiddler crabs (*Uca* spp.) for major areas in estuary at LCP site (2000 - 2007 data) for exposure estimates

All concentrations in mg/kg dw

Domain 1

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	61	--	--	54	54
Min	0.18	0.12	0.06	0.65	0.37
Max	1.8	1.22	0.58	6	52
Avg	0.95	0.65	0.30	2.22	7.93
Std Dev	0.31	--	--	1.15	13.09
Coefficent of Variation	0.323	--	--	0.52	1.65
95 UCL	1.02	0.69	0.33	2.49	10.85
UCL Statistic	95% Students	--	--	Approx Gamma	95% Bootstrap
Non-Detects	0	--	--	0	13

Domain 2

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	109	--	--	109	106
Min	0.07	0.05	0.02	0.17	0.12
Max	0.85	0.58	0.27	17	1.4
Avg	0.28	0.19	0.09	1.06	0.52
Std Dev	0.15	--	--	1.8	0.22
Coefficent of Variation	0.54	--	--	1.7	0.42
95 UCL	0.31	0.21	0.10	1.15	0.56
UCL Statistic	95% Students	--	--	95% H-UCL	95% Students
Non-Detects	0	--	--	28	37

Domain 3

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	84	--	--	84	73
Min	0.15	0.10	0.05	0.17	0.31
Max	0.49	0.33	0.16	2.93	19.48
Avg	0.27	0.18	0.09	0.81	2.11
Std Dev	0.09	--	--	0.63	4.41
Coefficent of Variation	0.34	--	--	0.77	2.09
95 UCL	0.29	0.20	0.09	0.93	3.34
UCL Statistic	95% Students	--	--	Approx Gamma	95% Students
Non-Detects	0	--	--	21	17

Domain 4

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	44	--	--	44	44
Min	0.09	0.06	0.03	0.16	0.23
Max	0.41	0.28	0.13	1.66	0.89
Avg	0.22	0.15	0.07	0.61	0.53
Std Dev	0.09	--	--	0.38	0.14
Coefficent of Variation	0.397	--	--	0.62	0.27
95 UCL	0.24	0.16	0.08	0.71	0.57
UCL Statistic	Approx Gamma	--	--	95% Bootstrap	95% Students
Non-Detects	0	--	--	16	11

Main Canal

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	43	--	--	39	39
Min	0.26	0.18	0.08	1.1	0.37
Max	1.01	0.69	0.32	7.39	4.2
Avg	0.57	0.39	0.18	2.86	1.45
Std Dev	0.15	--	--	1.43	1.03
Coefficent of Variation	0.27	--	--	0.501	0.71
95 UCL	0.61	0.41	0.20	3.26	1.77
UCL Statistic	95% Students	--	--	95% Students	95% Students
Non-Detects	0	--	--	0	6

Purvis Creek

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	42	--	--	35	35
Min	0.02	0.01	0.01	0.18	0.12
Max	0.21	0.14	0.07	2.7	2.3
Avg	0.13	0.09	0.04	0.73	0.92
Std Dev	0.05	--	--	0.63	0.52
Coefficent of Variation	0.37	--	--	0.87	0.57
95 UCL	0.14	0.10	0.04	0.98	1.07
UCL Statistic	95% Bootstrap	--	--	95% Bootstrap	95% Students
Non-Detects	0	--	--	11	2

Table 4-8a_Continued

Blythe Island

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	63	--	--	63	57
Min	0.059	0.04	0.02	0.104	0.26
Max	0.48	0.33	0.15	0.76	1.01
Avg	0.19	0.13	0.06	0.22	0.504
Std Dev	0.086	--	--	0.12	0.17
Coefficent of Variation	0.443	--	--	0.55	0.33
95 UCL	0.21	0.14	0.07	0.24	0.54
UCL Statistic	95% Students	--	--	95% Students	95% Students
Non-Detects	0	--	--	21	14

Area A (Main Canal + Domain 1)

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	104	--	--	93	93
Min	0.18	0.12	0.06	0.64	0.37
Max	1.8	1.22	0.58	7.39	52
Avg	0.79	0.54	0.25	2.49	5.21
Std Dev	0.32	--	--	1.31	10.47
Coefficent of Variation	0.404	--	--	0.53	2.008
95 UCL	0.84	0.57	0.27	2.75	7.58
UCL Statistic	95% Students	--	--	95% H-UCL	95% Bootstrap
Non-Detects	0	--	--	0	19

Troup Creek Reference

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Count	48	--	--	41	41
Min	0.002	0.001	0.001	0.003	0.12
Max	0.13	0.09	0.04	1.8	2.3
Avg	0.04	0.027	0.01	0.22	0.71
Std Dev	0.03	--	--	0.37	0.43
Coefficent of Variation	0.68	--	--	1.71	0.604
95 UCL	0.05	0.03	0.02	0.38	0.84
UCL Statistic	95% Bootstrap	--	--	95% Bootstrap	Approx Gamma
Non-Detects	1	--	--	28	13

Estuary Area Weighted Grand Mean and UCL

	Total Mercury	Methyl Mercury(a)	Inorganic Mercury(b)	Aroclor-1268	Lead
Mean	0.25	0.17	0.08	0.77	1.06
95UCL	0.27	0.18	0.09	0.89	1.4

Includes Mercury and Inorganic mercury samples extracted from the database.

a = Methyl Mercury is the total mercury value multiplied by a factor of 0.68.

b = Inorganic Mercury is the total mercury value minus the methyl mercury value. This is the remaining amount of mercury available for exposure.

Table 4-8b_Body burdens of chemicals of potential concern (COPCs) in fiddler crabs (*Uca* spp.) for major areas and years in estuary at LCP Site (2000 - 2007 data)[a, b]

Major area	Size of area (percent of total site of 789.26 acres)	Year	Total mercury[c]		Aroclor 1268		Lead	
			Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)
Domain 1 (marsh) -- AB Seep Station	20.28 acres (2.6%)	2000	1.1	14	3.0	7	22	7
		2002	0.95	7	2.8	7	1.8	7
		2003	0.82	7	2.1	7	33	7
		2004	1.1	10	1.1	10	1.4	10
		2005	1.0	13	1.8	13	0.38	13
		2006	1.1	7	2.4	7	0.87	7
		2007	0.96	3	4.6	3	2.0	3
		Total		**61**		**54**		**54**
Main Canal	1.54 acres (0.2%)	2000	0.74	8	2.0	4	1.9	4
		2002	0.67	4	0.67	4	2.8	4
		2003	0.41	7	1.8	7	1.6	7
		2004	0.50	7	3.4	7	1.1	7
		2005	0.39	7	2.7	7	0.61	7
		2006	0.50	7	2.9	7	0.69	7
		2007	0.42	3	1.3	3	1.5	3
		Total		**43**		**39**		**39**
Eastern Creek	4.42 acres (0.6%)	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	0.42	1	0.24	1	0.38	1
		2005	0.19	1	1.6	1	0.38	1
		2006	0.36	1	0.62	1	0.41	1
		2007	0.45	1	0.54	1	0.86	1
		Total		**4**		**4**		**4**
Western Creek Complex[d]	2.15 acres (0.3%)	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	0.34	42	0.50	42	0.57	42
		2005	0.19	38	0.90	38	0.38	35
		2006	0.26	20	0.46	20	0.50	20
		2007	0.15	9	0.50	9	0.57	9
		Total		**109**		**109**		**106**
Domain 2 (marsh)[d]	130.12 acres (16.5%)	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	0.34	42	0.50	42	0.57	42
		2005	0.19	38	0.90	38	0.38	35
		2006	0.26	20	0.46	20	0.50	20
		2007	0.15	9	0.50	9	0.57	9
		Total		**109**		**109**		**106**
Domain 3 (marsh)	156.21 acres (19.8%)	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	0.33	21	0.26	21	0.45	21
		2005	0.22	35	1.1	35	0.44	31
		2006	0.26	18	0.46	18	0.50	18
		2007	0.26	3	1.5	3	1.60	3
		Total		**77**		**77**		**73**
Domain 4 (marsh)	417.24 acres (52.9%)	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	0.24	21	0.42	21	0.61	21
		2005	0.17	11	0.94	11	0.38	11
		2006	0.25	12	0.71	12	0.54	12
		Total		**44**		**44**		**44**

Table 4-8b_Continued

Major area	Size of area (percent of total site of 789.26 acres)	Year	Total mercury[c] Body burden (mg/kg, dw)	Total mercury[c] Sample size (n)	Aroclor 1268 Body burden (mg/kg, dw)	Aroclor 1268 Sample size (n)	Lead Body burden (mg/kg, dw)	Lead Sample size (n)
North Purvis Creek	31.27 acres (4.0%)	2000	Fiddler crabs were not sampled in North Purvis Creek. Mean values of COPC are assumed to approximate those for South Purvis Creek.					
		2002						
		2003						
		2004						
		2005						
		2006						
		2007						
		Total						
South Purvis Creek	26.03 acres (3.3%)	2000	0.16	7	0.55	7	1.0	7
		2002	0.13	7	0.1	7	1.5	7
		2003	0.18	7	0.44	7	0.56	7
		2004	0.13	7	0.28	7	0.30	7
		2005	-----	0	-----	0	-----	0
		2006	0.13	4	0.3	4	0.91	4
		2007	0.16	3	0.74	3	1.5	3
		Total		**35**		**35**		**35**
Troup Creek (reference)	----------	2000	0.031	14	0.15	14	0.96	7
		2002	0.027	5	0.18	5	1.4	5
		2003	0.034	5	0.99	5	0.41	5
		2004	0.029	7	0.27	7	0.49	7
		2005	0.064	7	0.024	7	0.38	7
		2006	0.10	7	0.018	7	0.66	7
		2007	0.057	3	0.0042	3	0.77	3
		Total		**48**		**48**		**41**
Crescent River (reference)	----------	2000	0.018	7	0.17	7	1.3	7
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.046	7	0.032	7	0.38	7
		2006	-----	0	-----	0	-----	0
		Total		**14**		**14**		**14**

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[a] Each sample of fiddler crabs consisted of from two to seven replicates, with each replicate consisting of about 8-50 (mostly male) crabs.

[b] Body burdens of fiddler crabs identified by underlining consisted of at least one non-detected value that was assigned a value of 1/2 of detection limit.

[c] Body burden of methylmercury in fiddler crabs consisted of about 68% of total mercury (Appendix F).

[d] Western Creek Complex is in Domain 2, and data generated for the creek were also employed for the domain.

Table 4-9a_Concentrations of chemicals of potential concern (COPCs) in blue crabs (*Callinectes sapidus*) for major areas and years in estuary at LCP Site for exposure estimation (2000 - 2007 data)

All Concentrations in mg/kg dw

Purvis Creek

	Total Mercury	Methyl Mercury[(a)]	Inorganic Mercury[(b)]	Aroclor-1268	Lead
Count	91	--	--	91	91
Min	0.07	0.07	0	0.12	0.12
Max	6.3	6.3	0	7.9	4
Avg	1.59	1.59	0	1.61	0.82
Std Dev	1.08	--	--	1.47	0.87
Coefficent of Variation	0.68	--	--	0.91	1.07
95 UCL	1.78	1.78	0	1.88	1.21
UCL Statistic	Approx Gamma	--	--	Approx Gamma	95% Chebyshev
Non-Detects	0	--	--	1	40

Troup Creek

	Total Mercury	Methyl Mercury[(a)]	Inorganic Mercury[(b)]	Aroclor-1268	Lead
Count	49	--	--	49	49
Min	0.01	0.01	0	0.002	0.13
Max	0.49	0.49	0	2	14.3
Avg	0.15	0.15	0	0.13	0.73
Std Dev	0.11	--	--	0.29	2.08
Coefficent of Variation	0.73	--	--	2.22	2.85
95 UCL	0.19	0.19	0	0.30	4.21
UCL Statistic	Approx Gamma	--	--	95% Bootstrap	95% Bootstrap
Non-Detects	2	--	--	38	31

Notes:

Total Mercury was extracted from the database.

a = Methyl Mercury is the total mercury value multiplied by a factor of 1.0.

b = Inorganic Mercury is the total mercury value minus the methyl mercury value. There is no inorganic mercury remaining in the blue crab.

Table 4-9b_Yearly average body burdens of chemicals of potential concern (COPCs) in blue crabs (*Callinectes sapidus*) for major areas and years in estuary at LCP Site (2000 - 2007 data)[a, b]

	Size of area (percent of evaluated site of 57.30 acres)		Total mercury		Aroclor 1268		Lead	
Major area		Year	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)
North Purvis Creek	31.27 acres (54.6%)	2000	1.7	7	0.77	7	0.71	7
		2002	1.0	7	1.9	7	2.3	7
		2003	1.6	7	2.8	7	0.15	7
		2004	1.2	7	1.2	7	0.28	7
		2005	1.4	7	0.53	7	0.38	7
		2006	1.0	7	1.2	7	0.49	7
		2007[c]	1.7	7	1.0	7	0.44	7
		Total		**49**		**49**		**49**
South Purvis Creek	26.03 acres (45.4%)	2000	1.7	7	0.70	7	1.1	7
		2002	0.97	7	2.4	7	2.7	7
		2003	1.5	7	3.6	7	0.12	7
		2004	1.7	7	1.3	7	0.24	7
		2005	1.0	7	0.44	7	0.96	7
		2006	1.1	7	0.59	7	0.47	7
		Total		**42**		**42**		**42**
Troup Creek (reference)	----------	2000	0.069	7	0.15	7	0.75	7
		2002	0.14	7	0.09	7	1.2	7
		2003	0.073	7	0.43	7	0.12	7
		2004	0.17	7	0.17	6	0.17	6
		2005	0.18	7	0.02	8	0.38	8
		2006	0.15	7	0.02	7	0.20	7
		2007	0.15	7	0.0048	7	0.20	7
		Total		**49**		**49**		**49**
Crescent River (reference)	----------	2000	0.08	7	0.21	7	1.1	7
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.18	7	0.03	7	0.80	7
		2006	-----	0	-----	0	-----	0
		Total		**14**		**14**		**14**

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[a] Each sample of blue crabs consisted of from six to seven replicates, with each replicate consisting of a single male crab.

[b] Body burdens of blue crabs identified by underlining consisted of at least one non-detected value that was assigned a value of 1/2 of detection limit.

[c] 2007 blue crab collections were not in north or south Purvis Creek but rather at a single location at the mouth of the Main Canal.

Table 4-10a_Concentrations of chemicals of potential concern (COPCs) in mummichogs (*Fundulus heteroclitus*) for major areas in estuary at LCP Site for exposure estimates (2000 - 2007 data)

All concentrations in mg/kg dw

Eastern Creek (NS tributary)

	Total Mercury	Methyl Mercury[a]	Inorganic Mercury[b]	Aroclor-1268	Lead
Count	43	--	--	43	41
Min	0.34	0.31	0.03	0.95	0.12
Max	9.1	8.19	0.91	20.25	2.4
Avg	0.71	0.64	0.07	6.06	0.68
Std Dev	1.31	--	--	4.28	0.61
Coefficent of Variation	1.35	--	--	0.71	0.903
95 UCL	2.03	1.83	0.20	7.27	0.863
UCL Statistic	95% Bootstrap	--	--	Approx Gamma	95% Bootstrap
Non-Detects	0	--	--	0	10

Domain 4

Total Mercury	Methyl Mercury[a]	Inorganic Mercury[b]	Aroclor-1268	Lead
10	--	--	10	9
0.15	0.14	0.02	0.21	0.12
0.31	0.28	0.03	1.5	1.1
0.2	0.18	0.02	1.01	0.43
0.05	--	--	0.37	0.28
0.27	--	--	0.37	0.64
0.24	0.22	0.024	1.22	0.65
95% Students	--	--	95% Students	Approx Gamma
0	--	--	0	3

Western Creek Complex

	Total Mercury	Methyl Mercury[a]	Inorganic Mercury[b]	Aroclor-1268	Lead
Count	15	--	--	15	15
Min	0.13	0.12	0.01	0.37	0.12
Max	0.56	0.50	0.06	3.3	2.4
Avg	0.29	0.26	0.03	1.62	0.93
Std Dev	0.11	--	--	0.91	0.74
Coefficent of Variation	0.39	--	--	0.56	0.79
95 UCL	0.35	0.32	0.04	2.13	1.26
UCL Statistic	95% Students	--	--	Approx Gamma	95% Students
Non-Detects	0	--	--	0	7

Main Canal

Total Mercury	Methyl Mercury[a]	Inorganic Mercury[b]	Aroclor-1268	Lead
16	--	--	16	16
0.21	0.19	0.02	2.44	0.22
2.1	1.89	0.21	9.1	1
0.58	0.52	0.058	4.28	0.46
0.45	--	--	1.7	0.19
0.78	--	--	0.39	0.43
0.78	0.70	0.078	5.06	0.55
Approx Gamma	--	--	Approx Gamma	95% Students
0	--	--	0	5

Domain 3

	Total Mercury	Methyl Mercury[a]	Inorganic Mercury[b]	Aroclor-1268	Lead
Count	50	--	--	50	48
Min	0.1	0.09	0.01	0.43	0.12
Max	0.69	0.62	0.069	8.25	70
Avg	0.36	0.32	0.04	2.87	2.41
Std Dev	0.12	--	--	1.69	10.01
Coefficent of Variation	0.33	--	--	0.59	4.15
95 UCL	0.39	0.35	0.04	3.29	30.7
UCL Statistic	95% Students	--	--	Approx Gamma	95% Bootstrap
Non-Detects	0	--	--	0	12

Area A

Total Mercury	Methyl Mercury[a]	Inorganic Mercury[b]	Aroclor-1268	Lead
74	--	--	74	72
0.13	0.12	0.01	0.37	0.12
9.1	8.19	0.91	20.25	2.4
0.87	0.78	0.087	5.58	0.62
1.15	--	--	3.83	0.54
1.33	--	--	0.69	0.87
1.56	1.40	0.156	6.42	0.76
95% Bootstrap	--	--	Approx Gamma	95% Bootstrap
0	--	--	0	15

Table 4-10a_Continued

Troup Creek Reference (N St Simons)

	Total Mercury	Methyl Mercury[(a)]	Inorganic Mercury[(b)]	Aroclor-1268	Lead
Count	22	--	--	22	19
Min	0.03	0.03	0.003	0.02	0.12
Max	0.18	0.16	0.02	0.47	5.9
Avg	0.09	0.08	0.01	0.15	0.87
Std Dev	0.04	--	--	0.15	1.33
Coefficent of Variation	0.44	--	--	1	1.53
95 UCL	0.11	0.10	0.01	0.22	1.43
UCL Statistic	95% Students	--	--	Approx Gamma	Approx Gamma
Non-Detects	0	--	--	15	5

OU-1 Area Weighted Grand Site Mean and UCL

	Total Mercury	Methyl Mercury[(a)]	Inorganic Mercury[(b)]	Aroclor-1268	Lead
Mean	0.25	0.23	0.02	1.57	0.88
95 UCL	0.32	0.29	0.03	1.88	6.66

Notes:

Mercury and inorganic mercury was extracted from the database.

a = Methyl Mercury is the total mercury value multiplied by a factor of 0.90.

b = Inorganic Mercury is the total mercury value minus the methyl mercury value. This is the remaining amount of mercury available for exposure.

Area A = Main canal, Eastern Creek, and Western Creek Complex

Table 4-10b_Yearly average body burdens of chemicals of potential concern (COPCs) in mummichogs (*Fundulus heteroclitus*) for major areas and years in estuary at LCP Site (2000 - 2007 data)[a, b]

Major area	Size of area (percent of evaluated site of 711.68 acres)	Year	Total mercury [c]		Aroclor 1268		Lead	
			Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)
Main Canal	1.54 acres (0.2%)	2000	-----	0	-----	0	-----	0
		2002	1.0	4	3.7	4	0.62	4
		2003	0.54	2	7.4	2	0.57	2
		2004	0.91	1	2.8	1	0.12	1
		2005	0.36	3	3.0	3	0.69	3
		2006	0.26	3	3.8	3	0.41	3
		2007	0.50	3	5.2	3	0.29	3
		Total		**16**		**16**		**16**
Eastern Creek	4.42 acres (0.6%)	2000	0.60	6	1.8	6	1.1	6
		2002	2.2	7	8.3	7	1.7	7
		2003	0.60	6	5.8	6	0.40	6
		2004	1.0	6	3.5	6	0.19	6
		2005	0.54	6	6.8	6	0.38	4
		2006	0.70	6	7.0	6	0.43	6
		2007	0.85	6	9.1	6	0.25	6
		Total		**43**		**43**		**41**
Western Creek Complex[d]	2.15 acres (0.3%)	2000	0.33	3	0.82	3	1.5	3
		2002	0.43	3	2.8	3	1.8	3
		2003	0.17	3	1.3	3	0.79	3
		2004	0.36	3	1.6	3	0.12	3
		2005	0.21	3	1.6	3	0.48	3
		2006	-----	0	-----	0	-----	0
		Total		**15**		**15**		**15**
Domain 2 (marsh)[d]	130.12 acres (18.3%)	2000	0.33	3	0.82	3	1.5	3
		2002	0.43	3	2.8	3	1.8	3
		2003	0.17	3	1.3	3	0.79	3
		2004	0.36	3	1.6	3	0.12	3
		2005	0.21	3	1.6	3	0.48	3
		2006	-----	0	-----	0	-----	0
		Total		**15**		**15**		**15**
Domain 3 (marsh)	156.21 acres (21.9%)	2000	0.37	3	0.79	3	26	3
		2002	0.34	3	2.2	3	2.0	3
		2003	0.39	3	1.6	3	1.3	3
		2004	0.37	6	2.1	6	0.54	6
		2005	0.40	14	3.5	14	0.53	12
		2006	0.27	12	2.2	12	1.0	12
		2007	0.41	9	2.8	9	0.7	9
		Total		**50**		**50**		**48**
Domain 4 (marsh)	417.24 acres (58.6%)	2000	-----	0	-----	0	-----	0
		2002	0.22	1	1.3	1	1.6	1
		2003	0.14	3	1.1	3	0.48	3
		2004	0.21	3	0.97	3	0.33	3
		2005	0.21	3	1.2	3	0.36	2
		2006	-----	0	0.78	0	0.50	0
		Total		**10**		**10**		**9**

Table 4-10b_Continued

Major area	Size of area (percent of evaluated site of 711.68 acres)	Year	Total mercury [c]		Aroclor 1268		Lead	
			Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)
Troup Creek (reference)	----------	2000	0.031	3	0.15	3	2.8	3
		2002	0.12	4	0.11	4	1.3	4
		2003	0.077	3	0.45	3	0.54	3
		2004	0.15	3	0.24	3	0.12	3
		2005	0.14	3	0.04	3	-----	0
		2006	0.056	3	0.053	3	0.19	3
		2007	0.097	3	0.070	3	0.18	3
		Total		**22**		**22**		**19**
Crescent River (reference)	----------	2000	0.018	12	-	12	0.87	12
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.066	16	0.025	16	0.29	16
		2006	-----	0	-----	0	-----	0
		Total		**28**		**28**		**28**

[a] Each sample of mummichogs consisted of from one to four replicates, with each replicate consisting of 1-40 fish.

[b] Body burdens of mummichogs identified by underlining consisted of at least one non-detected value that was assigned a value of 1/2 of detection limit.

[c] Body burdens of methylmercury in mummichogs consisted of about 92% of total mercury (Appendix D).

[d] Western Creek Complex is in Domain 2, and mummichog data collected from the creek complex were also used in Domain 2.

Table 4-11a_Concentrations of chemicals of potential concern (COPCs) in large finfish for major areas in estuary at LCP Site for exposure estimates (2000 - 2007 data)

All concentrations in mg/kg dw

	Black Drum - Purvis Creek			Black Drum - Troup Creek			Black Drum - Crescent River		
	Total Mercury	**Methyl Mercury (a)**	**Aroclor-1268**	**Total Mercury**	**Methyl Mercury (a)**	**Aroclor-1268**	**Total Mercury**	**Methyl Mercury (a)**	**Aroclor-1268**
Count	50	--	50	16	--	16	8	--	8
Min	0.31	0.28	1.1	0.04	0.04	0.01	0.034	0.03	0.017
Max	3.28	2.98	18	0.18	0.16	0.20	0.07	0.06	0.017
Mean	0.84	0.76	5.51	0.11	0.10	0.10	0.045	0.04	0.017
Std Dev	0.543	--	3.567	0.035	--	0.042	0.015	--	NA
Coeff Var.	0.644	--	0.647	0.332	--	0.428	0.336	--	NA
95 UCL	0.96	0.87	6.45	0.12	0.11	0.12	0.055	0.05	NA
	H-UCL	--	Approx Gamma	Student's-t	--	Student's-t	Student's-t	--	NA
Non-Detects	0	--	0	0	--	1	0	--	8

	Red Drum - Purvis Creek			Red Drum - Troup Creek			Red Drum - Crescent River		
	Total Mercury	**Methyl Mercury (a)**	**Aroclor-1268**	**Total Mercury**	**Methyl Mercury (a)**	**Aroclor-1268**	**Total Mercury**	**Methyl Mercury (a)**	**Aroclor-1268**
Count	39	--	39	13	--	13	1	--	1
Min	0.18	0.16	0.16	0.08	0.07	0.04	0.18	0.16	0.016
Max	3.5	3.12	8.76	0.87	0.77	0.26	0.18	0.16	0.016
Mean	1.14	1.01	1.43	0.30	0.27	0.10	0.18	0.16	0.02
Std Dev	0.833	--	1.532	0.250	--	0.067	NA	NA	NA
Coeff Var.	0.728	--	1.071	0.845	--	0.683	NA	NA	NA
95 UCL	1.41	1.25	1.87	0.45	0.40	0.13	NA	NA	NA
	Approx Gamma	--	% Bootstrap	Approx Gamma	--	Approx Gamma	NA	NA	NA
Non-Detects	0	--	1	0	--	0	0		0

	Silver Perch - Purvis Creek			Silver Perch - Troup Creek			Silver Perch - Cresent River		
	Total Mercury	**Methyl Mercury (a)**	**Aroclor-1268**	**Total Mercury**	**Methyl Mercury (a)**	**Aroclor-1268**	**Total Mercury**	**Methyl Mercury (a)**	**Aroclor-1268**
Count	55	--	56	32	--	31	8	--	8
Min	0.18	0.18	0.09	0.11	0.11	0.07	0.13	0.13	0.016
Max	4.7	4.7	22	0.6	0.6	0.65	0.19	0.19	0.051
Mean	1.6	1.6	5.67	0.29	0.29	0.19	0.16	0.16	0.024
Std Dev	0.997	--	5.601	0.130	--	0.130	0.027	--	0.015
Coeff Var.	0.622	--	0.988	0.455	--	0.689	0.169	--	0.612
95 UCL	1.85	1.85	7.05	0.33	0.33	0.23	0.18	0.18	0.033
	Approx Gamma	--	Approx Gamma	Approx Gamma	--	Approx Gamma	Student's-t	--	% Bootstrap
Non-Detects	0	--	0	0	--	7	0	--	6

Table 4-11a_Continued

	Spotted Seatrout - Purvis Creek			Spotted Seatrout - Troup Creek			Spotted Seatrout - Cresent River		
	Total Mercury	Methyl Mercury (a)	Aroclor-1268	Total Mercury	Methyl Mercury (a)	Aroclor-1268	Total Mercury	Methyl Mercury (a)	Aroclor-1268
Count	49	--	49	21	--	21	8	--	8
Min	0.38	0.38	0.79	0.19	0.19	0.02	0.078	0.078	0.016
Max	5.3	5.3	19.38	0.53	0.53	0.47	0.156	0.156	0.016
Mean	2.27	2.27	4.92	0.34	0.34	0.16	0.108	0.11	0.016
Std Dev	1.352	--	3.844	0.096	--	0.109	0.033	--	NA
Coeff Var.	0.595	--	0.781	0.280	--	0.683	0.306	--	NA
95 UCL	2.65	2.65	5.91	0.38	0.38	0.21	0.13	0.13	NA
	Approx Gamma	--	Approx Gamma	Student's-t	--	Approx Gamma	Student's-t	--	NA
Non-Detects	0	--	0	0	--	0	0	--	8

	Striped Mullet - Purvis Creek			Striped Mullet - Troup Creek			Striped Mullet - Cresent River		
	Total Mercury	Methyl Mercury (a)	Aroclor-1268	Total Mercury	Methyl Mercury (a)	Aroclor-1268	Total Mercury	Methyl Mercury (a)	Aroclor-1268
Count	27	--	27	13	--	13	4	--	4
Min	0.10	0.04	0.04	0.01	0.004	0.01	0.015	0.006	0.016
Max	0.84	0.31	47.05	0.17	0.06	0.44	0.033	0.012	0.016
Mean	0.23	0.09	13.2	0.05	0.02	0.18	0.021	0.008	0.016
Std Dev	0.137	--	9.338	0.045	--	0.147	0.008	--	NA
Coeff Var.	0.596	--	0.707	0.895	--	0.810	0.399	--	NA
95 UCL	0.27	0.10	21.03	0.08	0.03	0.25	0.031	0.011	NA
	Approx Gamma	--	Chebyshev	Approx Gamma	--	Student's-t	Student's-t	--	NA
Non-Detects	0	--	0	0	--	3	0	--	4

(a) - Percentage of Total Mercury in the form of Methyl Mercury:
Black Drum - 91 %
Red Drum - 89 %
Silver Perch - 100 %
Spotted Seatrout - 100 %
Striped Mullet - 37 %

Table 4-11b_ Body burdens of chemicals of potential concern (COPCs) in large finfish for major areas and years in estuary at LCP Site (2000 - 2007 data)[a, b]

Major area	Size of area (percent of evaluated site of 57.30 acres)	Year	Total mercury Body burden (mg/kg, dw)	Total mercury Sample size (n)	Aroclor 1268 Body burden (mg/kg, dw)	Aroclor 1268 Sample size (n)	Lead Body burden (mg/kg, dw)	Lead Sample size (n)
			Silver Perch (*Bairdiella chrysoura*)					
Purvis Creek	57.30 acres (100%)	2000	2.1	7	2.9	8	0.78	8
		2002	1.1	8	16	8	1.2	8
		2003	1.6	8	3.8	8	0.12	8
		2004	1.3	8	3.6	8	0.14	8
		2005	0.84	8	2.8	8	0.36	8
		2006	1.6	8	3.7	8	0.089	8
		2007	1.5	8	3.3	8	0.10	8
		Total		**55**		**56**		**56**
Troup Creek (reference)	----------	2000	0.15	8	0.33	8	1.1	8
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.34	8	0.15	7	0.38	8
		2006	0.42	8	0.15	8	0.20	8
		2007	0.37	8	0.12	8	0.088	8
		Total		**32**		**31**		**32**
Crescent River (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.17	8	0.03	8	0.37	8
		2006	-----	0	-----	0	-----	0
		Total		**8**		**8**		**8**
			Red Drum (*Sciaenops ocellatus*)					
Purvis Creek	57.30 acres (100%)	2000	-----	0	-----	0	-----	0
		2002	0.81	8	1.2	8	0.50	8
		2003	0.67	8	1.0	8	0.12	8
		2004	1.1	8	0.92	8	0.16	8
		2005	0.64	8	0.71	8	0.39	8
		2006	1.0	3	3.5	3	0.17	3
		2007	1.7	4	2.6	4	0.063	4
		Total		**39**		**39**		**39**
Troup Creek (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.52	5	0.12	5	0.38	5
		2006	-----	0	-----	0	-----	0
		2007	0.16	8	0.080	8	0.078	8
		Total		**13**		**13**		**13**
Crescent River (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.22	1	0.018	1	0.38	1
		2006	-----	0	-----	0	-----	0
		Total		**1**		**1**		**1**

Table 4-11b_Continued

Major area	Size of area (percent of evaluated site of 57.30 acres)	Year	Total mercury		Aroclor 1268		Lead	
			Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)
			Black Drum (*Pogonias cromis*)					
Purvis Creek	57.30 acres (100%)	2000	0.92	2	4.2	2	0.90	2
		2002	0.41	8	7.3	8	1.0	8
		2003	0.61	8	2.9	8	0.21	8
		2004	0.92	8	3.1	8	0.12	8
		2005	0.88	8	7.8	8	0.38	7
		2006	0.54	8	4.8	8	0.41	8
		2007	0.87	8	5.3	8	0.32	8
		Total		**50**		**50**		**49**
Troup Creek (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.11	8	0.11	8	0.38	8
		2006	0.12	8	0.091	8	0.31	8
		2007	-----	0	-----	0	-----	0
		Total		**16**		**16**		**16**
Crescent River (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.06	8	0.016	8	0.38	8
		2006	-----	0	-----	0	-----	0
		Total		**8**		**8**		**8**
			Spotted Seatrout (*Cynoscion nebulosus*)					
Purvis Creek	57.30 acres (100%)	2000	0.64	1	0.99	1	0.90	1
		2002	0.90	8	5.8	8	0.94	8
		2003	1.4	8	3.7	8	0.12	8
		2004	2.0	8	3.7	8	0.14	8
		2005	2.8	8	6.5	8	0.36	8
		2006	1.7	8	2.8	8	0.069	8
		2007	3.0	8	4.0	8	0.049	8
		Total		**49**		**49**		**49**
Troup Creek (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.36	8	0.19	8	0.38	8
		2006	0.31	8	0.18	8	0.077	8
		2007	0.39	5	0.080	5	0.090	5
		Total		**21**		**21**		**21**
Crescent River (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.021	8	0.016	8	0.39	8
		2006	-----	0	-----	0	-----	0
		Total		**8**		**8**		**8**

Table 4-11b_Continued

Major area	Size of area (percent of evaluated site of 57.30 acres)	Year	Total mercury		Aroclor 1268		Lead	
			Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)	Body burden (mg/kg, dw)	Sample size (n)
			Striped Mullet (*Mugil cephalus*)					
Purvis Creek	57.30 acres (100%)	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	0.27	8	10	8	0.50	8
		2005	0.23	8	12	8	0.38	8
		2006	0.085	8	9.3	8	0.47	8
		2007	0.16	3	12	3	0.84	3
		Total		**27**		**27**		**27**
Troup Creek (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.10	6	0.019	6	0.38	6
		2006	0.026	5	0.32	5	0.60	5
		2007	0.019	2	0.22	2	0.18	2
		Total		**13**		**13**		**13**
Crescent River (reference)	----------	2000	-----	0	-----	0	-----	0
		2002	-----	0	-----	0	-----	0
		2003	-----	0	-----	0	-----	0
		2004	-----	0	-----	0	-----	0
		2005	0.021	4	0.016	4	0.38	4
		2006	-----	0	-----	0	-----	0
		Total		**4**		**4**		**4**

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[a] Each sample of finfish consisted of from one to eight replicates, with each replicate consisting of a single fish.

[b] Body burdens of finfish identified by underlining consisted of at least one non-detected value that was assigned a value of 1/2 of detection limit.

Table 4-12_Statistical analysis of survival and growth of mysids (*Mysidopsis bahia*) exposed for 7 days to surface water in estuary at LCP Site (2000 data)[a]

1. Number of surviving mysids (mean weight; mg, dw)[b]

	Replicate -- r								Mean	Variance
Water source (S)	1	2	3	4	5	6	7	8	(x)	(s2)
Control										
Control[c]	5 (0.39)	5 (0.32)	5 (0.57)	4 (0.45)	5 (0.41)	5 (0.33)	5 (0.52)	5 (0.85)	4.88 (0.48)	0.12 (0.029)
Reference Locations										
Crescent River	5 (0.46)	5 (0.54)	5 (0.69)	5 (0.79)	5 (0.52)	5 (0.84)	5 (0.54)	5 (0.46)	5.00 (0.60)	0 (0.023)
Troup Creek	5 (0.53)	5 (0.41)	5 (0.61)	5 (0.76)	5 (0.49)	5 (0.71)	5 (0.50)	5 (0.43)	5.00 (0.56)	0 (0.017)
Main Canal										
Mouth (C-5)	5 (0.47)	4 (0.90)	5 (0.66)	5 (0.85)	5 (0.47)	4 (1.02)	5 (0.51)	4 (0.73)	4.62 (0.70)	0.27 (0.044)
Purvis Creek										
Mouth (C-16)	5 (0.65)	4 (1.90)	5 (0.70)	4 (0.49)	5 (1.36)	5 (0.45)	5 (0.35)	5 (0.45)	4.75 (0.79)	0.21 (0.303)
Eastern Creek										
Mid-stretch (C-7)	4 (0.58)	5 (0.59)	5 (1.11)	5 (0.75)	5 (0.53)	5 (1.29)	5 (1.06)	5 (0.78)	4.88 (0.84)	0.12 (0.078)
Domain 3										
Near old oil-processing site (C-33)	5 (0.57)	5 (0.76)	5 (0.75)	5 (0.42)	5 (0.33)	5 (0.44)	5 (0.40)	5 (0.36)	5.00 (0.50)	0 (0.029)

No further statistical analysis required

1. Mean survival of mysids exposed to all water sources was from 92.4 to 100%, which was greater than minimum acceptable survival for control organisms (80%).
2. Mean growth (weight) of mysids exposed to water from the site and reference locations was from 0.50 to 0.84 mg, which was greater than weight of control organisms (0.48 mg).

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[a] Surface water employed in mysid toxicity test was collected directly into sampling containers on October 11 (Days 1 and 2 of test), October 13 (Days 3, 4, and 5 of test), and October 16 (Days 6 and 7 of test), 2000.

[b] Each replicate (r) consisted of 5 mysids at start of test (i. e., 5 mysids at end of test = 100% survival).

[c] Laboratory control water consisted of deionized water to which commercial sea salts were added.

Table 4-13_Statistical analysis of survival and growth of sheepshead minnows (C*yprinodon variegatus*) exposed for 7 days to surface water of estuary at LCP Site (based on 2000 data)[a]

1. Number of surviving fish (mean weight; mg, dw)[b]

Water source (S)	Replicate -- r 1	2	3	4	Mean (x)	Variance (s2)
			Control			
Control[c]	10 (1.22)	10 (1.01)	10 (1.14)	10 (1.16)	10.00 (1.13)	0 (0.008)
			Reference Locations			
Crescent River	10 (1.17)	10 (1.57)	10 (1.22)	9 (1.01)	9.75 (1.24)	0.25 (0.056)
Troup Creek	8 (0.76)	9 (1.36)	9 (0.54)	8 (0.50)	8.50 (0.79)	0.34 (0.158)
			Main Canal			
Main Canal (C-5)	10 (1.51)	10 (1.24)	10 (0.99)	10 (1.33)	10.00 (1.27)	0 (0.047)
			Eastern Creek			
Eastern Creek (C-7)	10 (1.59)	9 (0.90)	8 (0.76)	9 (1.10)	9.00 (1.09)	0.67 (0.132)
			Purvis Creek			
Mouth (C-16)	10 (1.00)	10 (1.00)	9 (0.95)	8 (0.68)	9.25 (0.91)	0.92 (0.024)
			Domain 3			
Near old oil-processing site (C-33)	9 (0.40)	7 (0.50)	10 (0.68)	6 (0.48)	8.00 (0.52)	3.35 (0.014)

2. Cochran's (C) test for homogeneity of variances of fish weight[d]

No further statistical analysis required for fish survival since mean survival of fis exposed to all water sources was from 80 to 100%, which was at least equal to minimum acceptable survival for control organisms (80%

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 0.158 / 0.439 = 0.36$ ns,
as compared to $C_{(tab.)} = 0.48$
for $k = 7$ and $v = 3$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of fish weight[e]

Source of variation in weight	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Water source (S)	s - 1 = 6	1.77	0.30	5.00 **,
Error (R)	s (r - 1) = 21	1.31	0.06	
Total (T)	sr - 1 = 27	3.08		

as compared to
$F_{(tab.)} = 3.81$ for $P = 0.01$,
6 numerator df, and 21
denominator df

Water source (S):	Station 33	Troup Creek	Station 16	Station 7	Control	Crescent River	Station 5
Mean (x) weight (mg, dry wt):	0.52	0.79	0.91	1.09	1.13	1.24	1.27
	————	————	————				
		————	————	————	————	————	————

$w_{(P = 0.05)}$ = q (square root of error MS / r)
= 4.60 (square root of 0.06 / 4)
= 0.55

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[a] Surface water employed in fish toxicity test was collected directly into sampling containers on October 11 (Days 1 and 2 of test), October 13 (Days 3, 4, and 5 of test), and October 16 (Days 6 and 7of test), 2000.

[b] Each replicate (r) consisted of 10 fish at start of test (i. e., 10 fish at end of test = 100% survival).

[c] Laboratory control water consisted of deionized water to which commercial sea salts were added.

[d] Cochran's (C) test, when applied to fish weight data indicated homogeneity of variances (as indicated by the symbol "ns"). Consequently, further statistical analyses were conducted with original (untransformed) data by parametric protocols.

[e] A parametric ANOVA applied to fish weight data documented the presence of statistically significant differences in weight (as indicated by the symbol "**" for $F_{[cal.]}$). Tukey's (w) test indicates that a major source of these differences is the relatively low weight of fish exposed to water from Station 33, although weight for that station is statistically similar to weight for Troup Creek (a reference location) and Station 16. In Tukey's test, weight data underscored by the same horizontal line are not significantly different (i. e., x1 - x2 < w value of 0.55), whereas data not underscored by the same horizontal line are significantly different (x1 - x2 > w value of 0.55).

Table 4-14_Results of sediment toxicity tests with amphipods *(Leptocheirus plumulosus)* exposed for 28 days to surface sediment of the LCP estuary (2000 - 2006 data)

1. Annual Toxicity Tests

Location	Year	Domain	Reproductive Response	Average Survival Rate	Survivor's Average Weight
Control	2000	Control	NA	71	NA
TC-C		Troup Creek Reference	NA	29	NA
MG-B7(C)		Domain 1	NA	31	NA
MG-D9(C)		Domain 1	NA	39	NA
MG-H7(C)		Domain 1	NA	15	NA
MG-K7(C)		Domain 1	NA	0	NA
MG-N2(C)		Domain 1	NA	49	NA
Control	2002	Control	1.16	86	0.79
TC-C		Troup Creek Reference	0.025	80	0.63
CR-C		Crescent River Reference	0.1	53	0.47
C-15		Western Creek Complex	0.47	77	0.70
C-45		Domain 4	0.29	71	0.60
C-5		Main Canal	0.07	54	0.42
C-6		Eastern Creek	0	48	0.51
C-7		Eastern Creek	0	56	0.43
D-C		Domain 4	0	63	0.61
MG-H7(C)		Domain 1	0.01	80	0.46
MG-K7(C)		Domain 1	0	68	0.46
Control	2003	Control	0.058	86	0.312
TC-C		Troup Creek Reference	0.078	69	0.354
CR-C		Crescent River Reference	0.048	76	0.366
C-15		Western Creek Complex	0.024	61	0.168
C-45		Domain 4	0.088	50	0.102
C-5		Main Canal	0.148	37	0.108
C-6		Eastern Creek	0.21	35	0.076
C-7		Eastern Creek	0	1	0.02
D-C		Domain 4	0.052	62	0.168
MG-H7(C)		Domain 1	0.19	30	0.094
MG-K7(C)		Domain 1	0.034	54	0.154
Control	2004	Control	3.20	86	0.274
TC-C		Troup Creek Reference	3.23	42	0.362
CR-C		Crescent River Reference	5.31	40	0.178
C-33		Domain 3	1.94	42	0.35
M-AB		Domain 1 Removal Area	0.079	15	0.302
C-101		Domain 3	1.59	25	0.308
C-105		Blythe Island	0	0	0
C-5		Main Canal	0.469	63	0.40
MG-H7(C)		Domain 1	0.55	24	0.50
MG-K7(C)		Domain 1	0.211	41	0.286
A-C		Domain 4	0.205	33	0.406
C-100		Domain 3	1.605	76	0.294
C-102		Domain 4	2.873	47	0.398
C-104		Blythe Island	3.006	66	0.316
C-15		Western Creek Complex	1.45	3	0.250
C-45		Domain 4	0.12	23	0.264
C-7		Eastern Creek	0	15	0.452
D-C		Domain 4	0.741	58	0.234
C-103		Blythe Island	0.148	72	0.230
C-6		Eastern Creek	2.848	37	0.384

Table 4-14_Continued

Location	Year	Domain	Reproductive Response	Average Survival Rate	Survivor's Average Weight
Control	2005	Control	2.21	82	0.360
TC-C		Troup Creek Reference	0.77	34	0.272
CR-C		Crescent River Reference	0.85	36	0.282
C-5		Main Canal	0.6	62	0.39
C-36		North Purvis Creek	0.26	65	0.408
C-29		North Purvis Creek	0	0	0
C-16		South Purvis Creek	0	7	0.45
C-6		Eastern Creek	0.95	42	0.39
C-7		Eastern Creek	0	0	0
C-15		Western Creek Complex	0	0	0
MG-K7(M)		Domain 1	0.39	45	0.532
MG-H7(M)		Domain 1	0.67	29	0.512
C-33		Domain 3	0.23	32	0.29
D-C		Domain 4	0	3	0.14
C-45		Domain 4	0	12	0.34
C-103		Blythe Island	0	14	0.26
C-104		Blythe Island	0	4	0.25
C-105		Blythe Island	0.38	36	0.302
C-200		Domain 3	0	23	0.326
C-201		South Turtle River	0	0	0
C-202		North Turtle River	0	19	0.528
C-203		South Turtle River	0	16	0.438
FS-AREA1		Domain 3	0	2	0.1
FS-AREA2		Domain 3	0	0	0
FS-AREA3		Domain 3	0	0	0
FS-AREA4		Main Canal	0.32	26	0.208
FS-AREA5		Main Canal	0	6	0.55
FS-AREA6		Domain 2	0.54	39	0.334
Control	2006	Control	0.562	85	0.74
TC-C		Troup Creek Reference	0.05	72	0.402
CR-C		Crescent River Reference	0.364	88	0.322
C-103		Blythe Island	0.082	80	0.58
C-104		Blythe Island	0.292	80	0.358
C-105		Blythe Island	0.358	82	0.488
C-15		Western Creek Complex	0.86	79	0.62
C-16		South Purvis Creek	0.656	87	0.378
C-29		North Purvis Creek	0.142	84	0.382
C-33		Domain 3	1.18	70	0.756
C-36		North Purvis Creek	0.508	84	0.426
C-45		Domain 4	0	60	0.34
C-5		Main Canal	0.61	87	0.712
C-6		Eastern Creek	0.126	67	0.592
C-7		Eastern Creek	0.356	91	0.556
D-C		Domain 4	0.36	87	0.534
FS-AREA1		Domain 3	0.072	41	0.322
FS-AREA2		Domain 3	0	1	0.1
FS-AREA3		Domain 3	0.906	87	0.43
FS-AREA4		Main Canal	0.032	85	0.65
FS-AREA5		Main Canal	0.464	88	0.426
FS-AREA6		Domain 2	0.074	78	0.352
M-AB		Domain 1 Removal Area	0.144	81	0.318
MG-H7(M)		Domain 1	0.154	66	0.458
MG-K7(M)		Domain 1	0.112	74	0.744

Table 4-14_Continued

2. Apparent Effects Threshold (AET) Tests

Control	2006	Control	1.55	95	0.42
SDEC-AET-1	2006	Eastern Creek	0	55	0.31
SDEC-AET-10	2006	Eastern Creek	0	0	0.00
SDEC-AET-11	2006	Eastern Creek	0	20	0.25
SDEC-AET-12	2006	Eastern Creek	0	70	0.33
SDEC-AET-13	2006	Eastern Creek	0.269	75	0.41
SDEC-AET-14	2006	Eastern Creek	0	80	0.44
SDEC-AET-15	2006	Eastern Creek	0	70	0.45
SDEC-AET-16	2006	Eastern Creek	0	0	0.00
SDEC-AET-17	2006	Eastern Creek	0	50	0.32
SDEC-AET-18	2006	Eastern Creek	0	75	0.34
SDEC-AET-19	2006	Eastern Creek	0	75	0.35
SDEC-AET-2	2006	Eastern Creek	0	50	0.29
SDEC-AET-20	2006	Eastern Creek	0.389	80	0.20
SDEC-AET-21	2006	Eastern Creek	0	25	0.50
SDEC-AET-22	2006	Eastern Creek	0	30	0.18
SDEC-AET-23	2006	Eastern Creek	0	55	0.61
SDEC-AET-24	2006	Eastern Creek	0.35	85	0.44
SDEC-AET-25	2006	Eastern Creek	1.38	80	0.29
SDEC-AET-26	2006	Eastern Creek	0	85	0.37
SDEC-AET-27	2006	Eastern Creek	0	85	0.41
SDEC-AET-28	2006	Eastern Creek	0	0	0.00
SDEC-AET-29	2006	Eastern Creek	0	0	0.00
SDEC-AET-3	2006	Eastern Creek	2.58	100	0.46
SDEC-AET-30	2006	Eastern Creek	0	50	0.45
SDEC-AET-31	2006	Eastern Creek	0.125	75	0.35
SDEC-AET-32	2006	Eastern Creek	0.727	85	0.35
SDEC-AET-33	2006	Eastern Creek	0	55	0.64
SDEC-AET-34	2006	Eastern Creek	0.0769	70	0.33
SDEC-AET-35	2006	Eastern Creek	0	80	0.56
SDEC-AET-36	2006	Eastern Creek	0.45	60	0.37
SDEC-AET-37	2006	Eastern Creek	0	80	0.59
SDEC-AET-38	2006	Eastern Creek	0	40	0.40
SDEC-AET-39	2006	Eastern Creek	0	75	0.61
SDEC-AET-4	2006	Eastern Creek	2.06	90	0.55
SDEC-AET-40	2006	Eastern Creek	0	50	0.69
SDEC-AET-41	2006	Eastern Creek	0	20	0.48
SDEC-AET-42	2006	Eastern Creek	1.88	90	0.53
SDEC-AET-43	2006	Eastern Creek	0	10	0.35
SDEC-AET-44	2006	Eastern Creek	1	100	0.48
SDEC-AET-45	2006	Eastern Creek	0	35	0.69
SDEC-AET-46	2006	Eastern Creek	1.56	90	0.43
SDEC-AET-47	2006	Eastern Creek	0	10	0.15
SDEC-AET-48	2006	Eastern Creek	0	10	0.20
SDEC-AET-49	2006	Eastern Creek	0	0	0.00
SDEC-AET-5	2006	Eastern Creek	0	65	0.71
SDEC-AET-50	2006	Eastern Creek	0.2308	80	0.33
SDEC-AET-6	2006	Eastern Creek	0	60	0.47
SDEC-AET-7	2006	Eastern Creek	0	0	0.00
SDEC-AET-8	2006	Eastern Creek	0	75	0.30
SDEC-AET-9	2006	Eastern Creek	0	65	0.19

Table 4-14_Continued

SDMC-AET-1	2006	Main Canal	0.269	85	0.39
SDMC-AET-10	2006	Main Canal	0.167	75	0.34
SDMC-AET-11	2006	Main Canal	0	80	0.31
SDMC-AET-12	2006	Main Canal	0	65	0.68
SDMC-AET-13	2006	Main Canal	0	80	0.34
SDMC-AET-14	2006	Main Canal	0	15	0.30
SDMC-AET-15	2006	Main Canal	0	75	0.41
SDMC-AET-16	2006	Main Canal	0.9	85	0.56
SDMC-AET-17	2006	Main Canal	0.375	55	0.55
SDMC-AET-18	2006	Main Canal	0	60	0.48
SDMC-AET-19	2006	Main Canal	0	50	0.39
SDMC-AET-2	2006	Main Canal	0	80	0.44
SDMC-AET-20	2006	Main Canal	0	55	0.27
SDMC-AET-21	2006	Main Canal	0.375	80	0.51
SDMC-AET-22	2006	Main Canal	0.611	80	0.24
SDMC-AET-23	2006	Main Canal	0	35	0.49
SDMC-AET-24	2006	Main Canal	0	15	0.27
SDMC-AET-25	2006	Main Canal	0	65	0.37
SDMC-AET-26	2006	Main Canal	0	55	0.39
SDMC-AET-27	2006	Main Canal	0.167	75	0.57
SDMC-AET-28	2006	Main Canal	0.654	95	0.44
SDMC-AET-29	2006	Main Canal	0	50	0.33
SDMC-AET-3	2006	Main Canal	0	65	0.39
SDMC-AET-30	2006	Main Canal	0	70	0.44
SDMC-AET-31	2006	Main Canal	0	55	0.43
SDMC-AET-32	2006	Main Canal	0.6	75	0.33
SDMC-AET-33	2006	Main Canal	0	45	0.19
SDMC-AET-34	2006	Main Canal	0	5	0.20
SDMC-AET-35	2006	Main Canal	1.625	85	0.45
SDMC-AET-36	2006	Main Canal	0	25	0.66
SDMC-AET-37	2006	Main Canal	0	65	0.31
SDMC-AET-38	2006	Main Canal	0.15	70	0.38
SDMC-AET-39	2006	Main Canal	0.688	75	0.33
SDMC-AET-4	2006	Main Canal	0	65	0.25
SDMC-AET-40	2006	Main Canal	0	5	0.30
SDMC-AET-41	2006	Main Canal	0	35	0.51
SDMC-AET-42	2006	Main Canal	0	60	0.34
SDMC-AET-43	2006	Main Canal	0	5	0.30
SDMC-AET-44	2006	Main Canal	0	15	0.53
SDMC-AET-45	2006	Main Canal	0	50	0.40
SDMC-AET-46	2006	Main Canal	0	55	0.57
SDMC-AET-47	2006	Main Canal	0	0	0.00
SDMC-AET-48	2006	Main Canal	0	0	0.00
SDMC-AET-49	2006	Main Canal	0.25	75	0.43
SDMC-AET-5	2006	Main Canal	0	15	0.33
SDMC-AET-50	2006	Main Canal	0.909	100	0.53
SDMC-AET-6	2006	Main Canal	0	35	0.44
SDMC-AET-7	2006	Main Canal	0	35	0.33
SDMC-AET-8	2006	Main Canal	0.8	80	0.43
SDMC-AET-9	2006	Main Canal	1.04	100	0.58

Table 4-14_Continued

SDWC-AET-1	2006	Western Creek Complex	0.833	100	0.40
SDWC-AET-10	2006	Western Creek Complex	3.64	90	0.57
SDWC-AET-11	2006	Western Creek Complex	0.938	100	0.68
SDWC-AET-12	2006	Western Creek Complex	0.5	70	0.45
SDWC-AET-13	2006	Western Creek Complex	0	85	0.49
SDWC-AET-14	2006	Western Creek Complex	1.733	90	0.44
SDWC-AET-15	2006	Western Creek Complex	0.2	80	0.41
SDWC-AET-16	2006	Western Creek Complex	0	75	0.31
SDWC-AET-17	2006	Western Creek Complex	0	65	0.41
SDWC-AET-18	2006	Western Creek Complex	1.682	100	0.73
SDWC-AET-19	2006	Western Creek Complex	0.083	80	0.43
SDWC-AET-2	2006	Western Creek Complex	0.556	65	0.75
SDWC-AET-20	2006	Western Creek Complex	1.111	85	0.46
SDWC-AET-21	2006	Western Creek Complex	0.571	80	0.39
SDWC-AET-22	2006	Western Creek Complex	1.571	95	0.51
SDWC-AET-23	2006	Western Creek Complex	0.792	100	0.65
SDWC-AET-24	2006	Western Creek Complex	2.833	100	0.43
SDWC-AET-25	2006	Western Creek Complex	0.643	90	0.57
SDWC-AET-26	2006	Western Creek Complex	2.25	75	0.80
SDWC-AET-27	2006	Western Creek Complex	0	75	0.55
SDWC-AET-28	2006	Western Creek Complex	0.708	95	0.35
SDWC-AET-29	2006	Western Creek Complex	0.5	85	0.31
SDWC-AET-3	2006	Western Creek Complex	0.818	85	0.38
SDWC-AET-30	2006	Western Creek Complex	0	0	0.00
SDWC-AET-31	2006	Western Creek Complex	0.778	100	0.48
SDWC-AET-32	2006	Western Creek Complex	1.91	100	0.49
SDWC-AET-33	2006	Western Creek Complex	0	30	0.35
SDWC-AET-34	2006	Western Creek Complex	0	25	0.28
SDWC-AET-35	2006	Western Creek Complex	0.5	85	0.41
SDWC-AET-36	2006	Western Creek Complex	0.917	80	0.49
SDWC-AET-37	2006	Western Creek Complex	0	75	0.42
SDWC-AET-38	2006	Western Creek Complex	0	90	0.41
SDWC-AET-39	2006	Western Creek Complex	0	30	0.13
SDWC-AET-4	2006	Western Creek Complex	2.27	100	0.60
SDWC-AET-40	2006	Western Creek Complex	0	50	0.30
SDWC-AET-41	2006	Western Creek Complex	1.42	90	0.62
SDWC-AET-42	2006	Western Creek Complex	0	10	0.15
SDWC-AET-43	2006	Western Creek Complex	2.17	85	0.35
SDWC-AET-44	2006	Western Creek Complex	0	55	0.35
SDWC-AET-45	2006	Western Creek Complex	0	40	0.46
SDWC-AET-46	2006	Western Creek Complex	0	45	0.36
SDWC-AET-47	2006	Western Creek Complex	0	5	0.20
SDWC-AET-48	2006	Western Creek Complex	0	85	0.56
SDWC-AET-49	2006	Western Creek Complex	0.962	85	0.44
SDWC-AET-5	2006	Western Creek Complex	0	50	0.51
SDWC-AET-50	2006	Western Creek Complex	1.625	95	0.39
SDWC-AET-6	2006	Western Creek Complex	0	80	0.24
SDWC-AET-7	2006	Western Creek Complex	0	55	0.33
SDWC-AET-8	2006	Western Creek Complex	0	5	0.20
SDWC-AET-9	2006	Western Creek Complex	0	60	0.29
Percentage of samples considered toxic			85%	80%	55%

NA - Not Analyzed
Red color indicates toxicity where there the test endpoint was statistically different than the controls (i.e., less than than the lower limit of the 60% confidence interval for the mean response of the controls, or or if survival was ≤ 85%).
Shaded cells indicate associated controls did not meet acceptability criteria.

Table 4-15_Statistical analysis of survival, growth, and reproduction of amphipods (*Leptocheirus plumulosus*) exposed for 28 days to surface sediment of estuary at LCP Site (2006 data)[a]

A. SURVIVAL OF AMPHIPODS

1. Raw data (number of survivors)[b]

Sediment source (S)	Replicate (r) 1	Replicate (r) 2	Replicate (r) 3	Replicate (r) 4	Replicate (r) 5	Mean (x)	Variance (s2)
Control							
Control	18	19	20	20	18	19.0	1.0
Reference Locations							
Crescent River	19	13	18	19	19	17.6	6.8
Troup Creek	8	17	16	14	17	14.4	14.3
Main Canal							
Mouth (C-5)	13	18	20	16	20	17.4	8.8
Eastern Creek							
Upstream (C-6)	8	15	14	18	12	13.4	13.8
Mid-stretch (C-7)	16	20	19	16	20	18.2	4.2
Western Creek Complex (In Domain 2)							
Mouth (C-15)	16	15	14	15	19	15.8	3.7
Purvis Creek							
Upstream (C-36)	19	18	16	17	14	16.8	3.7
Mid-stretch (C-29)	18	16	17	17	16	16.8	0.7
Mouth (C-16)	16	14	17	20	20	17.4	6.8
Domain 1 (Marsh)							
AB Seep Area	9	18	20	18	16	16.2	18.2
Marsh Grid (MG)							
K7 (M)	16	12	14	14	15	14.2	2.2
H7 (M)	11	14	15	10	16	13.2	6.7
Domain 3 (Marsh)							
Near old oil-processing site (C-33)	18	18	11	9	14	14.0	16.6
Domain 4 (Marsh)							
Northwestern inlet from Turtle River (D)	20	19	12	18	18	17.4	9.8
Southeastern boundary (C-45)	11	16	13	10	10	12.0	6.5
Blythe Island (Marsh)							
Northern boundary (C-103)	19	18	9	15	19	16.0	18.0
Northeastern boundary (C-104)	14	14	19	18	15	16.0	5.5
Southern location (C-105)	14	16	18	18	16	16.4	2.8
Feasibility-Study (FS) Locations							
Area 1 (Creek)	8	6	9	9	10	8.4	2.3
Area 2 (Creek)	0	0	0	0	1	0.2	0.2
Area 3 (Creek)	16	19	18	19	15	17.4	3.3
Area 4 (Creek)	17	14	18	17	19	17.0	3.5
Area 5 (Creek)	19	16	16	18	19	17.6	2.3
Area 6 (Marsh)	16	18	12	18	14	15.6	6.8

2. Cochran's Test (C) for homogeneity of variances of amphipod survival[c]

$C_{(cal.)}$ = 18.2/168.50 = 0.11 ns, as compared to $C_{(tab.)}$ = 0.16 for P criterion = 0.05, k = 25, and v = 4

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) Test of amphipod survival[d]

Source of variation in survival:	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S):	s - 1 = 24	1,793.09	74.71	11.08 **
Error (R):	s (r - 1) = 100	673.60	6.74	
Total (T):	sr - 1 = 124	2,466.69		

as compared to
$F_{(tab.)}$ = 2.01 for P criterion = 0.01,
24 numerator df, and 100
denominator df

Sediment source (S):	A2	A1	45	H7	6	33	K7	**TC**	A6	15	103	104	AB	105	36	29	A4	5	16	*D*	A3	A5	**CR**	7	**Cont.**
Mean (x) survival:	0.2	8.4	12.0	13.2	13.4	14.0	14.2	**14.4**	15.6	15.8	16.0	16.0	16.2	16.4	16.8	16.8	17.0	17.4	17.4	17.4	17.4	17.6	**17.6**	18.2	**19.0**

$W_{(P\ criterion\ =\ 0.05)}$ = q (square root of error MS / r)
= 5.34 (square root of 6.74 / 5)
= 2.77

Table 4-15_Continued

B. GROWTH (WEIGHT) OF AMPHIPODS

1. Raw data (mean weight of survivors; mg, dw)

Sediment source (S)	Replicate (r) 1	Replicate (r) 2	Replicate (r) 3	Replicate (r) 4	Replicate (r) 5	Mean (x)	Variance (s^2)
Control							
Control	0.67	0.69	0.60	0.97	0.77	0.740	0.020
Reference Locations							
Crescent River	0.39	0.18	0.24	0.32	0.48	0.322	0.014
Troup Creek	0.27	0.51	0.31	0.46	0.46	0.402	0.011
Main Canal							
Mouth (C-5)	0.59	0.71	0.85	0.76	0.65	0.712	0.010
Eastern Creek							
Upstream (C-6)	0.67	0.41	0.55	0.71	0.62	0.592	0.014
Mid-stretch (C-7)	0.60	0.57	0.49	0.61	0.51	0.556	0.003
Western Creek Complex (In Domain 2)							
Mouth (C-15)	0.69	0.69	0.39	0.71	0.62	0.620	0.018
Purvis Creek							
Upstream (C-36)	0.41	0.41	0.46	0.48	0.37	0.426	0.002
Mid-stretch (C-29)	0.55	0.21	0.30	0.54	0.31	0.382	0.024
Mouth (C-16)	0.43	0.29	0.51	0.36	0.30	0.378	0.009
Domain 1 (Marsh)							
AB Seep Area	0.37	0.45	0.29	0.27	0.21	0.318	0.009
Marsh Grid (MG)							
K7 (M)	0.86	0.76	0.82	0.89	0.39	0.744	0.042
H7 (M)	0.35	0.38	0.53	0.52	0.51	0.458	0.007
Domain 3 (Marsh)							
Near old oil-processing site (C-33)	0.81	0.86	0.71	0.88	0.52	0.756	0.022
Domain 4 (Marsh)							
Northwestern inlet from Turtle River (D)	0.54	0.54	0.55	0.57	0.47	0.534	0.001
Southeastern boundary (C-45)	0.37	0.33	0.24	0.34	0.42	0.340	0.004
Blythe Islan (Marsh)							
Northern boundary (C-103)	0.46	0.69	0.72	0.65	0.38	0.580	0.023
Northeastern boundary (C-104)	0.34	0.43	0.34	0.43	0.25	0.358	0.006
Southern location (C-105)	0.58	0.59	0.52	0.34	0.41	0.488	0.012
Feasibility-Study (FS) Locations							
Area 1 (Creek)	0.32	0.28	0.29	0.39	0.33	0.322	0.002
Area 2 (Creek)	0	0	0	0	0.50	0.100	0.050
Area 3 (Creek)	0.57	0.54	0.34	0.44	0.26	0.430	0.017
Area 4 (Creek)	0.84	0.62	0.25	0.74	0.80	0.650	0.057
Area 5 (Creek)	0.38	0.48	0.52	0.40	0.35	0.426	0.005
Area 6 (Marsh)	0.24	0.36	0.33	0.42	0.41	0.352	0.005

2. Cochran's Test (C) for homogeneity of variances of amphipod weight[c]

$C_{(cal.)}$ = 0.057/0.387 = 0.15 ns, as compared to $C_{(tab.)}$ = 0.16 for P criterion = 0.05, k = 25, and v = 4

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) Test of amphipod weight[d]

Source of variation in weight:	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S):	s - 1 = 24	3.267	0.136	9.07 **
Error (R):	s (r - 1) = 100	1.544	0.015	
Total (T):	sr - 1 = 124	4.811		

as compared to
$F_{(tab.)}$ = 2.01 for P criterion = 0.01,
24 numerator df, and 100
denominator df

Sediment source (S):	A2	AB	**CR**	A1	45	A6	104	16	29	**TC**	36	A5	A3	H7	105	D	7	103	6	15	A4	5	**Cont.**	K7	33
Mean (x) weight:	0.100	0.318	**0.322**	0.322	0.340	0.352	0.358	0.378	0.382	**0.402**	0.426	0.426	0.430	0.458	0.488	0.534	0.556	0.580	0.592	0.620	0.650	0.712	**0.740**	0.744	0.756

$W_{(P\ criterion\ =\ 0.05)}$ = q (square root of error MS / r)
= 5.34 (square root of 0.015 / 5)
= 0.131

Table 4-15__ Continued

C. REPRODUCTIVE RESPONSE OF OF AMPHIPODS

1. Raw data (reproductive response)[e, f]

Sediment source (S)	Replicate (r) 1	Replicate (r) 2	Replicate (r) 3	Replicate (r) 4	Replicate (r) 5	Mean (x)	Variance (s^2)
Control							
Control	0.50	0.25	0.83	0.33	0.90	0.562	0.085
Reference Locations							
Crescent River	0.47	0.44	0.41	0.23	0.27	**0.364**	0.011
Troup Creek	0	0	0	0	0.25	0.050	0.012
Main Canal							
Mouth (C-5)	0.17	0.57	0.86	0.20	1.25	0.610	0.209
Eastern Creek							
Upstream (C-6)	0.17	0	0	0.46	0	**0.126**	0.040
Mid-stretch (C-7)	0.23	0.41	0.40	0.21	0.53	0.356	0.018
Western Creek Complex (In Domain 2)							
Mouth (C-15)	0.35	0.64	2.29	0.75	0.27	0.860	0.678
Purvis Creek							
Upstream (C-36)	0	1.07	0.56	0	0.91	0.508	0.249
Mid-stretch (C-29)	0.32	0	0	0.17	0.22	**0.142**	0.020
Mouth (C-16)	0.39	1.10	0.50	0.83	0.46	0.656	0.090
Domain 1 (Marsh)							
AB Seep Area	0	0.10	0.62	0	0	**0.144**	0.073
Marsh Grid (MG)							
K7 (M)	0.07	0.06	0.29	0.14	0	**0.112**	0.012
H7 (M)	0.07	0	0	0.31	0.39	**0.154**	0.034
Domain 3 (Marsh)							
Near old oil-processing site (C-33)	0.64	1.40	3.86	0	0	1.180	2.577
Domain 4 (Marsh)							
Northwestern inlet from Turtle River (D)	0.31	1.17	0	0.32	0	0.360	0.230
Southeastern boundary (C-45)	0	0	0	0	0	**0**	0
Blythe Island (Marsh)							
Northern boundary (C-103)	0.10	0.06	0	0	0.25	**0.082**	0.011
Northeastern boundary (C-104)	0	0	0.46	0.50	0.50	0.292	0.071
Southern location (C-105)	0.14	0.61	0.31	0.73	0	0.358	0.095
Feasibility-Study (FS) Locations							
Feasibility Study (FS) Area 1 (Creek)	0	0	0.36	0	0	**0.072**	0.026
FS Area 2 (Creek)	0	0	0	0	0	**0**	0
FS Area 3 (Creek)	0.77	1.05	2.33	0.21	0.17	0.906	0.773
FS Area 4 (Creek)	0.08	0	0	0	0.1	**0.032**	0.002
FS Area 5 (Creek)	0.50	0.71	0.15	0.60	0.36	0.464	0.047
FS Area 6 (Marsh)	0	0.04	0	0	0.33	**0.074**	0.021

2. Cochran's Test (C) for homogeneity of variances of amphipod reproduction[c]

$C_{(cal.)} = 2.577/5.384 = 0.48^{*}$, as compared to $C_{(tab.)} = 0.16$ for P criterion = 0.05, k = 25, and v = 4

3. Nonparametric test (Kruskal- Wallis Test) of amphipod reproduction[f]

$$H_{(adj.)} = [12 / n (n-1)]\ [\sum R_i^2 / n_i] - 3 (n + 1)$$

$H_{(adj.)} = 61.15^{**}$, as compared to $X^2_{(tab.)} = 43.0$ for P criterion = 0.01 and 24 df

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[a] Surface sediment (0 - 15 cm in depth) employed in amphipod toxicity tests was collected on October 16-18, 2006. Control sediment was formulated the laboratory. Laboratory dilution water was formulated with artificial sea salt to a salinity of 20 ppt

[b] Each replicate (r) consisted of 20 amphipods at start of test (i. e., 20 amphipods at end of test = 100% survival).

[c] Cochran's Test (C) indicates homogeneity of variances when $C_{(cal.)}$ is identified by the symbol "ns" and heteroscedasticity when associated with the symbol "*" (P criterion = 0.05 in both cases).

[d] A parametric ANOVA indicates statistically significant differences among sediment sources when $F_{(cal.)}$ is identified by the symbol " ** " (P criterion = 0.01). Tukey's (w) test indicates the specific sources of any significant differences detected in an ANOVA. In Tukey's test, data underscored by the same horizontal line are not significantly different, whereas data not underscored by the same horizontal line are significantly different (P criterion = 0.05).

[e] Reproductive response is calculated as 1/2 of the number of juveniles produced in a replicate / number of surviving adult females.

[f] Since significant differences in amphipod reproduction were detected by the Kruskal-Wallis test, which is incapable of indicating sources of the differences, sediment sources at site that appear to be characterized by substantially impared mean reproduction, in comparison to mean reproduction for the Crescent River reference location, are identified in **bold print**.

Table 4-16_Relationships between survival of amphipods (*Leptocheirus plumulosus)* and chemical characteristics of surface sediment of estuary at LCP Site (2006 data)[a,b]

A. Evaluation of Metals of Potential Concern (COPC) and PAHs

1. Number of samples (n): 24 (including Crescent River and Troup Creek reference locations)

2. Number of Independent Chemical Variables: 22[c]

3. Linear Coefficients of Determination (r^2) for Chemical Variables vs. Survival of Amphipods (statistical significance for Cu at P criterion = 0.05; for Pb and Cd at P criterion = 0.01)[d]:

Silt/clay: +0.033 ns
Total mercury: +0.0065 ns
Aroclor 1268: +0.021 ns
Lead (Pb): -0.45 **
Total PAHs: -0.068 ns

Al: +0.0079 ns
As: +0.0085 ns
Ba: -0.025 ns
Be: +0.0059 ns
Cd: -0.40 **

Cr: +0.047 ns
Co: +0.012 ns
Cu: -0.20 *
Fe: +0.019 ns
Mg: +0.056 ns

Mn: +0.034 ns
Ni: +0.0040 ns
K: +0.063 ns
Ag: -0.00088 ns
Tl: +0.011 ns

V: +0.0069 ns
Zn: -0.134 ns

4. Parametric Analysis of Variance (ANOVA) for Relationship[e]

Source of Variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Explained	22	341.68	15.53	11.25 ns
Unexplained	1	1.38	1.38	
Total	23	343.06		as compared to $F_{(tab.)}$ = 248.55 for P criterion = 0.05, 22 numerator df, and 1 denominator df

5. Parametric squared multiple correlation coefficient (R^2): 0.9960 ns (as compared to 0.9998 for P criterion = 0.05, n = 24, and m = 23)

6. Kruskal's Index of Importance (mean partial r^2)

1) Ba: 0.37
2) Cd: 0.28
3) Lead (Pb): 0.26
4) Be: 0.26
5) Cu: 0.18
6) Tl: 0.18
7) Cr: 0.16
8) Ag: 0.098
9) Fe: 0.085
10) Mg: 0.082
11) Mn: 0.076
12) Al: 0.074
13) As: 0.074
14) V: 0.073
15) K: 0.072
16) Ni: 0.064
17) Zn: 0.064
18) Co: 0.062
19) Aroclor 1268: 0.060
20) Total mercury: 0.050
21) Silt/clay: 0.038
22)Total PAHs: 0.037

B. Evaluation of Primary Chemicals of Potential Concern Independent of Other Metals

1. Number of samples (n): 24 (including Crescent River and Troup Creek reference locations)

2. Number of Independent Chemical Variables: 4

3. Linear Coefficients of Determination (r^2) for COPC vs. Survival of Amphipods (statistical significance for Pb at P criterion = 0.01)[d]:

Total mercury: +0.0065 ns
Aroclor 1268: +0.021 ns
Lead (Pb): -0.45 **
Total PAHs: -0.068 ns

Table 4-16_Continued

B. Evaluation of Primary Chemicals of Potential Concern Independent of Other Metals -- Continued

4. Parametric Analysis of Variance (ANOVA) for Relationship

Source of Variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Explained	4	171.59	42.9	4.76 **
Total mecury	1	11.44	11.44	1.27 ns
Aroclor 268	1	6.82	6.82	0.76 ns
Lead	1	119.94	119.94	13.3 **
Total PAHs	1	4.02	4.02	0.45 ns
Unexplained	19	171.47	9.02	
Total	23	343.06		

as compared to $F_{(tab.)}$ =
4.50 for P criterion = 0.01,
4 numerator df, and
19 denominator df;
● 4.38 for P criterion = 0.05,
1 numerator df, and
19 denominator df; and
● 8.18 for P criterion = 0.01,
1 numerator df, and
19 denominator df;

5. Parametric squared multiple correlation coefficient (R^2): 0.50 **
(as compared to 0.49 for P criterion = 0.01, n = 24, and m = 5)

6. Kruskal's Index of Importance (mean partial r^2)

1) Lead: 0.44
2 Total PAHs: 0.052
3) Aroclor 1268: 0.035
4) Total mercury: 0.035

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[a] Surface sediment is from 0 - 15 cm in depth.

[b] Data evaluated in this table are based on previously presented tables addressing chemistry of sediment (Tables 4-3b and 4-5; 2006 data) and toxicity of sediment (Table 4-15).

[c] All independent chemical variables (as well as silt and clay content) are evaluated in this table except total organic content (TOC), calcium, sodium, and several metals not characteristic of sediment (antimony and selenium; Table 4-5). The exclusion of these metals also caused the number of independent and dependent variables (23) to be less than sample size (24), which is necessary for computer program to function.

[d] These coefficients of determination (r^2) assume linear relationships between chemical variables and survival of amphipods, which may not always exist. Consequently, the r^2 values may be most useful in identifying relationships in which statistically significant correlations are shown to exist and the general "direction" of all relationships (i. e., whether there is a positive or negative relationship between concentration of chemical in sediment and survival of amphipods). (The r^2 values are preceded by a positive or negative sign to indicate the direction of the underlying "r" values.)

[e] These results are to be interpreted with caution because of the substantial probability that unexplained variance is inflated (too high) because of intercorrelations among independent variables (i. e., variance inflaton factors [VIFs] that are in excess of 100) .

Table 4-17_Evaluation of 2006 amphipod toxicity test results with concentrations of selected constituents

Station	Survival Rate %	Reproductive Response [a]	Mercury	A-1268	Lead	Total PAHs	Cadmium	Chromium	Copper	Nickel	Zinc	% TOC	Sulfide
CR-C	88	**0.364**	0.013	0.00125	4.29	0.02	0.04	6.6	2.5	1.9	11	0.67	30.7
TC-C	**72**	**0.050**	0.074	0.026	17.4	0.04	0.14	26.6	8.2	7.7	45.8	3.00	77.2
C-5	87	0.610	7.03	31	40.9	2.16	0.23	57.3	11.3	12.9	69.8	4.72	564
C-6	**67**	**0.126**	8.75	25	31.9	0.37	0.22	50	13.0	11.3	72	6.56	7.2
C-7	91	**0.356**	3.27	13	27.9	0.47	0.19	50.2	11.5	12	73.1	5.75	169
C-15	79	0.860	0.46	1.0	25.8	0.44	0.21	55.2	11.8	13.7	76.2	4.22	1,230
C-36	84	0.508	1.09	1.4	28.9	0.57	0.28	59.8	12.8	14.1	27.1	4.66	1,080
C-29	84	**0.142**	0.67	0.98	25.7	0.52	0.24	49.6	12.1	12.8	79.4	5.23	957
C-16	87	0.656	0.19	1.2	6.55	2.56	0.06	14.2	3.2	3.8	18.1	0.96	0.25
M-AB	81	**0.144**	0.06	0.07	2.53	0.04	0.01	1.9	0.5	0.6	2.7	0.41	2.8
K-7(M)	**71**	**0.112**	2.36	4.6	30	0.25	0.14	61.9	11.7	12.5	71.7	4.42	11
H-7(M)	**66**	**0.154**	1.82	4.1	27.2	0.29	0.13	55.6	11.0	10.8	64.0	5.81	0.2
C-33	**70**	1.180	0.1	0.06	27.8	0.98	0.12	5.4	4.8	1.8	27.1	1.63	121
D-C	87	**0.360**	1.22	0.64	23.3	0.29	0.24	86.8	10.7	10.9	61.3	5.21	105
C-45	**60**	**0**	0.57	0.79	26.4	0.56	0.22	57.3	11.5	13.3	72.3	4.92	100
C-103	80	**0.082**	0.37	0.19	26.8	0.27	0.19	67.5	12.3	16.3	77.1	5.48	411
C-104	80	**0.292**	0.28	0.21	17.3	0.23	0.13	34.8	7.5	9.6	43.4	3.47	25.7
C-105	82	**0.358**	0.4	0.34	18.1	0.15	0.17	44.5	8.2	11.1	50.8	2.36	112
FS-AREA1	**41**	**0.072**	1.07	0.92	44.2	0.23	0.15	26.8	6.6	6.6	30.3	2.43	13.5
FS-AREA2	**1**	**0**	1.07	0.85	275	2.47	0.75	27	25.4	10.2	126	7.69	56.5
FS-AREA3	87	0.906	3.57	2.0	177	0.97	0.40	81.7	21	14.8	106	7.71	517
FS-AREA4	85	**0.032**	1.34	5.8	14.9	0.29	0.08	27.6	6.1	6.9	36.1	2.53	147
FS-AREA5	88	0.464	4.54	11	29.7	1.76	0.21	67.4	11.8	13.3	73.1	4.35	773
FS-AREA6	78	**0.074**	2.03	3.1	28.6	0.24	0.18	60.3	11.8	12.1	74.8	5.95	15.7

All concentrations in mg/kg dw

🟥	>3.2	>12.8	>60	>1.5	>4.2	>160	>108	>42.8	>271	<1	<50
🟨	>1.4<3.2	>3.3<12.8	>41<60	>0.8<1.5	>1<4.2	>52.3<160	>18.7<108	>15.9<42.8	>124<271	>1<3	>50<150
🟩											>150

Bolded test endpoints indicate survival or reproduction is significantly different than controls.

Note that the Troup Creek reference station (TC-C) was toxic.

[a] - defined as 1/2 of the number of juveniles produced ÷ the number of surviving adult females.

Table 4-18_Equilibrium partitioning of selected metals in surface sediment of estuary at LCP Site (2006 data)[a]

	Simultaneously extracted metals -- SEM (dw)[b]												Σ SEM (µmol/g, dry wt)	Acid volatile sulfide -- AVS (dw)		Σ SEM / AVS[c]	Σ SEM - AVS[d]
	Cadmium		Copper		Lead		Nickel		Silver		Zinc						
Sediment source (S)	mg/kg	µmol/g	mg/kg	µmol/g	mg/kg	µmol/g	mg/kg	µmol/g	mg/kg	µmol/g	mg/kg	µmol/g		mg/kg	µmol/g		
Reference Locations																	
Crescent River	**0.1**	0.00089	**0.3**	0.0047	**2.6**	0.0125	**0.5**	0.0085	**0.3**	0.0028	5.0	0.0765	0.1059	30.7	0.9517	0.111	----------
Troup Creek	**0.2**	0.0018	**0.4**	0.0063	**4.1**	0.0197	**0.8**	0.0136	**0.4**	0.0037	21	0.3213	0.3664	77.2	2.3932	0.153	----------
Main Canal																	
Mouth (C-5)	0	0	**1**	0.0157	**9**	0.0432	**2**	0.0340	**1**	0.0093	32.9	0.5034	0.6056	564	17.4800	0.035	----------
Eastern Creek																	
Upstream (C-6)	**0.3**	0.0027	2.0	0.0314	15.6	0.0749	1.7	0.0289	**0.7**	0.0065	42.6	0.6518	0.7962	7.2	0.2232	**3.567**	0.5730
Mid-stretch (C-7)	**0.3**	0.0027	2.8	0.0440	15	0.0720	1.9	0.0323	**0.6**	0.0056	43.3	0.6625	0.8191	169	5.2390	0.156	----------
Western Creek Complex (In Domain 2)																	
Mouth (C-15)	**1**	0.0089	**1**	0.0157	12.6	0.0605	**2**	0.0340	**1**	0.0093	43.5	0.6656	0.7940	1,230	38.1300	0.021	----------
Purvis Creek																	
Upstream (C-36)	**1**	0.0089	**2**	0.0314	**14.5**	0.0696	**3**	0.0510	**2**	0.0186	42.8	0.6548	0.8343	1,080	33.4800	0.025	----------
Mid-stretch (C-29)	0	0	**1**	0.0157	10.6	0.0509	**2**	0.0340	**1**	0.0093	48.8	0.7466	0.8565	957	29.6700	0.029	----------
Mouth (C-16)	0	0	0.6	0.0094	2.8	0.0134	**1**	0.0170	0	0	9.9	0.1515	0.1913	**1**	0.03100	**6.171**	0.1603
Domain 1																	
AB Seep Area	**0.1**	0.00089	**0.2**	0.0031	**2.2**	0.0106	**0.4**	0.0068	**0.2**	0.0019	2.0	0.0306	0.0539	2.8	0.0868	0.621	----------
Marsh Grid (MG)																	
K7 (M)	**0.3**	0.0027	2.8	0.0440	13.4	0.0643	1.8	0.0306	**0.5**	0.0046	28.7	0.4391	0.5853	11	0.3410	**1.716**	0.2443
H7 (M)	**0.3**	0.0027	3.5	0.0550	13.6	0.0653	1.9	0.0323	**0.5**	0.0046	27.3	0.4177	0.5776	**0.4**	0.0124	**46.581**	0.4177
Domain 3																	
Near old oil-processing site (C-33)	0	0	0	0	13	0.0624	**1**	0.0170	0	0	26.6	0.4070	0.4864	121	3.7500	0.130	----------
Domain 4																	
Northwestern inlet from Turtle River (D)	**0.3**	0.0027	**0.6**	0.0094	7.2	0.0346	**1.2**	0.0204	**0.6**	0.0056	34.7	0.5309	0.6036	105	3.2550	0.185	----------
Southeastern boundary (C-45)	0	0	**1**	0.0157	**7**	0.0336	**1**	0.0170	**1**	0.0093	50.1	0.7665	0.8421	100	3.1000	0.272	----------
Blythe Island																	
Northern boundary (C-103)	0	0	**1**	0.0157	9.8	0.0470	**1**	0.0170	**1**	0.0093	36.2	0.5539	0.6429	411	12.7400	0.050	----------
Northeastern boundary (C-104)	0	0	**1**	0.0157	**5**	0.0240	**1**	0.0170	**1**	0.0093	14.1	0.2157	0.2817	25.7	0.7967	0.354	----------
Southern location (C-105)	0	0	**1**	0.0157	**5**	0.0240	**1**	0.0170	**1**	0.0093	21.5	0.3290	0.3950	112	3.4700	0.114	----------
Feasibility-Study (FS) Locations																	
Area 1 (Creek)	0	0	0	0	20.4	0.0979	**1**	0.0170	0	0	14.9	0.2280	0.3429	13.5	0.4185	0.819	----------
Area 2 (Creek)	0.5	0.0044	**1**	0.0157	95.4	0.4579	**2**	0.0340	**1**	0.0093	78	1.1934	1.7147	56.5	1.7484	0.981	----------
Area 3 (Creek)	**1**	0.0089	**2**	0.0314	63.1	0.3029	**3**	0.0510	**2**	0.0186	58	0.8874	1.3002	517	16.0300	0.081	----------
Area 4 (Creek)	0	0	0.8	0.0126	5.8	0.0278	**1**	0.0170	0	0	18.7	0.2861	0.3435	147	4.5600	0.075	----------
Area 5 (Creek)	0	0	**1**	0.0157	8.2	0.0394	**1**	0.0170	**1**	0.0093	42.2	0.6457	0.7271	773	23.9600	0.030	----------
Area 6 (Marsh)	0	0	3.3	0.0518	14.1	0.0677	1.8	0.0306	**1**	0.0093	33.4	0.5110	0.6704	15.7	0.4867	**1.377**	0.1837

[a] This study was conducted as part of a comprehensive investigation performed in 2006 to identify causes of toxicity of sediment.

[b] Concentrations of metals underlined in **bold print** represent detection limits for the metals.

[c] A value of ∑SEM / AVS that is ≤ 1 is one criterion for indicating the absence of direct toxicity of the six metals (considered collectively) to benthic biota.

[d] A value of ∑SEM - AVS that is ≤ 5 µmol/g is the preferred criterion for indicating the absence of direct toxicity of the six metals (considered collectively) to benthic biota (SAI, 2003).

Table 4-19a.__ Apparent effects thresholds (AETs) for chemicals of potential concern (COPC) in surface sediment of estuary at LCP Site (based on 2006 data)[a, b, c]

Total mercury (mg/kg, dw)				Aroclor 1268 (mg/kg, dw)				Lead (mg/kg, dw)				Total PAHs (mg/kg, dw)			
Sampling station	Survival	Growth	Reproduction	Sampling station	Survival	Growth	Reproduction	Sampling station	Survival	Growth	Reproduction	Sampling station	Survival	Growth	Reproduction
	⬆	⬆	⬆		⬆	⬆	⬆		⬆	⬆	⬆		⬆	⬆	⬆
EC40	140	140	140	MC24	570	570	570	EC49	240	240	240	EC49	38.458	38.458	38.458
EC6	110	110	110	EC6	420	420	420	EC48	100	100	100	MC43	16.683	16.683	16.683
EC37	110	110	110	EC5	380	380	380	MC43	68	68	68	WC3	11.376	11.376	11.376
EC7	76	76	76	MC20	360	360	360	EC22	57	57	57	WC48	7.813	7.813	7.813
EC2	74	74	74	EC32	330	330	330	EC34	52	52	52	WC1	6.197	6.197	6.197
EC8	61	61	61	MC46	280	280	280	WC46	52	52	52	EC22	5.560	5.560	5.560
EC34	50	50	50	MC36	150	150	150	WC17	52	52	52	MC24	3.764	3.764	3.764
EC5	42	42	42	EC7	150	150	150	EC1	49	49	49	EC5	3.735	3.735	3.735
MC30	40	40	40	MC45	140	140	140	EC5	48	48	48	EC42	2.534	2.534	2.534**
MC46	35	35	35	EC23	130	130	130	WC21	47	47	47	MC20	2.238	2.238	2.238
EC32	30	30	30	EC10	120	120	120	EC6	45	45	45	EC19	1.527	1.527	1.527
MC47	29	29	29	EC33	120	120	120	WC40	45	45	45	WC2	1.509	1.509	1.509
MC45	29	29	29	MC22	110	110	110	EC9	43	43	43	EC18	1.335	1.335	1.335
MC11	28	28	28	EC26	110	110	110	MC3	42	42	42	WC50	1.324	1.324	1.324
EC48	28	28	28	EC19	110	110	110	WC39	42	42	42	EC6	1.243	1.243	1.243
EC10	26	26	26	EC1	90	90	90	MC47	42	42	42	WC49	1.103	1.103	1.103
MC19	24	24	24	MC37	76	76	76	MC46	42	42	42	EC48	1.100	1.100	1.100
MC41	22	22	22	MC26	68	68	68	MC25	41	41	41	MC4	1.010	1.010	1.010
MC24	22	22	22	EC8	59	59	59	MC13	41	41	41	EC1	0.997	0.997	0.997
EC1	21	21	21	MC44	55	55	55	MC44	41	41	41	EC11	0.986	0.986	0.986
EC35	20	20	20	MC47	54	54	54	WC16	40	40	40	MC46	0.955	0.955	0.955
EC3	19**	19	19**	EC37	44	44	44	MC36	40	40	40	EC23	0.910	0.910	0.910
MC20	18	18	18	EC25	44	44	44	EC10	40	40	40	WC4	0.896	0.896	0.896
EC41	17	17	17	EC44	43	43	43	WC34	40	40	40	EC32	0.883	0.883	0.883
EC26	17	17	17	MC14	39	39	39	WC44	39	39	39	EC26	0.878	0.878	0.878
WC50	16	16	16	EC36	39	39	39	EC8	39	39	39	WC46	0.878	0.878	0.878
WC43	15	15	15	EC41	38	38	38	EC37	38	38	38	MC8	0.859	0.859	0.859
EC33	14	14	14	MC39	37	37	37	MC20	38	38	38	MC26	0.858	0.858	0.858
MC42	13	13	13	EC31	36	36	36	WC5	38	38	38	MC36	0.849	0.849	0.849
MC13	13	13	13	MC27	34	34	34	WC37	38	38	38	EC36	0.809	0.809	0.809
EC44	13	13	13	MC19	33	33	33	EC40	37	37	37	EC16	0.774	0.774	0.774
EC9	13	13	13	MC30	32	32	32	WC38	37 **	37	37	MC37	0.769	0.769	0.769
EC23	13	13	13	MC13	32	32	32	WC36	37	37	37 **	MC7	0.761	0.761	0.761
WC38	13	13	13	MC18	30	30	30	EC33	36	36	36	MC1	0.761	0.761	0.761
WC35	13	13	13	EC35	30	30	30	WC42	36	36	36	EC34	0.750	0.750	0.750
MC28	12	12	12	MC23	28	28	28	EC26	36	36	36	MC45	0.744	0.744	0.744
WC41	12	12	12	EC42	28	28	28**	EC23	36	36	36	MC25	0.729	0.729	0.729
WC34	12	12	12	EC39	28	28	28	WC48	36	36	36	EC47	0.728	0.728	0.728
MC33	11	11	11	MC15	26	26	26	WC15	36	36	36	MC18	0.719	0.719	0.719
EC13	11	11	11	EC48	26	26	26	MC27	35	35	35	EC37	0.715	0.715	0.715
EC42	11	11	11	EC9	26	26	26	WC47	35	35	35	MC47	0.714	0.714	0.714
EC25	11	11	11	WC17	25	25	25	WC49	35	35	35	MC2	0.682	0.682	0.682
MC22	10	10	10	EC40	24	24	24	WC43	34	34	34	EC15	0.670	0.670	0.670
MC27	9.4	9.4	9.4	MC31	23	23	23	WC50	34	34	34	WC5	0.659	0.659	0.659
MC14	9.0	9.0	9.0	MC38	21	21	21	MC32	34	34	34	MC22	0.658	0.658	0.658
MC40	8.9	8.9	8.9	MC7	21	21	21	MC24	34	34	34	MC32	0.657	0.657	0.657
EC31	8.7	8.7	8.7	MC28	20	20	20	EC13	34	34	34	MC13	0.648	0.648	0.648
MC17	8.4	8.4	8.4	MC4	20	20	20	EC15	34	34	34	EC8	0.648	0.648	0.648
MC35	8.3	8.3	8.3	MC1	20	20	20	WC31	34	34	34	MC27	0.642	0.642	0.642
MC34	8.0	8.0	8.0	EC18	20	20	20	WC8	34	34	34	EC31	0.638	0.638	0.638
WC45	7.8	7.8	7.8	WC16	20	20	20	EC35	34	34	34	EC33	0.636	0.636	0.636
MC26	7.6	7.6	7.6	MC40	19	19	19	WC45	34	34	34	MC31	0.633	0.633	0.633
EC39	6.8	6.8	6.8	MC16	19	19	19	MC40	33	33	33	MC28	0.630	0.630	0.630
MC36	6.7	6.7	6.7	EC4	19	19	19	MC26	33	33	33	WC43	0.629	0.629	0.629
WC17	6.7	6.7	6.7	MC42	18	18	18	EC7	33	33	33	EC9	0.626	0.626	0.626
EC4	6.5	6.5	6.5	MC25	18	18	18	WC4	33	33	33	EC4	0.616	0.616	0.616
EC20	6.4	6.4	6.4	MC21	18	18	18	WC41	33	33	33	MC11	0.612	0.612	0.612
MC25	6.3	6.3	6.3	EC3	17	17	17	WC23	32	32	32	EC41	0.608	0.608	0.608
MC44	6.2	6.2	6.2	EC22	17	17	17	MC22	32	32	32	MC15	0.599	0.599	0.599
EC38	6.2	6.2	6.2	EC14	17	17	17	WC35	32	32	32	MC21	0.589	0.589	0.589
MC32	5.8	5.8	5.8	MC32	16	16	16	EC32	32	32	32	EC10	0.588	0.588	0.588
MC31	5.6	5.6	5.6	EC2	16	16	16	MC41	32	32	32	WC35	0.586	0.586	0.586
EC49	5.6	5.6	5.6	EC21	16	16	16	WC13	31	31	31	EC7	0.575	0.575	0.575
EC14	5.6	5.6	5.6	MC11	15	15	15	MC39	31	31	31	MC19	0.569	0.569	0.569
WC48	5.5	5.5	5.5	MC2	15	15	15	MC37	31	31	31	EC24	0.568	0.568	0.568
MC39	5.3	5.3	5.3	EC38	15	15	15	MC33	31	31	31	EC2	0.566	0.566	0.566
MC37	5.3	5.3	5.3	EC24	15	15	15	EC20	31	31	31	EC14	0.555	0.555	0.555
EC28	5.3	5.3	5.3	EC17	15	15	15	EC14	31	31	31	EC29	0.546	0.546	0.546
WC37	5.2	5.2	5.2	WC5	15	15	15	WC22	31	31	31	MC33	0.541	0.541	0.541
EC30	5.1	5.1	5.1	MC17	14	14	14	MC42	31	31	31	EC40	0.538	0.538	0.538
EC15	5.0	5.0	5.0	EC27	14	14	14	MC35	30	30	30	MC12	0.525	0.525	0.525
WC4	4.8	4.8	4.8	MC12	13	13	13	MC34	30	30	30	WC44	0.525	0.525	0.525
MC23	4.7	4.7	4.7	EC29	13	13	13	MC11	30	30	30	MC39	0.517	0.517	0.517
EC19	4.7	4.7	4.7	WC43	13	13	13	EC30	30	30	30	MC9	0.516	0.516	0.516
MC18	4.6	4.6	4.6	MC33	12	12	12	WC20	30	30	30	WC26	0.515	0.515	0.515
	⬆	⬆	⬆		⬆	⬆	⬆		⬆	⬆	⬆		⬆	⬆	⬆

Table 4-19a.__ Continued

Total mercury (mg/kg, dw)				Aroclor 1268 (mg/kg, dw)				Lead (mg/kg, dw)				Total PAHs (mg/kg, dw)			
Sampling station	Survival	Growth	Repro- duction	Sampling station	Survival	Growth	Repro- duction	Sampling station	Survival	Growth	Repro- duction	Sampling station	Survival	Growth	Repro- duction
	⬆	⬆	⬆		⬆	⬆	⬆		⬆	⬆	⬆		⬆	⬆	⬆
EC18	4.6	4.6	4.6	EC28	12	12	12	WC18	30	30	30	EC21	0.507	0.507	0.507
EC47	4.5	4.5	4.5	EC16	12	12	12	WC27	30	30	30	MC23	0.501	0.501	0.501
EC22	4.5	4.5	4.5	EC15	12	12	12	WC26	29	29	29	MC3	0.490	0.490	0.490
MC38	4.3	4.3	4.3	MC35	11	11	11	MC38	29	29	29	EC30	0.483	0.483	0.483
EC36	4.3	4.3	4.3	MC9	11	11	11	MC31	29	29	29	MC5	0.479	0.479	0.479
EC29	4.1	4.1	4.1	MC8	11	11	11	MC19	29	29	29	EC38	0.474	0.474	0.474
WC30	4.0	4.0	4.0	EC34	11	11	11	MC12	29	29	29	EC3	0.473	0.473	0.473
WC42	3.8	3.8	3.8	EC30	11	11	11	WC28	29	29	29	MC35	0.457	0.457	0.457
WC5	3.8	3.8	3.8	EC20	11	11	11	MC45	29	29	29	MC44	0.454	0.454	0.454
MC12	3.6	3.6	3.6	WC50	11	11	11	MC28	28	28	28	WC47	0.449	0.449	0.449
MC7	3.6	3.6	3.6	MC34	10	10	10	MC23	28	28	28	MC38	0.435	0.435	0.435
EC27	3.5	3.5	3.5	EC43	9.5	9.5	9.5	EC3	28	28	28	EC20	0.434	0.434	0.434
MC1	3.4	3.4	3.4	MC41	9.2	9.2	9.2	EC19	28	28	28	MC16	0.433	0.433	0.433
WC24	3.3	3.3	3.3	MC5	8.3	8.3	8.3	EC16	28	28	28	MC49	0.429	0.429	0.429
MC15	3.1	3.1	3.1	MC3	8.2	8.2	8.2	WC29	28	28	28	WC45	0.428	0.428	0.428
MC21	3.0	3.0	3.0	MC43	8.1	8.1	8.1	WC12	28	28	28	WC37	0.428	0.428	0.428
MC16	3.0	3.0	3.0	WC8	7.0	7.0	7.0	WC24	27	27	27	WC23	0.424	0.424	0.424
MC8	3.0	3.0	3.0	WC22	6.9	6.9	6.9	WC19	27	27	27	MC41	0.420	0.420	0.420
EC21	3.0	3.0	3.0	WC42	5.5	5.5	5.5	MC14	27	27	27	EC35	0.420	0.420	0.420
MC4	2.8	2.8	2.8	WC14	5.2	5.2	5.2	EC44	27	27	27	EC27	0.420	0.420	0.420
WC16	2.8	2.8	2.8	WC35	4.9	4.9	4.9	EC42	27	27	27	WC38	0.414	0.414	0.414
MC9	2.6	2.6	2.6	MC29	4.8	4.8	4.8	EC41	27	27	27	WC34	0.413	0.413	0.413
MC2	2.6	2.6	2.6	WC21	4.8	4.8	4.8	EC28	27	27	27	MC34	0.405	0.405	0.405
EC24	2.6	2.6	2.6	WC24	4.5	4.5	4.5	WC3	27	27	27	WC24	0.404	0.404	0.404
WC31	2.6	2.6	2.6	WC48	4.3	4.3	4.3	WC33	27	27	27	WC40	0.400	0.400	0.400
EC50	2.5	2.5	2.5	WC30	4.3	4.3	4.3	WC7	27	27	27	WC22	0.400	0.400	0.400
EC43	2.4	2.4	2.4	WC41	4.2	4.2	4.2	WC6	27	27	27	MC42	0.396	0.396	0.396
WC36	2.3	2.3	2.3	MC10	4.1	4.1	4.1	EC39	27	27	27	WC16	0.396	0.396	0.396
MC5	2.1	2.1	2.1	WC4	4.1	4.1	4.1	MC1	27	27	27	MC30	0.394	0.394	0.394
WC28	2.1	2.1	2.1	EC47	4.0	4.0	4.0	WC25	26	26	26	MC17	0.391	0.391	0.391
WC6	2.1	2.1	2.1	WC23	3.8	3.8	3.8	EC21	26	26	26	MC10	0.389	0.389	0.389
WC26	2.0	2.0	2.0	EC13	3.7	3.7	3.7	WC1	26	26	26	EC17	0.380	0.380	0.380
WC23	2.0	2.0	2.0	WC28	3.5	3.5	3.5	WC9	26	26	26	MC40	0.371	0.371	0.371
WC22	1.9	1.9	1.9	WC25	3.1	3.1	3.1	EC31	26	26	26	WC7	0.365	0.365	0.365
WC33	1.8	1.8	1.8	EC49	2.9	2.9	2.9	WC14	25	25	25	MC14	0.363	0.363	0.363
WC25	1.8	1.8	1.8	WC40	2.5	2.5	2.5	WC11	25	25	25	WC12	0.360	0.360	0.360
WC15	1.8	1.8	1.8	WC39	2.5	2.5	2.5	MC6	25	25	25	WC8	0.360	0.360	0.360
MC3	1.7	1.7	1.7	WC15	2.5	2.5	2.5	MC2	25	25	25	EC39	0.359	0.359	0.359
WC39	1.7	1.7	1.7	WC36	2.4	2.4	2.4	MC15	25	25	25	WC41	0.354	0.354	0.354
WC21	1.7	1.7	1.7	WC31	2.4	2.4	2.4	EC47	25	25	25	EC44	0.351	0.351	0.351
WC27	1.6	1.6	1.6	WC20	2.4	2.4	2.4	EC4	25	25	25	MC6	0.343	0.343	0.343
WC12	1.6	1.6	1.6	WC12	2.4	2.4	2.4	EC29	25	25	25	EC25	0.343	0.343	0.343
MC29	1.5	1.5	1.5	WC45	2.2	2.2	2.2	WC32	25	25	25	WC21	0.340	0.340	0.340
EC11	1.5	1.5	1.5	WC13	2.2	2.2	2.2	MC30	24	24	24	WC6	0.323	0.323	0.323
WC29	1.5	1.5	1.5	WC27	2.1	2.1	2.1	MC21	24	24	24	EC13	0.318	0.318	0.318
WC20	1.5	1.5	1.5	WC18	2.1	2.1	2.1	WC2	24	24	24	WC25	0.318	0.318	0.318
WC19	1.5	1.5	1.5	WC29	2.0	2.0	2.0	WC10	24	24	24	WC9	0.318	0.318	0.318
WC14	1.5	1.5	1.5	EC11	1.9	1.9	1.9	MC7	24	24	24	WC15	0.317	0.317	0.317
WC3	1.4	1.4	1.4	WC6	1.9	1.9	1.9	WC30	24	24	24	WC17	0.314	0.314	0.314
MC10	1.3	1.3	1.3	MC6	1.8	1.8	1.8	EC36	23	23	23	WC14	0.310	0.310	0.310
WC2	1.3	1.3	1.3	WC19	1.8	1.8	1.8	EC2	23	23	23	EC28	0.305	0.305	0.305
WC9	1.3	1.3	1.3	WC7	1.8	1.8	1.8	MC5	23	23	23	WC18	0.294	0.294	0.294
MC43	1.2	1.2	1.2	EC50	1.7	1.7	1.7	MC8	23	23	23	WC28	0.289	0.289	0.289
WC1	1.2	1.2	1.2	WC33	1.7	1.7	1.7	MC9	22	22	22	WC19	0.287	0.287	0.287
WC10	1.2	1.2	1.2	WC26	1.7	1.7	1.7	MC4	22	22	22	WC11	0.276	0.276	0.276
WC32	1.1	1.1	1.1	WC9	1.7	1.7	1.7	MC10	21	21	21	WC10	0.272	0.272	0.272
WC18	1.1	1.1	1.1	MC49	1.5	1.5	1.5	EC38	21	21	21	WC20	0.268	0.268	0.268
WC8	1.0	1.0	1.0	MC50	1.5	1.5	1.5	EC18	18	18	18	WC31	0.253	0.253	0.253
WC7	0.95	0.95	0.95	WC10	1.4	1.4	1.4	EC46	16	16	16	WC13	0.246	0.246	0.246
WC13	0.92	0.92	0.92	MC48	1.0	1.0	1.0	EC11	16	16	16	WC36	0.242	0.242	0.242
WC47	0.88	0.88	0.88	WC49	1.0	1.0	1.0	EC25	15	15	15	WC30	0.242	0.242	0.242
EC17	0.79	0.79	0.79	WC32	1.0	1.0	1.0	MC18	14	14	14	EC43	0.240	0.240	0.240
MC6	0.77	0.77	0.77	WC3	0.78	0.78	0.78	MC17	14	14	14	WC42	0.230	0.230	0.230
EC16	0.77	0.77	0.77	WC34	0.76	0.76	0.76	EC12	14	14	14	MC50	0.229	0.229	0.229
WC11	0.52	0.52	0.52	WC11	0.75	0.75	0.75	MC16	13	13	13	WC27	0.207	0.207	0.207
WC40	0.50	0.50	0.50	WC2	0.63	0.63	0.63	EC45	13	13	13	MC29	0.184	0.184	0.184
MC49	0.40	0.40	0.40	WC1	0.62	0.62	0.62	EC24	13	13	13	WC32	0.183	0.183	0.183
MC50	0.37	0.37	0.37	WC37	0.35	0.35	0.35	MC29	12	12	12	WC33	0.162	0.162	0.162
WC44	0.35	0.35	0.35	WC38	0.33	0.33	0.33	EC27	11	11	11	WC39	0.151	0.151	0.151
EC45	0.28	0.28	0.28	EC46	0.27	0.27	0.27	EC43	9.1	9.1	9.1	WC29	0.138	0.138	0.138
EC46	0.26	0.26	0.26	WC44	0.16	0.16	0.16	EC17	8.7	8.7	8.7	EC50	0.126	0.126	0.126
MC48	0.20	0.20	0.20	EC45	0.15	0.15	0.15	MC48	5.8	5.8	5.8	MC48	0.104	0.104	0.104
WC49	0.20	0.20	0.20	WC47	0.023	0.023	0.023	EC50	5.7	5.7	5.7	EC46	0.060	0.060	0.060
WC46	0.089	0.089	0.089	WC46	0.0079	0.0079	0.0079	MC49	4.4	4.4	4.4	EC45	0.037	0.037	0.037
EC12	0.044	0.044	0.044	EC12	0.0074	0.0074	0.0074	MC50	3.9	3.9	3.9	EC12	0.0065	0.0065	0.0065

[a] Chemical and toxicological data are based on 50 sediment samples collected from each of the Main Canal (MC), Eastern Creek (EC), and Western Creek Complex (WC) on October 22 - 25, 2006 (the only year that this evaluation was conducted). Toxicological data pertain to chronic (28-day) tests with amphipods (*Leptocheirus plumulosus*) exposed to the same 150 sediment samples.

[b] Data associated with black print and green background identify concentrations of COPC in surface sediment that were not toxic to amphipods, whereas data identified by red print indicate toxic sediment. Sediment was judged to be toxic to amphipods if survival was ≤ 85% (mean control survival = 97.5%) or if growth or reproduction was less than the lower limit of the 60% confidence interval (CI) for the mean response of control amphipods. This latter protocol is a conservative statistical approach for identifying AETs that identifies a greater number of toxic samples than if a more conventional (e. g., 95%) CI was employed.

[c] AETs for each COPC and associated measurement endpoints are identified by rectangular borders. The lowest (and most relevant) AET for a COPC is identified by double stars (**).

Table 4-19b.__ Apparent effects thresholds (AETs) for selected metals in surface sediment of estuary at LCP Site (based on 2006 data)[a, b, c]

Cadmium (mg/kg, dw)			
Sampling station	Survival	Growth	Reproduction
	⬆	⬆	⬆
WC42	0.376	0.376	0.376
WC17	0.363	0.363	0.363
WC8	0.362	0.362	0.362
WC21	0.359	0.359	0.359
WC5	0.336	0.336	0.336
WC50	0.32	0.32	0.32
EC48	0.304	0.304	0.304
WC48	0.302	0.302	0.302
WC31	0.3	0.3	0.3
MC46	0.296	0.296	0.296
WC4	0.295	0.295	0.295 **

Copper (mg/kg, dw)			
Sampling station	Survival	Growth	Reproduction
	⬆	⬆	⬆
MC47	28.2	28.2	28.2
EC8	25.3	25.3	25.3
WC17	22.4	22.4	22.4
EC5	21.8	21.8	21.8
MC19	20.7	20.7	20.7
MC42	20.1	20.1	20.1
EC7	20.1	20.1	20.1
MC46	20	20	20
EC6	19.9	19.9	19.9
WC39	19.9	19.9	19.9
MC41	19.4	19.4	19.4
MC11	19.1	19.1	19.1
WC40	19.1	19.1	19.1
EC1	19	19	19
MC44	18.8	18.8	18.8
WC34	18.8	18.8	18.8
MC35	18.8	18.8	18.8
WC45	18.8	18.8	18.8
WC37	18.7	18.7	18.7
MC33	18.5	18.5	18.5
WC38	18.4 **	18.4	18.4

Nickel (mg/kg, dw)			
Sampling station	Survival	Growth	Reproduction
	⬆	⬆	⬆
WC39	25.6	25.6	25.6
WC17	25.1	25.1	25.1
WC36	23.2	23.2	23.2
WC38	22.1 **	22.1	22.1
WC40	21.9	21.9	21.9
WC37	21.8	21.8	21.8
MC44	21	21	21
WC15	20.3	20.3	20.3
MC47	20.2	20.2	20.2
MC46	20.2	20.2	20.2
WC16	19.9	19.9	19.9
WC21	19.9	19.9	19.9
WC31	19.6	19.6	19.6
WC13	18.9	18.9	18.9
WC42	18.5	18.5	18.5
WC45	18.4	18.4	18.4
WC33	18.4	18.4	18.4
WC18	18.4	18.4	18.4

Silver (mg/kg, dw)			
Sampling station	Survival	Growth	Reproduction
	⬆	⬆	⬆
EC6	0.463	0.463	0.463
EC37	0.413	0.413	0.413
EC5	0.412	0.412	0.412
EC8	0.387	0.387	0.387
EC40	0.364	0.364	0.364
EC35	0.357	0.357	0.357
MC27	0.354	0.354	0.354
EC7	0.338	0.338	0.338
MC42	0.323	0.323	0.323
MC19	0.309	0.309	0.309
EC33	0.306	0.306	0.306
EC41	0.299	0.299	0.299
MC28	0.297	0.297	0.297
WC12	0.295	0.295	0.295
WC15	0.294	0.294	0.294
MC47	0.291	0.291	0.291
WC45	0.287	0.287	0.287
WC19	0.28	0.28	0.28
MC11	0.277	0.277	0.277
MC33	0.275	0.275	0.275
MC12	0.274	0.274	0.274
WC24	0.272	0.272	0.272 **

Zinc (mg/kg, dw)			
Sampling station	Survival	Growth	Reproduction
	⬆	⬆	⬆
MC47	106	106	106
EC6	98.7	98.7	98.7
MC6	97.1	97.1	97.1
EC8	96.3	96.3	96.3
MC41	95	95	95
WC42	93.8	93.8	93.8
MC42	93	93	93
EC5	92.8	92.8	92.8
MC30	91.4	91.4	91.4
EC3	90.5 **	90.5	90.5 **

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[a] Chemical and toxicological data are based on 50 sediment samples collected from each of the Main Canal (MC), Eastern Creek (EC), and Western Creek Complex (WC) on October 22 - 25, 2006 (the only year that this evaluation was conducted). Only those samples required to derive AETs are presented in this table. Toxicological data pertain to chronic (28-day) tests with amphipods (*Leptocheirus plumulosus)* exposed to the same 150 sediment samples.

[b] Data associated with black print and green background identify concentrations of COPC in surface sediment that were not toxic to amphipods, whereas data identified by red print indicate toxic sediment. Sediment was judged to be toxic to amphipods if survival was ≤ 85% (mean control survival = 97.5%) or if growth or reproduction was less than the lower limit of the 60% confidence interval (CI) for the mean response of control amphipods. This latter protocol is a conservative statistical approach for identifying AETs that identifies a greater number of toxic samples than if a more conventional (e. g., 95%) CI was employed.

[c] AETs for each metal and associated measurement endpoints are identified by rectangular borders. The lowest (and most relevant) AET for a metal is identified by double stars (**).

Table 4-20_Sediment effect concentrations summary - amphipods (Leptocheirus plumulosus)

Mercury

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	11.8	21.9	4.9	15.5	19	230	46
Accuracy	70	56	97	61	59		
Reliability Rank	14	11	19	12	12		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	11.3	21.7	4.2	15.4	62	240	47
Accuracy	83	72	124	76	56		
Reliability Rank	16	14	24	15	11		

Survivors Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	21.6	38.1	8.1	21.9	145	240	18
Accuracy	137	134	132	138	131		
Reliability Rank	10	10	10	10	10		

Aroclor 1268

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	19	35	6.5	24.7	44	230	66
Accuracy	110	86	144	97	81		
Reliability Rank	32	25	41	28	23		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	16.0	32	6.2	20.3	64	240	78
Accuracy	113	85	142	97	71		
Reliability Rank	37	28	46	32	23		

Survivors Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	61.0	110	19.4	61	420	240	15
Accuracy	133	131	122	133	133		
Reliability Rank	8	8	8	8	8		

OC-normalized Aroclor 1268

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.0	4.9	1.0	3.3	7.9	80	16
Accuracy	28	22	36	27	21		
Reliability Rank	6	4	7	5	4		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.0	5.2	0.9	3.5	12.3	90	19
Accuracy	38	31	43	37	27		
Reliability Rank	8	7	9	8	6		

Survivors Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	5.0	7.5	1.9	5.6	15.1	90	9
Accuracy	46	46	39	46	45		
Reliability Rank	5	5	4	5	5		

Total Polycyclic Aromatic Hydrocarbons

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.1	5.6	1.4	3.1	12	230	17
Accuracy	47	41	50	47	36		
Reliability Rank	3	3	4	3	3		

Average Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.5	4.4	0.8	2.1	6	240	27
Accuracy	66	60	103	65	56		
Reliability Rank	7	7	12	7	6		

Survivor's Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	2.5	5.1	1.2	2.5	12	240	14
Accuracy	134	133	127	135	135		
Reliability Rank	8	8	7	8	8		

OC-normalized PAHs

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	2.2	4.3	0.9	1.9	2.7	80	3
Accuracy	16	18	19	16	18		
Reliability Rank	1	1	1	1	1		

Average Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	0.6	1.0	0.2	0.6	2.7	90	16
Accuracy	36	30	52	36	26		
Reliability Rank	6	5	9	6	5		

Survivor's Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.0	1.6	0.5	1.0	4.3	90	7
Accuracy	46	44	44	46	44		
Reliability Rank	4	3	3	4	3		

Lead

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	66.3	238	44.8	88.7	177	230	9
Accuracy	40	38	52	39	38		
Reliability Rank	2	1	2	2	1		

Average Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	59.8	196	40.8	88.4	177	240	10
Accuracy	56	53	77	54	53		
Reliability Rank	2	2	3	2	2		

Survivor's Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	87.0	238	52.0	94	419.0	240	7
Accuracy	135	134	136	135	132		
Reliability Rank	4	4	4	4	4		

Accuracy = Number od samples where effect was predicted correctly
Reliability = (# samples in effects data set ÷ total # samples) * Accuracy

Table 4-21_Toxicity test results for grass shrimp (Palaemonetes pugio) for major areas of estuary at the LCP Site (2002 - 2005 data)

Location	Year	Area	DNA Strand Damage	Embryo Development %	Embryo Hatching %	Ovary Maturation %	Survival %
Control	2000	Control	NA	69.3	93	73.3	93
TC-C(S)		Troup Creek Reference	NA	44	84	52	88
CR-C(S)		Crescent River Reference	NA	73	96	73	92
C-16		South Purvis Creek	NA	44	76	61	72
C-33		Domain 3	NA	36	39	76	84
C-5		Main Canal	NA	11	0	20	80
C-7		Eastern Creek	NA	11	0	32	77
MG-B7(C)		Domain 1	NA	48	92	57	93
MG-D9(C)		Domain 1	NA	55	88	63	83
MG-H7(C)		Domain 1	NA	0	0	48	89
MG-K7(C)		Domain 1	NA	0	0	60	76
MG-N2(C)		Domain 1	NA	45	85	64	76
Control	2002	Control	2.2	61	92	85	87
TC-C		Troup Creek Reference	2.1	77	90	85	87
CR-C		Crescent River Reference	2.2	53	88	73	73
C-15		Western Creek Complex	2.1	74	89	93	87
C-45		Domain 4	2.3	25	84	39	40
C-5		Main Canal	4.3	21	61	40	57
C-6		Eastern Creek	3.6	16	50	32	15
C-7		Eastern Creek	3.9	18	77	38	23
D-C		Domain 4	2.3	28	88	57	67
MG-H7(C)		Domain 1	3.8	8	65	36	20
MG-K7(C)		Domain 1	NA	0	0	0	48
Control	2003	Control	1.3	40	93.3	80.3	81.7
TC-C		Troup Creek Reference	2.4	50	82	83	83
CR-C		Crescent River Reference	1.7	29	97	73	87
C-15		Western Creek Complex	1.9	21	87	73	58
C-45		Domain 4	1.7	45	88	78	85
C-5		Main Canal	2.7	28	88	72	85
C-6		Eastern Creek	2.2	32	88	78	72
C-7		Eastern Creek	1.9	30	93	78	77
D-C		Domain 4	1.8	29	87	74	83
MG-H7(C)		Domain 1	3.6	9	35	33	27
MG-K7(C)		Domain 1	2.2	15	87	71	83
Control	2004	Control	2.1	36	87	71	87
TC-C		Troup Creek Reference	2.5	39	73	72	82
CR-C		Crescent River Reference	2	38	93	80	87
C-33		Domain 3	2.6	9	67	78	42
M-AB		Domain 1 Removal Area	1.9	34	85	78	83
C-101		Domain 3	3.0	10	63	76	13
C-105		Blythe Island	2.8	11	65	55	63
C-5		Main Canal	2.2	29	83	54	67
MG-H7(C)		Domain 1	2.2	38	82	76	78
MG-K7(C)		Domain 1	2.3	17	70	70	67
A-C		Domain 4	1.9	26	92	62	52
C-100		Domain 3	2.3	25	83	78	73
C-102		Domain 4	2.3	28	87	56	32
C-104		Blythe Island	2.3	49	85	61	30
C-15		Western Creek Complex	2.1	44	88	59	65
C-45		Domain 4	2.0	29	92	54	47
C-7		Eastern Creek	3.5	3	45	58	27
D-C		Domain 4	2.7	21	72	75	60
C-103		Blythe Island	2.2	29	87	77	28
C-6		Eastern Creek	2.4	33	82	72	40

Location	Year	Area	DNA Strand Damage	Embryo Development %	Embryo Hatching %	Ovary Maturation %	Survival %
Control	2005	Control	1.9	54	91.7	81.3	81.7
TC-C		Troup Creek Reference	2.23	30.7	90	77.3	83.3
CR-C		Crescent River Reference	1.8	56.3	86.7	75.7	76.7
C-5		Main Canal	2.2	29.3	80	66	65
C-36		North Purvis Creek	1.9	38.7	80	79	73.3
C-29		North Purvis Creek	1.9	22	85	63.7	71.7
C-16		South Purvis Creek	2.1	28.3	85	66.7	71.7
C-6		Eastern Creek	1.63	37	83.3	69.3	73.3
C-7		Eastern Creek	3.67	8.7	46.7	50.3	36.7
C-15		Western Creek Complex	2.07	27	85	75.7	76.7
MG-K7(M)		Domain 1	2	31.7	76.7	83.3	81.7
MG-H7(M)		Domain 1	1.87	31.7	88.3	79.7	73.3
C-33		Domain 3	1.7	52.3	90	83.7	83.3
D-C		Domain 4	2	18	85	63.7	56.7
C-45		Domain 4	4.43	12	23.3	21.3	25
C-103		Blythe Island	1.97	34.7	90	60.3	78.3
C-104		Blythe Island	1.7	27.7	86.7	66	71.7
C-105		Blythe Island	2.07	28.3	81.7	68	83.3
C-200		Domain 3	1.8	46.7	86.7	72.3	81.7
C-201		South Turtle River	2.13	28.7	88.3	68	83.3
C-202		North Turtle River	1.67	47.3	83.3	70.7	80
C-203		South Turtle River	1.9	24.7	86.7	63.7	76.7
FS-AREA1		Domain 3	2.23	29	86.7	76.3	83.3
FS-AREA2		Domain 3	1.87	56.3	81.7	75.3	78.3
FS-AREA3		Domain 3	1.9	3.7	8.3	70.3	76.7
FS-AREA4		Main Canal	2.07	37.7	85	68.7	81.7
FS-AREA5		Main Canal	1.7	34	81.7	77.3	76.7
FS-AREA6		Domain 2	1.87	22.3	81.7	66.7	71.7
		Percentage of samples considered toxic:	32%	69%	26%	29%	40%

Notes

NA - Not Analyzed

DNA - deoxyribonucleic acid

Red color indicates toxicity (i.e., significantly different than controls at p=0.5)

Table 4-22_Sediment effect concentrations summary - grass shrimp

Mercury

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.2	10.5	1.4	4.8	11.0	77	26
Accuracy	45	36	51	41	37		
Reliability Rank	15	12	17	14	12		

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	13.5	46.0	3.9	15.4	86.6	77	9
Accuracy	61	59	56	60	57		
Reliability Rank	7	7	7	7	7		

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	13.0	46.0	3.4	17.3	86.6	77	7
Accuracy	57	57	52	56	55		
Reliability Rank	5	5	5	5	5		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	16.4	46.0	4.3	14.8	86.6	77	7
Accuracy	48	47	49	48	45		
Reliability Rank	4	4	4	4	4		

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	10.8	22.0	3.5	8.5	86.6	64	9
Accuracy	49	47	48	49	43		
Reliability Rank	7	7	7	7	6		

Aroclor 1268

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	12.0	20.0	3.2	10.7	41.0	77	19
Accuracy	41	33	46	40	29		
Reliability Rank	10	8	11	10	7		

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	18.6	23.0	5.0	16.6	69.0	77	9
Accuracy	59	57	52	60	60		
Reliability Rank	7	7	6	7	7		

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	18.4	43.5	4.8	25.3	69.0	77	8
Accuracy	55	58	48	56	58		
Reliability Rank	6	6	5	6	6		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	19.0	41.0	5.8	27.9	69.0	77	9
Accuracy	51	50	43	49	49		
Reliability Rank	6	6	5	6	6		

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	19.0	24.0	6.2	16.3	69.0	65	9
Accuracy	49	44	40	48	44		
Reliability Rank	7	6	6	7	6		

OC-normalized Aroclor 1268

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.5	5.2	1.0	2.9	7.9	77	20
Accuracy	41	33	40	42	29		
Reliability Rank	11	9	10	11	8		

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	4.2	7.0	1.3	5.4	15.1	77	9
Accuracy	56	57	52	57	59		
Reliability Rank	7	7	6	7	7		

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.9	7.0	1.2	5.7	15.1	77	9
Accuracy	53	55	47	55	57		
Reliability Rank	6	6	5	6	7		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	4.3	7.5	1.3	5.7	15.1	77	10
Accuracy	48	49	45	48	48		
Reliability Rank	6	6	6	6	6		

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	4.3	7.3	1.4	4.7	15.1	65	9
Accuracy	35	39	31	36	42		
Reliability Rank	5	5	4	5	6		

Table 4-22_(Continued) Sediment Effect Concentrations Summary - Grass Shrimp

Total Polycyclic Aromatic Hydrocarbons

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	4.0	6.1	1.6	4.5	11.5	77	7
Accuracy	26	25	32	25	27		
Reliability Rank	2	2	3	2	2		

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	3.9	6.1	1.6	3.3	11.8	77	5
Accuracy	55	56	53	56	58		
Reliability Rank	4	4	3	4	4		

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	6.1	6.1	2.0	4.6	52.8	77	1
Accuracy	51	51	48	48	55		
Reliability Rank	1	1	1	1	1		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	7.2	11.5	2.1	4.8	52.8	77	3
Accuracy	45	46	45	43	46		
Reliability Rank	2	2	2	2	2		

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	6.6	8.8	2.3	3.9	52.8	65	2
Accuracy	40	41	42	41	42		
Reliability Rank	1	1	1	1	1		

OC-normalized PAHs

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.3	2.5	0.5	1.4	4.3	77	6
Accuracy	27	26	28	27	25		
Reliability Rank	2	2	2	2	2		

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.0	1.6	0.4	0.9	4.3	77	5
Accuracy	56	56	53	57	58		
Reliability Rank	4	4	3	4	4		

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.6	1.6	0.6	1.2	13.7	77	1
Accuracy	50	50	46	49	55		
Reliability Rank	1	1	1	1	1		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.7	2.2	0.6	1.1	13.7	77	3
Accuracy	45	45	45	44	46		
Reliability Rank	2	2	2	2	2		

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1.5	1.6	0.6	0.9	13.7	65	3
Accuracy	42	41	41	42	43		
Reliability Rank	2	2	2	2	2		

Lead

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1190	1190	139	198	419	77	1
Accuracy	25	25	22	23	25		
Reliability Rank	0.3	0.3	0.3	0.3	0.3		

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	1190	1190	174	204	419	77	1
Accuracy	58	58	56	56	58		
Reliability Rank	1	1	1	1	1		

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	NA	NA	NA	NA	1190	77	0
Accuracy	77	77	77	77	55		
Reliability Rank	0	0	0	0	0		

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	NA	NA	NA	NA	1190	77	0
Accuracy	0	0	0	0	46		
Reliability Rank	0	0	0	0	0		

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*	*# samples in effects data set*
SEC Concentration	NA	NA	NA	NA	1190	65	0
Accuracy	65	65	#REF!	65	43		
Reliability Rank	0	0	#REF!	0	0		

Accuracy = Number od sample
Reliability = (# samples in effects data set ÷ total # samples) * Accuracy

Table 4-23_Grass shrimp toxicity - embryo development rate compared to primary chemicals of potential concern (COPCs)

Station	Embryo Development %	Mercury	Aroclor 1268	Total PAHs	Lead
TC-C	77	0.038	0.03	0.060	14.0
C-15	74	1.300	2.80	0.060	32.0
CR-C(S)	73	0.014	0.02	0.080	2.0
CR-C	56.3	0.095	0.01	0.136	12.4
FS-AREA2	56.3	2.170	2.30	5.097	387.0
MG-D9(C)	55	2.280	1.40	0.234	28.0
CR-C	53	0.025	0.19	0.060	12.0
C-33	52.3	0.243	0.01	0.649	419.0
TC-C	50	0.044	0.10	0.061	9.4
C-104	49	0.510	0.67	0.788	23.0
MG-B7(C)	48	6.600	15.00	0.562	28.0
C-202	47.3	0.218	0.21	0.442	17.2
C-200	46.7	4.430	8.20	1.365	154.0
MG-N2(C)	45	12.300	0.63	0.564	29.0
C-45	45	0.620	0.70	0.180	17.0
C-16	44	0.279	0.60	0.107	3.7
TC-C(S)	**44**	**0.052**	**0.04**	**0.810**	**12.0**
C-15	44	1.200	2.80	1.360	28.0
TC-C	39	0.026	0.03	0.468	8.0
C-36	38.7	1.920	3.70	1.189	29.1
CR-C	38	0.010	0.06	0.090	2.2
MG-H7(C)	38	0.820	12.00	4.945	34.0
FS-AREA4	37.7	1.160	7.00	0.561	15.4
C-6	37	86.600	69.00	1.484	42.1
C-33	36	0.079	0.02	0.086	17.0
C-103	34.7	1.990	0.56	0.492	24.2
M-AB	34	2.500	2.10	7.290	15.0
FS-AREA5	34	3.320	12.00	1.394	27.2
C-6	33	11.000	41.00	11.510	27.0
C-6	32	80.000	19.00	0.811	47.0
MG-K7(M)	31.7	5.680	16.00	0.876	29.5
MG-H7(M)	31.7	4.310	36.00	1.296	28.8
TC-C	**30.7**	**0.092**	**0.02**	**0.112**	**16.6**
C-7	30	4.100	3.70	11.782	43.0
C-5	29.3	1.100	4.20	1.067	25.8
CR-C	**29**	**0.010**	**0.10**	**0.084**	**7.5**
D-C	29	0.560	0.87	0.243	22.0
C-5	29	2.100	12.00	2.350	28.0
C-45	29	0.300	0.96	0.625	13.0
C-103	29	0.160	0.18	0.630	3.9
FS-AREA1	29	0.686	1.30	0.490	32.0
C-201	28.7	1.010	0.94	1.166	16.3
C-16	28.3	0.572	3.60	0.274	5.8
C-105	28.3	0.040	0.39	0.565	22.9
D-C	28	0.550	1.20	0.087	18.0
C-5	28	10.000	24.00	2.553	24.0
C-102	28	0.730	0.72	0.612	15.0
C-104	27.7	1.900	0.04	1.647	25.7
C-15	27	2.110	6.80	1.015	25.3
A-C	26	0.790	1.30	0.477	16.0
C-45	25	0.240	1.90	0.140	18.0
C-100	25	3.300	3.60	1.820	23.0

Table 4-23_Grass shrimp toxicity - embryo development rate compared to primary chemicals of potential concern (COPCs)

Station	Embryo Development %	Mercury	Aroclor 1268	Total PAHs	Lead
C-203	24.7	0.880	0.82	0.980	60.1
FS-AREA6	22.3	8.790	5.80	0.608	27.6
C-29	22	1.050	2.20	0.826	25.4
C-5	21	11.000	19.00	1.110	21.0
C-15	21	2.800	0.79	0.446	28.0
D-C	21	0.680	0.88	1.044	27.0
C-7	18	14.000	430.00	0.454	36.0
D-C	18	1.870	3.90	0.794	35.5
MG-K7(C)	17	3.000	10.00	1.684	46.0
C-6	16	48.000	19.00	4.363	20.0
MG-K7(C)	15	22.000	24.00	5.042	26.0
C-45	12	0.245	0.61	0.725	20.3
C-5	11	11.500	3.70	0.270	36.0
C-7	11	30.500	23.00	0.229	38.0
C-105	11	0.200	0.26	0.632	12.0
C-101	10	0.530	0.97	1.067	20.0
MG-H7(C)	9	6.800	2.20	0.222	21.0
C-33	9	0.044	0.03	0.441	8.9
C-7	8.7	80.400	82.00	6.072	52.0
MG-H7(C)	8	62.000	64.00	1.060	29.0
FS-AREA3	3.7	0.760	0.52	52.800	1190.0
C-7	3	18.000	20.00	3.550	29.0
MG-H7(C)	0	4.160	17.00	0.204	50.0
MG-K7(C)	0	3.100	0.33	11.726	47.0
MG-K7(C)	0	46.000	92.00	0.828	27.0

Notes

All concentrations in mg/kg.

Bolded value indicates toxicity at reference station.

PAHs = Polycyclic aromatic hydrocarb	> 3.2	> 12.8	> 4	> 198
Red typeface indicates toxic sample	> 1.4	> 3.3	> 1.6	> 139

Shading indicates likely contribution to toxic effect - Grass shrimp SECs from Table 4-22.

Table 4-24_Reproduction and DNA strand damage of field-collected indigenous grass shrimp (Palemonetes pugio) for major areas and years in estuary at LCP Site (2002 - 2007 data)[a]

A. PERCENT OF EMBRYOS HATCHING

		Replicate			Mean	
Major area -- 2006 mean concentrations of COPC in surface sediment and adult shrimp (mg/kg, dw)	Year	1	2	3	Value (x)	Statistical significance vs. control in same year[b]
Control						
Skidaway River --	2002	90	94	81	88.3	-------
	2003	90	95	90	91.7	-------
	2004	95	80	85	86.7	-------
	2005	94	90	88	90.7	-------
	2006	80	88	85	84.3	-------
	2007	95	80	95	90.0	-------
Grand mean:		-------	-------	-------	88.6	-------
Main Canal (Creek)						
Mouth C-5) --	2002	79	88	90	85.7	ns (P = 0.32)
	2003	75	90	90	85.0	ns (P = 0.16)
2006 Concentrations	2004	80	90	75	81.7	ns (P = 0.23)
Sediment -- tHg7.0; A1268: 31; Pb: 41	2005	83	90	81	84.7	ns (P = 0.075)
Shrimp: tHg -- 0.35; A1268: 0.33; Pb: 0.65	2006	80	85	93	86.0	ns (P = 0.37)
	2007	75	90	80	81.7	ns (P = 0.14)
Domain 1 (Bank of Main Canal)						
Mid-stretch (M-25/NOAA 4) --	2002	63	46	53	54.0	**** (P = 0.0032)**
	2003	85	80	95	86.7	ns (P = 0.19)
2006 Concentrations	2004	65	45	70	60.0	*** (P = 0.026)**
Sediment -- tHg: 0.78; A1268: 1.2; Pb: 21	2005	85	79	77	80.3	*** (P = 0.015)**
Shrimp -- tHg: 0.36; A1268: 0.87; Pb: 0.17	2006	95	75	88	86.0	ns (P = 0.41)
	2007	95	80	95	90.0	ns (P = 0.50)
Eastern Creek						
Upstream (C-6) --	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg: 8.8; A1268: 25; Pb: 32	2005	65	85	83	77.7	ns (P = 0.085)
Shrimp -- tHg: 0.40; A1268: 0.79; Pb: 0.092	2006	83	78	75	78.7	ns (P = 0.050)
	2007	65	80	75	73.3	*** (P = 0.033)**
Western Creek Complex (in Domain 2)						
Mouth (C-15) --	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg: 0.46; A1268: 1.0; Pb: 26	2005	96	85	92	91.0	ns (P = 0.47)
Shrimp -- tHg: 0.23; A1268: 0.24; Pb: 0.15	2006	93	75	90	86.0	ns (P = 0.39)
	2007	80	90	95	88.3	ns (P = 0.41)
Domain 3						
Northern boundary (C-100) --	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg:2.5; A1268: 3.3; Lead: 33	2005	88	96	90	91.3	ns (P = 0.42)
Shrimp -- tHg:0.33; A1268: 0.45; Lead: 0.16	2006	95	78	83	85.3	ns (P = 0.41)
	2007	-------	-------	-------	-------	-------
Domain 4						
Northwestern Inlet from Turtle River (D) --	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg: 1.2; A1268: 0.64 ; Pb: 23	2005	83	88	92	87.7	ns (P = 0.20)
Shrimp -- tHg: 0.14; A1268: 0.12 ; Pb: 0.15	2006	93	83	90	88.7	ns (P = 0.16)
	2007	-------	-------	-------	-------	-------

Table 4-24_ Continued

A. PERCENT OF EMBRYOS HATCHING -- CONTINUED

Major area -- 2006 mean concentrations of COPC in surface sediment and adult shrimp (mg/kg, dw)	Year	Replicate			Mean	
		1	2	3	Value (x)	Statistical significance vs. control in same year[b]
			Blythe Island			
Northern boundary (C-103) --	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg: 0.37; A1268: 0.19; Pb: 27	2005	83	90	94	89.0	ns (P = 0.34)
Shrimp -- tHg: 0.13; A1268: 0.10; Pb: 0.14	2006	78	90	85	84.3	ns (P = 0.50)
	2007	-------	-------	-------	-------	-------
Northeastern boundary (C-104)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg: 0.28; A1268: 0.21; Pb: 17	2005	94	85	83	87.3	ns (P = 0.22)
Shrimp -- tHg: 0.14; A1268: 0.10; Pb: 0.13	2006	95	85	78	86.0	ns (P = 0.39)
	2007	-------	-------	-------	-------	-------
Southern Major area (C-105)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
2006 Concentrations	2004	-------	-------	-------	-------	-------
Sediment -- tHg: 0.40; A1268: 0.34; Pb: 18	2005	94	85	90	89.7	ns (P = 0.38)
Shrimp -- tHg: 0.21; A1268: 0.12; Pb: 0.14	2006	80	98	80	86.0	ns (P = 0.41)
	2007	-------	-------	-------	-------	-------

B. DNA STRAND DAMAGE (TAIL MOMENT) OF EMBRYOS

Major area	Year	Replicate			Mean	
		1	2	3	Value (x)	Statistical significance vs. control in same year[b]
			Control			
Skidaway River	2002	2.4	1.3	2.7	2.13	-------
	2003	2.9	1.1	1.6	1.87	-------
	2004	2.1	2.3	2.7	2.37	-------
	2005	1.4	1.9	2.5	1.93	-------
	2006	2.0	1.8	2.5	2.10	-------
	2007	1.1	2.0	2.3	1.80	-------
			Main Canal (Creek)			
Mouth (C-5)	2002	3.9	2.9	3.1	3.30	*** (P = 0.048)**
	2003	2.2	3.1	1.9	2.40	ns (P = 0.23)
	2004	3.2	2.0	2.1	2.43	ns (P = 0.44)
	2005	2.4	1.9	2.7	2.33	ns (P = 0.19)
	2006	2.1	2.9	2.4	2.47	ns (P = 0.15)
	2007	2.3	1.6	2.7	2.20	ns (P = 0.23)
			Domain 1 (Bank of Main Canal)			
Mid-stretch (M-25/NOAA 4)	2002	5.7	4.6	3.3	4.53	*** (P = 0.026)**
	2003	2.8	1.9	3.1	2.60	ns (P = 0.16)
	2004	4.5	3.4	3.1	3.67	*** (P = 0.038)**
	2005	2.8	3.2	2.3	2.77	ns (P = 0.058)
	2006	3.0	1.9	2.3	2.40	ns (P = 0.24)
	2007	2.4	2.0	2.9	2.43	ns (P = 0.11)

Table 4-24_Continued

B. DNA STRAND DAMAGE (TAIL MOMENT) OF EMBRYOS -- CONTINUED

		Replicate			Mean	
Major area	Year	1	2	3	Value (x)	Statistical significance vs. control in same year[b]
Eastern Creek						
Upstream (C-6)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	1.9	2.2	2.6	2.23	ns (P = 0.23)
	2006	2.2	1.8	2.9	2.30	ns (P = 0.32)
	2007	2.9	2.2	3.1	2.73	ns (P = 0.054)
Western Creek Complex						
Mouth (C-15)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	1.5	2.3	2.5	2.10	ns (P = 0.36)
	2006	1.9	2.7	2.2	2.27	ns (P = 0.31)
	2007	2.9	1.8	2.5	2.40	ns (P = 0.24)
Domain 3						
Northern boundary (C-100)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	1.5	1.9	2.6	2.00	ns (P = 0.44)
	2006	2.0	1.8	2.9	2.23	ns (P = 0.38)
	2007	-------	-------	-------	-------	-------
Domain 4						
Northwestern Inlet from Turtle River (D)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	1.2	2.6	2.2	2.00	ns (P = 0.45)
	2006	2.6	1.7	1.9	2.07	ns (P = 0.46)
	2007	-------	-------	-------	-------	-------
Blythe Island						
Northern boundary (C-103)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	2.2	1.4	2.0	1.87	ns (P = 0.44)
	2006	2.5	1.5	1.9	1.97	ns (P = 0.36)
	2007	-------	-------	-------	-------	-------
Northeastern boundary (C-104)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	2.5	1.3	1.8	1.87	ns (P = 0.45)
	2006	1.8	1.5	2.4	1.90	ns (P = 0.29)
	2007	-------	-------	-------	-------	-------
Southern Major area (C-105)	2002	-------	-------	-------	-------	-------
	2003	-------	-------	-------	-------	-------
	2004	-------	-------	-------	-------	-------
	2005	1.6	2.6	2.0	2.07	ns (P = 0.39)
	2006	1.3	1.9	1.8	1.67	ns (P = 0.098)
	2007	-------	-------	-------	-------	-------

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[a] Each replicate of embryonic grass shrimp pertains to young from a single adult female. Concentrations of COPC in sediment (evaluated in 2006) are based on a single sample, while sample size for body burdens of COPC in adult shrimp approximates about 50 composited male and female individuals.

[b] Statistical significance was determined by nonparametric, unpaired, one-tailed "t' tests. All statistical relationships between control and area values were nonsignificant (ns) except for several values for the Main Canal, the bank of the Main Canal, and Eastern Creek.

Table 4-25_Selected community characteristics of benthic macroinvertebrates in surface sediment at LCP estuary (October 2000 data)[a]

Station		Total No. Taxa	Mean no. of Taxa per Repl.	No. of Taxa per Repl. (Std Dev)	Total No. Individuals	Mean Density (no./m2)	Density (Std Dev)	H' Shannon (log e)	d Diversity (log 2)	1/S Simpson Diversity	J' Pielou Evenness	D Margalef Richness	e Equitability	silt & clay %	Total Organic Carbon %
C5 -	mouth of Main Canal	5	3.3	2.1	30	435	356	1.46	2.10	0.63	0.90	1.18	1.18	90	6.5
C16 -	mouth of Purvis Creek	16	10.0	2.6	125	1,812	594	2.20	3.17	0.95	0.79	3.11	0.80	17	1.0
C7 -	mid-stretch Eastern Creek	14	7.3	3.2	312	4,522	4,703	1.62	2.34	0.71	0.62	2.26	0.50	96	6.7
C33 -	near old oil processing site	9	4.7	2.5	31	449	349	1.95	2.81	0.85	0.89	2.33	1.09	6.6	0.9
CR -	Crescent River	12	6.0	3.5	107	1,551	1,354	1.74	2.50	0.75	0.70	2.35	0.66	8.2	0.33
TC -	Troup Creek	23	11.0	8.5	107	1,551	1,525	2.63	3.80	1.14	0.84	4.71	0.87	44	2.1

Dominant Taxonomic Groups %

	C5	C16	C7	C33	CR	TC
Polychaetes	47	56	56	61	78	67
Oligochaetes	20	24	38	6.5	2	0
Bivalves	3	9	1	6.5	0	2
Gastropods	30	0	1	23	0	0
Arthropods	0	11	2	3	3	28
Cnidaria	0	0	0	0	16	3
Rhynchocoela	0	0	2	0	2	0

[a] - Macrobenthos were collected with a Petite Ponar grab sampler down to a sediment depth of about 15 cm. Three replicate samples were collected at each station and combined for presentation in this table.

Table 4-26_Exposure assumptions for finfish and wildlife evaluated in food-web exposure models for chemicals of potential concern (COPCs) in environmental media of estuary at LCP Site

Modeled predator	Body weight (kg, wt)[a]	Diet[b]	Food ingestion rate (kg,dw/day[c]	Sediment ingestion rate (kg,dw/day)[d]	Water ingestion rate (L/day)[e]	Time-use factor (TUF)	Territory (AUF)[f]
			Fish				
Higher trophic level fish (Age group II)	2.0	40% mummichogs 30% fiddler crabs 30% blue crabs	0.04 -- wet wt (2% of body weight)	0 (not employed in models)	143 (for Aroclor 1268 model only)	1 (year-round resident)	Water depth of 0.3 - 1.2 m (1 - 4 ft)
			Reptiles				
Diamondback terrapin	0.14	90% fiddler crabs 10% mummichogs	0.00059 (0.4% of body weight)	0.000027 (4.6% of food rate)	0 (estimate not available)	1 (year-round resident)	100 m (328 ft) along same small tidal creek
			Birds				
Red-winged blackbird	0.037	90% insects 10% fiddler crabs	0.0086 (23% of body weight)	0.00017 (2% of food rate)	0.0065	1 (year-round resident)	0.07 ha (0.17 acres)
Clapper rail	0.28	85% fiddler crabs 10% insects 5% mummichogs	0.025 (9% of body weight)	0.0025 (10% of food rate)	0.025	1 (year-round resident)	1.2 ha (2.97 acres)
Green heron	0.20	90% mummichogs 5% blue crabs 5% fiddler crabs	0.024 (12% of body weight)	0.00048 (2% of food rate)	0.023	1 (year-round resident)	2.5 ha (6.18 acres)
			Mammals				
Marsh rabbit	1.0	100% cordgrass	0.088 (9% of body weight)	0.0018 (2% of food rate)	0.099	1 (year-round resident)	3.1 ha (7.66 acres)
Raccoon	3.7	45% fiddler crabs 45% blue crabs 10% mummichogs	0.20 (5% of body weight)	0.019 (9.5% of food rate)	0.32	1 (year-round resident)	39 ha (96.37 acres)
River otter	6.7	30% mummichogs 50% silver perch 10% fiddler crabs 10% blue crabs	0.33 (5% of body weight)	0.015 (4.5% of food rate)	0.55	1 (year-round resident)	295 ha (728.94 acres)

[a] Body weights for the raccoon and river otter were derived from U. S. EPA's (1993) wildlife exposure factors handbook. Body weights for other predators were derived from the general scientific literature: red drum (Evans and Engel, 1994), diamondback terrapin (Allen and Littleford, 1955), red-winged blackbird (Orians, 1961), clapper rail (USGS, Undated), green heron (U. Guelph, 2000), and marsh rabbit (U. Michigan, 1999). Whenever available, body weights for adult females (to which most toxicity reference values apply) indigenous to Georgia or the southeastern United States are reported.

[b] Diets of predators are usually representative of diets reported in the general scientific literature, but are limited to food items that were collected in this investigation.

[c] Food ingestion rate of the red drum was derived from Evans and Engel (1994). Food ingestion rates of other predators were derived as functions of wildlife body weights by the allometric equations developed by Nagy (1987). Specific equations employed were -- 1) diamondback terrapin: equation for insectivorous lizards, the only available equation); 2) red-winged blackbird: equation for passerine birds; 3) clapper rail and green heron: equation for "all birds;" 4) marsh rabbit: equation for herbivorous mammals; and 5) raccoon and river otter: equation for "all eutherians."

[d] Sediment ingestion rates of predators were derived as functions of predator food ingestion rates according to the general relationships developed by Beyer et al. (1994).

[e] Water ingestion rates of predators were derived as functions of predator body weights by the allometric equations developed by the U. S. EPA (1993) for birds and mammals.

[f] Territories of predators are based on information presented in Texas Parks and Wildlife (Undated) for red drum; Gibbons *et al.* (2001) for diamondback terrapin; Case and Hewitt (1964) for red-winged blackbird; Zembal *et al.* (1998) for clapper rail; Gibbs and Melvin (1992) for green heron; and U. S. EPA (1993) for marsh rabbit, raccoon, and river otter.

Table 4-27_Toxicity reference values (TRVs) for finfish and wildlife evaluated in food-web exposure models for chemicals of potential concern (COPCs) in environmental media of estuary at LCP Site

Modeled predator	Chemical of potential concern (COPC)	Type of TRV[a]	Reference/comments[a]
Fishes (all sciaenid fishes)	Methylmercury	LOAEL = 0.30	Median highest LOAEL reported for 7 species of mostly freshwater fishes (as reviewed by Dillon, 2006b) (1.2 mg/kg dry weight conversion).
		NOAEL = 0.15	Median highest NOAEL reported for 7 species of mostly freshwater fishes monitored for various toxicological effects (as reviewed by Dillon, 2001) (0.6 mg/kg dry weight conversion).
	PCBs	LOAEL = 1.3	LOAEL value from Matta et al. (2001). (5.2 mg/kg dry weight conversion)
		NOAEL = 0.34	NOAEL value from Matta et al. (2001). (1.36 mg/kg dry weight conversion).
Reptiles (diamond-back terrapin)	Methylmercury	LOAEL = 5	Study of single gavage dose of chemical to juvenile alligators (Peters 1983) interpreted by Sprenger et al. (1997)
		NOAEL = 0.5	LOAEL-to-NOAEL uncertainty factor of 10 applied to alligator LOAEL
	PCBs (Aroclor 1254)	LOAEL = 3.2	Study (3 weeks) of Caspian terrapin metabolism after exposure to Aroclor 1254 (Yawetz et al., 1983) interpreted by Sprenger et al. (1997)
		NOAEL = 0.32	LOAEL-to-NOAEL uncertainty factor of 10 applied to terrapin LOAEL
	Lead	LOAEL = 2.8	Assume LOAEL and NOAEL derived for birds exposed to lead
		NOAEL = 0.28	are applicable to reptiles (Reiser and Temple 1981)
Birds (red-winged blackbird, clapper rail, green heron)	Methylmercury	LOAEL = 0.06	Spalding et al. 2000 growth reduction in great egret.
		NOAEL = 0.02	LOAEL-to-NOAEL uncertainty factor of 3 applied to mallard LOAEL
	Inorganic mercury	LOAEL = 0.90	Chronic study of sexual maturity and reproduction of Japanese
		NOAEL = 0.45	quail fed mecuric chloride (Hill and Schaffner, 1976)
	PCBs (Aroclor 1268)	NOAEL = 1.3	Study (9 weeks) of weight gain, livability, fertility, egg weight, and egg-shell thickness of chickens after exposure to Aroclor 1268 (Lillie et al., 1974; as identified by Huston, 2001)
		LOAEL = 3.9	NOAEL-to-LOAEL adjustment factor of 3 applied to chicken NOAEL
	Lead	LOAEL = 11.3	Chronic study of reproduction in Japanese quail (Eden et al., 1976)
		NOAEL = 3.85	Chronic study of reproduction in American kestrels (Pattee, 1984)
Mammals (marsh rabbit, raccoon, river otter)	Methylmercury	LOAEL = 0.15	Chronic (two-generation) study of mortality
		NOAEL = 0.075	in mink (Dansereau et al., 1999)
	Inorganic mercury	LOAEL = 0.37	Chronic (two-generation) study of fertility and reproduction
		NOAEL = 0.37	of rats fed mecuric chloride (Note NOAEL and LOAEL are the same). (Heath et al., 2009)
	PCBs (Aroclor 1254)	LOAEL = 0.3	Study (297 days) of mink reproduction after exposure
		NOAEL = 0.03	to Aroclor 1254 (Aulerich and Ringer, 1977)
	Lead	LOAEL = 80	Chronic (2-year) study of reproduction
		NOAEL = 8	in rats (Azar et al., 1973)

[a] Acronyms employed in this table are -- NOAEL (no observed adverse effect level), LOAEL (lowest observed adverse effect level). Unit of measurement for reptilian, avian, and mammalian TRVs is mg/kg BW/day. Unit of measurement for fishes TRVs is mg/kg (ww). Dry weight conversion assumes 75% fish moisture content. TRVs for inorganic mercury are not relevant for fishes and were not available for reptiles.

Table 4-28_Hazard quotients (HQs) for finfish based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area		Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value -- TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
				LOAEL	NOAEL	LOAEL	NOAEL
	Evans and Engle (1994) model						
Methyl-mercury (with fish growth)	Troup Creek Reference	95UCL exposure	0.140	0.30	0.15	0.5	0.9
		Mean exposure	0.110	0.30	0.15	0.4	0.7
	LCP Estuary	95UCL exposure	0.980	0.30	0.15	**3.3**	**6.5**
		Mean exposure	0.870	0.30	0.15	**2.9**	**5.8**
Aroclor 1268	***Approach 1 (K_{PW} derived by Clark et al. (1990) procedure***						
	Troup Creek Reference	95UCL exposure	0.139	1.3	0.34	0.1	0.4
		Mean exposure	0.079	1.3	0.34	0.1	0.2
	LCP Estuary	95UCL exposure	0.791	1.3	0.34	0.6	**2.3**
		Mean exposure	0.796	1.3	0.34	0.6	**2.3**
	Approach 2 (K_{PW} derived by Bergen et al. (1993) procedure						
	Troup Creek Reference	95UCL exposure	0.138	1.3	0.34	0.1	0.4
		Mean exposure	0.078	1.3	0.34	0.1	0.2
	LCP Estuary	95UCL exposure	0.763	1.3	0.34	0.6	**2.2**
		Mean exposure	0.714	1.3	0.34	0.5	**2.1**
	Approach 3 (K_{PW} eliminated in favor of direct estimation of C_{WD} (Gobas, 1993)						
	Troup Creek Reference	95UCL exposure	0.146	1.3	0.34	0.1	0.4
		Mean exposure	0.085	1.3	0.34	0.1	0.3
	LCP Estuary	95UCL exposure	1.876	1.3	0.34	**1.4**	**5.5**
		Mean exposure	1.767	1.3	0.34	**1.4**	**5.2**

Notes

[a] **-** Assumptions on which EEEs are based are presented in Appendix H and expressed as mg/kg (wet wt).

[b] **-** TRVs are reviewed in Table 4-27. TRVs for red drum are expressed as mg/kg (wet wt).

[c] **-** HQs greater than 1 are identified in **bold print** in this table.

Table 4-29_Hazard quotients (HQs) for field-collected finfish exposed to methylmercury and Aroclor 1268 in environmental media of estuary at LCP Site (2000 - 2007 data)

Chemical of potential concern (COPC)	Location in study area	Estimated Environmental Exposure -- EEE (mg/kg, dw)[a]	Toxicity Reference Value --TRV (mg/kg, dw)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Silver Perch (*Bairdiella chrysoura*)						
Methylmercury (MeHg = 100% of tHg)	<u>Troup Creek Reference</u>					
	95UCL exposure:	0.33	1.2	0.60	0.28	0.55
	Mean exposure:	0.29	1.2	0.60	0.24	0.48
	<u>Crescent River Reference</u>					
	95UCL exposure:	0.18	1.2	0.60	0.15	0.30
	Mean exposure:	0.16	1.2	0.60	0.13	0.27
	<u>LCP Estuary</u>					
	95UCL exposure:	1.85	1.2	0.60	**1.54**	**3.08**
	Mean exposure:	1.6	1.2	0.60	**1.33**	**2.67**
Aroclor 1268	<u>Troup Creek Reference</u>					
	95UCL exposure:	0.23	5.2	1.36	0.04	0.17
	Mean exposure:	0.19	5.2	1.36	0.04	0.14
	<u>Crescent River Reference</u>					
	95UCL exposure:	0.033	5.2	1.36	0.01	0.02
	Mean exposure:	0.024	5.2	1.36	0.00	0.02
	<u>LCP Estuary</u>					
	95UCL exposure:	7.05	5.2	1.36	**1.36**	**5.18**
	Mean exposure:	5.67	5.2	1.36	**1.09**	**4.17**
Red Drum (*Sciaenops ocellatus*)						
Methylmercury (MeHg = 89% of tHg)	<u>Troup Creek Reference</u>					
	95UCL exposure:	0.13	1.2	0.60	0.11	0.22
	Mean exposure:	0.1	1.2	0.60	0.08	0.17
	<u>Crescent River Reference</u>					
	95UCL exposure:	0.16	1.2	0.60	0.13	0.27
	Mean exposure:	0.16	1.2	0.60	0.13	0.27
	<u>LCP Estuary</u>					
	95UCL exposure:	1.25	1.2	0.60	**1.04**	**2.08**
	Mean exposure:	1.01	1.2	0.60	0.84	**1.68**
Aroclor 1268	<u>Troup Creek Reference</u>					
	95UCL exposure:	0.13	5.2	1.36	0.03	0.10
	Mean exposure:	0.10	5.2	1.36	0.02	0.07
	<u>Crescent River Reference</u>					
	95UCL exposure:	0.016	5.2	1.36	0.00	0.01
	Mean exposure:	0.016	5.2	1.36	0.00	0.01
	<u>LCP Estuary</u>					
	95UCL exposure:	1.87	5.2	1.36	0.36	**1.38**
	Mean exposure:	1.43	5.2	1.36	0.28	**1.05**

Table 4-29_Continued

Chemical of potential concern (COPC)	Location in study area	Estimated Environmental Exposure -- EEE (mg/kg, dw)[a]	Toxicity Reference Value --TRV (mg/kg, dw)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Black Drum (*Pogonias cromis*)						
Methyl-mercury (MeHg = 91% of tHg)	Troup Creek Reference					
	95UCL exposure:	0.11	1.2	0.60	0.09	0.18
	Mean exposure:	0.10	1.2	0.60	0.08	0.17
	Crescent River Reference					
	95UCL exposure:	0.05	1.2	0.60	0.04	0.08
	Mean exposure:	0.04	1.2	0.60	0.03	0.07
	LCP Estuary					
	95UCL exposure:	0.87	1.2	0.60	0.73	**1.45**
	Mean exposure:	0.76	1.2	0.60	0.63	**1.27**
Aroclor 1268	Troup Creek Reference					
	95UCL exposure:	0.12	5.2	1.36	0.02	0.09
	Mean exposure:	0.10	5.2	1.36	0.02	0.07
	Crescent River Reference					
	95UCL exposure:	0.017	5.2	1.36	0.00	0.01
	Mean exposure:	0.017	5.2	1.36	0.00	0.01
	LCP Estuary					
	95UCL exposure:	6.45	5.2	1.36	**1.24**	**4.74**
	Mean exposure:	5.51	5.2	1.36	**1.06**	**4.05**
Spotted Seatrout (*Cynoscion nebulosus*)						
Methyl-mercury (MeHg = 100% of tHg)	Troup Creek Reference					
	95UCL exposure:	0.38	1.2	0.60	0.32	0.63
	Mean exposure:	0.34	1.2	0.60	0.28	0.57
	Crescent River Reference					
	95UCL exposure:	0.13	1.2	0.60	0.11	0.22
	Mean exposure:	0.11	1.2	0.60	0.09	0.18
	LCP Estuary					
	95UCL exposure:	2.65	1.2	0.60	**2.21**	**4.42**
	Mean exposure:	2.27	1.2	0.60	**1.89**	**3.78**
Aroclor 1268	Troup Creek Reference					
	95UCL exposure:	0.21	5.2	1.36	0.04	0.15
	Mean exposure:	0.16	5.2	1.36	0.03	0.12
	Crescent River Reference					
	95UCL exposure:	0.016	5.2	1.36	0.00	0.01
	Mean exposure:	0.016	5.2	1.36	0.00	0.01
	LCP Estuary					
	95UCL exposure:	5.91	5.2	1.36	**1.14**	**4.35**
	Mean exposure:	4.92	5.2	1.36	0.95	**3.62**

Table 4-29_Continued

Chemical of potential concern (COPC)	Location in study area	Estimated Environmental Exposure -- EEE (mg/kg, dw)[a]	Toxicity Reference Value -- TRV (mg/kg, ww)[b] LOAEL	Toxicity Reference Value -- TRV (mg/kg, ww)[b] NOAEL	Hazard Quotient -- HQ (EEE / TRV)[c] LOAEL	Hazard Quotient -- HQ (EEE / TRV)[c] NOAEL
Striped Mullet (*Mugil cephalus*)						
Methyl-mercury (MeHg = 37% of tHg)	Troup Creek Reference					
	95UCL exposure:	0.03	1.2	0.60	0.03	0.05
	Mean exposure:	0.02	1.2	0.60	0.02	0.03
	Crescent River Reference					
	95UCL exposure:	0.011	1.2	0.60	0.01	0.02
	Mean exposure:	0.008	1.2	0.60	0.01	0.01
	LCP Estuary					
	95UCL exposure:	0.10	1.2	0.60	0.08	0.17
	Mean exposure:	0.09	1.2	0.60	0.08	0.15
Aroclor 1268	Troup Creek Reference					
	95UCL exposure:	0.250	5.2	1.36	0.05	0.18
	Mean exposure:	0.18	5.2	1.36	0.03	0.13
	Crescent River Reference					
	95UCL exposure:	0.016	5.2	1.36	0.00	0.01
	Mean exposure:	0.016	5.2	1.36	0.00	0.01
	LCP Estuary					
	95UCL exposure:	21.0	5.2	1.36	**4.04**	**15.46**
	Mean exposure:	13.2	5.2	1.36	**2.54**	**9.71**

[a] EEEs (body burdens) of methylmercury and Aroclor 1268 in finfish derived from 2000-2007. Assumes fish are 25% solids. Body burdens of methylmercury are based on values of total mercury presented in Table 4-11a.

[b] TRVs are reviewed in Table 4-27.

[c] HQs greater than 1 are identified in **bold print** in this table.

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Diamondback terrapin (*Malaclemys terrapin*)						
Methylmercury	Troup Creek Reference	0.00017	5	0.5	0.00003	0.0003
	Main Canal	0.0019	5	0.5	0.0004	0.004
	Eastern Creek	0.0029	5	0.5	0.0006	0.006
	Western Creek Complex	0.00093	5	0.5	0.0002	0.002
	Purvis Creek	0.00045	5	0.5	0.0001	0.001
	Domain 1	0.0032	5	0.5	0.001	0.006
	Domain 2	0.00093	5	0.5	0.0002	0.002
	Domain 3	0.00090	5	0.5	0.0002	0.002
	Domain 4	0.00071	5	0.5	0.0001	0.001
	Blythe Island	0.00061	5	0.5	0.0001	0.001
	Area A	0.0028	5	0.5	0.0006	0.006
Aroclor 1268 (TRVs are for Aroclor 1254	Troup Creek Reference	0.0016	3.2	0.32	0.0005	0.005
	Main Canal	0.023	3.2	0.32	0.007	0.07
	Eastern Creek	0.026	3.2	0.32	0.008	0.08
	Western Creek Complex	0.006	3.2	0.32	0.0019	0.019
	Purvis Creek	0.0052	3.2	0.32	0.002	0.02
	Domain 1	0.014	3.2	0.32	0.004	0.04
	Domain 2	0.0063	3.2	0.32	0.002	0.02
	Domain 3	0.0053	3.2	0.32	0.002	0.02
	Domain 4	0.0035	3.2	0.32	0.001	0.01
	Blythe Island	0.0013	3.2	0.32	0.0004	0.004
	Area A	0.0209	3.2	0.32	0.0065	0.065
Lead	Troup Creek Reference	0.0082	2.8	0.28	0.003	0.03
	Main Canal	0.013	2.8	0.28	0.005	0.05
	Eastern Creek	0.037	2.8	0.28	0.013	0.13
	Western Creek Complex	0.009	2.8	0.28	0.003	0.03
	Purvis Creek	0.009	2.8	0.28	0.003	0.03
	Domain 1	0.050	2.8	0.28	0.02	0.18
	Domain 2	0.015	2.8	0.28	0.005	0.05
	Domain 3	0.051	2.8	0.28	0.02	0.18
	Domain 4	0.007	2.8	0.28	0.003	0.03
	Blythe Island	0.006	2.8	0.28	0.002	0.02
	Area A	0.036	2.8	0.28	0.013	0.13

Notes

[a] - Assumptions on which EEEs are based are presented in Table 29. All EEEs are base on the 95UCL concentrations as presented in Appendix H.

[b] - TRVs are reviewed in Table 4-28. TRVs used as surrogates for Aroclor 1268 in diamondback terrapins and mammals pertain to Aroclor 1254.

[c] - HQs greater than 1 are identified in **bold print** in this table.
Area A is defined as the Main Canal + Eastern Creek + Domain 1.

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Red-Winged Blackbird (*Agelaius phoeniceus*)						
Methylmercury	Troup Creek Reference	0.0046	0.06	0.02	0.08	0.23
	Domain 1	0.020	0.06	0.02	0.33	**1.00**
	Domain 2	0.0087	0.06	0.02	0.14	0.43
	Domain 3	0.0084	0.06	0.02	0.14	0.42
	Domain 4	0.0076	0.06	0.02	0.13	0.38
	Blythe Island	0.0071	0.06	0.02	0.12	0.36
	Main Canal	0.013	0.06	0.02	0.22	0.67
	Eastern Creek	0.017	0.06	0.02	0.29	0.86
	Western Creek Complex	0.0087	0.06	0.02	0.14	0.43
	Purvis Creek	0.0060	0.06	0.02	0.10	0.30
	Area A	0.0170	0.06	0.02	0.28	0.85
Inorganic Mercury	Troup Creek Reference	0.0046	0.90	0.45	0.005	0.01
	Domain 1	0.064	0.90	0.45	0.07	0.14
	Domain 2	0.033	0.90	0.45	0.04	0.07
	Domain 3	0.016	0.90	0.45	0.02	0.04
	Domain 4	0.010	0.90	0.45	0.01	0.02
	Blythe Island	0.0071	0.90	0.45	0.01	0.02
	Main Canal	0.048	0.90	0.45	0.05	0.11
	Eastern Creek	0.125	0.90	0.45	0.14	0.28
	Western Creek Complex	0.021	0.90	0.45	0.02	0.05
	Purvis Creek	0.012	0.90	0.45	0.01	0.03
	Area A	0.075	0.90	0.45	0.08	0.17
Aroclor 1268	Troup Creek Reference	0.013	3.9	1.3	0.00	0.01
	Domain 1	0.169	3.9	1.3	0.04	0.13
	Domain 2	0.054	3.9	1.3	0.01	0.04
	Domain 3	0.035	3.9	1.3	0.01	0.03
	Domain 4	0.027	3.9	1.3	0.01	0.02
	Blythe Island	0.0105	3.9	1.3	0.00	0.01
	Main Canal	0.27	3.9	1.3	0.07	0.21
	Eastern Creek	0.37	3.9	1.3	0.09	0.28
	Western Creek Complex	0.048	3.9	1.3	0.01	0.04
	Purvis Creek	0.050	3.9	1.3	0.01	0.04
	Area A	0.25	3.9	1.3	0.06	0.19
Lead	Troup Creek Reference	0.118	11.3	3.85	0.01	0.03
	Domain 1	0.44	11.3	3.85	0.04	0.12
	Domain 2	0.31	11.3	3.85	0.03	0.08
	Domain 3	0.69	11.3	3.85	0.06	0.18
	Domain 4	0.12	11.3	3.85	0.01	0.03
	Blythe Island	0.101	11.3	3.85	0.01	0.03
	Main Canal	0.17	11.3	3.85	0.02	0.05
	Eastern Creek	0.37	11.3	3.85	0.03	0.10
	Western Creek Complex	0.16	11.3	3.85	0.01	0.04
	Purvis Creek	0.14	11.3	3.85	0.01	0.04
	Area A	0.34	11.3	3.85	0.03	0.09

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Clapper Rail (*Rallus longirostris*)						
Methylmercury	Troup Creek Reference	0.0032	0.06	0.02	0.05	0.16
	Domain 1	0.059	0.06	0.02	0.99	**2.96**
	Domain 2	0.018	0.06	0.02	0.29	0.88
	Domain 3	0.017	0.06	0.02	0.28	0.84
	Domain 4	0.014	0.06	0.02	0.23	0.68
	Blythe Island	0.012	0.06	0.02	0.19	0.58
	Main Canal	0.035	0.06	0.02	0.58	**1.74**
	Eastern Creek	0.052	0.06	0.02	0.86	**2.59**
	Western Creek Complex	0.018	0.06	0.02	0.29	0.88
	Purvis Creek	0.0084	0.06	0.02	0.14	0.42
	Area A	0.0499	0.06	0.02	0.83	**2.49**
Inorganic mercury	Troup Creek Reference	0.0023	0.90	0.45	0.003	0.01
	Domain 1	0.128	0.90	0.45	0.14	0.29
	Domain 2	0.060	0.90	0.45	0.07	0.13
	Domain 3	0.027	0.90	0.45	0.03	0.06
	Domain 4	0.016	0.90	0.45	0.02	0.03
	Blythe Island	0.009	0.90	0.45	0.01	0.02
	Main Canal	0.093	0.90	0.45	0.10	0.21
	Eastern Creek	0.245	0.90	0.45	0.27	0.54
	Western Creek Complex	0.037	0.90	0.45	0.04	0.08
	Purvis Creek	0.017	0.90	0.45	0.02	0.04
	Area A	0.147	0.90	0.45	0.16	0.33
Aroclor 1268	Troup Creek Reference	0.031	3.9	1.3	0.008	0.02
	Domain 1	0.43	3.9	1.3	0.11	0.33
	Domain 2	0.14	3.9	1.3	0.04	0.11
	Domain 3	0.105	3.9	1.3	0.03	0.08
	Domain 4	0.072	3.9	1.3	0.02	0.06
	Blythe Island	0.025	3.9	1.3	0.01	0.02
	Main Canal	0.64	3.9	1.3	0.16	0.49
	Eastern Creek	0.82	3.9	1.3	0.21	0.63
	Western Creek Complex	0.13	3.9	1.3	0.03	0.10
	Purvis Creek	0.13	3.9	1.3	0.03	0.10
	Area A	0.596	3.9	1.3	0.15	0.46
Lead	Troup Creek Reference	0.16	11.3	3.85	0.01	0.04
	Domain 1	1.28	11.3	3.85	0.11	0.33
	Domain 2	0.23	11.3	3.85	0.02	0.06
	Domain 3	0.87	11.3	3.85	0.08	0.23
	Domain 4	0.13	11.3	3.85	0.01	0.03
	Blythe Island	0.11	11.3	3.85	0.01	0.03
	Main Canal	0.27	11.3	3.85	0.02	0.07
	Eastern Creek	0.93	11.3	3.85	0.08	0.24
	Western Creek Complex	0.15	11.3	3.85	0.01	0.04
	Purvis Creek	0.18	11.3	3.85	0.02	0.05
	Area A	0.91	11.3	3.85	0.08	0.24

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Green Heron (*Butorides striatus*)						
Methylmercury	Troup Creek Reference	0.012	0.06	0.02	0.20	0.61
	Domain 1	0.166	0.06	0.02	**2.77**	**8.30**
	Domain 2	0.047	0.06	0.02	0.78	**2.33**
	Domain 3	0.0497	0.06	0.02	0.83	**2.48**
	Domain 4	0.035	0.06	0.02	0.59	**1.77**
	Blythe Island	0.028	0.06	0.02	0.46	**1.39**
	Main Canal	0.089	0.06	0.02	**1.48**	**4.44**
	Eastern Creek	0.21	0.06	0.02	**3.53**	**10.6**
	Western Creek Complex	0.047	0.06	0.02	0.78	**2.33**
	Purvis Creek	0.035	0.06	0.02	0.58	**1.75**
	Area A	0.17	0.06	0.02	**2.76**	**8.27**
Inorganic mercury	Troup Creek Reference	0.002	0.90	0.45	0.002	0.004
	Domain 1	0.046	0.90	0.45	0.05	0.10
	Domain 2	0.019	0.90	0.45	0.02	0.04
	Domain 3	0.010	0.90	0.45	0.01	0.02
	Domain 4	0.005	0.90	0.45	0.01	0.01
	Blythe Island	0.003	0.90	0.45	0.003	0.01
	Main Canal	0.031	0.90	0.45	0.034	0.07
	Eastern Creek	0.083	0.90	0.45	0.093	0.19
	Western Creek Complex	0.013	0.90	0.45	0.014	0.03
	Purvis Creek	0.006	0.90	0.45	0.007	0.01
	Area A	0.053	0.90	0.45	0.058	0.12
Aroclor 1268	Troup Creek Reference	0.028	3.9	1.3	0.007	0.02
	Domain 1	0.78	3.9	1.3	0.20	0.60
	Domain 2	0.26	3.9	1.3	0.07	0.20
	Domain 3	0.38	3.9	1.3	0.10	0.29
	Domain 4	0.15	3.9	1.3	0.04	0.12
	Blythe Island	0.104	3.9	1.3	0.03	0.08
	Main Canal	0.68	3.9	1.3	0.17	0.52
	Eastern Creek	0.97	3.9	1.3	0.25	0.75
	Western Creek Complex	0.26	3.9	1.3	0.07	0.20
	Purvis Creek	0.16	3.9	1.3	0.04	0.12
	Area A	0.82	3.9	1.3	0.21	0.63
Lead	Troup Creek Reference	0.23	11.3	3.85	0.02	0.06
	Domain 1	0.25	11.3	3.85	0.02	0.07
	Domain 2	0.298	11.3	3.85	0.03	0.08
	Domain 3	3.66	11.3	3.85	0.32	0.95
	Domain 4	0.14	11.3	3.85	0.01	0.04
	Blythe Island	0.086	11.3	3.85	0.01	0.02
	Main Canal	0.14	11.3	3.85	0.01	0.04
	Eastern Creek	0.25	11.3	3.85	0.02	0.06
	Western Creek Complex	0.22	11.3	3.85	0.02	0.06
	Purvis Creek	0.14	11.3	3.85	0.01	0.04
	Area A	0.22	11.3	3.85	0.02	0.06

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Marsh Rabbit (*Sylvilagus palustris*)						
Methylmercury	Troup Creek Reference	0.000054	0.15	0.075	0.0004	0.001
	Domain 1	0.0019	0.15	0.075	0.0126	0.025
	Domain 2	0.0008	0.15	0.075	0.005	0.011
	Domain 3	0.0004	0.15	0.075	0.003	0.005
	Domain 4	0.0003	0.15	0.075	0.002	0.004
	Blythe Island	0.00026	0.15	0.075	0.002	0.003
	Main Canal	0.0066	0.15	0.075	0.044	0.089
	Eastern Creek	0.0013	0.15	0.075	0.009	0.017
	Western Creek Complex	0.0008	0.15	0.075	0.005	0.010
	Purvis Creek	0.00022	0.15	0.075	0.001	0.003
	Area A	0.0013	0.15	0.075	0.009	0.017
Inorganic Mercury	Troup Creek Reference	0.00067	0.37	0.37	0.002	0.00
	Domain 1	0.038	0.37	0.37	0.10	0.10
	Domain 2	0.018	0.37	0.37	0.05	0.05
	Domain 3	0.0075	0.37	0.37	0.02	0.02
	Domain 4	0.0046	0.37	0.37	0.01	0.01
	Blythe Island	0.0031	0.37	0.37	0.01	0.01
	Main Canal	0.076	0.37	0.37	0.21	0.21
	Eastern Creek	0.057	0.37	0.37	0.15	0.15
	Western Creek Complex	0.013	0.37	0.37	0.04	0.04
	Purvis Creek	0.0047	0.37	0.37	0.01	0.01
	Area A	0.037	0.37	0.37	0.10	0.10
Aroclor 1268 (TRVs are for Aroclor 1254	Troup Creek Reference	0.018	0.3	0.03	0.06	0.60
	Domain 1	0.0904	0.3	0.03	0.30	**3.01**
	Domain 2	0.027	0.3	0.03	0.09	0.88
	Domain 3	0.015	0.3	0.03	0.05	0.48
	Domain 4	0.016	0.3	0.03	0.05	0.53
	Blythe Island	0.0039	0.3	0.03	0.01	0.13
	Main Canal	0.096	0.3	0.03	0.32	**3.20**
	Eastern Creek	0.14	0.3	0.03	0.48	**4.82**
	Western Creek Complex	0.024	0.3	0.03	0.08	0.81
	Purvis Creek	0.028	0.3	0.03	0.09	0.94
	Area A	0.099	0.3	0.03	0.33	**3.31**
Lead	Troup Creek Reference	0.23	80	8	0.003	0.028
	Domain 1	0.33	80	8	0.004	0.04
	Domain 2	0.35	80	8	0.004	0.04
	Domain 3	0.69	80	8	0.009	0.09
	Domain 4	0.32	80	8	0.004	0.04
	Blythe Island	0.17	80	8	0.002	0.02
	Main Canal	0.42	80	8	0.005	0.05
	Eastern Creek	0.34	80	8	0.004	0.04
	Western Creek Complex	0.295	80	8	0.004	0.04
	Purvis Creek	0.31	80	8	0.004	0.04
	Area A	0.32	80	8	0.004	0.04

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
Raccoon (*Procyon lotor*)						
Methylmercury	Troup Creek Reference	0.0018	0.15	0.075	0.01	0.02
	Domain 1	0.0203	0.15	0.075	0.14	0.27
	Domain 2	0.015	0.15	0.075	0.10	0.20
	Domain 3	0.015	0.15	0.075	0.10	0.20
	Domain 4	0.015	0.15	0.075	0.10	0.19
	Blythe Island	0.014	0.15	0.075	0.10	0.19
	Main Canal	0.017	0.15	0.075	0.11	0.23
	Eastern Creek	0.0201	0.15	0.075	0.13	0.27
	Western Creek Complex	0.015	0.15	0.075	0.10	0.20
	Purvis Creek	0.014	0.15	0.075	0.09	0.19
	Area A	0.019	0.15	0.075	0.13	0.26
Inorganic Mercury	Troup Creek Reference	0.00032	0.5	0.05	0.00	0.01
	Domain 1	0.0204	0.37	0.37	0.06	0.06
	Domain 2	0.0098	0.37	0.37	0.03	0.03
	Domain 3	0.0041	0.37	0.37	0.01	0.01
	Domain 4	0.0023	0.37	0.37	0.01	0.01
	Blythe Island	0.0011	0.37	0.37	0.00	0.00
	Main Canal	0.015	0.37	0.37	0.04	0.04
	Eastern Creek	0.041	0.37	0.37	0.11	0.11
	Western Creek Complex	0.0059	0.37	0.37	0.02	0.02
	Purvis Creek	0.0027	0.37	0.37	0.01	0.01
	Area A	0.024	0.37	0.37	0.06	0.06
Aroclor 1268 (TRVs are for Aroclor 1254	Troup Creek Reference	0.0054	0.3	0.03	0.02	0.18
	Domain 1	0.078	0.3	0.03	0.26	**2.61**
	Domain 2	0.033	0.3	0.03	0.11	**1.11**
	Domain 3	0.029	0.3	0.03	0.10	0.97
	Domain 4	0.023	0.3	0.03	0.08	0.77
	Blythe Island	0.017	0.3	0.03	0.06	0.57
	Main Canal	0.11	0.3	0.03	0.37	**3.67**
	Eastern Creek	0.146	0.3	0.03	0.49	**4.87**
	Western Creek Complex	0.031	0.3	0.03	0.10	**1.05**
	Purvis Creek	0.031	0.3	0.03	0.10	**1.02**
	Area A	0.106	0.3	0.03	0.35	**3.53**
Lead	Troup Creek Reference	0.071	80	8	0.001	0.009
	Domain 1	0.15	80	8	0.002	0.02
	Domain 2	0.11	80	8	0.001	0.01
	Domain 3	0.29	80	8	0.004	0.04
	Domain 4	0.049	80	8	0.001	0.01
	Blythe Island	0.041	80	8	0.001	0.005
	Main Canal	0.066	80	8	0.001	0.008
	Eastern Creek	0.13	80	8	0.002	0.02
	Western Creek Complex	0.061	80	8	0.001	0.008
	Purvis Creek	0.053	80	8	0.001	0.007
	Area A	0.12	80	8	0.001	0.01

Table 4-30_Hazard quotients (HQs) for wildlife at LCP estuary based on exposure models (2000-2007 data)

Chemical of Potential Concern (COPC)	Location in Study Area	Estimated Environmental Exposure -- EEE (mg/kg BW/day)[a]	Toxicity Reference Value --TRV (mg/kg BW/day)[b]		Hazard Quotient -- HQ (EEE / TRV)[c]	
			LOAEL	NOAEL	LOAEL	NOAEL
River Otter (*Lutra canadensis*)						
Methylmercury	Troup Creek Reference	0.0061	0.15	0.075	0.04	0.08
	Main Canal	0.00013	0.15	0.075	0.001	0.002
	Eastern Creek	0.00051	0.15	0.075	0.003	0.007
	Western Creek Complex	0.00018	0.15	0.075	0.001	0.002
	Purvis Creek	0.0046	0.15	0.075	0.03	0.06
	Domain 1	0.00235	0.15	0.075	0.02	0.03
	Domain 2	0.01082	0.15	0.075	0.07	0.14
	Domain 3	0.0127	0.15	0.075	0.08	0.17
	Domain 4	0.0333	0.15	0.075	0.22	0.44
	Blythe Island	0.0326	0.15	0.075	0.22	0.43
	Area A	0.0086	0.15	0.075	0.06	0.11
Inorganic mercury	Troup Creek Reference	0.00491	0.37	0.37	0.013	0.013
	Main Canal	0.00013	0.37	0.37	0.0004	0.0004
	Eastern Creek	0.00064	0.37	0.37	0.002	0.002
	Western Creek Complex	0.00016	0.37	0.37	0.0004	0.0004
	Purvis Creek	0.00396	0.37	0.37	0.01	0.01
	Domain 1	0.00226	0.37	0.37	0.006	0.006
	Domain 2	0.01075	0.37	0.37	0.03	0.03
	Domain 3	0.01082	0.37	0.37	0.03	0.03
	Domain 4	0.02773	0.37	0.37	0.07	0.07
	Blythe Island	0.0268	0.37	0.37	0.07	0.07
	Area A	0.0009	0.37	0.37	0.00	0.00
Aroclor 1268 (TRVs are for Aroclor 1254	Troup Creek Reference	0.0071	0.3	0.03	0.02	0.24
	Main Canal	0.00073	0.3	0.03	0.002	0.02
	Eastern Creek	0.00027	0.3	0.03	0.001	0.01
	Western Creek Complex	0.00069	0.3	0.03	0.002	0.02
	Purvis Creek	0.01737	0.3	0.03	0.058	0.58
	Domain 1	0.01027	0.3	0.03	0.034	0.34
	Domain 2	0.04164	0.3	0.03	0.139	**1.39**
	Domain 3	0.05056	0.3	0.03	0.169	**1.69**
	Domain 4	0.11827	0.3	0.03	0.394	**3.94**
	Blythe Island	0.11232	0.3	0.03	0.374	**3.74**
	Area A	0.00419	0.3	0.03	0.014	0.14
Lead	Troup Creek Reference	0.05574	80	8	0.001	0.01
	Main Canal	0.00020	80	8	0.000003	0.00003
	Eastern Creek	0.0010	80	8	0.00001	0.0001
	Western Creek Complex	0.00032	80	8	0.000004	0.00004
	Purvis Creek	0.00681	80	8	0.00009	0.0009
	Domain 1	0.00523	80	8	0.00007	0.0007
	Domain 2	0.03258	80	8	0.0004	0.004
	Domain 3	0.1649	80	8	0.002	0.02
	Domain 4	0.04683	80	8	0.0006	0.006
	Blythe Island	0.03782	80	8	0.0005	0.005
	Area A	0.00158	80	8	0.00002	0.0002

Table 7-1_Sampling stations comprising fiddler crab polygons

5-NOAA-G	6-NOAA-G	7-NOAA-G	9-NOAA-G	M-25	M-100	M-104	M-108	M-204	TC
Fiddler Crab Sampling Stations									
5-NOAA-G -04	6-NOAA-G -04	7-NOAA-G -04	9-NOAA-G -04	M-25 -00	M-100 -04	M-104 -04	M-108 -04	M-204 -05	TC-C -02
5-NOAA-G -05	6-NOAA-G -05	7-NOAA-G -05	9-NOAA-G -05	M-25 -02	M-100 -05	M-104 -05	M-108 -05	M-204 -06	TC-C -05
5-NOAA-G -06		8-NOAA-G -04	8-NOAA-G -04	M-25 -03	M-100 -06	M-104 -06	M-108 -06		TC-M -03
5-NOAA-G -07		8-NOAA-G -05	8-NOAA-G -05	M-25 -04	M-103 -04	M-101 -04			TC-M -04
M-102 -04		8-NOAA-G -06	8-NOAA-G -06	M-25 -04	M-103 -05	M-104 -05			TC-M -06
M-102 -05		8-NOAA-G -07	8-NOAA-G -07	M-25 -05	M-103 -06				TC-M -07
			7-NOAA-G -04	M-25 -06					
			7-NOAA-G -05	M-25 -07					
			6-NOAA-G -04						
			6-NOAA-G -05						
Sediment Sampling Stations									
5-NOAA-G -04	6-NOAA-G -04	7-NOAA-G -04	9-NOAA-G -04	M-25 -00	M-100 -04	M-104 -04	M-108 -04	M-204 -05	TC-C -02
5-NOAA-G -05	6NOAA-G -05	7-NOAA-G -05	9-NOAA-G -05	M-25 -02	M-100 -05	M-104 -05	M-108 -05	M-204 -06	TC-C -03
5-NOAA-G -06	6-NOAA-G -06	7-NOAA-G -05	9-NOAA-G -06	M-25 -03	M-100 -06	M-104 -06	M-108 -06	C-34 -00	TC-C -04
5-NOAA-G -07	6-NOAA-G -07	7-NOAA-G -05	9-NOAA-G -07	M-25 -04	M-103 -04	M-101 -04	C-104 -04	C-34 -05	TC-C -05
C-4 -00	SD2M-3 -04	8-NOAA-G -04	8-NOAA-G -04	M-25 -05	M-103 -05	M-104 -05	C-104 -05	C-34 -06	TC-C -06
C-4 -02	SD2M-5 -04	8-NOAA-G -05	8-NOAA-G -05	M-25 -06	M-103 -06	A-C -02	C-104 -06	C-34 -07	TC-C -07
C-4 -03	SD2M-16 -04	8-NOAA-G -06	8-NOAA-G -06	M-25 -07	M-44 -00	A-C -03	SD5M-5 -04	C-200 -05	TC-C(S) -00
C-4 -04		8-NOAA-G -07	8-NOAA-G -07	SD-19 -03	M-44 -05	A-C -04	SD5M-12 -04	C-204 -05	TC-M -02
C-5 -00		C-12 -00	7-NOAA-G -04	SD-20 -03	C-14 -00	A-M -02	SD5M-27 -04	M-41 -00	TC-M -03
C-5 -02		C-12 -05	7-NOAA-G -05	SD-21 -03	C-14 -05	A-M -03		M-41 -05	TC-M -04
C-5 -03		C-13 -00	7-NOAA-G -05	SDMC-AET-47 -06	C-36 -00	A-M -04		M-41 -06	TC-M -05
C-5 -04		C-13 -02	7-NOAA-G -05	SDMC-AET-48 -06	C-36 -05	C-32 -00		FS-AREA1 05	TC-M -06
C-5 -05		C-13 -03	6-NOAA-G -04	SDMC-AET-49 -06	C-36 -06	C-32 -05		FS-AREA1 06	TC-M -07
C-5 -06		C-13 -04	6NOAA-G -05	SDMC-AET-50 -06	SD3M-12 -04	C-101 -04		FS-AREA1 07	TC-M(S) -00
C-5 -07		C-13 -05	6-NOAA-G -06		SD3M-15 -04	M-39 -00			
M-26 -00		C-14 -00	6-NOAA-G -07		SD3M-21 -04	M-46 -00			
M-102 -04		C-14 -05	C-12 -00		SD4M-12 -04	M-46 -02			
M-102 -05		M-27 -00	C-12 -05		SD4M-33 -05	M-46 -03			
SD-01 -03		M-27 -02	C-13 -00		SD-UPC-C8 -05	M-46 -04			
SD-02 -03		M-27 -03	C-13 -02		SD-UPC-C9 -05	SD3M-14 -04			
SD-03 -03		M-27 -04	C-13 -03		SD-UPC-C10 -05	SD3M-16 -04			
SD-04 -03		SD2C-6 -04	C-13 -04		SD-UPC-C11 -05	SD3M-22 -04			
SD-05 -03		SD2C-7 -04	C-13 -05		SD-UPC-C12 -05	SD3M-25 -04			
SD-06 -03		SD2C-9 -04	C-15 -00		SD-UPC-C13 -05	SD4M-49 -05			
SD3M-2 -04		SD2C-10 -04	C-15 -02			SD-UPC-C2 -05			
SDMC-AET-1 -06		SD2C-11 -04	C-15 -03			SD-UPC-C3 -05			
SDMC-AET-2 -06		SD2C-12 -04	C-15 -03			SD-UPC-C4 -05			
SDMC-AET-3 -06		SD2C-19 -04	C-15 -04			SD-UPC-C5 -05			
SDMC-AET-4 -06		SD2C-6 -04	C-15 -05						
SDMC-AET-5 -06		SD2C-6 -04	C-15 -06						
SDMC-AET-6 -06		SD2C-6 -04	C-15 -07						
SDMC-AET-7 -06		SD2C-6 -04	M-27 -00						
SDMC-AET-8 -06		SD2M-1 -04	M-27 -02						
SDMC-AET-9 -06		SD2M-2 -04	M-27 -03						
SDMC-AET-10 -06		SD2M-12 -04	M-27 -04						

Table 7-1_Sampling stations comprising fiddler crab polygons

5-NOAA-G	6-NOAA-G	7-NOAA-G	9-NOAA-G	M-25	M-100	M-104	M-108	M-204	TC
Sediment Sampling Stations (Cont'd.)									
		SDWC-AET-7 -06	SD2C-6 -04						
		SDWC-AET-8 -06	SD2C-7 -04						
		SDWC-AET-9 -06	SD2C-8 -04						
		SDWC-AET-10 -06	SD2M-2 -04						
		SDWC-AET-11 -06	SD2M-3 -04						
		SDWC-AET-12 -06	SD2M-5 -04						
		SDWC-AET-13 -06	SD2M-16 -04						
		SDWC-AET-14 -06	SDWC-AET-6 -06						
		SDWC-AET-15 -06	SDWC-AET-7 -06						
		SDWC-AET-16 -06	SDWC-AET-8 -06						
		SDWC-AET-17 -06	SDWC-AET-9 -06						
		SDWC-AET-18 -06	SDWC-AET-10 -06						
		SDWC-AET-19 -06							
		SDWC-AET-20 -06							
		SDWC-AET-21 -06							

Table 7-2_Fiddler crab BAF data

All concentrations in mg/kg dw

	Mercury		*A-1268*		*Lead*	
	Sediment	***Tissue***	***Sediment***	***Tissue***	***Sediment***	***Tissue***
5-NOAA-G	3.20	0.29	9.64	1.57	25.79	0.59
6-NOAA-G	0.65	0.24	1.14	0.36	22.19	0.49
7-NOAA-G	1.90	0.28	3.24	0.61	27.09	0.53
9-NOAA-G	1.37	0.25	1.73	0.69	24.85	0.50
M-25	5.83	0.57	13.92	2.87	21.29	1.45
M-100	1.83	0.25	3.28	1.04	23.26	0.47
M-104	1.29	0.26	2.37	0.42	21.20	0.46
M-108	0.49	0.22	0.26	0.19	18.42	0.43
M-204	2.88	0.32	2.90	0.68	67.90	0.68
TC	0.08	0.05	0.05	0.23	17.64	0.66

	% TOC	***% Lipids***
5-NOAA-G	4.3	2.5
6-NOAA-G	5.8	3.6
7-NOAA-G	5.3	3.9
9-NOAA-G	5.1	1.4
M-25	2.9	4.2
M-100	3.9	4.0
M-104	4.8	2.5
M-108	5.8	2.8
M-204	4.6	2.5
TC	3.5	2.0

Table 7-3_ Sampling stations comprising mummichog polygons

C-5	*C-6*	*C-9*	*C-13*	*C-39*	*C-45*	*C-100*	*C-102*	*C-103*	*C-204*	*C-C*	*D-C*	*T-C*
Mummichog Sampling Stations												
C-5 -02	C-6 -00	C-9 -00	C-13 -00	C-39 -05	C-45 -02	C-100 -04	C-102 -04	C-103 -04	C-204 -05	C-C -02	D-C -05	TC-C -00
C-5 -03	C-6 -02	C-9 -02	C-13 -02	C-39 -06	C-45 -03	C-100 -05	C-102 -05	C-103 -05	C-200 -05	C-C -03	D-C -06	TC-C -02
C-5 -04	C-6 -03	C-9 -03	C-13 -03	C-39 -07	C-45 -04	C-100 -06		C-103 -06		C-C -04		TC-C -03
C-5 -05	C-6 -04	C-9 -04	C-13 -04	C-33 -00	C-45 -05			C-104 -04		C-C -05		TC-C -04
C-5 -06	C-6 -05	C-9 -05	C-13 -05	C-33 -02				C-104 -05		C-C -06		TC-C -05
C-5 -07	C-6 -06	C-9 -06		C-33 -03				C-104 -06				TC-C -06
	C-6 -07	C-9 -07		C-33 -04								TC-C -07
				C-33 -05								
				C-33 -06								
				C-33 -07								
				C-34 -06								
				C-34 -07								
Sediment Sampling Stations												
C-5 -00	C-6 -00	C-9 -00	C-13 -00	C-39 -05	C-45 -00	C-100 -04	C-102 -04	C-103 -04	C-204 -05	C-C -02	D-C -02	TC-C -02
C-5 -02	C-6 -02	C-9 -02	C-13 -02	C-39 -06	C-45 -02	C-100 -05	C-102 -05	C-103 -05	C-34 -00	C-C -03	D-C -03	TC-C -03
C-5 -03	C-6 -03	C-9 -03	C-13 -03	C-39 -07	C-45 -03	C-100 -06	C-102 -06	C-103 -06	C-34 -05	C-C -04	D-C -04	TC-C -04
C-5 -04	C-6 -04	C-9 -04	C-13 -04	C-30 -00	C-45 -04	M-44 -04	M-103 -04	C-104 -04	C-34 -06	C-C -05	D-C -05	TC-C -05
C-5 -05	C-6 -05	C-9 -05	C-13 -05	C-30 -05	C-45 -05	M-44 -05	M-103 -05	C-104 -05	C-34 -07	C-C -06	D-C -06	TC-C -06
C-5 -06	C-6 -06	C-9 -06	C-12 -00	C-30 -06	C-45 -06	M-100 -04	M-103 -06	C-104 -06	C-200 -05	C-M -02	D-M -02	TC-C -07
C-5 -07	C-6 -07	C-9 -07	C-12 -05	C-31 -00	M-44 -00	M-100 -05	SD4M-3 -04	M-108 -04	M-41 -00	C-M -03	D-M -03	TC-C(S) -00
C-4 -00	M-20 -00	C-3 -00	C-14 -00	C-31 -02	M-105 -04	M-100 -06	SD4M-9 -04	M-108 -05	M-41 -05	C-M -04	D-M -04	TC-M -02
C-4 -02	M-20 -05	C-3 -02	C-14 -05	C-31 -03	M-105 -05	SD3M-6 -04	SD4M-12 -04	M-108 -06	M-41 -06	M-105 -04	SD4M-2 -04	TC-M -03
C-4 -03	M-21 -00	C-3 -03	C-15 -00	C-31 -04	SD2M-19 -04	SD3M-12 -04	SD4M-18 -04	SD5M-1 -04	M-204 -05	M-105 -05	SD4M-5 -04	TC-M -04
C-4 -04	M-21 -02	C-3 -04	C-15 -02	C-31 -05	SD4M-1 -04	SD3M-15 -04	SD4M-27 -05	SD5M-3 -04	M-204 -06	SD4M-10 -04	SD4M-8 -04	TC-M -05
M-26 -00	M-21 -03	M-25 -00	C-15 -03	C-31 -06	SD4M-5 -04	SD3M-18 -04	SD4M-28 -05	SD5M-4 -04	FS-AREA1 -05	SD4M-44 -05	SD4M-10 -04	TC-M -06
SD-01 -03	M-21 -04	M-25 -02	C-15 -04	C-31 -07	SD4M-19 -04	SD3M-21 -04	SD4M-29 -05	SD5M-9 -04	FS-AREA1 -06	SD4M-45 -05	SD4M-17 -04	TC-M -07
SD-02 -03	MG-K7-C -00	M-25 -03	C-15 -05	C-33 -00	SD4M-45 -05	SD4M-33 -05	SD4M-31 -05	SD5M-13 -04	FS-AREA1 -07	SD4M-46 -05	SD4M-36 -05	TC-M(S) -00
SD-03 -03	MG-K7-C -02	M-25 -04	C-15 -06	C-33 -02	SD4M-47 -05	SD-UPC-C8 -05	SD4M-32 -05	SD5M-16 -04			SD4M-37 -05	
SD-04 -03	MG-K7-C -03	M-25 -05	C-15 -07	C-33 -03	SD-LPC-C2 -05	SD-UPC-C9 -05		SD5M-17 -04			SD4M-38 -05	
SD-05 -03	MG-K7-C -04	M-25 -06	M-27 -00	C-33 -04	SD-LPC-C3 -05	SD-UPC-C10 -05		SD5M-21 -04			SD4M-39 -04	
SD-06 -03	MG-K7-M -00	M-25 -07	M-27 -02	C-33 -05	SD-LPC-C4 -05	SD-UPC-C11 -05		SD5M-25 -04			SD4M-40 -05	
SD-07 -03	MG-K7-M -05	MG-B7-C -00	M-27 -03	C-33 -06	SD-LPC-C5 -05	SD-UPC-C12 -05		SD5M-29 -04			SD4M-42 -05	
SD-08 -03	MG-K7-M -06	MG-B7-C -02	M-27 -04	C-33 -07	SD-LPC-C6 -05	SD-UPC-C13 -05					SD4M-43 -05	
SD-09 -03	SE-10 -03	MG-B7-C -03	6-NOAA-G -04	C-34 -00	SD-LPC-C7 -05	SD-UPC-C14 -05					SD4M-44 -05	
SD-10 -03	SE-11 -03	MG-B7-C -04	6-NOAA-G -05	C-34 -05	SD-LPC-C8 -05	SD-UPC-C15 -05					SD4M-50 -05	
SD-11 -03	SE-12 -03	MG-B7-M -00	6-NOAA-G -06	C-34 -06	SD-LPC-C9 -05	SD-UPC-C16 -05						
SD-12 -03	SE-13 -03	MG-B7-M -05	6-NOAA-G -07	C-34 -07	SD-LPC-C10 -05	SD-UPC-C17 -05						
SDMC-AET-1 -06	SE-14 -03	MG-B7-M -06	7-NOAA-G -04	M-37 -00	SD-LPC-C11 -05							
SDMC-AET-2 -06	SE-15 -03	MG-D9-C -00	7-NOAA-G -05	M-37 -05								
SDMC-AET-3 -06	SE-16 -03	MG-D9-C -02	7-NOAA-G -06	M-37 -06								
SDMC-AET-4 -06	SE-17 -03	MG-D9-C -03	7-NOAA-G -07	M-37 -07								
SDMC-AET-5 -06	SE-18 -03	MG-D9-C -04	8-NOAA-G -04	M-38 -00								
SDMC-AET-6 -06	SE-19 -03	MG-D9-M -00	8-NOAA-G -05	M-38 -05								
SDMC-AET-7 -06	SDEC-AET-2 -06	MG-D9-M -05	8-NOAA-G -06	M-40 -00								
SDMC-AET-8 -06	SDEC-AET-3 -06	MG-D9-M -06	8-NOAA-G -07	M-41 -00								
SDMC-AET-9 -06	SDEC-AET-4 -06	SD-15 -03	9-NOAA-G -04	M-41 -05								
SDMC-AET-10 -06	SDEC-AET-5 -06	SD-16 -03	9-NOAA-G -05	M-41 -06								
SDMC-AET-11-06	SDEC-AET-6 -06	SD-17 -03	9-NOAA-G -06	M-200 -05								
SDMC-AET-12-06	SDEC-AET-7 -06	SD-18 -03	9-NOAA-G -07	SD3M-3 -04								
SDMC-AET-13-06	SDEC-AET-8 -06	SD19 -03	SD2C-6 -04	SD3M-5 -04								

Table 7-4_Bioaccumulation factors for finfish - area weighted method

If it is assumed that the source of all mercury and A-1268 in finfish is from the LCP estuary creek sediment (regardless of how the fish acquired the chemical through the food web), then fish body burden is ultimately related to the sediment source.

Area	*% Total Area*	*Average Hg Sed.Conc.*	*Sed. Hg Contribution*		*Avg A-1268 Sed. Conc.*	*Sed. A-1268 Contribution*	
Main Canal	2	7.4	0.148		27.64	0.553	
Eastern Creek	7	20.28	1.420		49.57	3.470	
Western Creek Complex	4	2.75	0.110		3.18	0.127	
Purvis Creek	87	1.22	1.061		3.78	3.289	
Area Weighted Estuary Sediment Concentration			2.74	mg/kg dw		7.44	mg/kg dw

Measured mean wholebody from estuary

Concentrations	*Mercury*	*A-1268*
Red Drum	1.14	1.43
Black Drum	0.84	5.51
Silver Perch	1.60	5.67
Spotted Seatrout	2.27	4.92
Striped Mullet	0.23	13.2

BAFs		
Red Drum	**0.416**	**0.192**
Black Drum	**0.307**	**0.741**
Silver Perch	**0.584**	**0.762**
Spotted Seatrout	**0.829**	**0.661**
Striped Mullet	**0.084**	**1.775**

Table 7-5_Data for bioaccumulation factors for finfish

Black Drum

	Mercury		*A-1268*	
	Sediment	*Tissue*	*Sediment*	*Tissue*
2003	0.44	0.61	0.6	2.88
2004	1.81	1.74	9.36	5.32
2005	1.32	0.86	4.24	7.77
2006	0.61	0.54	1.1	4.81
2007	0.59	0.87	1.1	5.33
2002	0.62	0.41	3.05	7.31
2000	1.04	0.925	0.63	4.15
2005 TC-C	0.145	0.097	0.053	0.106
2006 TC-C	0.082	0.114	0.028	0.089
2005 CR-C	0.095	0.045	0.012	0.017

Red Drum

	Mercury		*A-1268*	
	Sediment	*Tissue*	*Sediment*	*Tissue*
2003	0.44	0.674	0.6	1.02
2004	1.81	2.24	9.36	1.55
2005	1.32	0.622	4.24	0.69
2006	0.61	1.026	1.1	3.51
2007	0.59	1.686	1.1	2.505
2002	0.62	0.812	3.05	1.15
2005 TC-C	0.145	0.509	0.053	0.122
2007 TC-C	0.10	0.163	0.047	0.082
2005 CR-C	0.095	0.182	0.012	0.016

Silver Perch

	Mercury		*A-1268*	
	Sediment	*Tissue*	*Sediment*	*Tissue*
2003	0.44	1.61	0.6	3.83
2004	1.81	2.59	9.36	7.14
2005	1.32	0.83	4.24	2.81
2006	0.61	1.5	1.1	3.65
2007	0.59	1.52	1.1	3.31
2002	0.62	1.12	3.05	16.04
2000	1.04	2.12	0.63	2.91
2005 TC-C	0.145	0.321	0.053	0.152
2006 TC-C	0.082	0.298	0.028	0.147
2007 TC-C	0.10	0.375	0.047	0.125
2005 CR-C	0.095	0.161	0.012	0.024

Spotted Seatrout

	Mercury		*A-1268*	
	Sediment	*Tissue*	*Sediment*	*Tissue*
2003	0.44	1.43	0.6	3.66
2004	1.81	4.02	9.36	7.15
2005	1.32	2.83	4.24	6.55
2006	0.61	1.71	1.1	2.85
2007	0.59	2.95	1.1	4.0
2002	0.62	0.9	3.05	5.81
2000	1.04	0.64	0.63	0.99
2005 TC-C	0.145	0.348	0.053	0.19
2006 TC-C	0.082	0.306	0.028	0.179
2007 TC-C	0.10	0.391	0.047	0.079
2005 CR-C	0.095	0.108	0.012	0.016

Striped Mullet

	Mercury		*A-1268*	
	Sediment	*Tissue*	*Sediment*	*Tissue*
2004	1.81	0.21	9.36	18.51
2005	1.32	0.3	4.24	12.06
2006	0.61	0.21	1.1	9.32
2007	0.59	0.16	1.1	12.45
2005 TC-C	0.145	0.081	0.053	0.058
2006 TC-C	0.082	0.026	0.028	0.315
2007 TC-C	0.10	0.019	0.047	0.216
2005 CR-C	0.095	0.021	0.012	0.016

Table 7-6_Bioaccumulation factors for biota
LCP Chemical, Brunswick, GA

	Total Mercury in Sediment to Total Mercury in Biota					Aroclor-1268 in Sediment to Aroclor-1268 in Biota				
Receptor	a	b	R^2	Curve Fit Type	Source	a	b	R^2	Curve Fit Type	Source
Cordgrass	Not Evaluated					0.022	0.0000		Linear	Figure 7-20
Fiddler Crabs	0.2187	0.4733	0.8725	Power	Figure 7-2	0.1995	0.0000	0.9167	Linear	Figure 7-3
Blue Crabs	1.303	0.0000		Linear	Figure 7-9	0.426	0.0000		Linear	Figure 7-8
Mummichogs	0.2348	0.4706	0.8840	Power	Figure 7-7	1.2188	0.4918	0.8117	Power	Figure 7-6
BAFs formed from Plots of Data Aggregated by Years										
Silver Perch	1.6511	0.7371	0.7917	Power	Figure 7-15	2.4556	0.8834	0.8876	Power	Figure 7-14
Red Drum	1.2095	0.7002	0.7205	Power	Figure 7-11	0.7748	0.6803	0.7492	Power	Figure 7-10
Black Drum	0.9084	1.0323	0.8967	Power	Figure 7-13	2.5436	0.9589	0.8972	Power	Figure 7-12
Spotted Seatrout	1.9818	0.8641	0.7301	Power	Figure 7-17	2.1172	0.8997	0.9130	Power	Figure 7-16
Striped Mullet	0.2144	0.8472	0.8657	Power	Figure 7-19	3.9936	1.0458	0.8887	Power	Figure 7-18
Area-Weighted BAFs										
Receptor	BAF				Source	BAF				Source
Silver Perch	0.584				Table 7-4	0.762				Table 7-4
Red Drum	0.416				Table 7-4	0.192				Table 7-4
Black Drum	0.307				Table 7-4	0.741				Table 7-4
Spotted Seatrout	0.829				Table 7-4	0.661				Table 7-4
Striped Mullet	0.084				Table 7-4	1.775				Table 7-4

Curve Fite Type:

Linear	$y = a x + b$
Logarithmic (Log)	$y = a \ln(x) + b$
Power	$y = a x^b$

Table 7-7_Key parameters for wildlife food chain models
LCP Chemical, Brunswick, GA

Receptor	Food Ingestion Rate kg dry wt/day	Body Weight kg wet weight	Sediment Ingestion Rate kg dry w/d	Water Ingestion Rate L/day	Dietary Fraction Blue Crabs	Dietary Fraction Cordgrass	Dietary Fraction Fiddler Crabs	Dietary Fraction Mummi-chogs	Dietary Fraction Silver Perch	Area Use Factor Unitless
Clapper rail	0.025	0.28	0.0025	0.025	0.0	0.0	0.95	0.05	0.0	1.0
Green Heron	0.024	0.2	0.00048	0.023	0.05	0.0	0.05	0.9	0.0	1.0
Marsh rabbit	0.088	1.0	0.0018	0.099	0.0	1.0	0.0	0.0	0.0	1.0
Raccoon	0.20	3.7	0.019	0.32	0.45	0.0	0.45	0.1	0.0	0.3
River otter	0.33	6.7	0.015	0.55	0.1	0.0	0.1	0.3	0.5	1.0

The Area Use Factor for the river otter was based on the original area of the site that did not include Domain 4. The value of 0.66 was calculated by dividing 480 acres by 728 acres (Appendix H Table H-7 home range for river otter).
However, we have now changed the area of the site to 790 acres.
Therefore the area use factor for the river otter was adjusted to 1.

Table 7-8_Toxicity reference values for receptors
LCP Chemical, Brunswick, GA

Parameter	Avian[1]		Mammal[1]		Fish[2]			
	NOAEL, mg/kg-BW/day	LOAEL, mg/kg-BW/day	NOAEL, mg/kg-BW/day	LOAEL, mg/kg-BW/day	NOAEL, mg/kg		LOAEL, mg/kg	
					wet weight	dry weight	wet weight	dry weight
Methyl mercury	0.02	0.06	0.075	0.15	0.15	0.6	0.3	1.2
Aroclor-1268	1.3	3.9	0.03	0.3	0.34	1.36	1.3	5.2

[1] Values in mg/kgBW/day

[2] The fish TRVs are the same as reported earlier in Table 30 but are converted to mg/kg dry weight for use in the determination of protective concentrations assuming 75% body water.

Table 7-9_Average methylmercury contents in sediment and biota

Item	Average Percentage Methylmercury
Sediment	0.75%
Cordgrass	10%
Fiddler Crabs	68%
Blue Crabs	100%
Mummichogs	92%
Silver Perch	100%
Red Drum	89%
Black Drum	91%
Spotted Seatruot	100%
Striped Mullet	37%

Table 7-10_Determination of protective sediment concentrations for marsh rabbit - Aroclor 1268
LCP Chemical, Brunswick, GA

		Cordgrass						
Sediment Concentration mg/kg	Sediment Ingestion Rate kg/day	Predicted Concentration, mg/kg, dry[1]	Fraction of Diet[2]	Food Ingestion Rate kg/day	Body Weight kg	Total Dose mg/kg/day	Aroclor 1268 NOAEL mg/kg/day[3]	Hazard Quotient
5	0.0018	0.11	1.0	0.088	1.0	0.0185	0.03	0.62
7	0.0018	0.15	1.0	0.088	1.0	0.0259	0.03	0.86
8	0.0018	0.18	1.0	0.088	1.0	0.0296	0.03	0.99
10	0.0018	0.22	1.0	0.088	1.0	0.0370	0.03	1.23
14	0.0018	0.31	1.0	0.088	1.0	0.0517	0.03	1.7
16	0.0018	0.35	1.0	0.088	1.0	0.0591	0.03	2.0

		Cordgrass						
Sediment Concentration mg/kg	Sediment Ingestion Rate kg/day	Predicted Concentration, mg/kg, dry[1]	Fraction of Diet[2]	Food Ingestion Rate kg/day	Body Weight kg	Total Dose mg/kg/day	Aroclor 1268 LOAEL mg/kg/day[3]	Hazard Quotient
50	0.0018	1.10	1.0	0.088	1.0	0.185	0.3	0.62
60	0.0018	1.32	1.0	0.088	1.0	0.222	0.3	0.74
70	0.0018	1.54	1.0	0.088	1.0	0.259	0.3	0.86
80	0.0018	1.76	1.0	0.088	1.0	0.296	0.3	0.99
100	0.0018	2.20	1.0	0.088	1.0	0.370	0.3	1.2
160	0.0018	3.52	1.0	0.088	1.0	0.591	0.3	2.0

Footnotes:

1 Predicted concentrations in prey reflected bioaccumulation relationships in Table 7-6.

2 Dietary fractions and other food-chain model assumptions were drawn from parameter values on Table 7-7.

3 Toxicity reference values are provided in Table 7-8.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-11_Determination of protective sediment concentrations for clapper rail - mercury
LCP Chemical, Brunswick, GA

			Fiddler Crabs			Mummichogs							
Total Mercury Sediment Concentration mg/kg	Methyl-mercury Sediment Concentration mg/kg[1]	Sediment Ingestion Rate kg/day	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methylmercury Concentration, mg/kg	Fraction of Diet[3]	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methylmercury Concentration, mg/kg	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Total Dose mg kg^{-1} day^{1}	Methyl Mercury NOAEL mg/kg/day[4]	Hazard Quotient
1	0.008	0.0025	0.22	0.15	0.95	0.23	0.22	0.05	0.025	0.28	0.0136	0.02	0.68
2	0.015	0.0025	0.30	0.21	0.95	0.33	0.30	0.05	0.025	0.28	0.0190	0.02	0.95
2.2	0.017	0.0025	0.32	0.22	0.95	0.34	0.31	0.05	0.025	0.28	0.0199	0.02	0.99
3	0.023	0.0025	0.37	0.25	0.95	0.39	0.36	0.05	0.025	0.28	0.0230	0.02	1.15
5	0.038	0.0025	0.47	0.32	0.95	0.50	0.46	0.05	0.025	0.28	0.0294	0.02	1.47
8	0.060	0.0025	0.59	0.40	0.95	0.62	0.57	0.05	0.025	0.28	0.0369	0.02	1.84

			Fiddler Crabs			Mummichogs							
Total Mercury Sediment Concentration mg/kg	Methyl-mercury Sediment Concentration mg/kg[1]	Sediment Ingestion Rate kg/day	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methylmercury Concentration, mg/kg	Fraction of Diet[3]	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methylmercury Concentration, mg/kg	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Total Dose mg kg^{-1} day^{1}	Methyl Mercury LOAEL mg/kg/day[4]	Hazard Quotient
10	0.075	0.0025	0.65	0.44	0.95	0.69	0.64	0.05	0.025	0.28	0.0410	0.06	0.68
15	0.113	0.0025	0.79	0.54	0.95	0.84	0.77	0.05	0.025	0.28	0.0499	0.06	0.83
20	0.150	0.0025	0.90	0.61	0.95	0.96	0.88	0.05	0.025	0.28	0.0574	0.06	0.96
21.8	0.164	0.0025	0.94	0.64	0.95	1.00	0.92	0.05	0.025	0.28	0.0598	0.06	0.997
25	0.188	0.0025	1.00	0.68	0.95	1.07	0.98	0.05	0.025	0.28	0.0639	0.06	1.1
30	0.225	0.0025	1.09	0.74	0.95	1.16	1.07	0.05	0.025	0.28	0.0699	0.06	1.2

Footnotes:

1 Proportions of methyl mercury in sediments and various tissues are provided in Table 7-9.

2 Predicted concentrations in prey reflected bioaccumulation relationships in Table 7-6.

3 Dietary fractions and other food-chain model assumptions were drawn from parameter values on Table 7-7.

4 Toxicity reference values are provided in Table 7-8.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-12_Determination of protective sediment concentrations for raccoon - Aroclor 1268
LCP Chemical, Brunswick, GA

		Fiddler Crabs		Blue Crabs		Mummichogs							
Sediment Concentration mg/kg	Sediment Ingestion Rate kg/day	Predicted Concentration, mg/kg, dry[1]	Fraction of Diet[2]	Predicted Concentration, mg/kg, dry	Fraction of Diet	Predicted Concentration, mg/kg, dry	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Area Use Factor	Total Dose mg kg^{-1} day ^{1}	Aroclor 1268 NOAEL mg/kg/day[3]	Hazard Quotient
1.0	0.019	0.2	0.45	0.43	0.45	1.2	0.1	0.20	3.7	0.3	0.0081	0.03	0.27
3.0	0.019	0.6	0.45	1.28	0.45	2.1	0.1	0.2	3.7	0.3	0.0217	0.03	0.72
4.25	0.019	0.8	0.45	1.81	0.45	2.5	0.1	0.2	3.7	0.3	0.0299	0.03	0.997
5.0	0.019	1.0	0.45	2.13	0.45	2.7	0.1	0.2	3.7	0.3	0.0348	0.03	1.2
7.0	0.019	1.4	0.45	2.98	0.45	3.2	0.1	0.2	3.7	0.3	0.0478	0.03	1.6
10.0	0.019	2.0	0.45	4.26	0.45	3.8	0.1	0.2	3.7	0.3	0.0670	0.03	2.2

		Fiddler Crabs		Blue Crabs		Mummichogs							
Sediment Concentration mg/kg	Sediment Ingestion Rate kg/day	Predicted Concentration, mg/kg, dry[1]	Fraction of Diet[2]	Predicted Concentration, mg/kg, dry	Fraction of Diet	Predicted Concentration, mg/kg, dry	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Area Use Factor	Total Dose mg kg^{-1} day ^{1}	Aroclor 1268 LOAEL mg/kg/day[3]	Hazard Quotient
10	0.019	2.0	0.45	4.26	0.45	3.8	0.1	0.2	3.7	0.3	0.067	0.3	0.22
40	0.019	8.0	0.45	17.04	0.45	7.5	0.1	0.2	3.7	0.3	0.256	0.3	0.85
47	0.019	9.4	0.45	20.02	0.45	8.1	0.1	0.2	3.7	0.3	0.299	0.3	0.998
50	0.019	10.0	0.45	21.30	0.45	8.3	0.1	0.2	3.7	0.3	0.318	0.3	1.1
80	0.019	16.0	0.45	34.08	0.45	10.5	0.1	0.2	3.7	0.3	0.504	0.3	1.7
100	0.019	20.0	0.45	42.60	0.45	11.7	0.1	0.2	3.7	0.3	0.628	0.3	2.1

Footnotes:

1 Predicted concentrations in prey reflected bioaccumulation relationships in Table 7-6.

2 Dietary fractions and other food-chain model assumptions were drawn from parameter values on Table 7-7.

3 Toxicity reference values are provided in Table 7-8.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-13_ Determination of protective sediment concentrations for green heron - mercury
LCP Chemical, Brunswick, GA

			Fiddler Crabs			Blue Crabs			Mummichogs							
Sediment Concentration mg/kg	Methyl-mercury Sediment Concentration mg/kg[1]	Sediment Ingestion Rate kg/day	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg[1]	Fraction of Diet[3]	Predicted Total Mercury Concentration, mg/kg, dry2	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet	Predicted Total Mercury Concentration, mg/kg, dry2	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Total Dose mg kg^{-1} day^{-1}	Methyl Mercury NOAEL mg/kg/day[4]	Hazard Quotient
0.3	0.0023	0.00048	0.12	0.08	0.05	0.4	0.4	0.05	0.13	0.12	0.9	0.024	0.2	0.0161	0.02	0.80
0.4	0.0030	0.00048	0.14	0.10	0.05	0.5	0.5	0.05	0.15	0.14	0.9	0.024	0.2	0.0189	0.02	0.94
0.44	0.0033	0.00048	0.15	0.10	0.05	0.6	0.6	0.05	0.16	0.15	0.9	0.024	0.2	0.0199	0.02	0.995
0.6	0.0045	0.00048	0.17	0.12	0.05	0.8	0.8	0.05	0.18	0.17	0.9	0.024	0.2	0.0237	0.02	1.19
0.8	0.0060	0.00048	0.20	0.13	0.05	1.0	1.0	0.05	0.21	0.19	0.9	0.024	0.2	0.0281	0.02	1.4
1	0.0075	0.00048	0.22	0.15	0.05	1.3	1.3	0.05	0.23	0.22	0.9	0.024	0.2	0.0321	0.02	1.6

			Fiddler Crabs			Blue Crabs			Mummichogs							
Sediment Concentration mg/kg	Methyl-mercury Sediment Concentration mg/kg[1]	Sediment Ingestion Rate kg/day	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg[1]	Fraction of Diet[3]	Predicted Total Mercury Concentration, mg/kg, dry2	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet	Predicted Total Mercury Concentration, mg/kg, dry2	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Total Dose mg kg^{-1} day^{-1}	Methyl Mercury LOAEL mg/kg/day[4]	Hazard Quotient
1	0.0075	0.00048	0.22	0.15	0.05	1.3	1.3	0.05	0.23	0.22	0.9	0.024	0.2	0.0321	0.06	0.53
2	0.0150	0.00048	0.30	0.21	0.05	2.6	2.6	0.05	0.33	0.30	0.9	0.024	0.2	0.0492	0.06	0.82
2.70	0.0203	0.00048	0.35	0.24	0.05	3.5	3.5	0.05	0.37	0.34	0.9	0.024	0.2	0.0598	0.06	0.997
4	0.0300	0.00048	0.42	0.29	0.05	5.2	5.2	0.05	0.45	0.41	0.9	0.024	0.2	0.0779	0.06	1.3
5	0.0375	0.00048	0.47	0.32	0.05	6.5	6.5	0.05	0.50	0.46	0.9	0.024	0.2	0.0908	0.06	1.5
6	0.0450	0.00048	0.51	0.35	0.05	7.8	7.8	0.05	0.55	0.50	0.9	0.024	0.2	0.1033	0.06	1.7

Footnotes:

[1] Proportions of methyl mercury in sediments and various tissues are provided in Table 7-9.

[2] Predicted concentrations in prey reflected bioaccumulation relationships in Table 7-6.

[3] Dietary fractions and other food-chain model assumptions were drawn from parameter values on Table 7-7.

[4] Toxicity reference values are provided in Table 7-8.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-14_Determination of protective sediment concentrations for river otter - mercury
LCP Chemical, Brunswick, GA

			Fiddler Crabs			Blue Crabs			Mummichogs		
Sediment Concentration mg/kg	Methyl-mercury Sediment Concentration mg/kg[1]	Sediment Ingestion Rate kg/day	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet[3]	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet
1	0.0075	0.015	0.22	0.149	0.1	1.3	1.30	0.1	0.23	0.22	0.3
2	0.0150	0.015	0.30	0.206	0.1	2.6	2.61	0.1	0.33	0.30	0.3
1.66	0.0125	0.015	0.28	0.189	0.1	2.2	2.16	0.1	0.30	0.27	0.3
4	0.0300	0.015	0.42	0.287	0.1	5.2	5.21	0.1	0.45	0.41	0.3
6	0.0450	0.015	0.51	0.347	0.1	7.8	7.82	0.1	0.55	0.50	0.3
8	0.0600	0.015	0.59	0.398	0.1	10.4	10.42	0.1	0.62	0.57	0.3

Silver Perch								
Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg[1]	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Area Use Factor	Total Dose mg kg^{-1} day^{-1}	Methyl Mercury NOAEL mg/kg/day[4]	Hazard Quotient
1.7	1.7	0.5	0.33	6.7	1.00	0.0510	0.075	0.68
2.8	2.8	0.5	0.33	6.7	1.00	0.0861	0.075	1.15
2.4	2.4	0.5	0.33	6.7	1.00	0.0747	0.075	0.997
4.6	4.6	0.5	0.33	6.7	1.00	0.1462	0.075	1.9
6.2	6.2	0.5	0.33	6.7	1.00	0.2001	0.075	2.7
7.6	7.6	0.5	0.33	6.7	1.00	0.2502	0.075	3.3

Table 7-14_Continued

			Fiddler Crabs			Blue Crabs			Mummichogs		
Sediment Concentration mg/kg	Methyl-mercury Sediment Concentration mg/kg[1]	Sediment Ingestion Rate kg/day	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet[3]	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet	Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg	Fraction of Diet
2	0.0150	0.015	0.30	0.206	0.1	2.6	2.61	0.1	0.33	0.30	0.3
3	0.0225	0.015	0.37	0.250	0.1	3.9	3.91	0.1	0.39	0.36	0.3
4.12	0.0309	0.015	0.43	0.291	0.1	5.4	5.37	0.1	0.46	0.42	0.3
5	0.0375	0.015	0.47	0.319	0.1	6.5	6.52	0.1	0.50	0.46	0.3
6	0.0450	0.015	0.51	0.347	0.1	7.8	7.82	0.1	0.55	0.50	0.3
7	0.0525	0.015	0.55	0.374	0.1	9.1	9.12	0.1	0.59	0.54	0.3

Silver Perch								
Predicted Total Mercury Concentration, mg/kg, dry[2]	Predicted Methyl-mercury Concentration, mg/kg[1]	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Area Use Factor	Total Dose mg kg^{-1} day^{-1}	Methyl Mercury LOAEL mg/kg/day[4]	Hazard Quotient
2.8	2.8	0.5	0.33	6.7	1.00	0.086	0.15	0.57
3.7	3.7	0.5	0.33	6.7	1.00	0.117	0.15	0.78
4.7	4.7	0.5	0.33	6.7	1.00	0.150	0.15	0.997
5.4	5.4	0.5	0.33	6.7	1.00	0.174	0.15	1.2
6.2	6.2	0.5	0.33	6.7	1.00	0.200	0.15	1.3
6.9	6.9	0.5	0.33	6.7	1.00	0.226	0.15	1.5

Footnotes:

1 Proportions of methyl mercury in sediments and various tissues are provided in Table 7-9.
2 Predicted concentrations in prey reflected bioaccumulation relationships in Table 7-6.
3 Dietary fractions and other food-chain model assumptions were drawn from parameter values on Table 7-7.
4 Toxicity reference values are provided in Table 7-8.
Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-15_Determination of protective sediment concentrations for river otter - Aroclor 1268
LCP Chemical, Brunswick, GA

		Fiddler Crabs		Blue Crabs		Mummichogs		Silver Perch							
Sediment Concentration mg/kg	Sediment Ingestion Rate kg/day	Predicted Concentration, mg/kg, dry[1]	Fraction of Diet[2]	Predicted Concentration, mg/kg, dry	Fraction of Diet	Predicted Concentration, mg/kg, dry	Fraction of Diet	Predicted Concentration, mg/kg, dry	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Area Use Factor	Total Dose mg kg^{-1} day^{1}	Aroclor 1268 NOAEL mg/kg/day[3]	Hazard Quotient
0.2	0.015	0.040	0.1	0.085	0.1	0.55	0.3	0.59	0.5	0.33	6.7	1	0.0238	0.03	0.79
0.3	0.015	0.050	0.1	0.107	0.1	0.62	0.3	0.72	0.5	0.33	6.7	1	0.0282	0.03	0.94
0.27	0.015	0.054	0.1	0.115	0.1	0.64	0.3	0.77	0.5	0.33	6.7	1	0.0299	0.03	0.997
0.3	0.015	0.060	0.1	0.128	0.1	0.67	0.3	0.85	0.5	0.33	6.7	1	0.0324	0.03	1.08
0.4	0.015	0.080	0.1	0.170	0.1	0.78	0.3	1.09	0.5	0.33	6.7	1	0.0405	0.03	1.4
0.5	0.015	0.100	0.1	0.213	0.1	0.87	0.3	1.33	0.5	0.33	6.7	1	0.0482	0.03	1.6

		Fiddler Crabs		Blue Crabs		Mummichogs		Silver Perch							
Sediment Concentration mg/kg	Sediment Ingestion Rate kg/day	Predicted Concentration, mg/kg, dry[1]	Fraction of Diet[2]	Predicted Concentration, mg/kg, dry	Fraction of Diet	Predicted Concentration, mg/kg, dry	Fraction of Diet	Predicted Concentration, mg/kg, dry	Fraction of Diet	Food Ingestion Rate kg/day	Body Weight kg	Area Use Factor	Total Dose mg kg^{-1} day^{1}	Aroclor 1268 LOAEL mg/kg/day[3]	Hazard Quotient
2	0.015	0.399	0.1	0.852	0.1	1.71	0.3	4.53	0.5	0.33	6.7	1	0.147	0.3	0.49
3	0.015	0.599	0.1	1.278	0.1	2.09	0.3	6.48	0.5	0.33	6.7	1	0.206	0.3	0.7
4.65	0.015	0.928	0.1	1.981	0.1	2.60	0.3	9.55	0.5	0.33	6.7	1	0.298	0.3	0.993
5	0.015	0.998	0.1	2.130	0.1	2.69	0.3	10.18	0.5	0.33	6.7	1	0.317	0.3	1.1
6	0.015	1.197	0.1	2.556	0.1	2.94	0.3	11.96	0.5	0.33	6.7	1	0.370	0.3	1.2
7	0.015	1.397	0.1	2.982	0.1	3.17	0.3	13.70	0.5	0.33	6.7	1	0.421	0.3	1.4

Footnotes:

1 Predicted concentrations in prey reflected bioaccumulation relationships in Table 1.
2 Dietary fractions and other food-chain model assumptions were drawn from parameter values on Table 2.
3 Toxicity reference values are provided in Table 7-8.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-16_Summary of protective sediment concentrations for wildlife and fish based on a hazard quotient (1.0)

Receptor	Protective Sediment Concentrations			
	Total Mercury		Aroclor-1268	
	NOAEL	LOAEL	NOAEL	LOAEL
Marsh Rabbit	NA	NA	8	80
Clapper Rail	2.2	22	NA	NA
Raccoon	NA	NA	4.3	47
Green Heron	0.44	2.7	NA	NA
River Otter	1.7	4.1	0.27	4.7
Finfish				
Finfish Model [a]	0.19	0.47	--	--
Finfish Model [b]	--	--	1.5	7
Finfish Model [c]	--	--	2.06	10.00
Red Drum [d]	0.73	1.55	2.5	16.8
Red Drum [e]	2.32	3.95	7.6	27.6
Black Drum [d]	0.85	1.6	0.55	2.1
Black Drum [e]	2.5	4.65	1.93	7.1
Silver Perch [d]	0.43	0.87	0.58	2.41
Silver Perch [e]	1.52	2.55	1.99	7.0
Spotted Seatrout [d]	0.42	0.7	0.67	2.8
Spotted Seatrout [e]	1.1	1.85	2.2	8.0
Striped Mullet [d]	11	25	0.39	1.3
Striped Mullet [e]	19.9	39	0.84	3.0

NA - Not assessed because receptor is not at risk.

a - Based on red drum model exposure (Evans and Engel, 1994) procedure (See Appendix H.)

b - Finfish model exposure Approach 1 (K_{PW} derived by Clark et al. (1990) procedure).

c - Finfish model exposure Approach 2 (K_{PW} derived by Bergen et al. (1993) procedure).

d - Based on BAF curves for data aggregated by year for field-collected finfish.

e - Based on area-weighted site BAF for field-collected finfish.

-- - Model does not apply to receptor.

Table 7-17_Determination of protective sediment concentrations for higher trophic level finfish - mercury
LCP Chemical, Brunswick, GA

Finfish exposure model based on Red Drum from Evans and Engel (1994)

	Fiddler Crabs			Blue Crabs			Mummichogs							
Sediment Concentration mg/kg	Predicted Total Mercury Conc. mg/kg, dry[1]	Predicted Methylmercury Conc. mg/kg[2]	Fraction of Diet[3]	Predicted Total Mercury Conc. mg/kg, dry[1]	Predicted Methylmercury Conc. mg/kg[2]	Fraction of Diet[3]	Predicted Total Mercury Conc. mg/kg, dry[1]	Predicted Methylmercury Conc. mg/kg[2]	Fraction of Diet[3]	Conc. Methylmercury in Red Drum Diet, mg/kg dw[4]	Bioaccumulation Factor for E&E Model (includes growth)[5]	E&E Model Predicted Red Drum Conc. mg/kg dw[6]	Methyl Mercury NOAEL mg/kg dw[7]	Hazard Quotient
0.10	0.07	0.05	0.30	0.1	0.1	0.30	0.07	0.06	0.40	0.08	4.78	0.38	0.6	0.63
0.15	0.09	0.06	0.30	0.2	0.2	0.30	0.08	0.07	0.40	0.10	4.78	0.50	0.6	0.83
0.19	0.10	0.07	0.30	0.2	0.2	0.30	0.08	0.07	0.40	0.12	4.78	0.59	0.6	0.986
0.3	0.12	0.08	0.30	0.4	0.4	0.30	0.09	0.08	0.40	0.17	4.78	0.84	0.6	1.4
0.4	0.14	0.10	0.30	0.5	0.5	0.30	0.09	0.09	0.40	0.22	4.78	1.05	0.6	1.8
0.5	0.16	0.11	0.30	0.7	0.7	0.30	0.10	0.09	0.40	0.26	4.78	1.26	0.6	2.1

	Fiddler Crabs			Blue Crabs			Mummichogs							
Sediment Concentration mg/kg	Predicted Total Mercury Conc. mg/kg, dry[1]	Predicted Methylmercury Conc. mg/kg[2]	Fraction of Diet[3]	Predicted Total Mercury Conc. mg/kg, dry[1]	Predicted Methylmercury Conc. mg/kg[2]	Fraction of Diet[3]	Predicted Total Mercury Conc. mg/kg, dry[1]	Predicted Methylmercury Conc. mg/kg[2]	Fraction of Diet[3]	Conc. Methylmercury in Red Drum Diet, mg/kg dw[4]	Bioaccumulation Factor for E&E Model (includes growth)[5]	E&E Model Predicted Red Drum Conc. mg/kg dw[6]	Methyl Mercury LOAEL mg/kg dw[7]	Hazard Quotient
0.3	0.12	0.08	0.30	0.4	0.4	0.30	0.09	0.08	0.40	0.17	4.78	0.84	1.2	0.70
0.4	0.14	0.10	0.30	0.5	0.5	0.30	0.09	0.09	0.40	0.22	4.78	1.05	1.2	0.88
0.47	0.15	0.10	0.30	0.6	0.6	0.30	0.10	0.09	0.40	0.25	4.78	1.20	1.2	0.998
0.6	0.17	0.12	0.30	0.8	0.8	0.30	0.10	0.09	0.40	0.31	4.78	1.47	1.2	1.2
0.7	0.18	0.13	0.30	0.9	0.9	0.30	0.11	0.10	0.40	0.35	4.78	1.67	1.2	1.4
1.0	0.22	0.15	0.30	1.3	1.3	0.30	0.11	0.11	0.40	0.48	4.78	2.3	1.2	1.9

[1] Based on bioaccumulation models presented on Table 7-6.

[2] Based on average proportions of methylmercury in biota in Table 7-9.

[3] Based on dietary fractions presented in Table 29.

[4] Concentration in prey normalized by dietary fraction.

[5] Food-chain multiplier for the Evans and Engel (1994) model including growth. (See Table 1 in Appendix H.)

[6] Bioaccumulation factor from Evans and Engel (1994) model mutiplied by the concentration in the Red Drum diet.

[7] Toxicity Reference Values are in Table 7-8.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-18_Determination of protective sediment concentrations for higher trophic level finfish - Aroclor 1268
LCP Chemical, Brunswick, GA

Gobas Model Approach 1 - Gobas model using estimate of Aroclor 1268 concentration in surface water from Clark et al. (1990)

Sediment Concentration mg/kg	Predicted Surface Water Conc. µg/L Clark et al. (1990)[1]	Fiddler Crabs		Blue Crabs		Mummichogs		Average Conc. in Prey, mg/kg dw[3]	Gobas Model Predicted Conc. Red Drum, mg/kg dw[4]	Aroclor 1268 NOAEL mg/kg dw	Hazard Quotient
		Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]				
1.0	0.003	0.2	0.30	0.43	0.30	0.6	0.40	0.41	0.85	1.36	0.63
1.5	0.005	0.3	0.30	0.64	0.30	0.7	0.40	0.55	1.18	1.36	0.87
1.8	0.006	0.4	0.30	0.77	0.30	0.7	0.40	0.63	1.37	1.36	1.01
2	0.007	0.4	0.30	0.85	0.30	0.8	0.40	0.69	1.49	1.36	1.10
3	0.010	0.6	0.30	1.28	0.30	0.9	0.40	0.94	2.09	1.36	1.54
4	0.013	0.8	0.30	1.70	0.30	1.1	0.40	1.19	2.68	1.36	1.97

Sediment Concentration mg/kg	Predicted Surface Water Conc. µg/L Clark et al. (1990)[1]	Fiddler Crabs		Blue Crabs		Mummichogs		Average Conc. in Prey, mg/kg dw[3]	Gobas Model Predicted Conc. Red Drum, mg/kg dw[4]	Aroclor 1268 LOAEL mg/kg dw	Hazard Quotient
		Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]				
6	0.020	1.2	0.30	2.56	0.30	1.3	0.40	1.66	3.82	5.2	0.73
7	0.023	1.4	0.30	2.98	0.30	1.4	0.40	1.89	4.37	5.2	0.84
8.5	0.028	1.7	0.30	3.62	0.30	1.6	0.40	2.23	5.20	5.2	1.00
9	0.030	1.8	0.30	3.83	0.30	1.6	0.40	2.34	5.48	5.2	1.05
10	0.033	2.0	0.30	4.26	0.30	1.7	0.40	2.56	6.02	5.2	1.16
15	0.050	3.0	0.30	6.39	0.30	2.1	0.40	3.65	8.72	5.2	1.68

1 Concentration in surface water was estimated by the partition coefficeint for suspended sediments K_{PW} in Appendix H given by Clark et al. (1990).
2 See Table 4-26 in main document.
3 Concentrations in fiddler crabs, blue crabs, and mummichogs weighted by proportion of red drum diet.
4 See Table 2 in Appendix H for details.

Table 7-18_ Determination of protective sediment concentrations for Red Drum - Aroclor 1268 (Continued)
LCP Chemical, Brunswick, GA

Gobas Model Approach 2 - Gobas model using estimate of Aroclor 1268 concentration in surface water from Bergen et al. (1993)

Sediment Concentration mg/kg	Predicted Surface Water Conc. µg/L Bergen et al. (1993)[1]	Fiddler Crabs		Blue Crabs		Mummichogs		Average Cocentration in Prey, mg/kg dw[3]	Gobas Model Predicted Conc. Red Drum, mg/kg dw[4]	Aroclor 1268 NOAEL mg/kg dw	Hazard Quotient
		Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]				
1.0	0.002	0.2	0.30	0.43	0.30	0.6	0.40	0.41	0.77	1.36	0.57
2.0	0.004	0.4	0.30	0.85	0.30	0.8	0.40	0.69	1.32	1.36	0.97
2.1	0.004	0.4	0.30	0.88	0.30	0.8	0.40	0.70	1.36	1.36	0.997
2.2	0.004	0.4	0.30	0.94	0.30	0.8	0.40	0.74	1.43	1.36	1.05
3	0.005	0.6	0.30	1.28	0.30	0.9	0.40	0.94	1.84	1.36	1.35
4	0.007	0.8	0.30	1.70	0.30	1.1	0.40	1.19	2.34	1.36	1.72

Sediment Concentration mg/kg	Predicted Surface Water Conc. µg/L Bergen et al. (1993)[1]	Fiddler Crabs		Blue Crabs		Mummichogs		Average Cocentration in Prey, mg/kg dw[3]	Gobas Model Predicted Conc. Red Drum, mg/kg dw[4]	Aroclor 1268 LOAEL mg/kg dw	Hazard Quotient
		Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]	Predicted Conc. mg/kg, dry[1]	Fraction of Diet[2]				
6	0.011	1.2	0.30	2.56	0.30	1.3	0.40	1.66	3.31	5.2	0.64
8	0.014	1.6	0.30	3.41	0.30	1.5	0.40	2.11	4.26	5.2	0.82
9	0.016	1.8	0.30	3.83	0.30	1.6	0.40	2.34	4.72	5.2	0.9082
10	0.018	2.0	0.30	4.26	0.30	1.7	0.40	2.56	5.19	5.2	0.997
12	0.021	2.4	0.30	5.11	0.30	1.9	0.40	3.00	6.10	5.2	1.17
15	0.027	3.0	0.30	6.39	0.30	2.1	0.40	3.65	7.46	5.2	1.43

1 Concentration in surface water was estimated by the partition coefficeint for suspended sediments K_{PW} in Appendix F given by Bergen et al. (1993).

2 See Table 4-26 in main document.

3 Concentrations in fiddler crabs, blue crabs, and mummichogs weighted by proportion of red drum diet.

4 See Table 3 in Appendix H for details.

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-19_Determination of protective sediment concentrations for red drum - mercury *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration mg/kg, dry[1]	Predicted Methyl-mercury Concentration, mg/kg	Mean Methyl Mercury Reference[a] Concentration	Body Burden less Reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
0.5	0.74	0.66	0.27	0.40	0.6	0.66
0.6	0.85	0.75	0.27	0.49	0.6	0.81
0.73	0.97	0.87	0.27	0.60	0.6	0.9998
0.8	1.03	0.92	0.27	0.65	0.6	1.09
1.0	1.21	1.08	0.27	0.81	0.6	1.35
2.0	1.97	1.75	0.27	1.48	0.6	2.47

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration mg/kg, dry[1]	Predicted Methyl-mercury Concentration mg/kg	Mean Methyl Mercury Reference[a] Concentration	Body Burden less Reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
1.0	1.21	1.08	0.27	0.81	1.2	0.67
1.3	1.45	1.29	0.27	1.03	1.2	0.86
1.55	1.64	1.46	0.27	1.20	1.2	0.997
1.6	1.68	1.50	0.27	1.23	1.2	1.02
2.0	1.97	1.75	0.27	1.48	1.2	1.23
4.0	3.19	2.84	0.27	2.57	1.2	2.15

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration mg/kg, dry[1]	Predicted Methyl-mercury Concentration mg/kg	Mean Methyl Mercury Reference[a] Concentration	Body Burden less Reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
2	0.83	0.74	0.27	0.47	0.6	0.79
2.1	0.87	0.78	0.27	0.51	0.6	0.85
2.32	0.97	0.86	0.27	0.59	0.6	0.99
2.5	1.04	0.93	0.27	0.66	0.6	1.10
3.0	1.25	1.11	0.27	0.84	0.6	1.41
4.0	1.66	1.48	0.27	1.21	0.6	2.02

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration mg/kg, dry[1]	Predicted Methyl-mercury Concentration mg/kg	Mean Methyl Mercury Reference[a] Concentration	Body Burden less Reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
2	0.83	0.74	0.27	0.47	1.2	0.39
3.0	1.25	1.11	0.27	0.84	1.2	0.70
3.95	1.64	1.46	0.27	1.20	1.2	0.996
4.0	1.66	1.48	0.27	1.21	1.2	1.01
5.0	2.08	1.85	0.27	1.58	1.2	1.32
6.0	2.50	2.22	0.27	1.95	1.2	1.63

* - from field-collected finfish
a - From Troup Creek reference area (Table 4-11a in text)
Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-20_ Determination of protective sediment concentrations for red drum - Aroclor 1268 *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration, mg/kg, dry	Mean Reference Concentration	Body Burden less Reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
1.0	0.77	0.09	0.68	1.36	0.50
2.0	1.24	0.09	1.15	1.36	0.85
2.5	1.45	0.09	1.36	1.36	0.996
3.0	1.64	0.09	1.55	1.36	1.14
4.0	1.99	0.09	1.90	1.36	1.40
5.0	2.32	0.09	2.23	1.36	1.64

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration, mg/kg, dry	Mean Reference Concentration	Body Burden less Reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
10	3.71	0.09	3.62	5.2	0.70
15	4.89	0.09	4.80	5.2	0.92
16.8	5.28	0.09	5.19	5.2	0.998
20	5.95	0.09	5.86	5.2	1.13
25	6.92	0.09	6.83	5.2	1.31
30	7.84	0.09	7.75	5.2	1.49

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less Reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
5	0.96	0.09	0.87	1.36	0.64
6	1.15	0.09	1.06	1.36	0.78
7.55	1.45	0.09	1.36	1.36	1.000
8.0	1.54	0.09	1.45	1.36	1.06
9	1.73	0.09	1.64	1.36	1.20
10	1.92	0.09	1.83	1.36	1.35

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less Reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
20	3.84	0.09	3.75	5.2	0.72
25	4.80	0.09	4.71	5.2	0.91
27.55	5.29	0.09	5.20	5.2	1.000
30	5.76	0.09	5.67	5.2	1.09
35	6.72	0.09	6.63	5.2	1.28
40	7.68	0.09	7.59	5.2	1.46

* - from field-collected finfish

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-21_Determination of protective sediment concentrations for black drum - mercury *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
0.6	0.54	0.49	0.10	0.39	0.6	0.65
0.7	0.63	0.57	0.10	0.47	0.6	0.79
0.8	0.72	0.66	0.10	0.56	0.6	0.93
0.85	0.77	0.70	0.10	0.60	0.6	1.00
1.0	0.91	0.83	0.10	0.73	0.6	1.21
2.0	1.86	1.69	0.10	1.59	0.6	2.65

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
1.0	0.91	0.83	0.10	0.73	1.2	0.61
1.2	1.10	1.00	0.10	0.90	1.2	0.75
1.5	1.38	1.26	0.10	1.16	1.2	0.96
1.55	1.43	1.30	0.10	1.20	1.2	1.00
1.7	1.57	1.43	0.10	1.33	1.2	1.11
2.0	1.86	1.69	0.10	1.59	1.2	1.33

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
1.0	0.307	0.28	0.10	0.18	0.6	0.30
2.0	0.614	0.56	0.10	0.46	0.6	0.76
2.5	0.768	0.70	0.10	0.60	0.6	1.00
3.0	0.921	0.84	0.10	0.74	0.6	1.23
4.0	1.228	1.12	0.10	1.02	0.6	1.70
5.0	1.535	1.40	0.10	1.30	0.6	2.16

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
2.0	0.614	0.56	0.10	0.46	1.2	0.38
2.5	0.768	0.70	0.10	0.60	1.2	0.50
4.65	1.428	1.30	0.10	1.20	1.2	1.00
5.0	1.535	1.40	0.10	1.30	1.2	1.08
6.0	1.842	1.68	0.10	1.58	1.2	1.31
7.0	2.149	1.96	0.10	1.86	1.2	1.55

* - from field-collected finfish

a - From Troup Creek reference area (Table 4-11a in text)

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-22_Determination of protective sediment concentrations for black drum - Aroclor 1268 *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
0.4	1.06	0.07	0.99	1.36	0.72
0.5	1.31	0.07	1.24	1.36	0.91
0.55	1.43	0.07	1.36	1.36	1.00
0.6	1.56	0.07	1.49	1.36	1.09
0.7	1.81	0.07	1.74	1.36	1.28
1.0	2.54	0.07	2.47	1.36	1.82

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
1.0	2.54	0.07	2.47	5.2	0.48
2.0	4.94	0.07	4.87	5.2	0.94
2.14	5.26	0.07	5.19	5.2	1.00
2.5	6.12	0.07	6.05	5.2	1.16
3.0	7.29	0.07	7.22	5.2	1.39
4.0	9.61	0.07	9.54	5.2	1.83

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
1.0	0.74	0.07	0.67	1.36	0.49
1.5	1.11	0.07	1.04	1.36	0.77
1.93	1.43	0.07	1.36	1.36	1.00
2.0	1.48	0.07	1.41	1.36	1.04
2.5	1.85	0.07	1.78	1.36	1.31
3.0	2.22	0.07	2.15	1.36	1.58

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
6.0	4.45	0.07	4.38	5.2	0.84
7.0	5.19	0.07	5.12	5.2	0.98
7.10	5.26	0.07	5.19	5.2	1.00
8.0	5.93	0.07	5.86	5.2	1.13
9.0	6.67	0.07	6.60	5.2	1.27
10	7.41	0.07	7.34	5.2	1.41

* - from field-collected finfish
Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-23_ Determination of protective sediment concentrations for silver perch - mercury *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
0.3	0.68	0.68	0.29	0.39	0.6	0.65
0.4	0.84	0.84	0.29	0.55	0.6	0.92
0.43	0.89	0.89	0.29	0.60	0.6	1.00
0.5	0.99	0.99	0.29	0.70	0.6	1.17
0.6	1.13	1.13	0.29	0.84	0.6	1.41
0.7	1.27	1.27	0.29	0.98	0.6	1.63

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
0.6	1.13	1.13	0.29	0.84	1.2	0.70
0.7	1.27	1.27	0.29	0.98	1.2	0.82
0.869	1.49	1.49	0.29	1.20	1.2	1.00
1.0	1.65	1.65	0.29	1.36	1.2	1.13
2.0	2.75	2.75	0.29	2.46	1.2	2.05
5.0	5.41	5.41	0.29	5.12	1.2	4.26

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
1.0	0.58	0.58	0.29	0.29	0.6	0.49
1.3	0.76	0.76	0.29	0.47	0.6	0.78
1.52	0.89	0.89	0.29	0.60	0.6	1.00
1.6	0.93	0.93	0.29	0.64	0.6	1.07
1.7	0.99	0.99	0.29	0.70	0.6	1.17
1.8	1.05	1.05	0.29	0.76	0.6	1.27

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
1	0.58	0.58	0.29	0.29	1.2	0.25
2.0	1.17	1.17	0.29	0.88	1.2	0.73
2.55	1.49	1.49	0.29	1.20	1.2	1.00
3	1.75	1.75	0.29	1.46	1.2	1.22
4.0	2.34	2.34	0.29	2.05	1.2	1.71
5	2.92	2.92	0.29	2.63	1.2	2.19

* - from field-collected finfish

a - From Troup Creek reference area (Table 4-11a in text)

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-24_Determination of protective sediment concentrations for silver perch - Aroclor 1268 *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
0.4	1.09	0.16	0.94	1.36	0.69
0.5	1.33	0.16	1.18	1.36	0.86
0.58	1.51	0.16	1.36	1.36	1.00
0.6	1.56	0.16	1.41	1.36	1.04
0.7	1.79	0.16	1.64	1.36	1.20
1.0	2.46	0.16	2.30	1.36	1.69

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
1.5	3.51	0.16	3.36	5.2	0.65
2.0	4.53	0.16	4.37	5.2	0.84
2.4	5.34	0.16	5.19	5.2	1.00
3.0	6.48	0.16	6.33	5.2	1.22
4.0	8.36	0.16	8.20	5.2	1.58
5.0	10.18	0.16	10.02	5.2	1.93

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
1	0.76	0.16	0.61	1.36	0.45
1.5	1.14	0.16	0.99	1.36	0.73
2.0	1.51	0.16	1.36	1.36	1.00
3.0	2.29	0.16	2.13	1.36	1.57
4.0	3.05	0.16	2.89	1.36	2.13
5.0	3.81	0.16	3.66	1.36	2.69

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
5.0	3.81	0.16	3.66	5.2	0.70
6.0	4.57	0.16	4.42	5.2	0.85
7.0	5.35	0.16	5.19	5.2	1.00
8.0	6.10	0.16	5.94	5.2	1.14
9.0	6.86	0.16	6.70	5.2	1.29
10.0	7.62	0.16	7.47	5.2	1.44

* - from field-collected finfish

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-25_Determination of protective sediment concentrations for spotted seatrout - mercury *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
0.3	0.70	0.70	0.34	0.36	0.6	0.60
0.4	0.90	0.90	0.34	0.56	0.6	0.93
0.42	0.94	0.94	0.34	0.60	0.6	1.00
0.5	1.09	1.09	0.34	0.75	0.6	1.25
0.8	1.63	1.63	0.34	1.29	0.6	2.16
1	1.98	1.98	0.34	1.64	0.6	2.74

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
0.5	1.09	1.09	0.34	0.75	1.2	0.62
0.7	1.46	1.46	0.34	1.12	1.2	0.93
0.75	1.54	1.54	0.34	1.20	1.2	1.00
0.8	1.63	1.63	0.34	1.29	1.2	1.08
0.9	1.81	1.81	0.34	1.47	1.2	1.22
1.0	1.98	1.98	0.34	1.64	1.2	1.37

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
0.8	0.66	0.66	0.34	0.32	0.6	0.54
1.0	0.83	0.83	0.34	0.49	0.6	0.82
1.1	0.94	0.94	0.34	0.60	0.6	0.99
1.3	1.08	1.08	0.34	0.74	0.6	1.23
1.4	1.16	1.16	0.34	0.82	0.6	1.37
1.5	1.24	1.24	0.34	0.90	0.6	1.51

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference[a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
1	0.83	0.83	0.34	0.49	1.2	0.41
1.5	1.24	1.24	0.34	0.90	1.2	0.75
1.85	1.53	1.53	0.34	1.19	1.2	0.99
3.0	2.49	2.49	0.34	2.15	1.2	1.79
4	3.32	3.32	0.34	2.98	1.2	2.48
5.0	4.15	4.15	0.34	3.81	1.2	3.17

* - from field-collected finfish

a - From Troup Creek reference area (Table 4-11a in text)

Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-26_Determination of protective sediment concentrations for spotted seatrout - Aroclor 1268 *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
0.5	1.13	0.11	1.02	1.36	0.75
0.6	1.34	0.11	1.23	1.36	0.90
0.667	1.47	0.11	1.36	1.36	0.9998
0.7	1.54	0.11	1.43	1.36	1.05
0.8	1.73	0.11	1.62	1.36	1.19
1.0	2.12	0.11	2.01	1.36	1.48

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
1.0	2.12	0.11	2.01	5.2	0.39
2.0	3.95	0.11	3.84	5.2	0.74
2.77	5.29	0.11	5.18	5.2	0.9969
3.0	5.69	0.11	5.58	5.2	1.07
4.0	7.37	0.11	7.26	5.2	1.40
5.0	9.01	0.11	8.90	5.2	1.71

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
2.0	1.32	0.11	1.21	1.36	0.89
2.1	1.39	0.11	1.28	1.36	0.939
2.22	1.47	0.11	1.36	1.36	0.997
2.5	1.65	0.11	1.54	1.36	1.13
3.0	1.98	0.11	1.87	1.36	1.38
4.0	2.64	0.11	2.53	1.36	1.86

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
6.0	3.97	0.11	3.86	5.2	0.74
7.0	4.63	0.11	4.52	5.2	0.87
8.02	5.30	0.11	5.19	5.2	0.998
9.0	5.95	0.11	5.84	5.2	1.12
10	6.61	0.11	6.50	5.2	1.25
11	7.27	0.11	7.16	5.2	1.38

* - from field-collected finfish
Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-27_Determination of protective sediment concentrations for striped mullet -mercury *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
9.0	1.38	0.51	0.02	0.49	0.6	0.82
10	1.51	0.56	0.02	0.54	0.6	0.90
11.3	1.67	0.62	0.02	0.60	0.6	0.998
12	1.76	0.65	0.02	0.63	0.6	1.05
13	1.88	0.70	0.02	0.68	0.6	1.13
15	2.13	0.79	0.02	0.77	0.6	1.28

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
15	2.13	0.79	0.02	0.77	1.2	0.64
20	2.71	1.00	0.02	0.98	1.2	0.82
25.1	3.29	1.22	0.02	1.20	1.2	0.997
30	3.83	1.42	0.02	1.40	1.2	1.16
35	4.36	1.61	0.02	1.59	1.2	1.33
40	4.88	1.81	0.02	1.79	1.2	1.49

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury NOAEL mg/kg/day	Hazard Quotient
15	1.26	0.47	0.02	0.45	0.6	0.74
19	1.60	0.59	0.02	0.57	0.6	0.951
19.94	1.67	0.62	0.02	0.60	0.6	0.9996
21	1.76	0.65	0.02	0.63	0.6	1.05
22	1.85	0.68	0.02	0.66	0.6	1.11
25	2.10	0.78	0.02	0.76	0.6	1.26

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Total Mercury Concentration, mg/kg dw	Predicted Methyl-mercury Concentration, mg/kg dw	Mean Methyl Mercury Reference [a] Concentration	Body Burden less reference	Methyl Mercury LOAEL mg/kg/day	Hazard Quotient
20	1.68	0.62	0.02	0.60	1.2	0.50
30	2.52	0.93	0.02	0.91	1.2	0.76
39.1	3.28	1.22	0.02	1.20	1.2	0.996
50	4.20	1.55	0.02	1.53	1.2	1.28
60	5.04	1.86	0.02	1.84	1.2	1.54
70	5.88	2.18	0.02	2.16	1.2	1.80

* - from field-collected finfish
a - From Troup Creek reference area (Table 4-11a in text)
Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-28_ Determination of protective sediment concentrations for striped mullet - Aroclor 1268 *
LCP Chemical, Brunswick, GA

Based on BAF Curves

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
0.30	1.13	0.14	0.99	1.36	0.73
0.35	1.33	0.14	1.19	1.36	0.88
0.392	1.50	0.14	1.36	1.36	0.998
0.40	1.53	0.14	1.39	1.36	1.02
0.50	1.93	0.14	1.79	1.36	1.32
1.0	3.99	0.14	3.85	1.36	2.83

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
1.0	3.99	0.14	3.85	5.2	0.74
1.2	4.83	0.14	4.69	5.2	0.90
1.32	5.34	0.14	5.20	5.2	0.999
1.4	5.68	0.14	5.54	5.2	1.06
1.5	6.10	0.14	5.96	5.2	1.15
2.0	8.24	0.14	8.10	5.2	1.56

Based on Area-Weighted Site BAF

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 NOAEL mg/kg/day	Hazard Quotient
0.7	1.24	0.14	1.10	1.36	0.81
0.8	1.42	0.14	1.28	1.36	0.94
0.843	1.50	0.14	1.35	1.36	0.996
0.9	1.60	0.14	1.46	1.36	1.07
1.0	1.78	0.14	1.63	1.36	1.20
1.2	2.13	0.14	1.99	1.36	1.46

Sediment Concentration mg/kg	Predicted Aroclor-1268 Concentration mg/kg, dry	Mean Reference Concentration	Body Burden less reference	Aroclor 1268 LOAEL mg/kg/day	Hazard Quotient
1.0	1.78	0.14	1.63	5.2	0.31
2.0	3.55	0.14	3.41	5.2	0.66
3.0	5.33	0.14	5.18	5.2	0.9967
4.0	7.10	0.14	6.96	5.2	1.34
5.0	8.88	0.14	8.73	5.2	1.68
6.0	10.65	0.14	10.51	5.2	2.02

* - from field-collected finfish
Yellow shading identifies protective sediment concentration at a HQ of 1.

Table 7-29_COPC concentrations protective of benthic invertebrates

	Grass Shrimp [a]			Amphipods [b]		
COPC	TEL	PEL / ER-L		TEL	PEL / ER-L	
Mercury	***1.4***	***3.2***	(ER-L)	4.2	11.3	(ER-L)
Reliability Rank	17	15		24	16	
Aroclor 1268	***3.2***	***12.8***	(PEL)	6.2	16	(ER-L)
Reliability Rank	11	10		46	37	
Total PAHs	1.6	4.0	(ER-L)	***0.8***	***1.5***	(ER-L)
Reliability Rank	3	2		12	7	
Lead	139	198	(PEL)	***41***	***60***	(ER-L)
Reliability Rank	0.3	0.3		3	2	

[a] - based on most sensitive endpoint (embryo development)

[b] - based on most sensitive endpoint (survival)

Reliability rank is specific to species

TEL - Threshold Effect Level

PEL - Probable Effects Level

ER-L - Effects Range Low

Numbers in bold and italics indicate the selected protective concentration ranges

Table 7-30. Sediment remedial goal options for protection of wildlife and finfish LCP Chemical, Brunswick, GA

COPC Receptor Group	NOAEL	Rule of 5 Range					LOAEL	Selected RGO Range
Mercury mg/kg								
Omnivorous Birds	2.2	3.2	4.7	7	10	15	22	***1 - 3***
Piscivorous Birds	0.44	0.6	0.8	1.1	1.5	2.0	2.7	
Piscivorous Mammals	1.7	2.0	2.4	2.8	3.3	3.9	4.2	
Aroclor 1268 mg/kg								
Herbivorous Mammals	8	12	17	25	37	55	80	***5 - 10***
Omnivorous Mammals	4.3	6	10	14	21	32	47	
Piscivorous Mammals	0.27	0.4	0.7	1.1	1.8	2.9	4.6	
Mercury mg/kg								
Red Drum	0.73	1.0	1.3	1.7	2.2	3.0	3.95	***1 - 3***
Black Drum	0.85	1.1	1.5	2.0	2.6	3.5	4.65	
Silver Perch	0.43	0.6	0.8	1	1.4	1.9	2.55	
Spotted Seatrout	0.42	0.5	0.7	0.9	1.1	1.4	1.85	
Striped Mullet	11	14	17	21	26	32	39	
Aroclor 1268 mg/kg								
Red Drum	2.5	3.7	5.6	8.3	12.4	18.4	27.6	***3 - 6***
Black Drum	0.55	0.8	1.3	2	3	4.6	7.1	
Silver Perch	0.58	0.9	1.3	2	3.1	4.6	7	
Spotted Seatrout	0.67	1	1.5	2.3	3.5	5.3	8	
Striped Mullet	0.39	0.5	0.8	1.1	1.5	2.1	3	

Source: From Table 7-16. Data from field-collected finfish used here.

APPENDICES

APPENDIX A

GLOBAL POSITIONING SYSTEM COORDINATES FOR MAJOR SAMPLING STATIONS IN ESTUARY AT LCP SITE

Appendix A
Coordinates of Sampling Stations
Referenced in Main Body of Document[a]

Station	Coordinates	
ID	X	Y
Main Canal		
C-1	861136.25	432334.16
C-2	861080.06	432337.56
C-3	860471.44	432388.75
C-4	859884.56	432452.41
C-5	859713.00	432503.41
Eastern Creek		
C-6	860499.25	431266.84
C-7	860442.31	431765.53
C-8	860276.94	431862.97
C-9	860524.81	432273.50
Western Creek Complex		
C-10	860283.75	430713.09
C-11	859798.75	431254.88
C-12	859565.63	431704.84
C-13	859434.00	431650.84
C-14	859314.69	431774.69
C-15	859371.06	431939.28
Purvis Creek[b]		
C-16	858072.88	430755.97
C-29	859479.19	432658.44
C-36	859698.63	435170.03
M-28/NOAA10	858064.69	430620.03
M-44	860368.25	435649.75
Domain 1 (Marsh)[c]		
C-18	860893.50	430685.06
C-B7	860572.06	432214.38
C-D9	860361.44	432104.56
C- H7	860498.56	431675.84
C-K7	860447.75	431486.16
C-N2	860913.50	430771.44
M-25/NOAA4	860731.56	432373.97
M-AB	861163.31	431379.13
M-19	860826.88	432153.19
M-B7	860590.94	432228.97
M-D9	860351.69	432114.31
M-H7	860496.81	431670.91
M-K7	860444.00	431498.03
M-N2	860922.88	430764.81
Domain 2 (Marsh)[c]		
M-20	860496.75	431262.16
M-21	860364.25	431542.75
M-22	860449.50	431763.69
M-23	860262.38	431850.44
M-24	860219.44	432127.97
M-27	859451.13	431654.06
M-NOAA3	860168.85	432092.57
M-NOAA5[d]	859688.22	432470.04
M-NOAA6	859727.63	431532.80
M-NOAA7	859229.02	431523.32
M-NOAA8	859138.61	431731.56
M-NOAA9	859490.28	432009.99

Station	Coordinates	
ID	X	Y
Domain 3 (Marsh)[c]		
C-30	861611.06	432778.91
C-31	860957.44	432987.44
C-32	859743.25	433275.63
C-33	861812.69	433302.72
C-34	861541.13	434079.94
C-35	859669.50	434450.28
C-39	861351.51	432589.33
C-100	861028.00	435630.00
C-101	859845.00	433866.00
C-204	860974.11	434131.69
M-26	859688.81	432549.34
M-37	861297.25	432558.97
M-38	860957.44	432987.44
M-39	859729.75	433341.91
M-40	861807.19	433294.56
M-41	861541.13	434026.94
M-42	860064.19	434386.69
M-43	859689.06	434481.50
M-100	859730.00	435328.00
M-101	859730.00	433775.00
M-102	859759.00	432636.00
M-204	860981.49	434008.80
Domain 4 (Marsh)[c]		
C-45	858154.75	432257.28
C-A	859253.00	433763.28
C-B	858757.13	434016.28
C-C	856904.44	432297.59
C-D	857384.88	433902.88
C-102	859041.00	435840.00
M-46	859553.19	433519.19
M-A	859231.56	433750.03
M-B	858753.31	434027.16
M-C	856878.88	432247.66
M-D	857382.25	433919.63
M-103	859622.00	435312.00
M-104	859455.00	433171.00
M-105	857827.00	431972.00
Blythe Island (Marsh)[c]		
C-103	853227.00	431747.00
C-104	854469.00	431157.00
C-105	854224.00	428668.00
M-106	854391.00	427398.00
M-107	852215.00	430308.00
M-108	855043.00	430888.00
Feasibility Study (FS) Areas		
FS Area 1	FS areas are large areas from which composite samples were collected.	
FS Area 2		
FS Area 3		
FS Area 4		
FS Area 5		
FS Area 6		

[a] Locations of these sampling stations are illustrated in Figures 3-3 through 3-5 of the main body of this document, with environmental media sampled at the stations identified in Tables 3-2 through 3-4.

[b] Locations identified as marsh stations (M-44 and M-28/NOAA10) reflect conditions in Purvis Creek.

[c] Marsh locations identified by the "C" prefix, unlike those identified by the "M" prefix, exhibited drainage from creek water at time of sampling.

[d] Station M-26 is located near the border between Domains 2 and 3.

APPENDIX B

UPDATED REFINED ECOLOGICAL SCREENING
FOR CHEMICALS OF POTENTIAL CONCERN
IN ESTUARY AT LCP SITE
B.1 Sediment
B.2 Surface Water

Appendix B

UPDATED REFINED ECOLOGICAL SCREENING FOR CHEMICALS OF POTENTIAL CONCERN IN ESTUARY AT LCP SITE

This appendix is an update of the refined ecological screening that was performed for all chemicals evaluated in the estuary at the LCP Site in Section 2 of the “Problem Formulation” phase (Step 3) of this baseline ecological risk assessment (BERA). Results of the Problem Formulation phase, together with results of preliminary screening-level evaluations (Steps 1 and 2 of the BERA), were submitted by Honeywell to Region 4 of the U. S. Environmental Protection Agency in 2001 (Honeywell International, 2001).

The screening strategy (including Figure 1, as well as Table 1 for sediment and Table 2 for surface water) presented in this appendix reflect, whenever possible and appropriate, the text and strategy presented in the original refined ecological screening document. Major differences in this updated ecological screening are: 1) the exclusive use of new chemical data in the screening process (i. e., data generated during 2000 as part of the estuarine BERA, and after clean-up activities at the site had been completed); 2) the elimination of results of aquatic toxicity tests as a screening criterion; and 3) the comparison of concentrations of site chemicals to concentrations at a new reference location in a different estuarine system from the system in which the LCP Site is situated (i. e., the Crescent River).

For sediment (Table 1) and surface water (Table 2) maximum concentrations of chemicals are compared to Region 4 (USEPA) or other conservative ecological screening values (ESVs).

It is important to emphasize that, although many chemicals are identified in this screening as chemicals of potential concern (COPC), only the major chemicals historically known to be of concern – mercury, Aroclor 1268, lead, and polynuclear aromatic hydrocarbons (PAHs) will be used to quantify risks to ecological receptors. The remaining COPCs will largely be evaluated qualitatively as to their potential contribution to risks in the estuary. However, all chemicals present in surface water and surface sediment from the site are, in fact, evaluated in the toxicity tests and macrobenthos evaluations conducted as part of the BERA.

Reference

Honeywell, International. 2001. Problem formulation for baseline ecological risk assessment for the estuary at the LCP Chemical Site in Brunswick, Georgia – December 2001. Morristown, NJ. 24 pp.

Table B-1_ Updated refined ecological screening for chemicals of potential concern (COPC) in estuarine surface sediment at LCP Site [a]

Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) or max. DL[b] (ppm)	Ecological effects value -- EEV (ppm) - E	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > EEV: Excl. any high DLs No.	Sample conc. > EEV: Excl. any high DLs %	Sample conc. > EEV: Incl. high DLs No.	Sample conc. > EEV: Incl. high DLs %	Sample conc. > EEV: Incl. high DLs Max. DL (ppm)	Reference value (ppm)[c]
Metals with Associated USEPA Region 4 Ecological Effects Values (EEVs)											
Antimony	No	92/16	2.7	12	0.23	0	0	--No High DLs--			<1.0
Arsenic	No	92/87	22	7.24	**3.0**	18	69	--No High DLs--			7.34
Cadmium	No	242/189	0.95	1	0.95	0	0	14	54	2.30	<0.24
Chromium	Yes (?)	92/92	160	52.3	**3.1**	14	54	--No High DLs--			21.18
Copper	No	242/240	41.6	18.7	**2.2**	2	8	--No High DLs--			6.25
Lead	Yes	703/703	1590	30.2	**52.6**	22	28	--No High DLs--			13.72
Mercury	Yes	780/777	145	0.13	**1,115**	75	96	--No High DLs--			0.217
Nickel	Yes (?)	242/239	25.6	15.9	**1.6**	1	4	--No High DLs--			6.16
Silver	Yes (?)	242/180	**1.02**	2	0.51	0	0	18	69	**4.50**	**<0.49**
Zinc	No	242/242	131	124	**1.1**	0	0	--No High DLs--			29.775
Metals without USEPA Region 4 EEVs, but with Associated Reference Concentrations											
Aluminum	No	92/92	**56500**	--	--	--	--	--	--	--	**14204**
Barium	Yes	92/92	**96.2**	--	--	--	--	--	--	--	**19.85**
Beryllium	No	92/88	**2.6**	--	--	--	--	--	--	--	**0.86**
Calcium	Yes	92/92	**21900**	--	--	--	--	--	--	--	**1627**
Cobalt	No	92/90	**10.6**	--	--	--	--	--	--	--	**3.6**
Iron	No	92/92	**44200**	--	--	--	--	--	--	--	**15322**
Magnesium	Yes	92/92	**10000**	--	--	--	--	--	--	--	**3048**
Manganese	No	92/92	**1000**	--	--	--	--	--	--	--	**285**
Methyl mercury	Yes	148/147	**0.05**	--	--	--	--	--	--	--	**<0.00034525**
Potassium	Yes (?)	92/91	**5100**	--	--	--	--	--	--	--	**1705**
Selenium	No	92/19	**4.3**	--	--	--	--	--	--	--	**<0.775**
Sodium	Yes	92/92	**37000**	--	--	--	--	--	--	--	**6310**
Thallium	No	92/40	**5.8**	--	--	--	--	--	--	--	**<1.13**
Vanadium	No	92/92	**118**	--	--	--	--	--	--	--	**31.625**

Table B-1_ Updated refined ecological screening for chemicals of potential concern (COPC) in estuarine surface sediment at LCP Site [a]

Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) or max. DL[b] (ppm)	Ecological effects value -- EEV (ppm) - E	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > EEV					Reference value (ppm)[c]
	Elements of screening process										
						Excl. any high DLs		Incl. high DLs			
						No.	%	No.	%	Max. DL (ppm)	
Organic Chemicals with Associated USEPA Region 4 EEVs											
Dioxins/Furans											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	No	3/3	0.000054	2.5E-06	**21.5**	3	100	--No High DLs--			0.000000225
PCBs											
Aroclor-1268	Yes	778/741	570	0.00003	**19,000,000**	74	96	75	97	0.10	<0.04944
Pesticides											
4,4'-DDD	No	42/0	0.055	0.0033	--	0	0	25	100	**0.06**	**<0.00282**
4,4'-DDE	No	42/0	0.055	0.0033	--	0	0	25	100	**0.06**	**<0.00282**
4,4'-DDT	No	42/4	0.003	0.0033	**9.1**	4	16	25	100	0.06	<0.00282
Chlordane	No	42/0	0.28	0.0017	--	0	0	25	100	**0.28**	**<0.0013**
Dieldrin	No	42/0	0.055	0.0033	--	0	0	25	100	**0.06**	**<0.00282**
Endrin	No	42/1	0.0044	0.0033	**1.3**	1	4	25	100	0.06	<0.00282
gamma-BHC (Lindane)	No	42/0	0.028	0.0033	--	0	0	18	72	**0.03**	**<0.00146**
Semivolatile Organic Chemicals											
2-Methylnaphthalene	Yes	549/238	0.64	0.33	**1.9**	0	0	1	1	0.45	<0.00686
Acenaphthene	Yes	696/320	2.1	0.33	**6.4**	0	0	2	3	**1.40**	**<0.00686**
Acenaphthylene	Yes	696/350	0.31	0.33	0.9	0	0	2	3	**1.40**	**<0.00661**
Anthracene	Yes	696/381	2	0.33	**6.1**	0	0	2	3	1.40	<0.00656
Benzo(a)anthracene	Yes	696/433	12	0.33	**36.4**	2	3	3	4	1.40	<0.00734
Benzo(a)pyrene	Yes	696/433	10	0.33	**30.3**	2	3	3	4	1.40	<0.00794
bis(2-Ethylhexyl) phthalate	No	25/22	0.78	0.18	**4.3**	14	56	17	68	1.10	0.16
Chrysene	Yes	696/432	17	0.33	**51.5**	2	3	3	4	1.40	<0.00798
Dibenzo(a,h)anthracene	Yes	696/377	6.5	0.33	**19.7**	0	0	2	3	1.40	<0.00657
Fluoranthene	Yes	696/464	4.9	0.33	**14.8**	1	1	2	3	1.40	<0.0093
Fluorene	Yes	696/337	4.3	0.33	**13.0**	1	1	2	3	0.45	<0.0063
High Molecular Weight PAHs (HPAHs)	Yes			0.66		2	3	--Not Applicable --			--Not Applicable --
Low Molecular Weight PAHs (LPAHs)	Yes			0.33		1	1	--Not Applicable --			--Not Applicable --
Naphthalene	Yes	696/322	5.1	0.33	**15.5**	1	1	2	3	0.45	<0.0070
Phenanthrene	Yes	696/369	17.000	0.33	**51.5**	0	0	2	3	1.40	<0.0069
Pyrene	Yes	696/492	21	0.33	**63.6**	3	4	--No High DLs--			<0.091
Total PAHs$^{(d)}$	Yes			1.7		3	4	--Not Applicable --			--Not Applicable --

Table B-1_ Updated refined ecological screening for chemicals of potential concern (COPC) in estuarine surface sediment at LCP Site [a]

Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) or max. DL[b] (ppm)	Ecological effects value -- EEV (ppm) - E	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > EEV: Excl. any high DLs No.	Sample conc. > EEV: Excl. any high DLs %	Sample conc. > EEV: Incl. high DLs No.	Sample conc. > EEV: Incl. high DLs %	Sample conc. > EEV: Incl. high DLs Max. DL (ppm)	Reference value (ppm)[c]
Elements of screening process											
Organic Chemicals without USEPA Region 4 EEVs, but with Associated Reference Concentrations											
Dioxins/Furans											
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	No	3/3	0.0088	--	--	--	--	--	--	--	0.0031
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	No	3/3	0.00089	--	--	--	--	--	--	--	0.00025
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	No	3/3	0.00003	--	--	--	--	--	--	--	0.0000032
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	No	3/3	0.00032	--	--	--	--	--	--	--	0.0000048
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	No	3/3	0.00005	--	--	--	--	--	--	--	0.000037
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	No	3/3	0.000009	--	--	--	--	--	--	--	0.0000015
hepta-CDD (total)	No	3/3	0.0044	--	--	--	--	--	--	--	0.00069
hexa-CDD (total)	No	3/3	0.0014	--	--	--	--	--	--	--	0.00388
penta-CDD (total)	No	3/3	0.00019	--	--	--	--	--	--	--	0.00012
tetra-CDD (total)	No	3/3	0.00012	--	--	--	--	--	--	--	0.00028
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF	No	3/3	0.0026	--	--	--	--	--	--	--	0.000003
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	No	3/3	0.0015	--	--	--	--	--	--	--	0.0000030
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	No	3/3	0.00080	--	--	--	--	--	--	--	0.0000003
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	No	3/3	0.0059	--	--	--	--	--	--	--	0.0000008
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	No	3/3	0.0017	--	--	--	--	--	--	--	0.0000004
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	No	3/2	0.00033	--	--	--	--	--	--	--	0.0000002
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	No	3/3	0.0067	--	--	--	--	--	--	--	0.0000002
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	No	3/3	0.00073	--	--	--	--	--	--	--	0.0000007
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	No	3/3	0.0010	--	--	--	--	--	--	--	0.0000002
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	No	4/4	0.0041	--	--	--	--	--	--	--	0.0000009
hepta-CDF (total)	No	3/3	0.0033	--	--	--	--	--	--	--	0.000006
hexa-CDF (total)	No	3/3	0.01208	--	--	--	--	--	--	--	0.000006
penta-CDF (total)	No	3/3	0.01521	--	--	--	--	--	--	--	0.000002
tetra-CDF (total)	No	3/3	0.01155	--	--	--	--	--	--	--	0.0000034
	No										

Table B-1_ Updated refined ecological screening for chemicals of potential concern (COPC) in estuarine surface sediment at LCP Site [a]

	Elements of screening process										
Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) or max. DL[b] (ppm)	Ecological effects value -- EEV (ppm) - E	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > EEV					Reference value (ppm)[c]
						Excl. any high DLs		Incl. high DLs			
						No.	%	No.	%	Max. DL (ppm)	
Pesticides											
Aldrin	No	42/1	**0.01**	--	--	--	--	--	--	--	**<0.0015**
alpha-BHC	No	42/0	**0.028**	--	--	--	--	--	--	--	**<0.0015**
beta-BHC	No	42/0	**0.028**	--	--	--	--	--	--	--	**<0.0015**
delta-BHC	No	42/1	**0.0074**	--	--	--	--	--	--	--	**<0.0015**
Endosulfan I	No	42/1	**0.0061**	--	--	--	--	--	--	--	**<0.0015**
Endosulfan II	No	42/0	**0.055**	--	--	--	--	--	--	--	**<0.0028**
Endosulfan sulfate	No	42/0	**0.055**	--	--	--	--	--	--	--	**<0.0028**
Endrin aldehyde	No	42/4	**0.048**	--	--	--	--	--	--	--	**<0.0028**
Heptachlor	No	42/0	**0.028**	--	--	--	--	--	--	--	**<0.0015**
Heptachlor epoxide	No	42/1	**0.0048**	--	--	--	--	--	--	--	**<0.0015**
Methoxychlor	No	42/0	**0.28**	--	--	--	--	--	--	--	**<0.015**
Toxaphene	No	42/0	**2.8**	--	--	--	--	--	--	--	**<0.15**
Semivolatile Organic Chemicals											
1,2,4-Trichlorobenzene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
1,2-Dichlorobenzene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
1,3-Dichlorobenzene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
1,4-Dichlorobenzene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
1-Methyl Naphthalene	No	331/13	**5.4**	--	--	--	--	--	--	--	**<0.0099**
2,2'-Oxybis(1-Chloropropane	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2,4,5-Trichlorophenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2,4,6-Trichlorophenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2,4-Dichlorophenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2,4-Dimethylphenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2,4-Dinitrophenol	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
2,4-Dinitrotoluene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2,6-Dinitrotoluene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2-Chloronaphthalene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2-Chlorophenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2-Methylphenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
2-Nitroaniline	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
2-Nitrophenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
3,3'-Dichlorobenzidine	No	25/0	**4.2**	--	--	--	--	--	--	--	**<0.6125**

Table B-1_ Updated refined ecological screening for chemicals of potential concern (COPC) in estuarine surface sediment at LCP Site [a]

	Elements of screening process										
Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) or max. DL[b] (ppm)	Ecological effects value -- EEV (ppm) - E	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > EEV					Reference value (ppm)[c]
						Excl. any high DLs		Incl. high DLs			
						No.	%	No.	%	Max. DL (ppm)	
3-Nitroaniline	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
3/4-Methylphenol	No	25/1	0.20	--	--	--	--	--	--	--	<0.3025
4,6-Dinitro-2-methylpheno	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
4-Bromophenyl-phenylether	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
4-Chloro-3-methylpheno	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
4-Chloroaniline	No	25/0	**4.2**	--	--	--	--	--	--	--	**<0.6125**
4-Chlorophenyl-phenylether	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
4-Nitroaniline	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
4-Nitrophenol	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
Benzo(b)fluoranthene	Yes	696/412	**6.3**	--	--	--	--	--	--	--	**<0.0104**
Benzo(g,h,i)perylene	Yes	696/407	**9.00**	--	--	--	--	--	--	--	**<0.0071**
Benzo(k)fluoranthene	Yes	696/374	**2.5**	--	--	--	--	--	--	--	**<0.0077**
bis(2-Chloroethoxy) methane	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
bis(2-Chloroethyl) ether	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Butylbenzylphthalate	No	25/1	0.17	--	--	--	--	--	--	--	<0.3025
Carbazole	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Di-n-butylphthalate	No	25/0	**2.1**	--	--	--	--	--	--	--	**0.205**
Di-n-octylphthalate	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Dibenzofuran	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.11**
Diethylphthalate	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Dimethylphthalate	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Hexachlorobenzene	No	25/1	0.098	--	--	--	--	--	--	--	<0.3025
Hexachlorobutadiene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Hexachlorocyclopentadiene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Hexachloroethane	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Indeno(1,2,3-cd)pyrene	Yes	696/402	**4.2**	--	--	--	--	--	--	--	**<0.0072**
Isophorone	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
N-Nitroso-di-n-propylamine	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
N-Nitrosodiphenylamine/Diphenylamine	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Nitrobenzene	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**
Pentachlorophenol	No	25/0	**11**	--	--	--	--	--	--	--	**<1.575**
Phenol	No	25/0	**2.1**	--	--	--	--	--	--	--	**<0.3025**

All sediment concentrations, associated detection limits, and ecological effects values are reported in dry weight.

[a] COPC, as determined by a weight-of-evidence approach, are identified in **large bold print**, as are data reflecting the rationale for the identification.

[b] The acronym "DL" refers to "detection limit."

[c] Half the detection limit wdas used to represent non-detected values for total PAHs.

Table B-2_ Updated refined ecological screening for chemicals of potential concern (COPC) in estuarine surface water at LCP Site[a]

			Elements of screening process								
						Sample conc. > ESV					
						Excl. any high DLs		Incl. high DLs			
Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) **or** max. DL[b] (ppm)	Ecological screening value -- ESV (ppm) - E[c]	Maximum definable hazard quotient -- MDHQ (C / E)	No.	%	No.	%	Max. DL (ppm)	Reference value (ppm)
Total Metals with Associated Ecological Screening Values (ESVs)											
Aluminum	No	11/11	1.80	1.5	**1.2**	2	18	--No High DLs--			0.94
Antimony	No	11/1	0.0059	4.3	0.001	0	0	--No High DLs--			<0.02
Arsenic	No	11/5	0.0072	0.036	0.2	0	0	--No High DLs--			0.0054
Beryllium	No	11/0	--	0.00013	--	0	0	11	100	0.004	<0.004
Cadmium	No	11/0	--	0.0093	--	0	0	--No High DLs--			<0.005
Chromium	Yes (?)	11/8	0.0046	0.103	0.05	0	0	--No High DLs--			<0.01
Copper	No	11/11	0.0045	0.0029	**1.6**	5	45	--No High DLs--			0.0024
Iron	No	11/11	1.2	0.3	**4.0**	10	90	--No High DLs--			0.695
Lead	Yes	75/28	0.0073	0.0085	0.8	0	0	--No High DLs--			0.00565
Mercury	Yes	99/99	0.000795	0.000025	**20.3**	24	52	--No High DLs--			0.0000079
Nickel	Yes (?)	11/0	--	0.0083	--	0	0	11	100	0.04	<0.04
Selenium	No	11/4	0.0079	0.071	0.1	0	0	--No High DLs--			<0.01
Silver	Yes (?)	11/0	--	0.00023	--	0	0	11	100	0.01	<0.01
Thallium	No	11/2	0.0065	0.0213	0.3	0	0	--No High DLs--			0.0061
Zinc	No	11/10	0.0190	0.086	0.2	0	0	--No High DLs--			0.0076
Dissolved Metals with Associated Ecological Screening Values (ESVs)											
Aluminum, dissolved	No	11/8	0.046	1.5	0.3	0	0	--No High DLs--			<0.20
Antimony, dissolved	No	11/0	--	4.3	--	0	0	--No High DLs--			<0.02
Arsenic, dissolved	No	11/5	0.0059	0.036	0.2	0	0	--No High DLs--			0.00395
Beryllium, dissolved	No	11/0	--	0.00013	--	0	0	11	100	0.004	<0.004
Cadmium, dissolved	No	11/0	--	0.0093	--	0	0	--No High DLs--			<0.005
Chromium, dissolved	Yes (?)	11/4	0.0048	0.103	0.05	0	0	--No High DLs--			<0.01
Copper, dissolved	No	11/10	0.0035	0.0029	**1.2**	1	9	2	18	0.02	0.0018
Iron, dissolved	No	11/6	0.56	0.3	**1.9**	1	9	--No High DLs--			0.0375
Lead, dissolved	Yes	28/19	0.0023	0.0085	0.3	0	0	--No High DLs--			0.00101
Mercury, dissolved	Yes	28/17	0.000009	0.000025	--	0	0	11	100	0.0002	0.0000406
Nickel, dissolved	Yes (?)	11/0	--	0.0083	--	0	0	11	100	0.04	<0.04
Selenium, dissolved	No	11/2	0.0082	0.071	0.1	0	0	--No High DLs--			<0.01
Silver, dissolved	Yes (?)	11/0	--	0.00023	--	0	0	11	100	0.01	<0.01
Thallium, dissolved	No	11/2	0.0060	0.0213	0.3	0	0	--No High DLs--			0.0053
Zinc, dissolved	No	11/9	0.0150	0.086	0.2	0	0	--No High DLs--			0.0155
Total Metals without Ecological Screening Values (ESVs)											
Barium	Yes	11/11	**0.041**	--	--	--	--	--	--	--	**0.03**
Calcium	Yes	11/11	360	--	--	--	--	--	--	--	305
Cobalt	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
Magnesium	Yes	11/11	1200	--	--	--	--	--	--	--	1030
Manganese	No	11/11	0.16	--	--	--	--	--	--	--	0.0355
Methyl mercury	Yes	81/81	**0.000016**	--	--	--	--	--	--	--	**0.000000054**
Potassium	Yes (?)	11/11	**430**	--	--	--	--	--	--	--	**320**
Sodium	Yes	11/11	9300	--	--	--	--	--	--	--	7750
Vanadium	No	11/6	0.0130	--	--	--	--	--	--	--	<0.015

			Elements of screening process								
						Sample conc. > ESV					
						Excl. any high DLs		Incl. high DLs			
Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) **or** max. DL[b] (ppm)	Ecological screening value -- ESV (ppm) - E[c]	Maximum definable hazard quotient -- MDHQ (C / E)	No.	%	No.	%	Max. DL (ppm)	Reference value (ppm)
Dissolved Metals without Ecological Screening Values (ESVs)											
Barium, dissolved	**Yes**	**11/11**	**0.039**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0.027**
Calcium, dissolved	Yes	11/11	360	--	--	--	--	--	--	--	295
Cobalt, dissolved	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
Magnesium, dissolved	Yes	11/11	1200	--	--	--	--	--	--	--	1020
Manganese, dissolved	**No**	**11/5**	**0.15**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**<0.02**
Potassium, dissolved	**Yes (?)**	**11/11**	**430**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**325**
Sodium, dissolved	Yes	11/11	9600	--	--	--	--	--	--	--	7250
Vanadium, dissolved	No	11/2	0.0066	--	--	--	--	--	--	--	<0.02
Organic Chemicals with Associated Ecological Screening Values (ESVs)											
Dioxins/Furans											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	No	3/0	--	0.00000001	--	0	0	--No High DLs--			7.75E-10
Pesticides											
4,4'-DDD	No	11/0	--	0.000025	--	0	0	11	100	0.0001	<0.0001
4,4'-DDE	No	11/0	--	0.00014	--	0	0	--No High DLs--			<0.0001
4,4'-DDT	No	11/0	--	0.000001	--	0	0	11	100	0.0001	<0.0001
Aldrin	No	11/0	--	0.00013	--	0	0	--No High DLs--			<0.00005
alpha-BHC	No	11/0	--	14.004	--	0	0	--No High DLs--			<0.00005
Chlordane	No	11/0	--	0.000004	--	0	0	11	100	0.0005	<0.0005
Dieldrin	No	11/0	--	0.0000019	--	0	0	11	100	0.0001	<0.0001
Endosulfan I	No	11/0	--	0.0000087	--	0	0	11	100	0.00005	<0.00005
Endosulfan II	No	11/0	--	0.0000087	--	0	0	11	100	0.0001	<0.0001
Endrin	No	11/0	--	0.0000023	--	0	0	11	100	0.0001	<0.0001
gamma-BHC (Lindane)	No	11/0	--	0.000016	--	0	0	11	100	0.00005	<0.00005
Heptachlor	No	11/0	--	0.0000036	--	0	0	11	100	0.00005	<0.00005
Heptachlor epoxide	No	11/0	--	0.0000036	--	0	0	11	100	0.00005	<0.00005
Methoxychlor	No	11/0	--	0.00003	--	0	0	11	100	0.0005	<0.0005
Toxaphene	No	11/0	--	0.0000002	--	0	0	11	100	0.005	<0.005
Semi-Volatiles											
1,2,4-Trichlorobenzene	No	11/0	--	0.0045	--	0	0	11	100	0.01	<0.01
1,2-Dichlorobenzene	No	11/0	--	0.0197	--	0	0	--No High DLs--			<0.01
1,3-Dichlorobenzene	No	11/0	--	0.0285	--	0	0	--No High DLs--			<0.01
1,4-Dichlorobenzene	No	11/0	--	0.0199	--	0	0	--No High DLs--			<0.01
2,4-Dinitrophenol	No	11/0	--	0.0485	--	0	0	11	100	0.05	<0.05
4-Nitrophenol	No	11/0	--	0.0717	--	0	0	--No High DLs--			<0.05
Acenaphthene	Yes	46/1	0.00022	0.0097	0.02	0	0	--No High DLs--			<0.0002
Butylbenzylphthalate	No	11/1	0.00100	0.0294	0.03	0	0	--No High DLs--			<0.01
Di-n-butylphthalate	No	11/1	0.00059	0.0034	0.2	0	0	10	91	0.01	<0.01
Diethylphthalate	No	11/0	--	0.0759	--	0	0	--No High DLs--			<0.01
Dimethylphthalate	No	11/0	--	0.58	--	0	0	--No High DLs--			<0.01
Fluoranthene	Yes	46/2	0.00012	0.0016	0.08	0	0	--No High DLs--			<0.0002
Hexachlorobutadiene	No	11/0	--	0.00032	--	0	0	11	100	0.01	<0.01
Hexachlorocyclopentadiene	No	11/0	--	0.00007	--	0	0	11	100	0.01	<0.01
Hexachloroethane	No	11/0	--	0.0094	--	0	0	11	100	0.01	<0.01
Isophorone	No	11/0	--	0.129	--	0	0	--No High DLs--			<0.01

			Elements of screening process								
Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) **or** max. DL[b] (ppm)	Ecological screening value -- ESV (ppm) - E[c]	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > ESV					Reference value (ppm)
						Excl. any high DLs		Incl. high DLs			
						No.	%	No.	%	Max. DL (ppm)	
N-Nitrosodiphenylamine/Diphenylamine	No	11/0	--	33	--	0	0	--No High DLs--			<0.01
Naphthalene	Yes	46/1	0.0050	0.0235	0.2	0	0	--No High DLs--			<0.0002
Nitrobenzene	No	11/0	--	0.0668	--	0	0	--No High DLs--			<0.01
Pentachlorophenol	No	11/0	--	0.0079	--	0	0	11	100	0.05	<0.05
Phenol	No	11/0	--	0.058	--	0	0	--No High DLs--			<0.01
Organic Chemicals without Associated Ecological Screening Values (ESVs)											
Dioxins/Furans											
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**No**	**3/3**	**0.00000006**	--	--	--	--	--	--	--	**0.000000058**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**No**	**3/1**	**0.0000000072**	--	--	--	--	--	--	--	**0.0000000047**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**No**	**3/0**	**0.0000000037**	--	--	--	--	--	--	--	**<0.0000000017**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**No**	**3/0**	**0.0000000035**	--	--	--	--	--	--	--	**<0.0000000017**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**No**	**3/0**	**0.0000000035**	--	--	--	--	--	--	--	**<0.0000000017**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**No**	**3/0**	**0.0000000032**	--	--	--	--	--	--	--	**<0.00000000155**
hepta-CDD (total)	**No**	**3/3**	**0.00000003**	--	--	--	--	--	--	--	**1.03E-08**
hexa-CDD (total)	**No**	**3/1**	**0.00000001**	--	--	--	--	--	--	--	**9.20E-09**
penta-CDD (total)	**No**	**3/1**	**0.0000000476**	--	--	--	--	--	--	--	**1.23E-09**
tetra-CDD (total)	No	3/0	0.0000000027	--	--	--	--	--	--	--	<0.00000000155
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**No**	**3/0**	**0.0000000073**	--	--	--	--	--	--	--	**<0.0000000032**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**No**	**3/0**	**0.0000000031**	--	--	--	--	--	--	--	**<0.000000002**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**No**	**3/0**	**0.0000000040**	--	--	--	--	--	--	--	**<0.0000000017**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**No**	**3/0**	**0.0000000027**	--	--	--	--	--	--	--	**<0.0000000012**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**No**	**3/0**	**0.0000000024**	--	--	--	--	--	--	--	**<0.0000000012**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**No**	**3/0**	**0.0000000032**	--	--	--	--	--	--	--	**<0.00000000145**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**No**	**3/0**	**0.0000000025**	--	--	--	--	--	--	--	**<0.0000000013**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**No**	**3/0**	**0.0000000028**	--	--	--	--	--	--	--	**<0.0000000013**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**No**	**3/1**	**0.0000000476**	--	--	--	--	--	--	--	**<0.00000000125**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	No	3/0	0.0000000020	--	--	--	--	--	--	--	<0.00000000105
hepta-CDF (total)	No	3/0	0.0000000035	--	--	--	--	--	--	--	<0.00000000155
hexa-CDF (total)	No	3/0	0.0000000027	--	--	--	--	--	--	--	<0.0000000013
penta-CDF (total)	No	3/0	2.4E-09	--	--	--	--	--	--	--	<0.0000000013
tetra-CDF (total)	No	3/1	0.0000000047	--	--	--	--	--	--	--	<0.00000000105
PCBs								--	--	--	
Aroclor-1268	Yes	75/23	0.00100	--	--	--	--	--	--	--	0.00003
Pesticides								--	--	--	
beta-BHC	No	11/0	0.00005	--	--	--	--	--	--	--	<0.00005
delta-BHC	No	11/0	0.00005	--	--	--	--	--	--	--	<0.00005
Endosulfan sulfate	No	11/0	0.0001	--	--	--	--	--	--	--	<0.0001
Endrin aldehyde	No	11/0	0.0001	--	--	--	--	--	--	--	<0.0001

			Elements of screening process								
Preliminarily evaluated chemicals	Major association with LCP Facility	No. samples / no. detects	Maximum detected conc. (C) **or** max. DL[b] (ppm)	Ecological screening value -- ESV (ppm) - E[c]	Maximum definable hazard quotient -- MDHQ (C / E)	Sample conc. > ESV: Excl. any high DLs No.	Sample conc. > ESV: Excl. any high DLs %	Sample conc. > ESV: Incl. high DLs No.	Sample conc. > ESV: Incl. high DLs %	Sample conc. > ESV: Incl. high DLs Max. DL (ppm)	Reference value (ppm)
Semi-Volatiles								--	--	--	
1-Methyl Naphthalene	**No**	**46/1**	**0.0068**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**<0.0002**
2,2'-Oxybis(1-Chloropropane)	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2,4,5-Trichlorophenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2,4,6-Trichlorophenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2,4-Dichlorophenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2,4-Dimethylphenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2,4-Dinitrotoluene	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2,6-Dinitrotoluene	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2-Chloronaphthalene	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2-Chlorophenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2-Methylnaphthalene	**No**	**45/1**	**0.00063**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**<0.0002**
2-Methylphenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
2-Nitroaniline	No	11/0	0.05	--	--	--	--	--	--	--	<0.05
2-Nitrophenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
3,3'-Dichlorobenzidine	No	11/0	0.02	--	--	--	--	--	--	--	<0.02
3-Nitroaniline	No	11/0	0.05	--	--	--	--	--	--	--	<0.05
3/4-Methylphenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
4,6-Dinitro-2-methylphenol	No	11/0	0.05	--	--	--	--	--	--	--	<0.05
4-Bromophenyl-phenylether	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
4-Chloro-3-methylphenol	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
4-Chloroaniline	No	11/0	0.02	--	--	--	--	--	--	--	<0.02
4-Chlorophenyl-phenylether	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
4-Nitroaniline	No	11/0	0.05	--	--	--	--	--	--	--	<0.05
Acenaphthylene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Anthracene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Benzo(a)anthracene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Benzo(a)pyrene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Benzo(b)fluoranthene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Benzo(g,h,i)perylene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Benzo(k)fluoranthene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
bis(2-Chloroethoxy) methane	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
bis(2-Chloroethyl) ether	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
bis(2-Ethylhexyl) phthalate	**No**	**11/6**	**0.0051**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0.00291**
Carbazole	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
Chrysene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Di-n-octylphthalate	No	11/1	0.0016	--	--	--	--	--	--	--	<0.01
Dibenzo(a,h)anthracene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Dibenzofuran	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
Fluorene	Yes	46/1	0.00016	--	--	--	--	--	--	--	<0.0002
Hexachlorobenzene	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
Indeno(1,2,3-cd)pyrene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
N-Nitroso-di-n-propylamine	No	11/0	0.01	--	--	--	--	--	--	--	<0.01
Phenanthrene	Yes	46/0	0.0002	--	--	--	--	--	--	--	<0.0002
Pyrene	Yes	46/1	0.000089	--	--	--	--	--	--	--	<0.0002

[a] COPC, as determined by a weight-of-evidence approach, are identified in **large bold print**, as are data reflecting the rationale for the identification.

[b] The acronym "DL" refers to "detection limit." One-half of the DL was used to represent non-detects for sums of PAHs.

[c] Most ESVs are Region 4 (U. S. EPA) saltwater chronic screening values. However, Region 4 values do not exist for aluminum, antimony, beryllium, and iron. ESVs employed for these four metals are The State of Florida's marine criteria.

APPENDIX C

TOXICITY TEST REPORTS

(On CD Only)

RESULTS OF CHRONIC BIOMONITORING SCREEN TESTS CONDUCTED ON RECEIVING WATER SAMPLES COLLECTED FROM SITE LCP

Submitted to:

Mr. Curt Rose
CDR Environmental Specialists
171 Cays Drive
Naples, Florida 34114

Submitted by:

The SeaCrest Group
1341 Cannon Street
Louisville, Colorado 80027
303-661-9324

November 10, 2000

INTRODUCTION

Biomonitoring provides an effective means to test multimedia waters for toxicity. These tests complement chemical analyses in detecting environmental effects, since the detection of such effects solely through chemical analyses are often difficult to accomplish.

Chronic tests, conducted with the marine invertebrate *Mysidopsis bahia* (mysids) and the marine fish known as the sheepshead minnow (*Cyprinodon variegatus*), measure significant differences in growth between control and exposed organisms, as well as survival effects. These tests are conducted over 7 days as opposed to the 96 hr acute tests which measure only survival effects.

MATERIALS AND METHODS

Sample Collection

Grab samples of water from six sites, labeled TC, CR, C-5, C-7, C-16, and C-33, were collected into one-gallon plastic containers at unspecified times on October 11, 2000; from 10:40 to 12:40 on October 13, 2000; and from 13:25 to 16:10 on October 16, 2000. Each set of samples were chilled and shipped overnight to the SeaCrest lab in ice chests where they were delivered at 10:15 on October 12, 2000; at 09:00 on October 14, 2000; and at 10:15 on October 17, 2000. At the lab the samples were refrigerated at 4°C between uses. The Chain of Custody forms documenting sample collection and transfer times are included in Appendix 1.

Dilution Water

An artificial saltwater was created using Forty Fathoms^R sea salts added to deionized water. This was used as the control water for the test. The average salinity of the samples was 25‰. The salinity of the samples that were below 25‰ were adjusted up with Forty Fathoms^R sea salts. The samples that were above 25‰ were not adjusted or diluted. The control water was adjusted to 25‰. All samples were allowed to set for a time and equilibrate with the salts before animals were added.

Test Organisms

The tests were conducted with *Mysidopsis bahia* (mysids), a saltwater invertebrate, and a saltwater fish, the sheepshead minnow (*Cyprinodon variegatus).* The mysids and sheepshead minnows were obtained from Aquatic BioSystems, Inc., an aquatic test organism supplier located in Ft. Collins, Colorado. The animals were received on the day the test was started. The animals were acclimated to test temperature and aerated prior to being used. Both species were fed newly-hatched brine shrimp (*Artemia* sp.) prior to being used and during the test.

One day old sheepshead minnow larvae were used in the tests, as required by the guidelines. The tests used 7 day old mysids, since growth measurements and sex determinations were required at test termination.

Both species were tested in reference toxicant tests using copper sulfate to ensure the organisms' health and test acceptability.

CDR

No alkalinity

Test Procedures

Upon receipt at the lab, the water samples were analyzed for ammonia, alkalinity, salinity, dissolved oxygen, and pH. Ammonia was determined with an Orion ion selective electrode according to procedures contained in APHA/AWWA/WPCF (1998). Alkalinity was determined according to procedures described in Hach Chemical Company (1992). Conductivity, dissolved oxygen, and pH probes were used to take these measurements. Salinity was determined using an Aquafauna^R salinity refractometer.

The tests followed the procedures in Peltier, et al. (1994) and were started on October 12, 2000. Per client request , the waters were tested only at the 100% concentration, with no dilution series created.

The *Mysidopsis* were tested in 260 ml plastic disposable cups containing 150 ml of test water. There were 8 replicates of each sample. Each replicate contained five test organisms, for a total of forty organisms per sample. The test organisms were monitored daily for survival. The water in each beaker was changed daily. Water quality readings of temperature, pH, and dissolved oxygen were measured, before and after each water change. The mysids were fed brine shrimp (*Artemia* sp.) at a rate of approximately 150 *Artemia* per mysid, twice a day. After seven days, the mysids were removed from the test waters and individually sexed (if mature) under a dissecting microscope. After sexing they were euthanized and placed into specially-prepared drying pans to dry overnight. The replicates were weighed the next day on a six-place electrobalance to determine weights to the nearest 0.01 mg. The sheets with the test information and daily readings are located in Appendix 2. The sheets with the survival numbers and final sex determinations are located in Appendix 3. The average dry weight determinations are located in Appendix 4.

The sheepshead minnows were exposed in 1 liter glass jars to which 500 ml of test media was added. Ten fish were placed in each jar and four replicates at each concentration were used. Fish were monitored for survival daily and fed live *Artemia* sp. once daily. Water in the cups was changed and monitored with readings of temperature, dissolved oxygen, and pH, daily. After seven days, the fish were removed from the cups and euthanized. The fish were weighed on a four place analytical balance after drying overnight in an oven at approximately 95°C. The benchsheet with all survival and growth information is located in Appendix 5.

REFERENCE TOXICANT TESTS

The batches of test organisms acquired from Aquatic BioSystems, Inc. were tested in reference toxicant tests using $CuSO_4$. These tests were conducted at the same time as the chronic tests with the sample waters. The benchsheets for the reference toxicant tests are located in Appendix 6.

The sample tests ran very well and there was good control survival for both species. However the LC50 concentrations for the two species did not correlate well with the results presented in the guidelines from testing conducted by the EPA. The mysid LC50 was below the range listed in the guidelines and the sheepshead minnow LC50 was well above the range listed. However, since the test results were good and control survival was good for both species, we do not consider the reference toxicant test results as an indication that the animals were not healthy.

REFERENCES

APHA/AWWA/WPCF. 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. American Public Health Association.

Hach Company. 1992. Hach Water Analysis Handbook. 2nd Edition. Hach Company, Loveland, Colorado.

Peltier, C.I. et al. 1994. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Marine and Estuarine Organisms. Second Edition. EPA/600/4-91/003. 483 pp.

APPENDIX 1. Chains of Custody Forms

The SeaCrest Group
An Environmental Services Company
1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record
(enclose with each shipping container)

Purchase Order Number:
Project Number (lab use only): 300446-451

Client:
Program/Site: LCP
Contact: Curt Rose
Phone: 941-394-8441
Address: 171 Cays Drive
Naples FL 34114

Collected by:

These fields may be used for field test results

	Sample Identification (Effluent, [✓ Receiving], Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute: Cerio	Acute: FH Minnow	Acute: Accelerated	Chronic: Cerio	Chronic: FH Minnow	Chronic: Accelerated	TRE	Other	Mysid 1007	Sheepshead Minnow 1004			Total Units	Total Volume
1	TC[1]	10/11/00		Grab									✓	✓			2	
2	CR[1]												✓	✓			2	
3	C-5												✓	✓			2	
4	C-7												✓	✓			2	
5	C-16												✓	✓			2	
6	C-33												✓	✓			2	
7																		
8													7-Day					
9	[illegible]												Tests					
10	[illegible]																	

Comments and special testing instructions: For Days 1 + 2 of tests. Salinity of 5-25 ppt. Test 100% receiving water. Run positive + negative controls.

[1] Refer to Attachment 1 for initial sample transfer from M Hodson et al. to S. Pitney and S Pitney to Curt Rose

Relinquished by: Curt Rose
Representing: CDR Environmental
To Whom: Fed Express
Date/Time: 10/11/00

Relinquished by:
Representing:
To Whom:
Date/Time:

Next recipient:
Relinquished by:
Rec'd by:
Date/Time: 10/12/00 1015

10:15, 10/12/00

WHITE COPY: Accompanies samples   CANARY COPY: Client

The SeaCrest Group
An Environmental Services Company
1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number:

Project Number (lab use only): 300446 - 300451

Client:
Program/Site: LCP
Contact: Curt Rose
Phone: 941-394-8441
Address: 171 Cays Drive
Naples FL 34114

Collected by:

These fields may be used for field test results

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute			Chronic									Total Units	Total Volume
					Cerio	FH Minnow	Accelerated	Cerio	FH Minnow	Accelerated	TRE	Other	Mysid	Sheepshead Minnow				
1	TC[1]	10/13/00		Grab									✓	✓			3	
2	CR[1]	↓		↓									✓	✓			3	
3	C-5		1240										✓	✓			3	
4	C-7		1040										✓	✓			3	
5	C-16		1230										✓	✓			3	
6	C-33		1203										✓	✓			3	
7																		
8																		
9																		
10																		

Comments and special testing instructions: For Days 3, 4 + 5 of tests

1 Refer to Attachment 1 for initial sample transfer

SEE ATTACHED SAMPLE RECEIPT FORM

Relinquished by: Curt Rose
Representing: CDR
To Whom: Fed Express
Date/Time: 5:00 PM

Relinquished by:
Representing:
To Whom:
Date/Time:

Next recipient:
Relinquished by:
Rec'd by:
Date/Time: 10.14.00 0900

WHITE COPY: Accompanies samples CANARY COPY: Client

The SeaCrest Group
An Environmental Services Company

1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number #3

Project Number (lab use only) 300446 - 300451

Client:
Program/Site: LCP
Contact: Curt Rock
Phone: 941-394-8441
Address: 171 Cays Drive
Naples, FL 34114

Collected by:

These fields may be used for field test results

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute: Cerio	Acute: FH Minnow	Acute: Accelerated	Chronic: Cerio	Chronic: FH Minnow	Chronic: Accelerated	TRE	Other	Mysid	Sheepshead Minnow			Total Units	Total Volume
1	TC[1]	10/16/00	1415	Grab									✓	✓			2	
2	CR[1]	↓	1325	↓									✓	✓			2	
3	C-5		1515										✓	✓			2	
4	C-7		1430										✓	✓			2	
5	C-16		1538										✓	✓			2	
6	G-33		1610										✓	✓			2	
7																		
8																		
9																		
10																		

Comments and special testing instructions: Fax Days 6+7 of tests

1 Refers to Attachment 1 for initial sample transfer

SEE ATTACHED
RECEIPT FORM

Relinquished by: Representing: CDR To Whom: FedExpress Date/Time: 10/16/00 1730
Relinquished by: Representing: To Whom: Date/Time:
Next recipient: Relinquished by: Rec'd by: Date/Time: 10/17/00 1015

CANARY COPY Client

APPENDIX 2. *Mysidopsis bahia* Test Setup and Daily Readings

The SeaCrest Group
An Environmental Services Company
Aquatic Toxicology Laboratory

7-Day Chronic Mysid Shrimp (*Mysidopsis bahia*)

Survival, Growth, and Fecundity Test

Job Code Number: 300446 - 300451

Test Dates: 10·12·00 Through 10·19·00

Test Times: 1600 Through 1600

Sample Numbers:
300446, 300447
300448, 300449
300450, 300451

Results Checked By: []____________
[]____________
[]____________

Study Director:____________

The SeaCrest Group

Job Code No 300446-300451

TEST CONDITIONS

Organism/Age	*Mysidopsis bahia* 7 Days	No. of Reps	8
Dilution Water		Number of Organisms/Replicate	5
Temperature	26-27°C	Type/Volume of Test Chamber	HDPE/250ml
Test Accept. criteria	> 80% Surv. >.20mg Growth	Feeding	3 Times Daily

SAMPLING/DILUTION DOCUMENTATION

Sample Numbers/ Dates			
Set # 1	Set # 2	Set # 3	Set # 4

Dilutions			
Concentrations ( )	Volume Test Solution	Volume Dilution Water	Total Volume ( )
100%	150 mL	0	150 mL
Totals			

RANDOMIZATION

Organism Batch No.	Date	Analyst

Job Code #: 300446 - 300451

Mysid Shrimp Survival, Growth, and Fecundity Test

Daily Record of Test Conditions

D.O. (mg/l)

Day	0	1		2		3		4		5		6		7
Initial/Final	I	I	F	I	F	I	F	I	F	I	F	I	F	F
Control	5.8	6.4	7.1	5.0	5.9	5.1	5.6	5.1	5.7	5.3	5.7	6.4	6.4	5.1
300446	6.0	5.9	7.3	5.2	6.4	4.8	6.3	4.9	6.2	5.0	5.9	5.9	6.0	5.0
300447	6.4	4.6	6.7	4.9	6.2	4.7	6.1	4.9	6.0	5.1	6.9	5.1	6.6	5.2
300448	7.8	5.3	6.2	5.4	6.1	4.8	6.0	4.9	6.1	5.1	7.1	5.4	6.9	5.7
300449	6.7	5.2	6.6	5.5	6.0	5.1	5.8	5.2	5.7	5.6	6.7	5.2	6.6	6.2
300450	8.2	5.1	6.5	5.1	7.4	5.0	6.5	5.1	6.7	5.2	7.3	5.3	6.4	EEin 6.1
300451	6.2	5.2	5.9	5.0	6.2	5.0	5.7	5.1	6.0	5.4	5.4	5.1	5.7	6.2
Meter No.	2	2	2	2	2	2	2	2	2	2	2	2	2	2

pH (Initial)

Day	0	1	2	3	4	5	6	7
Control	8.0	7.9/8.0	7.8/7.9	7.9/8.0	7.8/7.9	8.0/8.3	7.9/8.2	8.0
300446	7.8	7.9/7.8	7.9/7.8	8.0/7.8	7.9/7.8	7.9/7.9	7.8/7.8	7.8
300447	7.3	7.3/7.4	7.8/7.4	7.8/7.5	7.8/7.5	7.8/7.5	7.7/7.5	7.7
300448	7.3	7.8/7.4	7.8/7.5	7.9/7.6	7.8/7.6	7.8/7.5	7.8/7.6	7.8
300449	7.2	7.8/7.4	7.7/7.4	7.9/7.5	7.7/7.5	7.8/7.5	7.8/7.5	7.9
300450	7.3	7.9/7.5	7.8/7.4	7.8/7.5	7.8/7.4	7.8/7.5	7.8/7.5	7.9
300451	7.8	8.0/7.9	7.9/7.4	7.8/7.5	7.8/7.4	7.8/7.5	7.9/7.5	7.9
Meter No.	6	6	6	7	7	7	6	6

Job Code #: 300446 - 300451

Mysid Shrimp Survival, Growth, and Fecundity Test

Daily Record of Test Conditions

Temperature (°C) (Initial)								
Day	0	1	2	3	4	5	6	7
Control	26.2	26.2/26.3	25.4/26.2	25.9/24.4	25.6/24.6	24.7/24.8	26.5/25.6	25.9
300446	26.5	27.0/26.9	26.5/27.0	25.6/25.1	25.4/25.0	25.4/25.9	26.0/24.5	26.1
300447	26.0	26.1/25.7	26.2/26.5	25.3/25.1	25.7/25.0	25.1/25.4	25.9/25.0	25.7
300448	26.1	25.5/25.4	26.1/26.1	24.8/25	24.8/25.2	24.6/25.2	25.9/25.0	26.2
300449	26.1	27.0/26.9	26.5/26.2	25.6/25.1	24.9/25.3	24.9/25.0	26.5/25.2	26.9
300450	26.3	26.7/26.5	26.3/26.1	24.9/25.1	24.9/25.1	25.3/24.9	26.6/25.0	25.3
300451	25.9	26.3/26.6	25.7/27.0	24.6/24.9	24.7/24.9	25.1/24.8	26.5/25.2	24.7
Meter No.	2	2	2	7	7	7	2	2

Salinity (ppt) (Initial)								
Day	0	1	2	3	4	5	6	7
Control	25		25			25		
300446	24	EESD ~~25~~	25			26		
300447	27		26			28		
300448	24		23			26		
300449	25		24			26		
300450	25		24			27		
300451	24	EESD ~~24~~	24			25		
Meter No.	1		1			1		

Day	0	1	2	3	4	5	6	7
Initials	SB	SB	SB	GA	GA	GA	SB	SB

KAC Initial readings of samples on back of page.

		TC	CR	C5	C7	C16	C33
First set	Sal.	12	27	24	25	25	2
	Cl_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	NH_3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Second Set	Sal.	13	26	23	24	24	19
	Cl_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	NH_3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Third Set	Sal.	19	32	26	27	27	18
	Cl_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	NH_3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

✓ weight issue?

APPENDIX 3. *Mysidopsis bahia* Surival and Sex Determinations

Mysid Shrimp Survival and Fecundity, Test Data

Job Code #: 300~~3~~46 - 300~~3~~51
4 4

Test Start-Date/Time: 10·12·00 / 16:00
Test Stop-Date/Time: 10-19-00 / 16:00

Conc:	Rep. No.	Number Alive Day 0	1	2	3	4	5	6	7	Fem. with eggs	Fem. no eggs	Males	Immatu
Control	A	5	5	5	5	5	5	5	5			1	4
	B	5	5	5	5	5	5	5	5	1		1	3
	C	5	5	5	5	5	5	5	5	2			3
	D	5	5	4	4	4	4	4	4				4
	E	5	5	5	5	5	5	5	5			5	
	F	5	5	5	5	5	5	5	5	1		4	
	G	5	5	5	5	5	5	5	5	1		2	2
	H	5	5	5	5	5	5	5	5	2		1	2

Conc:	Rep. No.	0	1	2	3	4	5	6	7	Fem. with eggs	Fem. no eggs	Males	Immatu
100% 300446 TC	A	5	5	5	5	5	5	5	5				5
	B	5	5	5	5	5	5	5	5			3	2
	C	5	5	5	5	5	5	5	5	3		1	1
	D	5	5	5	5	5	5	5	5			1	4
	E	5	5	5	5	5	5	5	5	2		2	1
	F	5	5	5	5	5	5	5	5	1		1	3
	G	5	5	5	5	5	5	5	5	2			3
	H	5	5	5	5	5	5	5	5	1			4

Conc:	Rep. No.	0	1	2	3	4	5	6	7	Fem. with eggs	Fem. no eggs	Males	Immatu
100% 300447 CR	A	5	5	5	5	5	5	5	5	1			4
	B	5	5	5	5	5	5	5	5	1			4
	C	5	5	5	5	5	5	5	5	1		1	3
	D	5	5	5	5	5	5	5	5	1		2	2
	E	5	5	5	5	5	5	5	5	2			3
	F	5	5	5	5	5	5	5	5			1	4
	G	5	5	5	5	5	5	5	5	1			4
	H	5	5	5	5	5	5	5	5	2			3

Conc:	Rep. No.	0	1	2	3	4	5	6	7	Fem. with eggs	Fem. no eggs	Males	Immatu
100% 00448 C-5	A	5	5	5	5	5	5	5	5			2	3
	B	5	5	5	4	4	4	4	4	1			3
	C	5	5	5	5	5	5	5	5	2			3
	D	5	5	5	5	[illegible] ~~4~~ 5	5	5	5	2		1	2
	E	5	5	5	5	5	5	5	5	1		1	3
	F	5	5	5	5	5	5	4	4	2			2
	G	5	5	5	5	5	5	5	5	1		2	2
	H	5	4	4	4	4	4	4	4	1			3

Mysid Shrimp Survival and Fecundity Test Data

Job Code #: 300446-300451

	Rep. No.	Number Alive											
		Day								Fem. with eggs	Fem. no eggs	Males	Immatu
		0	1	2	3	4	5	6	7				
Conc:	A	5	5	5	5	5	5	5	EE SD ~~5~~ 4	1		2	1
100%	B	5	5	5	5	5	5	5	EE SD ~~4~~ 5				5
	C	5	5	5	5	5	5	5	5			2	3
	D	5	5	5	5	5	5	5	5	2		1	2
300449	E	5	5	5	5	5	5	5	5			1	4
	F	5	5	5	5	5	5	5	5				5
C-7	G	5	5	5	5	5	5	5	5			2	3
	H	5	5	5	5	5	5	5	5			2	3
Conc:	A	5	5	5	5	5	5	5	5	1			4
100%	B	5	5	4	4	4	4	4	4	2			2
	C	5	5	5	5	5	5	5	5			2	3
	D	5	5	5	5	5	5	4	4	1			3
300450	E	5	5	5	5	5	5	5	5	3			2
	F	5	5	5	5	5	5	5	5	1		2	2
C-16	G	5	5	5	5	5	5	5	5	1			4
	H	5	5	5	5	5	5	5	5			1	4
Conc:	A	5	5	5	5	5	5	5	5				5
100%	B	5	5	5	5	5	5	5	5	2		1	2
	C	5	5	5	5	5	5	5	5	2			3
	D	5	5	5	5	5	5	5	5	1		1	3
300451	E	5	5	5	5	5	5	5	5				5
C-33	F	5	5	5	5	5	5	5	5	1		2	2
	G	5	5	5	5	5	5	5	5	3		1	1
	H	5	5	5	5	5	5	5	5	2			3

Day/Time	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/19	10/19	10/19	10/19
Initials	SB	SB	JB	GA	GA	GA	JB	JB	JB	JB	JL	JL

APPENDIX 4. *Mysidopsis bahia* Growth Determinations

Weight Data for Mysid Shrimp Growth

Page 1

Job Code #: 300446-300451

Drying Date/Time: From: 10.19.00

Drying Temp. (°C): 100°C

To: 10.20.00

Analyst: SB

Weighing Date/Time: 10.20.00/150

Conc:	Rep	Tare Wgt. (mg)	Gross Dry Wgt. (mg)	No. of animals	Mean Dry Wgt. of animal (mg)	Remarks
Control	1	15.51	17.44	5	0.39	
	2	14.01	15.63	5	0.32	
	3	11.82	14.68	5	0.57 CDR	CE 11/9/
	4	12.07	13.88	EE SB ~~4~~ ~~8~~ 4	~~0.45~~ 0.46	~~0.36~~ ~~0.45~~ DG CESB (0.
	5	11.12	13.15	5	0.41	
	6	13.22	14.85	5	0.33	
	7	8.87	11.47	5	0.52	0.48 CDR
	8	10.90	15.16	5	0.85	$\bar{X}$ = 0.~~47~~ m
300446 TC	1	12.09	14.73	5	0.53	
	2	10.88	12.94	5	0.41	
	3	10.87	13.93	5	0.61	
	4	13.07	16.89	5	0.76	
	5	12.57	15.04	5	0.49	
	6	13.61	17.14	5	0.71	
	7	14.44	16.95	5	0.50	
	8	12.46	14.61	5	0.43	$\bar{X}$ = 0.56 mg
300447 CR	1	11.52	13.80	5	0.46	
	2	10.79	13.47	5	0.54	
	3	11.65	15.08	5	0.69	
	4	10.31	14.25	5	0.79	
	5	10.45	13.04	5	0.52	
	6	11.38	15.56	5	0.84	
	7	11.64	14.32	5	0.54	
	8	13.86	16.18	5	0.46	$\bar{X}$ = 0.60 mg
300448 C5	1	15.15	17.48	5	0.47	
	2	16.97	21.47	EE SB ~~4~~ ~~8~~ 4	~~0.90~~	CE KC 11/9/00 ~~1.13~~ CESB 0.90
	3	18.06	21.37	5	0.66	
	4	15.34	19.59	5	0.85	
	5	18.80	21.14	5	0.47	CE KC 11/9/00
	6	17.53	22.62	EE SB ~~4~~ ~~8~~ 4	~~1.02~~	~~1.27~~ CESB 1.02
	7	20.66	23.21	5	0.51	CE KC 11/9/00
	8	21.30	24.95	EE SB ~~4~~ ~~8~~ 4	~~0.73~~	~~0.91~~ CESB 0.7

$\bar{X}$ = 0.70 mg

Page

Weight Data for Mysid Shrimp Growth

Job Code #: 300446-300451

Conc:	Rep	Tare Wgt. (mg)	Gross Dry Wgt. (mg)	No. of animals	Mean Dry Wgt. of animal (mg)	Remarks 0.58 CE MC 11/
300449 C7	1	17.91	20.82	FF JB ~~4~~ ~~8~~ 4	~~0.58~~	~~0.73~~ CESB
	2	18.10	21.06	5	0.59	
	3	15.88	21.43	5	1.11	
	4	18.36	22.09	5	0.75	
	5	18.13	20.80	5	0.53	
	6	17.82	24.27	5	1.29	
	7	17.97	23.26	5	1.06	
	8	16.60	20.48	5	0.78	$\bar{X}$ = 0.84 mg
300450 C16	1	20.15	23.41	5	0.65	
	2	19.04	28.53	FF JB 4 ~~4~~ ~~8~~	~~1.90~~	~~CE MC 11/9/00~~ ~~2.37~~ CESB 1.90
	3	18.97	22.45	5	0.70	CE MC 11/9/00
	4	17.48	19.92	FF JB 4 ~~4~~ ~~8~~	~~0.49~~	~~0.61~~ CESB 0.4
	5	20.39	27.18	5	1.36	
	6	17.48	19.71	5	0.45	
	7	16.37	18.10	5	0.35	
	8	18.30	20.57	5	0.45	$\bar{X}$ = 0.79 mg
300451 C33	1	18.10	20.93	5	0.57	
	2	18.91	22.69	5	0.76	
	3	20.22	23.98	5	0.75	
	4	16.58	18.70	5	0.42	
	5	17.40	19.05	5	0.33	
	6	18.01	20.20	5	0.44	
	7	16.35	18.35	5	0.40	
	8	17.26	19.04	5	0.36	$\bar{X}$ = 0.50 mg
		21.56	30.08	5	1.70	Frozen mysid From 10.13.00

APPENDIX 5. *Cyprinodon variegatus* (Sheepshead minnow) Test Sheets

1. EXPOSURE CHAMBER

Total Capacity: 1 Liter ~~500 ml~~ EEKAC 11/10/00
Test Solution Volume: 500 ~~250 ml~~
Test Solution Surface Area: ________ cm
Water Depth (constant): ________ cm
(cyclic): ________ to ________ cm

2. FEEDING SCHEDULE

Not Fed: ________
Fed Daily: EEKAC ~~2X/day~~ Once a day KAC 11/10/00
Fed Irregularly: ________
(Describe): ________
Food Used: <24hr. Artemia

3. AERATION

None: ________
Slow: ________ (Bubbles or ml/min)
Moderate: ________ (Bubbles or ml/min)
Vigorous: ________ (Bubbles or ml/min)
From: ________ AM/PM; ________ / ________ (Date)
To: ________ AM/PM; ________ / ________ (Date)

4. SCREENED ANIMAL ENCLOSURES

Not Used: ________
Used: ________ cm Diameter

5. CONDITION/APPEARANCE of surviving organisms at end of test: (I.e., alive but immobile; loss of orientation; erratic movement; etc.) Surviving organisms were healthy.

6. Comments: ________

The SeaCrest Group Fathead Minnow Chronic Benchsheet Form: 038 Effective: May, 1997

Permittee: CDR- ENVIRONMENTAL
Site: —
IWC %: —
Sample Date: 10/11/00
Test Started: 10/12/00 1600
Lab Number: 300446-451
Template Number: N/A
Dilution Water: SALT H_2O (25‰) 00-07
Species Information: ABS SHM 001011 (<1d)
Test Ended: 10/19/00 1600

Test Conditions:

Conc	Test	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	SAL. ~~Cond~~
C-33	DO	5.7	~~4.2~~ / 5.7	4.6 / 6.1	5.3 / 5.9	5.3 / 5.8	4.9 / 5.5	5.8 / 5.7	5.5	24
C-16	DO	7.2	4.7 / 6.2	4.8 / 6.4	5.6 / 5.8	5.1 / 5.7	4.8 / 7.0	5.7 / 6.9	5.4	25
C-7	DO	6.2	5.2 / 6.0	4.5 / 5.9	5.4 / 5.9	5.0 / 5.6	4.2 / 6.5	5.1 / 7.0	5.6	25
C-5	DO	6.5	5.4 / 6.1	4.8 / 6.2	5.6 / 6.0	5.2 / 5.8	4.2 / 6.9	5.2 / 7.1	5.7	24
CR	DO	6.0	4.5 / 6.0	4.7 / 6.2	5.1 / 6.1	5.3 / 6.2	4.3 / 6.6	5.5 / 7.0	5.3	27
TC	DO	5.8	4.5 / 5.7	4.9 / 6.0	5.2 / 6.2	5.3 / 5.8	4.3 / 5.6	5.5 / 5.9	4.7	24
CONTROL	DO	5.7	4.7 / 5.7	5.1 / 6.0	5.4 / 6.6	5.6 / 5.3	4.8 / 5.8	5.4 / 5.4	5.6	25
C-33	°C	25.7	25.4 / 26.0	26.2 / 27.0	25.4 / 25.4	24.4 / 26.0	24.7 / 25.9	24.2 / 24.7	25.0	24
C-16	°C	26.0	25.3 / 25.8	26.1 / 26.0	25.3 / 25.3	24.2 / 26.0	25.1 / 25.8	24.6 / 24.7	25.1	24
C-7	°C	25.8	25.3 / 26.0	25.1 / 26.1	25.6 / 25.2	26.0 / 26.0	25.0 / 26.0	23.7 / 25.2	24.5	24
C-5	°C	24.7	25.1 / 26.0	24.5 / 26.1	25.3 / 24.5	26.0 / 26.0	25.1 / 25.9	23.7 / 25.1	24.5	23
CR	°C	25.0	25.7 / 25.8	25.2 / 26.0	25.8 / 25.4	25.3 / 26.0	26.0 / 26.0	24.8 / 25.1	24.9	25
TC	°C	25.3	25.8 / 25.6	25.4 / 26.7	25.7 / 25.4	25.2 / 26.0	26.0 / 26.0	24.8 / 25.0	24.0	25
CONTROL	°C	24.9	25.6 / 25.2	25.7 / 26.6	26.0 / 25.6	24.9 / 26.0	26.0 / 25.6	24.8 / 26.0	24.0	25
C-33	pH	7.9	7.8 / 7.9	8.0 / 7.6	7.8 / 7.5	8.3 / 7.9	7.7 / 7.5	8.1 / 7.5	8.1	
C-16	pH	7.5	7.9 / 7.4	7.8 / 7.5	7.8 / 7.5	8.3 / 7.9	7.7 / 7.4	8.0 / 7.5	8.1	27
C-7	pH	7.4	7.8 / 7.5	7.7 / 7.5	7.8 / 7.5	8.2 / 7.9	7.6 / 7.5	8.0 / 7.5	7.9	27
C-5	pH	7.4	7.8 / 7.5	7.7 / 7.5	7.8 / 7.5	8.3 / 8.0	7.6 / 7.5	7.9 / 7.6	8.0	26
CR	pH	7.4	7.7 / 7.5	7.7 / 7.5	7.8 / 7.5	8.2 / 7.9	7.6 / 7.5	7.9 / 7.6	7.8	32
TC	pH	7.9	7.9 / 7.9	8.0 / 7.9	7.9 / 7.9	8.3 / 8.4	7.8 / 7.9	8.0 / 7.9	8.0	~~17~~ 26
CONTROL	pH	8.1	7.9 / 8.1	7.9 / 7.8	7.9 / 8.0	8.3 / 8.9	8.0 / 8.4	8.0 / 8.4	8.1	25

1st set

	TC ~~Eff #1~~	CR ~~Eff #2~~	C5 ~~Eff #3~~	C7 ~~Rec'g #1~~	C16 ~~Rec'g #2~~	C33 ~~Rec'g #3~~	Recon #1	Recon #2	Recon #3
~~Hardness~~	12	27	24	25	25	2	NA	NA	NA
~~Alkalinity~~	~~12~~	~~27~~	~~24~~	~~25~~	~~25~~ ~~60 WC~~				
Chlorine	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Ammonia:	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			

Conc	Rep	0	1	2	3	4	5	6	7	Cup	Fish &Tare	Tare	Fish Wt	Wt mg	Avg Wt	
C-33	#1	10	10	10	10	9	9	9	9	# 28	1.0432	1.0396	0.0036	0.36	0.42	.40
	#2	10	10	10	10	10	10	8	7	# 27	1.0384	1.0349	0.0035	0.35		.50
	#3	10	10	10	10	10	10	10	10	# 26	1.0670	1.0602	0.0068	0.68		.68
	#4	10	10	10	10	7	7	7	6	# 25	1.0435	1.0406	0.0029	0.29		.48
C16	#1	10	10	10	10	10	10	10	10	# 24	1.0463	1.0363	0.0100	1.0	0.85	1.00
	#2	10	10	10	10	10	10	10	10	# 23	1.0513	1.0398	0.0115	1.0		1.00
	#3	10	9	9	9	9	9	9	9	# 22	1.0599	1.0513	0.0086	0.86		.95
	#4	10	10	10	10	9	9	8	8	# 21	1.0501	1.0446	0.0055	0.55		.68
C-7	#1	10	10	10	10	10	10	10	10	# 20	1.0558	1.0399	0.0159	1.59	1.00	1.59
	#2	10	10	10	10	10	10	9	9	# 19	1.0618	1.0537	0.0081	0.81		.90
	#3	10	10	10	10	10	9	9	8	# 18	1.0338	1.0277	0.0061	0.61		.76
	#4	10	10	10	10	10	10	10	9	# 17	1.0543	1.0444	0.0099	0.99		1.10
C5	#1	10	10	10	10	10	10	10	10	# 16	1.0587	1.0436	0.0151	1.51	1.27	1.51
	#2	10	10	10	10	10	10	10	10	# 15	1.0562	1.0438	0.0124	1.24		1.24
	#3	10	10	10	10	10	10	10	10	# 14	1.0561	1.0462	0.0099	0.99		.99
	#4	10	10	10	10	10	10	10	10	# 13	1.0612	1.0479	0.0133	1.33		1.33
CR	#1	10	10	10	10	10	10	10	10	# 12	1.0436	1.0319	0.0117	1.17	1.22	1.17
	#2	10	10	10	10	10	10	10	10	# 11	1.0539	1.0382	0.0157	1.57		1.57
	#3	10	10	10	10	10	10	10	10	# 10	1.0554	1.0432	0.0122	1.22		1.22
	#4	10	10	10	10	10	10	9	9	# 9	1.0608	1.0517	0.0091	0.91		1.01
TC	#1	10	10	10	10	10	10	9	9	# 8	1.0559	1.0498	0.0061	0.61	0.68	.76
	#2	10	9	9	9	9	9	9	9	# 7	1.0631	1.0508	0.0123	1.23		.36
	#3	10	10	10	10	10	10	9	9	# 6	1.0298	1.0249	0.0049	0.49		.54
	#4	10	10	10	10	9	9	8	9	# 5	1.0434	1.0394	0.0040	0.40		.50
CONTROL	#1	10	10	10	10	10	10	10	10	# 4	1.0617	1.0495	0.0122	1.22	1.13	1.22
	#2	10	10	10	10	10	10	10	10	# 3	1.0516	1.0415	0.0101	1.01		1.01
	#3	10	10	10	10	10	10	10	10	# 2	1.0356	1.0242	0.0114	1.14		1.14
	#4	10	10	10	10	10	10	10	10	# 1	1.0469	1.0353	0.0116	1.16		1.16
Initials		HW	HW	DA	HW	HW	HW	DA	HW	# 29	1.0450	1.0415	0.0035	0.35	Pretest	

Second set

	TC	CR	C5	C7	C16	C33
Sal:	13	26	23	24	24	19
Cl_2:	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

#6645 HW 10/13/00

Third set

TC	CR	C5	C7	C16	C33
19 ~~27~~	32	26	27	27	18
<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Appendix 6. QA/QC and Reference Toxicant Test Charts

Form: 037 Effective: May, 1997

The SeaCrest Group Fathead Minnow Acute Benchsheet

Permittee: MYSID DEFTOX	Lab Number: –
Site: –	Template Number: –
IWC %: –	Dilution Water: SALT H2O 00-07 (25‰)
Sample Date: –	Species Information: ABS MYSID 00105 (10d)
Test Started: 10/15/00 1130	Test Ended: 10/19/00 1100
Test Conditions: CuSO4	

ppb

Conc & Rep	Number Alive					Dissolved Oxygen					Temperature °C					pH					~~Cond.~~ ~~µmhos~~ Sal %
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	
250	5	0	—	—	—	5.6	5.7	—	—	—	25.8	25.4	—	—	—	7.9	8.4	—	—	—	26
	5	0	—	—	—																
125	5	2	1	0	–	5.7	5.7	5.5	5.3	–	25.9	25.3	25.7	25.4	–	8.0	8.4	7.9	7.9	–	26
	5	1	1	0	–																
62.5	5	1	0	—	—	5.7	5.7	5.6	5.3	5.2	25.9	25.2	25.6	25.4	25.7	8.0	8.4	7.9	7.9	8.0	26
	5	1	1	1	0																
31.25	5	5	5	5	5	5.7	5.8	5.5	5.1	5.1	25.9	25.1	25.6	25.4	25.6	8.0	8.4	7.9	7.9	7.9	26
	5	5	5	5	5																
15.625	5	5	5	5	5	5.7	5.8	5.6	5.2	5.2	25.8	25.0	25.2	25.1	25.4	8.0	8.4	7.9	7.9	8.0	26
	5	5	5	5	5																
C	5	5	5	5	5	5.7*	~~6.2~~	5.6	5.3	5.2	25.6	25.3	25.0	25.1	25.3	8.0	8.4	7.9	7.9	7.9	26
	5	5	5	5	5		6.0														
Initials	HW	HW	HW	HW	HW											HW	HW	HW	HW	HW	

	Effluent #1	Receiving #1	Recon	Effluent #2	Receiving #2
Hardness (mg/l)					
Alkalinity (mg/l)					
Chlorine (mg/l)					
Ammonia Initial (mg/l)				NC	
Ammonia Final (mg/l)					

*EE
HW
10/16/00

```
⌐¬ɒiNLQ 12cpi/ ♣2X☺#●{☻°  ë?xxx≡↑>H┬☺x·§6►X►@Ä╒{±☺X☻@·······     ·  ·
  ıdd≡¶?Φ┬☺d·§6►X►@Ä┼{±☺X☻@·······      ·   ·                 G Φ_9Φϵ9<■t<▌
Φ┴RΦΩLt■â>τK tϵδ╙╛NbΦ╡3╟D►☺+└úXëúVëúTëúZëÇ╡f☻ïN♦ï^♠ΦMHΦ;GΦ     eëΦq¤ïσ]¯Y[X├SQR╖:
(δ"Φ/ï╤ ╙<└s♠Φv9Bδ⌠Φ▲♥╤<█uδï╨ΦD:Φ          9ZY[├QΦ6:Φ/8Y├PV┘┴"THE SEACREST GROUP
                                                                Page ___________

********************************** Version  2.5 **********************************

                   Results calculated using the Summary Method.

*****************************************************************************

              Sponsor            :                        CDR
              Species            :           MYSIDOPSIS BAHIA
              Study Number       :              300445-300451
              Dates of test      :  10/15/00  to     10/19/00
              Test Material      :                      CUSO4
              Concentration Units :                       PPB
              Report run by      :                        KAC
              Date of report     :                 11-13-2000

*****************************************************************************
                                  REF TOX
*****************************************************************************

           Concentration      Number       Number       Percent
            (    PPB    )     Exposed       Dead          Dead
           -------------      -------      ------        ------
                250.0            10           10          100.0
                125.0            10           10          100.0
                 62.5            10           10          100.0
                 31.3            10            0            0.0
                 15.6            10            0            0.0
              Control            10            0            0.0

*****************************************************************************

                                      95% Confidence Limits
Method              W         LC50       Lower          Upper         Slope
-----------------------------------------------------------------------------

Binomial                     44.19      31.25          62.50        --N/A--
Moving Average              ******      ******         ******        --N/A--
Probit                      ******      ******         ******          0.00
Logit                        49.60      25.08          83.46           5.87

-----------------------------------------------------------------------------

  Note --  In order to produce this summary report, no warning or diag-
           nostic messages were given (if any occurred).  An asterisk
           appearing next to the method indicates that there was a
           warning associated with the corresponding method.  You should
           run the full report for this method to determine the problem.
           This report is intended for informational purposes only.

****************************** End Of Report ******************************
```

Form: 037 Effective: May, 1997

The SeaCrest Group Fathead Minnow Acute Benchsheet

—

Permittee: CYPRINODON REFTOX	Lab Number: –
Site: ABS	Template Number: –
IWC %: –	Dilution Water: SALT H_2O 00-07 (25‰)
Sample Date: –	Species Information: ABS SHM 001011 (2d)
Test Started: 10/13/00 11:00	Test Ended: 10/17/00 1145
Test Conditions: $CuSO_4$ AERATED	

Conc & Rep	Number Alive					Dissolved Oxygen					- Temperature °C					pH					~~Cond.~~ SAL
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	~~µmhos~~ ‰
1000	10	10	10	9	9	5.6	4.8	4.6	6.4	5.7	25.2	25.4	26.0	260	25.7	7.8	7.7	7.7	83	7.8	22
	10	10	9	9	8																22
500	10	10	10	10	9	5.6	4.7	4.6	6.4	5.7	25.3	25.4	260	26.0	258	8.0	7.7	7.7	83	7.9	22
	10	9	9	7	7																22
250	10	10	10	10	10	5.7	4.7	4.7	6.5	5.6	25.2	25.5	26.0	258	258	8.1	7.7	7.7	8.4	7.9	21
	10	9	9	9	9																24
125	10	10	10	10	10	5.7	4.8	4.6	6.5	5.5	25.2	25.5	259	255	258	8.1	7.7	7.7	83	7.9	21
	10	~~9~~10	10	10	10																21
62.5	10	10	10	10	10	5.7	4.9	4.2	6.5	5.3	25.1	25.6	258	25.9	25.6	8.1	7.7	7.7	8.4	7.9	21
	10	10	9	9	9																21
0	10	10	10	10	10	5.7	4.6	4.8	6.5	5.9	24.6	25.8	249	26.0	25.7	8.1	7.8	7.7	83	7.8	22
	10	10	10	10	10																22
Initials	HW		HW	HW	HW											HW		HW	HW	HW	

	Effluent #1	Receiving #1	Recon	Effluent #2	Receiving #2
Hardness (mg/l)					
Alkalinity (mg/l)					
Chlorine (mg/l)					
Ammonia Initial (mg/l)				KMS	
Ammonia Final (mg/l)					

Appendix 7. Test Animal History Forms

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

RECEIVED
10/12/00
HW

ORGANISM HISTORY

DATE: 10/11/00

SPECIES: Mysidopsis bahia

AGE: 6 day

LIFE STAGE: Juvenile

HATCH DATE: 10/5/00

BEGAN FEEDING: Immediately

FOOD: Artemia

TEMP.	PH	INITIAL D.O.
23.9	7.4	9.1
		5.9 AFTER AERATION

Water Chemistry Record:

	Mean	Range
TEMPERATURE:	24°C	--
SALINITY/CONDUCTIVITY:	24 ppt	--
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	135 mg/l	--
pH:	8.08	--

Comments:

Facility Supervisor

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 10/11/00

SPECIES: Cyprinodon variegatus
AGE: N/A
LIFE STAGE: Embryo
HATCH DATE: 10/11/00
BEGAN FEEDING: N/A
FOOD: N/A

		INITIAL
Temp.	pH	D.O.
23.5	8.1	10.1
		6.0 AFTER AERATION

Water Chemistry Record:	Mean	Range
TEMPERATURE:	22 °C	--
SALINITY/CONDUCTIVITY:	26 ppt	--
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	160 mg/l	--
pH:	8.42	--

Comments:

Facility Supervisor

RESULTS OF CHRONIC SEDIMENT TESTS CONDUCTED ON SAMPLES FROM THE LCP PROJECT

Submitted to:

Mr. Curt Rose
CDR Environmental Specialists
171 Cays Drive
Naples, Florida 34114

Submitted by:

The SeaCrest Group
1341 Cannon Street
Louisville, Colorado 80027
303-661-9324

March 13, 2001

The SeaCrest Group
An Environmental Services Company

March 16, 2001

Mr. Curt Rose
CDR Environmental Specialists
171 Cay Drive
Naples, Florida 34114

Dear Curt:

Please find enclosed the report for the chronic aquatic sediment tests performed on eleven sediment samples using the marine benthic amphipod *Leptocheirus plumulosus*. I am providing you with the Materials, Methods, and Procedures write-up for the tests, as we discussed. I have included a brief written summary of the sediment test results. All the raw data for the tests is included in the Appendices.

I apologize that we could not obtain successful test results with the remaining five sediment samples. The first six sediments appeared to provide little difficulty. However it seems that the longer the test sediments were held, the worse survival results were obtained. This included the South Boulder Reservoir control sediment that was held under the same conditions as the test sediments throughout the holding time.

It's possible that any organic material in the sediments changed during the holding time and therefore less nutrition was provided. Although the test organisms were fed food recommended by the culturing facility from which they were purchased, the food available was not the diet recommended in the Chesapeake Bay test guidelines. The live algal cells they recommend were not available to our facility. This probably contributed to the testing difficulties. I have included all test results for the three groups of tests that were run. Hopefully information can be

The test organisms were tested in reference toxicant tests with copper sulfate. All three batches of amphipods produced LC50 concentrations that were within 23 ug/L (ppb) of each other. These are very similar results and should indicate that all three batches of animals were comparable in health and testability.

Please call if you have any questions.

Sincerely,

Kelly A. Carr

Kelly A. Carr
Laboratory Manager

enclosures: Report, Invoice

1341 Cannon Street • Louisville, Colorado 80027 • 303-661-9324 • Fax 303-661-9325

INTRODUCTION

Sediment contamination is an environmental issue that can have widespread effects on aquatic systems. The sediment may serve as a reservoir for numerous contaminants that can detrimentally affect an aquatic ecosystem. However not all substances found and measured in sediments are bioavailable. Therefore tests conducted with aquatic organisms that utilize the sediment for feeding and/or protection provide information on the ability of the sediment to adversely affect the aquatic community.

MATERIALS AND METHODS

Sample Collection

Grab samples of sediment from eleven sites were collected into clean, plastic containers from October 16 to October 19, 2000. The samples were chilled and shipped in coolers on October 19, 2000 for overnight delivery to the SeaCrest lab, where they arrived at 10:~~30~~ 20 CDR on October 20, 2000. At the lab the sediment samples were refrigerated at 4°C between uses. The Chain of Custody forms documenting sample collection and transfer times are included in Appendix 1.

Dilution Water

A 20 part-per-thousand ($^0/_{00}$) artificial saltwater (Forty Fathoms^R sea salt) was used as the overlying water for the sediment tests. This water was created and aerated for a minimum of 48 hours before being adjusted to test temperature and used for the daily water change-outs.

Test Organisms

The chronic tests were conducted with a benthic estuarine invertebrate, the amphipod *Leptocheirus plumulosus*. The amphipods started in the chronic test should be approximately one day old. However it was not possible to get an exact age from the test organism supplier. The amphipods used in the present tests were between one and three days old at the start of the test, according to the "Organism History" information supplied with the animals. The supplier provided this as the closest grouping of age they could achieve. The Organism History records are supplied in Appendix 2.

The *Leptocheirus* were tested in reference toxicant tests using copper sulfate ($CuSO_4$) to measure health and test acceptability. The LC50 concentrations achieved for the three reference toxicant tests conducted with the *Leptocheirus* were 54.4 ug/L, 31.0 ug/L, and 49.1 ug/L copper.

Test Procedures

The 28-day chronic tests followed the procedures outlined in the December, 1992 publication of the Chesapeake Bay Program guidelines for "Development of a Chronic Sediment Toxicity Test for Marine Benthic Amphipods" (CBP/TRS 89/93).

In preparation the sediments did not require sieving but were thoroughly stirred and all large particles (i.e. branches, stones) were removed manually. Each sediment was visually inspected for indigenous organisms, none were observed. The control sediment, the experimental (field) control sediments, and the test sediments were treated and tested in the same way.

The test containers were 1 liter glass jars to which 175 ml of the homogenized sediment was added. Then 725 mis of 20‰ saltwater were poured over the sediment. The sediments were tested at the 100% concentration only, no dilution series was used. Five replicates were used for each sediment sample. A "performance control" sediment set was run in addition to the test sediments. The control was a clean, uncontaminated sediment obtained from Boulder Reservoir and consisting of organic material and sand. One "experimental" (field) sediment, collected from an area thought to be clean near the site of the test sediment collection, was tested with each batch of sediments.

The first set of chronic *Leptocheirus* tests was started on October 25, 2000 and ran for 28 days, ending on November 22, 2000. One of the experimental control sediments (TC) and five of the test sediments (MG-B7, MG-D9, MG-H7, MG-K7, and MG-N2) were run at this time, along with the performance control sediment. The second set of tests were run with the remaining four test sediments (C-5, C-7, C-16, AND C-33), the other experimental control sediment (CR), and the performance control sediment. These tests were started on December 13, 2000 and ended 28 days later on January 10, 2001. When these tests did not achieve a satisfactory control survival, the sediments were rerun in a third test starting on February 1, 2001 and ending 28 days later on March 1, 2001.

During all the tests the water over the sediments was changed once a day. One test container of each sediment was monitored every other day for temperature, dissolved oxygen, and pH, before the water change. Artificial saltwater used for the change-outs was held in the incubator at test temperature prior to use. Multiple 40-gallon batches of 20‰ saltwater were made during the chronic tests. The data sheet documenting the batch preparations and water quality checks is located in Appendix 3.

The test chambers were fed 1 ml of flake fish food slurry solution (4 grams of flake food blended into 1 liter of deionized water) three times a week. Observations of mortality and/or behavior effects were made and recorded at each water change-out.

The water over each sediment sample was measured for pH, salinity, alkalinity, conductivity, and ammonia at the beginning and at the end of the 28-day tests. The data sheets containing the readings of temperature, dissolved oxygen, and pH; and the water quality readings taken at the beginning and end of the test; are located in Appendices 4, 5, and 6 (for test sets 1, 2, and 3). The tests were held at a temperature of 25 ± 1°C in an incubator with a programmed day cycle of 16 hours light and 8 hours dark. The daily temperature readings and monthly light intensity readings for the incubator are located in Appendix 7. The temperature readings for the incubator were higher than those recorded in the tests themselves (as seen on

Note: Appendices 5 + 6 not relevant and not included in this data report. CDR the test data sheets), however the incubator readings show consistency in the temperature that was maintained.

Dissolved oxygen levels were maintained by aerating all replicates of each sediment test throughout the test study, as suggested in the Chesapeake Bay test instructions.

Test Termination

The sediment tests were terminated at 28 days. Water was pulled from each replicate of one sediment test and composited for final water quality readings. Then the water was poured from each replicate into a clean plastic pan and searched thoroughly for live animals. The sediment was then added to the pans and thoroughly searched also. Diligent effort was made to account for every test organism, either by retrieving them live or finding a body. After the live search, each replicate sediment was returned to the jar and saltwater solution containing rose bengal was added. The sediment was stirred to insure that the rose bengal stain contacted any organisms that were present. The next day (approximately 24 hours later) these sediments were again inspected and any remaining organisms were removed.

On the same day as the live pick, all adults pulled from the sediments were sexed using a dissecting microscope. The adults were euthanized following sexing and dried for 24 hours in a drying oven at approximately 95°C. The dried animals were cooled and weighed the next day. The data sheets containing the dry weight determinations and the number of surviving *Leptocheirus* per replicate are located in Appendices 8, 9, and 10 (for test sets 1, 2, and 3).

The daily observation sheets, which also contain the number of adults and juveniles counted in each replicate at test termination, are located in Appendices 11, 12, and 13 (for test sets 1, 2, and 3).

Only Appendices 8 and 11
are included in this
data report.
CDR

RESULTS

The first *Leptocheirus* chronic tests achieved acceptable performance control survival, although not as high as the 80% survival that the Chesapeake Bay study suggested could be achieved. Table 1 provides a summary of the first set of test results for tests performed on samples TC, MG-B7, MG-D9, MG-H7, MG-K7, and MG-N2. Juveniles were found only in the performance control (2) and in sample MG-N2 (23).

Table 1. Results of sediment tests run from October 25 to November 22, 2000.

Sediment	Survival (%)	Replicate Survival Range Low (%)	Replicate Survival Range High (%)	Survivor's Average Weight (mg)
Performance Control	71%	60%	90%	0.54
TC (Experimental Control)	29%	20%	35%	0.82
MG-B7	31%	15%	30%	1.11
MG-D9	39%	10%	60%	0.83
MG-H7	15%	0%	25%	0.96
MG-K7	0%	--	--	--
MG-N2	49%	25%	65%	0.81

The second set of sediment tests did not achieve acceptable performance control survival. Therefore it was requested that these sediment samples be tested again to attempt to obtain acceptable results. Table 2 provides a summary of the first set of test results for tests performed on samples CR, C-5, C-7, C-16, and C-33. There were juveniles seen in the experimental control CR (10) and in sample C-7 (6).

Table 2. Results of sediment tests run from December 13, 2000 to January 10, 2001.

Sediment	Survival (%)	Replicate Survival Range Low (%)	Replicate Survival Range High (%)	Survivor's Average Weight (mg)
Performance Control	36%	15%	55%	0.21
CR (Experimental Control)	32%	15%	55%	0.66
C-5	11%	5%	20%	0.23
C-7	31%	15%	40%	0.23
C-16	22%	5%	40%	0.31
C-33	67%	60%	80%	0.55

The second set of sediments were tested again to attempt to obtain acceptable results. These tests showed much lower survival numbers in every sediment sample, including the performance control and the experimental control. Table 3 provides a summary of the second set of test results for tests performed on samples CR, C-5, C-7, C-16, and C-33. There were no juveniles found in these test samples.

Table 3. Results of sediment tests run from February 1, to March 1, 2001.

Sediment	Survival (%)	Replicate Survival Range Low (%)	Replicate Survival Range High (%)	Survivor's Average Weight (mg)
Performance Control	0%	--	--	--
CR (Experimental Control)	2%	0	2%	0.09
C-5	0%	--	--	--
C-7	0%	--	--	--
C-16	0%	--	--	--
C-33	0%	--	--	--

REFERENCE TOXICANT TEST RESULTS

The benchsheets for the reference toxicant tests are located in Appendix 14. Each batch of amphipods used for the chronic tests were tested in reference toxicant tests with $CuSO_4$ (the toxicant used at SeaCrest for saltwater organisms) to determine their health and test acceptability. The test guidelines recommended allowing the amphipods to obtain an age of at least one week before performing the reference test, since survival was very low if they were removed from sediment before that age. Some of the reference tests were run with reduced animals per replicate and/or reduced replicates when the number of animals ordered from the supplier did not match the number of animals received.

The *Leptocheirus* reference toxicant tests (called reference controls) were conducted on the first batch of test organisms from November 2 to November 6, 2000; on the second batch of test organisms from December 13 to December 17, 2000; and on the third batch of test organisms from February 12 to February 16, 2001. The test chambers were 30 ml plastic beakers containing water and a small piece of Nitex^R screen placed over the bottom of each beaker. The test was a static, non-renewal. The animals were fed 0.1 ml of fish flake slurry on days 0 and 2. The test concentrations run were 250, 125, 62.5, 31.25, and 15.63 ug/L copper (as $CuSO_4$). The LC50 concentrations for the three tests (three different batches of amphipods) were, respectively, 54.4 ug/L, 31.0 ug/L, and 49.1 ug/L copper.

REFERENCES

APHA/AWWA/WEF. 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. American Public Health Association.

Hach Company. 1992. Hach Water Analysis Handbook. 2nd Edition. Hach Company, Loveland, Colorado.

Chesapeake Bay Program. December, 1992. "Development of a Chronic Sediment Toxicity Test for Marine Benthic Amphipods". CBP/TRS 89/93.

APPENDIX 1. Chain of Custody Form

The SeaCrest Group
An Environmental Services Company

1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record
(enclose with each shipping container)

Purchase Order Number:

Project Number (lab use only): 300459 - 300469

Client: LCP
Contact:
Address:
Program/Site:
Phone:

Collected by: Sampling Team

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute: Cerio	Acute: FH Minnow	Acute: Accelerated	Chronic: Cerio	Chronic: FH Minnow	Chronic: Accelerated	TRE	Other	28-Dey Amphipod Test (Leptocheirus	These fields may be used for field test results			Total Units	Total Volume
1	TC(C)(S)	10-16-00	1115	Grab									✓		plumulosus)		1	
2	CR(C)(S)	10-16-00	1635										✓				1	
3	C-5(S)	10-19-00	Refer to Data (0900)										✓				1	
4	C-7(S)	10-18-00	1610										✓				1	
5	C-16(S)	10-18-00	1010										✓				1	
6	C-33(S)	10-19-00	1050										✓				1	
7	MG-B7(C)(S)	10-16-00	1320										✓				1	
8	MG-D9(C)(S)	10-18-00	1515										✓				1	
9	MG-H7(C)(S)	10-18-00	1605										✓				1	
10	MG-K7(C)(S)	10-16-00	1455										✓				1	
	MG-N2(C)(S)	10-19-00	1030										✓				1	

SEE ATTACHED SAMPLE RECEIPT FORM

Comments and special testing instructions:
Eleven (11) samples. Three (3) replicates per sample. Monitor survival, growth and reproduction (if reproduction occurs). Conduct positive and negative controls.

Relinquished by:
Representing: CDR
To Whom: Fed. Express
Date/Time: 6:00 PM

Relinquished by:
Representing:
To Whom:
Date/Time:

Next recipient:
Relinquished by:
Rec'd by:
Date/Time: 10-20-00 1030

WHITE COPY: Accompanies samples
CANARY COPY: Client

Appendix 2. Test Organism History Sheets from Supplier

COPY

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

RECEIVED
10/25/00

L001024

ORGANISM HISTORY

DATE: 10/24/00

SPECIES: Leptocheirus plumulosus

AGE: 1-3 day

LIFE STAGE: Juvenile

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: Tetramin® Flake Slurry

Temp	pH	Initial D.O.
23.3	8.2	20.2

Salinity	After aeration
19‰	8.2

Water Chemistry Record:	Mean	Range
TEMPERATURE:	25 °C	21-26°C
SALINITY/CONDUCTIVITY:	18 ppt	14-24 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	115 mg/l	90-135 mg/l
pH:	8.38	8.09-8.47

Comments:

Facility Supervisor

Aquatic BioSystems, Inc • Quality Research Organisms

APPENDIX 3. Forty Fathoms^R Salt Water Batches

The SeaCrest Group
Louisville, Colorado

Page No. : 1
Form No. : 025
Effective: February, 1993

SALTWATER LOG

Batch No.	Quantity Water Prepared	Salinity *	Date	Data By
00·01	40L	20	10·24·00	GA
00·02	40L	20	10·31·00	GA
00·02	40L.	20	11·13·00	GA
00·03	40L	20	11·26·00	GA
00 04	40L	20	12·19·00	GA
01·01	50L	20	01·02·01	GA
01.02	35L	20	02·01·01	GA
01·03	40L	20	02·13·01	GA
01-04	35L	20	02-20-01	DS

KKC

* Measured in parts per thousand (‰).

APPENDIX 4. Daily Temperature and Dissolved Oxygen Readings, Other Water Quality Readings for the First Five Sediment Samples and One Experimental Control Sediment (MG-B7, MG-D9, MG-H7, MG-K7, MG-N2, TC)

Sediment Sample Source Control
Date of Test Initiation 10·25·00
Toxicologist Conducting Test Ann Hanson, Kelly Carr, Geoff Henderson, Stacey Breslow

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
10·25·00 1200	0	Control · 2	25.6	6.2	8.1	20	100	34900	0.45
KC 10-27-00 1255	2	3	24.0	6.1	7.9	—		—	
GH 10·29·00 1050	4	1	24.4	6.0	7.9	—		—	
AH 10·31·00 1345	6	5	25.0	6.0	7.4	—		—	
GH 11·2·00 1350	8	4	24.7	5.7	7.3	—		—	
SB 11·4·00 1430	10	2	24.9	5.5	7.6	—		—	
GH 11·6·00 1525	12	3	24.5	6.3	7.5	—		—	
GH 11·8·00 1255	14	2	25.5	6.3	7.5	—		—	
SB 11·10·00 1500	16	1	26.1	5.6	7.9	—		—	
AH 11·12·00 1255	18	2	24.4	6.0	7.3	—		—	
SB 11·14·00 1530	20	3	26.2	5.8	7.8	—		—	

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Sediment Sample Source Control
Date of Test Initiation 10/25/00
Toxicologist Conducting Test

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GA 11.16.00 1615	22	5	23.8	6.3	7.4	–		–	
PA 11.18.00 1700	24	4	23.2	6.7	7.6	–		–	
GA 11.20.00 1310	26	4	24.6	5.9	7.7	–		–	
C 11.22.00 1255	28	3	23.6	6.3	7.8	20	118	26400	0.58

pHC

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Sediment Sample Source MG - B7

Date of Test Initiation 10 · 25 · 00

Toxicologist Conducting Test Dan Hanson, Kelly Carr, Geoff Henderson, Stacey Breslow

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
10·25 00 1315 [illegible]	0	1	25.4	6.2	8.0	20	118	26600	0.45
10-27 00 1235 KC	2	3	24.0	6.1	7.4	—		—	
10 29 00 1100 GH	4	2	24.4	6.0	7.6	—		—	
10 31 00 1405 GH	6	1	25.1	5.7	7.3	—		—	
11 2 00 1400 GH	8	5	24.5	6.0	7.5	—		—	
11-4 00 1515 SB	10	2	25.2	5.8	7.6	—		—	
11 6 00 1555 GH	12	3	24.6	5.6	74	—		—	
11 8 00 1335 GH	14	1	25.1	5.7	7.8	—		—	
11·10 00 1540 SB	16	4	26.3	4.9	7.5	—		—	
11.12 [illegible] [illegible] GH	18	1	24.7	5.7	7.6	—		—	
SB 11.14 00 1510	20	2	25.7	5.1	7.5	—		—	

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 2

Sediment Sample Source MG - B7
Date of Test Initiation 10/25/00
Toxicologist Conducting Test

GK 11.16.00 1650
11.18.00
GK 11.20.00 1330
GK 11.22.00 1300

Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
22	2	23.3	5.1	7.4	—		—	
24	4	23.6	5.4	7.6	—		—	
26	4	24.0	5.1	7.7	—		—	
28	1	24.2	6.0	7.7	20	117	26700	0.71
					KHC			

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 1

Sediment Sample Source MG-D9
Date of Test Initiation 10.25.00
Toxicologist Conducting Test Geoff Henderson, Kelly Carr, Stacey Breslow, Dan Hanson

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GH 10.25.00 1200	0	4	24.6	6.0	7.9	20	134	25800	0.30
KAC 10-27-00 11:50	2	3	24.7	5.5	7.5	–		–	
GH 10.29.00 1000	4	5	24.2	5.9	7.6	–		–	
GH 10.31.00 1300	6	3	24.2	6.1	7.8	–		–	
GH 11.2.00 1330	8	2	24.2	6.7	5.1	–		–	
SB 11.4.00 1415	10	1	24.4	6.2	7.7	–		–	
GH 11.6.00 1510	12	3	24.2	6.5	7.8	–		–	
GH 11.8.00 1240	14	1	25.7	6.3	8.1	–		–	
SB 11.10.00 1435	16	4	26.1	5.5	7.7	–		–	
GH 11.12.00 1210	18	5	25.7	6.3	7.9	–		–	
SB 11.14.00 1435	20	2	25.4	5.9	7.8	–		–	

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 2

Sediment Sample Source MG-D9
Date of Test Initiation 10/25/00
Toxicologist Conducting Test

Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GK 11 16 00 1350 22	3	23.2	6.4	7.1	—		—	
DK 11-18-00 24	2	23.2	6.7	8.0	-		-	
GK 11 20 00 1240 26	1	24.4	6.2	8.0	—		-	
GK 11-22-00 0730 28	3	24.5	6.6	7.9	20	116	27800	0.93

Figure D.3 Data sheet for temperature and overlying water chemistry measurements

Page 1

Sediment Sample Source MG-H7
Date of Test Initiation 10·25·00
Toxicologist Conducting Test Geoff Henderson, Kelly Carr, Stacey Breslow, Dan Hanson

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GH 10·25·00 1230	0	3	25.1	5.1	7.6	20	144	24900	0.98
KC 10-27-00 1220	2	5	24.8	6.1	7.8	—		—	
GH 10 24 00 1040	4	2	24.4	6.0	7.8	—		—	
GH 10 31·00 1420	6	1	24.7	6.6	7 6	—		—	
GH 11·2·00 1410	8	5	24.2	5.9	7.5	—		—	
SB 11-4-00 1500	10	3	25.1	6.0	7.6	—		—	
GH 11 6 00 1620	12	1	24.4	6.1	7.2	—		—	
GH 11 8 00 1325	14	3	25.0	6.2	7.7	—		—	
SB 11-10-00 1530	16	2	25.4	5.6	7.7	—		—	
GH 11·12·00 1250	18	2	24.1	6.0	7.6	—		—	
SB 11·14·00 1445	20	1	25.2	5.8	7.6	—		—	

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 2

Sediment Sample Source MG-H7

Date of Test Initiation 10/25/00

Toxicologist Conducting Test

GA 11.16.00 1010

DA 11.18.00 1740

GA 11.20.00 1300

GA 11.22.00 1130

Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
22	3	23.1	5.7	7.7	—		—	
24	4	23.1	6.6	7.9 ~~6.6~~*	—		—	
26	2	24.6	6.1	7.8	—		—	
28	1	24.6	6.3	7.7	20	101	25800	1.21
					RKC			

* EE DW 11.18

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 1

Sediment Sample Source MG-K7
Date of Test Initiation 10-25-00
Toxicologist Conducting Test Geoff Henderson, Kelly Carr, Stacey Breslow, Dan Hanson

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)	
GH 1315 10-25-00	0	3	24.9	5.3	7.8	20	164	25600	1.31 ~~0.95~~	E.E. GH
KC 1135 10-27-00	2	4	24.4	5.7	7.6	—		—		
GH 10-29-00 1010	4	5	24.2	5.8	7.8	—		-		
GH 10-31-00 1310	6	1	24.3	5.9	7.3	—		—		
GH 11-2-00 1340	8	5	24.4	6.0	7.2	—		—		
SB 11-4-00 1445	10	2	23.9	6.1	7.7	—		—		
GH 11-6-00 1355	12	1	24.3	4.5	7.0	—		—		
GH 11-8-00 1240	14	1	24.7	6.2	8.0	-		-		
SB 11-10-00 1545	16	3	24.7	5.9	7.8	—		—		
GH 11-12-00 1235	18	3	24.7	5.6	7.5	—		-		
SB 11-14-00 1505	20	2	25.4	5.6	7.8	-		—		

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 2

Sediment Sample Source MG - X7
Date of Test Initiation 10/25/00
Toxicologist Conducting Test

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
LH 11.16.00 1640	22	5	24.7	5.2	7.4	—		—	
DD 11.18.00 1740	24	3	23.2	4.6	7.6	—		—	
GH 11.20.00 1340	26	3	24.1	6.3	7.9	—		—	
GG 11.22.00 1455	28	1	24.4	6.0	7.7	30	106	25500	0.91

HC

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 1

Sediment Sample Source MG·N2

Date of Test Initiation 10·25·00

Toxicologist Conducting Test Geoff Henderson, Kelly Carr, Stacey Breslow, Dan Hanson

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GH 10·25·00 1115	0	2	25.7	3.8	7.1	20	152	35800	2.07
KAC 10-27-00 12:07	2	1	24.3	6.1	8.0	—		—	
GH 10 29·00 1020	4	3	24.4	5.7	8 0	—		—	
GH 10 31·00 1320	6	2	24.1	6.2	6.1	—		—	
GH 11·2·00 1335	8	3	24 4	5.8	5.9	—		—	
11·4·00 SD 1450	10	1	24.7	5.8	7.7	—		—	
11·6·00 GH 1610	12	3	24 5	6.2	7.8	—		—	
11·8·00 GH 1310	14	3	25.1	6.5	6.4	—		—	
11·10·00 1515 SB	16	2	25.5	5.6	8.0	—		—	
11·12·00 1240 GH	18	3	24.6	5 8	7 8	—		—	
SB 11·14·00 1455	20	1	25.7	5.6	7.6	—		—	

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Sediment Sample Source MG-N2
Date of Test Initiation 10/25/00
Toxicologist Conducting Test

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GH 11-16-00 1600	22	4	23.1	6.2	7.0	–		–	
DH 11-18-00 1720	24	3	23.1	4.3	7.1	–		–	
GH 11-20-00 1250	26	2	24.3	6.7	7.1	–		–	
GH 11-22-00 1600	28	1	24.0	6.2	7.0	20	97	27500	4.14
						KAC			

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 1

Sediment Sample Source TC (c)(s) 300459
Date of Test Initiation 10·25·00
Toxicologist Conducting Test Dan Hanson, Kelly Carr, Geoff Henderson, Stacey Breslow

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
DA 10 25 00 1115	0	TC-1	26.0	6.1	7.65	20	162	265000	0.93
KC 10-27-00 1245	2	5	24.9	5.8	7.5	–		–	
GH 10.29.00 1030	4	4	24.4	6.0	7.7	–		–	
GH 10 31.00 1355	6	5	24.9	5.8	7.0	–		–	
GH 11.2.00 1400	8	3	24.6	6.1	7.0	–		–	
SD 11.4.00 1435	10	2	24.4	6.2	7.8	–		–	
KC 11.6.00 540	12	4	24.5	6.5	7.8	–		–	
GH 11 8 00 1305	14	1	25.0	6.2	6.9	–		–	
11.10.00 1450 SD	16	3	24.6	5.8	7.8	–		–	
11.12.00 1310 GH	18	4	24.6	6.0	7.8	–		–	
11.14.00 SA 1525	20	2	24.1	5.8	7.7	–		–	

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

Page 2

Sediment Sample Source TC (c)(s)
Date of Test Initiation 10/25/00
Toxicologist Conducting Test

	Test Day	Test Replicate Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	SALINITY (ppt)	Alkalinity (mg/L)	Specific Conductance (umhos/cm)	Total Ammonia (mg/L)
GA 11.16.00 1620	22	2	23.4	5.8	7.9	—		—	
GL 11.18.00 1700	24	3	24.4	6.2	7.9	—		—	
GA 11.20.00 1320	26	4	23.7	6.1	7.7	—		—	
SG 11.22.00 1300	28	2	25.9	5.8	7.7	20	107	27500	0.84

KPC

Figure D.3 Data sheet for temperature and overlying water chemistry measurements.

APPENDIX 7. Incubator Daily Temperature Readings and Monthly Light Intensity Readings

The SeaCrest Group
Louisville, Colorado

COPY

Page No. :
Form No. : 022a
Effective: February, 1993

TEMPERATURE RECORD

Incubator No. : 1
Acceptable Temperature Range : 75-79° F (24-26° C)
Incubator Make : Department of Agriculture
Model : PCG 78
NIST Correction :
Date of NIST Correction :
Initials :

Date	Temperature	Data By	Maintenance Performed	Light Intensity (fc)
10·3·00	26.4	GA	TEMP OK FOR TESTS	
10·4·00	26.2	GA	" " " "	
10·5·00	26.3	GA	" " " "	
10·6·00	25.5	SB		
10·7·00	25.3	SB		
10·8·00	25.4	GA		
10·9·00	27.0	GA	TEMP OK FOR TESTS	
10·10·00	26.3	SB	" " " "	
10·11·00	26.2	SB	" " " "	
10·12·00	26.7	SB	" " " "	
10·13·00	26.6	SB	" " " "	
10·14·00	26.4	SB	" " " "	
10·15·00	26.5	GA	" " " "	
10·16·00	26.5	GA	" " " "	
10·17·00	26.4	GA	" " " "	
10·18·00	26.7	GA	" " " "	
10·19·00	26.7	SB	" " " "	
10·20·00	26.9	SB	" " " "	
10·21·00	26.8	SB	" " " "	
10·22·00	27.3	GA	" " " "	
10·23·00	27.4	GA	" " " "	
10·24·00	27.2	GA	" " "	
10·25·00	26.6	GA	" " " "	
10·26·00	26.2	GA	" " " "	
10·27·00	26.8	SB	" " " "	
10·28·00	27.0	SB	" " " "	
10·29·00	28.9	GA	TURNED DOWN	
10·30·00	26.2	GA	TEMP OK FOR TESTS	

The SeaCrest Group
Louisville, Colorado

COPY

Page No. :
Form No. : 022a
Effective: February, 1993

TEMPERATURE RECORD

Incubator No. : 1
Acceptable Temperature Range : 75-79 ° F (24-26° C)
Incubator Make : Department of Agriculture
Model : PCG 78
NIST Correction :
Date of NIST Correction :
Initials :

Date	Temperature	Data By	Maintenance Performed	Light Intensity (fc)
10.21.00	26.5	GH	TEMP OK FOR TESTS	
11.1.00	26.7	GH	" " "	
11.2.00	26.2	GH	" " " "	
11.3.00	26.0	SD		
11.4.00	25.0	SD		
11.5.00	25.2	GH		
11.6.00	25.1	GH		
11.7.00	27.4	GH	TEMP OK – – –	
11.8.00	27.4	GH	" " " "	
11.9.00	27.1	GH	" " " "	
11.10.00	26.9	SD	" "	
11.11.00		SD		
11.12.00	26.5	GH	TEMP OK FOR TESTS	
11.13.00	27.1	GH	" " " "	
11.14.00	27.3	GH	" "	
11.15.00	27.2	GH	" " "	
11.16.00	27.3	GH	" " " "	
11.17.00	25.0	SD		
11.18.00	24.4	SD		
11.19.00	24.4	GH	[illegible]	
11.20.00	27.2	GH	TEMP OK FOR TE–	
11.21.00	[illegible].2	GH	" "	
11.22.00	27.2	GH	" "	
11.23.00	27.4	GH	" " " "	
11.24.00	27.6	SD	" " "	
11.25.00	27.6	SD	" " "	
11.26.00	27.6	GH	" " " "	
11.27.00	27.7	GH	" " "	

Appendix 8. Number Surviving and Dry Weight Determinations for First Five Sediment Samples and One Experimental Control Sediment (MG-B7, MG-D9, MG-H7, MG-K7, MG-N2, TC)

Page 1

Weight Data Form

Test Dates 10 25 00 11 22 00	**Species** Leptocheirus plumulosus	
Test Material Sediment	**Weighing Date** 11 ~~27~~ 00	**Food** Tetra min
Location LCP	**Oven Temp (°C)** 100 (95?) CDR	**Age Organisms** 29 31 d
Analyst	**Drying Time (h)** >24	**Initial No/Rep** 20

Pan #	Sample	Replicate	Wt. of Oven Dried Pan (mg)	Wt. of Pan + Oven Dried Organisms (mg)	Dried Wt. of Organisms (mg)	Number of Survivors	Mean wt per Survivor	Sample Mean ~~(per 20)~~ *
1	Control	1	19 90	29 23	9.33	15	0.62	~~0.47~~ *
2	"	2	24.36	29 31	4.95	12	0.41	~~0.25~~ *
3	'	3	23.27	31.56	8.29	12	0.69	~~0.44~~ *
4	'	4	25.09	34 07	8.98	14	0.64	~~0.45~~ *
5	'	5	27.50	33 46	6.46	18	0.36	~~0.32~~ *
6	TC	1	28.44	34 33	5.89	6	0.98	~~0.29~~ *
7	"	2	25.93	30 49	4.56	6	0.76	
8	"	3	25.31	29 58	4.07	6	0.68	
9	"	4	26.51	31 42	4.91	7	0.70	
10	"	[illegible]	27.69	31 65	3.96	4	0.99	0.82 mg
11	MG·B7	1	35.69	43 18	7.49	6	1.25	
12	"	2	31.22	34 99	3.77	3	1.26	
13	"	3	33.87	45 99	12.12	14	0.87	
14	"	4	30.15	36.32	6.17	5	1.23	
15	'	5	30.48	33 24	2.76	3	0.92	1.11 mg
16	MG D9	1	27.66	33 47	5.81	7	0.83	
17	"	2	30.65	33 26	2.61	2	1.31	
18	"	3	25.76	31.40	5.64	4	0.71	
19	"	4	27 48	36.45	8.97	12	0.75	
20	.	5	29.80	35 10	5.30	10	0.53	0.83 mg
21	MG H7	1	28.31	32.71	4.40	4	1.10	
22	"	2	27.68	34.47	6.79	5	1.36	
23	"	3	32.52	-	-	0	-	-
24		4	34.91	40 40 ~~[illegible]~~	5.49	5	1.10	
25	'	.	34.94	37 49	2.55	1	0.26	0.96 mg
26	MG·K-		33.42	-	-	0	-	-
27		2	30.94	-	-	0	-	-

* EE MC 12/1/00

$\bar{X} = 0.54$

Figure D.10 Weight data sheet.

Page 2

Weight Data Form

Test Dates 10-25-00 – 11-22-00	**Species** Leptocheirus plumulosus	
Test Material	**Weighing Date** 11-27-00	**Food**
Location LCP	**Oven Temp (°C)**	**Age Organisms**
Analyst	**Drying Time (h)**	**Initial No/Rep**

PAN #	Sample	Replicate	Wt of Oven Dried Pan (mg)	Wt. of Pan + Oven Dried Organisms (mg)	Dried Wt. of Organisms (mg)	Number of Survivors	Mean wt per Survivor	Sample Mean
28	MG K7	3	35.66	-	-	0	-	-
29	"	4	36.37	-	-	0	-	-
30	"	5	35.44	-	-	0	-	-
31	MG N2	1	35.38	40.42	5.04	8	0.63	
32	"	2	34.32	41.32	7.0	11	0.64	
33	"	3	34.36	43.99	9.63	12	0.80	
34	"	4	39.68	45.35	5.67	5	1.13	
35	"	[illegible]	38.11	49.44	11.33	13	0.87	0.81 mg
26	Control #1/Frozen	—	35.11	37.91	2.8	20	0.14	
27	Control #2/Frozen	—	44.04	47.51	3.47	20	0.17	0.16 mg

JAC

Figure D.10 Weight data sheet.

Appendix 11. Daily Comments and Observations for First Five Sediment Samples and One Experimental Control Sediment (MG-B7, MG-D9, MG-H7, MG-K7, MG-N2, TC)

Page 1

Study Director

Study Code Control

Study Name ~~Control~~ L. plumulosus Fed Mon., Wed., Fri

Daily Comment Sheet

Day 0 Date 10-25-00 Initials

1200 Added 20 organisms to each rep. Fed 1ml Tetra-min per rep

Day 1 Date 10-26-00 Initials GA

GA 0950 LEPTOCHEIRUS SEEN SWIMMING IN REP. 1.

Day 2 Date 10-27-00 Initials HC

HC 13:00 No Leptochirus seen. Fed 1 ml Tetra-Min slurry/rep.

Day 3 Date 10-28-00 Initials HC

HC 13:35 Molts seen in reps 5, 2, 3, 4. Holes that look like air or burrow holes seen in sediment.

Day 4 Date 10-29-00 Initials GA

GA 1050 BURROWING HOLES SEEN IN ALL REPS.

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name Control

Daily Comment Sheet

Day 5 Date 10-30-00 Initials GA

1330 GA BURROW HOLES SEEN IN ALL REPS. FED

Day 6 Date 10-31-00 Initials GA

1345 GA BURROW HOLES SEEN IN ALL REPS

Day 7 Date 11-1-00 Initials GA

1250 GA BURROWING HOLES SEEN IN ALL REPS. FED

Day 8 Date 11-2-00 Initials GA

1330 GA BURROW HOLES SEEN IN ALL REPS.

Day 9 Date 11-3-00 Initials DA

1525 DA Burrow holes observed in all reps. Fed

Figure D.7 Daily comment data sheet.

Page 3

Study Director

Study Code

Study Name Control

Daily Comment Sheet

Day 10 Date 11-4-00 Initials SB

1430 SB Burrow holes seen in all reps.

Day 11 Date 11-5-00 Initials GA

1250 GA Burrow holes seen in all reps.

Day 12 Date 11-6-00 Initials GA

1500 GA Burrow holes seen in all reps. FED

Day 13 Date 11-7-00 Initials SB

1405 SB burrow holes seen in all reps.

Day 14 Date 11-8-00 Initials GA

[illegible] GA Burrow holes seen in all reps. FED

Figure D.7 Daily comment data sheet.

Study Director
Study Code
Study Name Control

Daily Comment Sheet

Day 15 Date 11-9-00 Initials SB

1200 SB Burrow holes seen in all reps.

Day 16 Date 11-10-00 Initials SB

1500 SB burrow holes seen in all reps. molts seen in reps 2, 1 & 4. Fed 1mL Tetra-min / rep.

Day 17 Date 11-11-00 Initials SB

1340 SB Burrow holes seen in all reps.

Day 18 Date 1-12-00 Initials GK

1255 GK Burrow holes seen in all reps.

Day 19 Date 11-13-00 Initials GK

1250 GK Burrow holes seen in all reps. FED

Figure D.7 Daily comment data sheet.

Page 5

Study Director

Study Code

Study Name Control

Daily Comment Sheet

Day 20 Date 11-14-00 Initials SB

1530 SB Burrow holes seen in all reps.

Day 21 Date 11-15-00 Initials GA

1220 GA No Leptocheirus or Burrow holes observed. F.D

Day 22 Date 11-16-00 Initials GA

1615 GA Burrow holes seen in all reps.

Day 23 Date 11-17-00 Initials MC

1625 No Leptocheirus seen. Fed all reps.

Day 24 Date 11-18-00 Initials DA

1700 Burrow holes seen in all reps.

Figure D.7 Daily comment data sheet.

Page 6

Study Director

Study Code control

Study Name

Daily Comment Sheet

Day 25 Date 11-19-00 Initials GA

1310 GA [illegible] 140 [illegible] 2 reps

Day 26 Date 11-20-00 Initials GA

[illegible] GA [illegible] T-D

Day 27 Date 11-21-00 Initials GA

1255 GA [illegible] in [illegible] 2+3

Day 28 Date 11-22-00 Initials DA

Test Taken Down	Rep #	[illegible] #	♂	♀	# [illegible]	Survival %
	1	15	5	10	0	75%
	[illegible]	12	7	5	1	60
	3	12	5	7	0	60
	4	14	4	10	1	70
	[illegible]	18	4	9	0	90

$\bar{X}=71$

Day Date - - Initials

KAC

Figure D.7 Daily comment data sheet.

Page 1

Study Director

Study Code MG - B7

Study Name L plumolosus Fed Mon., Wed., Fri.

Daily Comment Sheet

Day 0 Date 10 - 25 - 00 Initials DA

1315 Added 20 organisms to each rep. Fed 1ml Tetra-min to each rep.

Day 1 Date 10 - 26 - 00 Initials GA

0920 GA LEPTOCHEIRUS SEEN FLOATING IN REPS. 2+3 (PUSHED UNDER)

Day 2 Date 10 - 27 - 00 Initials KAC

KAC 1239 No Leptochirus seen. Fed 1ml Tetra-Min slurry/rep.

Day 3 Date 10 - 28 - 00 Initials KAC

KAC 1355 No Leptochirus seen.

Day 4 Date 10 - 29 - 00 Initials GA

1100 GA NO LEPTOCHEIRUS SEEN

Figure D.7 Daily comment data sheet.

Page 2

Study Director

Study Code

Study Name MG-B7

Daily Comment Sheet

Day 5 Date 10-30-00 Initials GA

13 20 GA NO LEPTOCHEIRUS SEEN

Day 6 Date 10-31-00 Initials GA

1405 GA BURROW HOLES SEEN IN REPS. 2+3.

Day 7 Date 11-1-00 Initials GA

1310 BURROWING HOLES SEEN IN ALL REPS. FED.

Day 8 Date 11-2-00 Initials GA

1405 GA BURROW HOLES SEEN IN ALL REPS.

Day 9 Date 11-3-00 Initials DH

1530 DH Burrow holes observed in all reps. Fed.

Figure D.7 Daily comment data sheet.

Page 3

Study Director

Study Code

Study Name MG - B7

Daily Comment Sheet

Day 10 Date 11 - 4 - 00 Initials SB

1515 SB Burrow holes seen in all reps.

Day 11 Date 11 - 5 - 00 Initials GA

1310 GA Burrow holes seen in all reps.

Day 12 Date 11 - 6 - 00 Initials GA

1550 GA Burrow holes seen in all reps. FED.

Day 13 Date 11 - 7 - 00 Initials SB

1340 SB Burrow holes seen in all reps.

Day 14 Date 11 - 5 - 00 Initials GA

1335 GA Burrow holes seen in all reps. FED

Figure D.7 Daily comment data sheet.

Page 4

Study Director

Study Code

Study Name MG - B7

Daily Comment Sheet

Day 15 Date 11 - 9 . 00 Initials SB

1125 SB Burrow holes seen in all reps.

Day 16 Date 11 - 10 - 00 Initials SB

1540 SB Burrow holes seen in all reps. Fed 1ML Tetra-min/rep.

Day 17 Date 11 - 11 - 00 Initials SB

1335 SB Burrow holes seen in all reps.

Day 18 Date 11 - 12 - 00 Initials GA

1220 GA Burrow holes seen in all reps.

Day 19 Date 11 - 3 - 00 Initials GA

1325 GA Burrow holes seen in all reps Fed

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name MG - B7

Daily Comment Sheet

Day 20 Date 11-14-00 Initials SB

1510 SB Burrow holes seen in all reps.

Day 21 Date 11-15-00 Initials GA

1245 GA BURROW HOLES SEEN IN ALL REPS FED

Day 22 Date 11-16-00 Initials GA

1650 GA BURROW HOLES SEEN IN ALL REPS.

Day 23 Date 11-17-00 Initials BC

1650 Burrow seen. Fed all reps.

Day ~~17t~~ 24 Date 11-18-00 Initials DA

1746 Burrow hole seen in all reps

Figure D.7 Daily comment data sheet.

Page 6

Study Director

Study Code MC-B7

Study Name

Daily Comment Sheet

Day 25 Date 11 - 19 - 00 Initials GA

1330 GA BURROW HOLES SEEN IN ALL REPS.

Day 26 Date 11 - 20 - 00 Initials GA

1330 GA BURROW HOLES SEEN IN ALL REPS. FED

Day 27 Date 11 - 21 - 00 Initials GA

1310 GA BURROW HOLES SEEN IN ALL REPS.

Day 28 Date 11 - 22 - 00 Initials GA

TEST TAKEN DOWN	REP #	SURVIVAL #	♂	♀	# BABIES	Survival %
	1	6	3	3	0	30%
	2	3	0	3	0	15
	3	14	9	5	0	70
	4	5	4	1	0	25
	5	3	1	2	0	15

$\bar{X} = 31\%$

Day Date - - Initials

KAC

Figure D.7 Daily comment data sheet.

Page 1

Study ' or

Stuc MG-D9

‹ame L. Plumulosus

Fed Mon., Wed., Fri.

Daily Comment Sheet

Day 0 Date 10-25-00 Initials GA

1200 GA ADDED 20 ORGANISMS/REP FED 1 ml TETRAMIN/REP

Day 1 Date 10-26-00 Initials GA

GA 1010 No LEPTOCHEIRUS OBSERVED.

Day 2 Date 10-27-00 Initials KC

1150 KC. No Leptochirus seen. Fed 1 ml Tetra-Min slurry/rep.

Day 3 Date 10-28-00 Initials KC

1500 KC Burrow holes seen in Rep. 1.

Day 4 Date 10-29-00 Initials GA

1000 GA No LEPTOCHEIRUS SEEN.

Figure D.7 Daily comment data sheet.

Page 3

Study Director

Study Code

Study Name MG - D9

Daily Comment Sheet

Day 10 Date 11-4-00 Initials SB

1415 SB No Leptochirus seen.

Day 11 Date 11-5-00 Initials GA

1230 GA Burrow holes seen in all reps.

Day 12 Date 11-6-00 Initials GA

1400 GA Burrow holes seen in all reps. FED

Day 13 Date 11-7-00 Initials SB

1330 SB Burrow holes seen in all reps.

Day 14 Date 11-8-00 Initials GA

1240 GA Burrow holes seen in all reps. FED

Figure D.7 Daily comment data sheet.

Page 4

Study Director

Study Code

Study Name MG-D9

Daily Comment Sheet

Day 15 Date 11-9-00 Initials SB

1105 SB Burrow holes seen in all reps. Molts seen in reps 3 & 4.

Day 16 Date 11-10-00 Initials SB

1440 SB Burrow holes seen in all reps. Fed 1ml Tetra-min/rep.

Day 17 Date 11-11-00 Initials SB

1325 SB Burrow holes seen in all reps.

Day 18 Date 11-12-00 Initials GA

1310 GA Burrow holes seen in all reps.

Day 19 Date 11-13-00 Initials GA

1320 GA Burrow holes seen in reps 3 & 4 Fed

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name MG-D9

Daily Comment Sheet

Day 20 Date 11-14-00 Initials SB

1435 SB Burrow holes seen in reps 3&4.

Day 21 Date 11-15-00 Initials GA

1155 GA BURROW HOLES SEEN IN REPS. 4+5. FED.

Day 22 Date 11-16-00 Initials GA

1550 GA BURROW HOLES SEEN IN ALL REPS.

Day 23 Date 11-17-00 Initials KMC

1700 Nothing seen - water too cloudy. All reps fed.

Day 24 Date 11-18-00 Initials PL

1600 Burrow holes seen in all reps.

Figure D.7 Daily comment data sheet.

Page 6

Study Director

Study Code mG-09

Study Name

Daily Comment Sheet

Day 25 **Date** 11-19-00 **Initials** GA

1240 GA Burrow holes seen in all reps.

Day 26 **Date** 11-20-00 **Initials** GA

1240 GA Burrow holes seen in all reps. FED

Day 27 **Date** 11-21-00 **Initials** GA

1230 GA No Leptocheirus/Burrow holes seen.

Day 28 **Date** 11-22-00 **Initials** GA

Test taken down:	Rep #	Survival #	♂	♀	# Babies	Survival %
	1	7	3	4	0	35%
	2	2	2	0	0	10%
	3	8	2	6	0	40%
	4	12	9	3	0	60%
	5	[illegible] 10 EC GA 11/22	7	3	0	50% $\bar{x} = 39\%$

Day **Date** - - **Initials**

NC

Figure D.7 Daily comment data sheet.

Page 1

Study Director

Study Code MG-H7

Study Name L. PLUMULOSUS

Fed Mon., Wed., Fri.

Daily Comment Sheet

Day 0 Date 10-25-00 Initials GA

1230 GA ADDED 20 ORGANISMS / REP. FED 1ml TETRAMIN / REP

Day 1 Date 10-26-00 Initials GA

0940 GA LEPTOCHEIRUS SEEN FLOATING IN REP 5. (PUSHED UNDER).

Day 2 Date 10-27-00 Initials KAC

KAC 12:25 No Leptochirus seen. Fed 1ml Tetra-Min slurry/rep.

Day 3 Date 10-28-00 Initials KAC

KAC 14:10 Saw what looks like dead animals in rep. 4.

Day 4 Date 10-29-00 Initials GA

1035 GA N LEPTOCHEIRUS SEEN

Figure D.7 Daily comment data sheet.

Page 2

Study Director

Study Code

Study Name MG-H7

Daily Comment Sheet

Day 5 Date 10-30-00 Initials GA

1310 GA LEPTOCHEIRUS SEEN FLOATING IN [illegible] 5 (BUCKET CENTER). FED.

Day 6 Date 10-31-00 Initials GA

1420 NO LEPTOCHEIRUS SEEN.

Day 7 Date 11-1-00 Initials GA

1330 GA NO LEPTOCHEIRUS SEEN FED.

Day 8 Date 11-2-00 Initials GA

1410 GA NO LEPTOCHEIRUS SEEN

Day 9 Date 11-3-00 Initials

1540 No lepto. observed. Fed.

Figure D.7 Daily comment data sheet.

Page 3

Study Director

Study Code

Study Name MG-#7

Daily Comment Sheet

Day 10 Date 11-4-00 Initials SB

1500 SB Burrow holes seen in reps 1&4.

Day 11 Date 11-5-00 Initials GA

1340 GA No burrow holes observed.

Day 12 Date 11-6-00 Initials GA

1625 GA Burrow holes seen in all reps. (FED)

Day 13 Date 11-7-00 Initials SB

1415 SB burrow holes seen in all reps.

Day 14 Date 11-8-00 Initials GA

1325 GA Burrow holes seen in all reps. (FED.)

Figure D.7 Daily comment data sheet.

Page 4

Study Director
Study Code
Study Name MG-#7

Daily Comment Sheet

Day 15 Date 11-9-00 Initials SB

1120 SB Burrow holes seen in reps 1, 2 & 5.

Day 16 Date 11-10-00 Initials SB

1530 SB Burrow holes seen in all reps. (fed) 1mL Tetra-min/rep.

Day 17 Date 11-11-00 Initials SB

1400 SB Burrow holes seen in all reps

Day 18 Date 11-12-00 Initials [illegible]

1250 [illegible] Burrow holes seen in all reps.

Day 19 Date 11-13-00 Initials [illegible]

1345 [illegible] Burrow holes seen in all reps.

Figure D.7 Daily comment data sheet.

Page 5

Study Director

Study Code

Study Name MG - N7

Daily Comment Sheet

Day 20 Date 11 - 14 - 00 Initials SB

1445 SB Burrow holes seen in all reps.

Day 21 Date 11 - 15 - 00 Initials GA

1210 GA BURROW HOLES SEEN IN ALL REPS. FED

Day 22 Date 11 - 16 - 00 Initials GA

1610 GA BURROW HOLES SEEN IN ALL REPS.

Day 23 Date 11 - 17 - 00 Initials KC

1645 Burrow holes seen. Fed all replicates.

Day 24 Date 11 - 18 - 00 Initials DA

1740 Burrow holes seen in all reps.

Figure D.7 Daily comment data sheet.

Page 6

Study Director

Study Code MG-H7

Study Name

Daily Comment Sheet

Day 25 Date 11-19-00 Initials GA

1300 GA BURROW HOLES SEEN IN ALL REPS.

Day 26 Date 11-20-00 Initials GA

1300 GA BURROW HOLES SEEN IN REP. 2 + 3 ECD

Day 27 Date 11-21-00 Initials GA

1245 GA BURROW HOLES SEEN IN ALL REPS

Day 28 Date 11-22-00 Initials GA

	REP #	SURVIVAL #	♂	♀	# BABIES	Survival %
TEST TAKEN DOWN:						
	1	4	2	2	0	20 %
	2	~~3~~ 4 5	4	1	0	25
	3	0	–	–	0	0
	4	5	2	3	0	25
	5	1	–	1	0	5

$\bar{X}=15$

Day Date - - Initials

KPC

Figure D.7 Daily comment data sheet.

Page 1

Study Director

Study Code MG-K7

Study Name L. Plumulosus Fed Mon., Wed., Fri.

Daily Comment Sheet

Day 0 Date 10-25-00 Initials GA

1315 GA ADDED 20 ORGANISMS / REP. FED 1 ml TETRA-MIN / REP

Day 1 Date 10-26-00 Initials GA

1020 GA NO LEPTOCHIRUS OBSERVED.

Day 2 Date 10-27-00 Initials KAC

1135 KAC No Leptochirus seen. Fed 1 mL Tetra-Min slurry/rep.

Day 3 Date 10-28-00 Initials KAC

KAC 14:40 No Leptochirus seen.

Day 4 Date 10-29-00 Initials GA

[illegible] GA NO LEPTOCHIRUS SEEN.

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name MG-X7

Daily Comment Sheet

Day 15 Date 11-9-00 Initials SB

1140 SB Burrow holes seen in reps 4&5.

Day 16 Date 11-10-00 Initials SB

1545 SB No leptochirus seen. Fed 1mL Tetra-min/rep

Day 17 Date 11-11-00 Initials SB

1330 SB Burrow holes seen in reps 1,2&5.

Day 18 Date 11-12-00 Initials GA

1230 GA No LEPTOCHEIRUS SEEN.

Day 19 Date 11-13-00 Initials GA

1340 GA NO LEPTOCHEIRUS SEEN FED.

Figure D.7 Daily comment data sheet.

Page 6

Study Director

Study Code MG-K7

Study Name

Daily Comment Sheet

Day 25 Date 11-19-00 Initials GA

1340 GA Burrow holes seen in Reps. 2 + 3.

Day 26 Date 11-20-00 Initials GA

1340 GA No Leptocheirus / Burrow holes seen (Fed)

Day 27 Date 11-21-00 Initials GA

1320 GA No Leptocheirus / Burrow holes seen.

Day 28 Date 11-22-00 Initials GA

Test Taken Down:	Rep #	Survival #	♂	♀	# Babies	Survival %
	1	0	–	–	0	0
	2	0	–	–	0	0
	3	0	–	–	0	0
	4	0	–	–	0	0
	5	0	–	–	0	0

Day Date - - Initials

HAC

Figure D.7 Daily comment data sheet.

Page 1

Study Director

Study Code MG-N2

Study Name L. Plumulosus Fed Mon., Wed., Fri.

Daily Comment Sheet

Day 0 Date 10-25-00 Initials GA

1115 GA ADDED 20 ORGANISMS / REP FED 1 ml TETRA-MIN / REP.

Day 1 Date 10-26-00 Initials GA

0910 GA LEPTOCHEIRUS SEEN FLOATING IN REP. 4. (PUSHED UNDER).

Day 2 Date 10-27-00 Initials HC

HC 12:10 No Leptocheirus seen. Fed 1ml Tetra-Min slurry/rep.

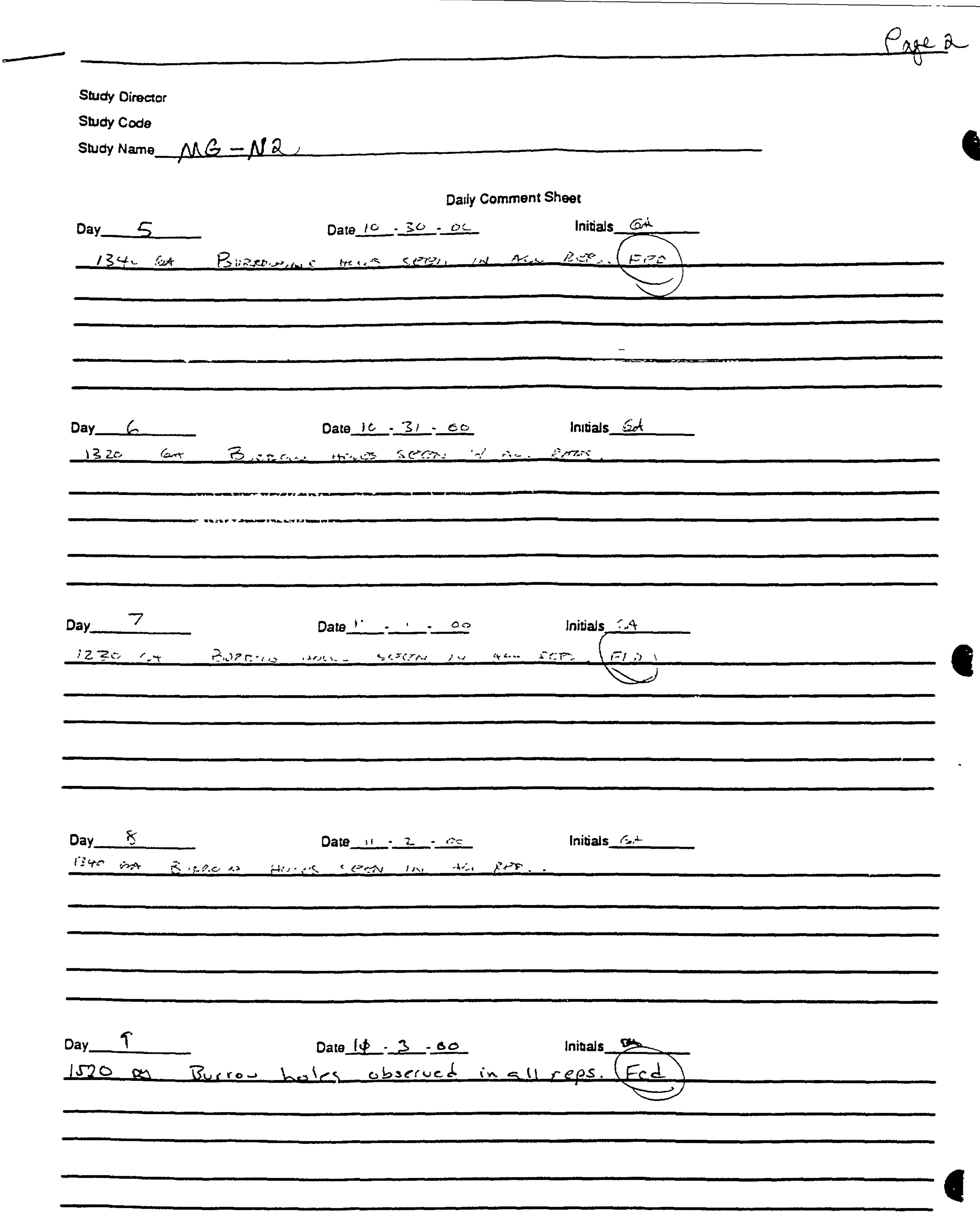
Day 3 Date 10-28-00 Initials HC

HC 14:25 Burrow holes seen in all reps.

Day 4 Date 10-29-00 Initials GA

GA 1020 BURROW HOLES SEEN IN ALL REPS

Figure D.7 Daily comment data sheet.



Page 2

Study Director

Study Code

Study Name MG-N2

Daily Comment Sheet

Day 5 Date 10-30-00 Initials GA

1340 GA Burrowing holes seen in all reps. Fed

Day 6 Date 10-31-00 Initials GA

1320 GA Burrow holes seen in all reps.

Day 7 Date 11-1-00 Initials GA

1230 GA Burrowing holes seen in all reps. Fed

Day 8 Date 11-2-00 Initials GA

1340 GA Burrow holes seen in all reps..

Day 9 Date 10-3-00 Initials [illegible]

1520 [illegible] Burrow holes observed in all reps. Fed

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name MG-N2

Daily Comment Sheet

Day 10 Date 11-4-00 Initials SB

1450 SB Burrow holes seen in all reps.

Day 11 Date 11-5-00 Initials GA

1330 GA BURROW HOLES SEEN IN ALL REPS.

Day 12 Date 11-6-00 Initials GA

1610 GA BURROW HOLES SEEN IN ALL REPS. FED.

Day 13 Date 11-7-00 Initials SB

1425 SB burrow holes seen in all reps.

Day 14 Date 11-8-00 Initials GA

1315 GA BURROW HOLES SEEN IN ALL REPS. FED

Figure D.7 Daily comment data sheet.

Page 4

Study Director
Study Code
Study Name MG - N2

Daily Comment Sheet

Day 15 Date 11 - 9 - 00 Initials SB

1125 SB Burrow holes seen in all reps.

Day 16 Date 11 - 10 - 00 Initials SB

1515 SB Burrow holes seen in all reps. molts seen in all reps.
Fed 1ml Tetra-min/rep.

Day 17 Date 11 - 11 - 00 Initials SB

1355 SB Burrow holes seen in rep 1. water too murky to see
in other reps.

Day 18 Date 11 - 12 - 00 Initials GA

1240 GA BURROW HOLES SEEN in all REPS.

Day 19 Date 11 - 13 - 00 Initials GA

1340 GA BURROW HOLES SEEN IN ALL REPS. FED

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name MG-N2

Daily Comment Sheet

Day 20 Date 11-14-00 Initials SB

1455 SB Burrow holes seen in all reps.

Day 21 Date 11-15-00 Initials GH

1200 GH Burrow holes seen in reps. 3 [illegible] 4. Fed.

Day 22 Date 11-16-00 Initials GH

1600 GH Burrow holes seen in all reps.

Day 23 Date 11-17-00 Initials HC

1140 HC Burrow holes seen. Fed all reps.

Day 24 Date 11-18-00 Initials GH

1720 GH Burrow holes seen in all reps.

Figure D.7 Daily comment data sheet.

Page 6

Study Director
Study Code MG-N2
Study Name

Daily Comment Sheet

Day 25 Date 11 - 19 - 00 Initials GA

1250 GA Burrow holes seen in all pots.

Day 26 Date 11 - 20 - 00 Initials GA

1250 GA No [illegible] / burrow holes [illegible] (more water) [illegible]

Day 27 Date 11 - 21 - 00 Initials GA

1240 GA Burrow holes seen in all pots.

Day 28 Date 11 - 22 - 00 Initials GA

Test Taken Down.	Rep #	Survival #	♂	♀	# Brood	Survival %
	1	8	5	3	8	40%
	2	11	4	7	6	55
	3	12	6	6	0	60
	4	5	43	2	5	25
	5	13	8	5	4	65 $\bar{x} = 49\%$

Day Date - - Initials

HC

Figure D.7 Daily comment data sheet.

Page 1

Study Director
Study Code TC - (c)(s)
Study Name L. plumulosus Fed Mon., Wed., Fri.

Daily Comment Sheet

Day 0 Date 10 - 25 - 00 Initials GA

1115 Added 20 organisms per rep. Fed 1ml Tetra-min

Day 1 Date 10 - 26 - 00 Initials GA

GA 1000 NO LEPTOCHEIRUS OBSERVED

Day 2 Date 10 - 27 - 00 Initials HC

HC 12:45 No Leptochirus seen. Fed 1ml Tetra-Min slurry/rep.

Day 3 Date 10 - 28 - 00 Initials HC

HC 14:15 Burrow holes seen in all reps except rep. 5.

Day 4 Date 10 - 29 - 00 Initials GA

1030 GA BURROW HOLES SEEN IN ALL REPS.

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name TC (c)(s)

Daily Comment Sheet

Day 10 Date 11-4-00 Initials SB

1425 SB Burrow holes observed in all reps.

Day 11 Date 11-5-00 Initials GA

1300 GA Burrow holes seen in all reps.

Day 12 Date 11-6-00 Initials GA

1540 GA Burrow holes seen in all REP. Ext.

Day 13 Date 11-7-00 Initials SB

1400 SB burrow holes seen in all reps except 5.

Day 14 Date 11-8-00 Initials GA

1305 GA Burrow holes seen in all REP. [illegible]

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name TC (c)(s)

Daily Comment Sheet

Day 15 Date 11-9-00 Initials SB

1150 SB No animals seen - water murky.

Day 16 Date 11-10-00 Initials SB

1450 SB Burrow holes seen in rep 4. Water too murky in other reps to see. Fed 1mL Tetra-min/rep

Day 17 Date 11-11-00 Initials SB

1350 SB Burrow holes seen in all reps.

Day 18 Date 11-12-00 Initials GH

1310 GH BURROW HOLES SEEN IN ALL REPS.

Day 19 Date 11-13-00 Initials GH

1400 GH BURROW HOLES SEEN IN REPS 4+5. FED

Figure D.7 Daily comment data sheet.

Study Director

Study Code

Study Name TC (c)(5)

Daily Comment Sheet

Day 20 Date 11-14-00 Initials SB

1525 SB Burrow holes seen in reps 1, 2, & 3. Water too morky to see in reps 4 & 5.

Day 21 Date 11-15-00 Initials GA

1230 GA Burrow holes seen in all reps. Fed

Day 22 Date 11-16-00 Initials GA

1620 GA Burrow holes seen in all reps

Day 23 Date 11-17-00 Initials AC

1630 Burrow holes seen. All reps fed

Day 24 Date 11-18-00 Initials SA

1700 Burrow holes seen in all reps

Figure D.7 Daily comment data sheet.

Page 6

Study Director

Study Code TC-(C)(S)

Study Name

Daily Comment Sheet

Day 25 Date 11-19-00 Initials GH

730 GH BURROW HOLES SEEN IN ALL REPS.

Day 26 Date 11-20-00 Initials GH

[illegible] GH BURROW HOLES SEEN IN REPS. 2+4 ETC

Day 27 Date 11-21-00 Initials GH

1300 GH BURROW HOLES SEEN IN REPS. 4+1.

Day 28 Date 11-22-00 Initials SB

TEST TAKEN DOWN:

REP #	SURVIVAL #	♂	♀	# BABIES	Survival %
1	6	3	3	0	30%
2	6	3	3	0	30%
3	6	1	5	0	30%
4	7	2	5	0	35%
5	4	3	1	0	20% $\bar{X}$=

Day___ Date___-___-___ Initials___

Figure D.7 Daily comment data sheet.

Appendix 14. Reference Toxicant Test Benchsheets and Reference Stock Prep Sheets

Form: 037 Effective: May, 1997

The SeaCrest Group Fathead Minnow Acute Benchsheet

Permittee: Leptocheirus Ref-Tox	Lab Number: —
Site: —	Template Number: —
IWC %: (250 ppb) Cu SO4	Dilution Water: Seaswater 00.02 (20%) (20ppt).
Sample Date: —	Species Information: Lept. ABS 100.025 9-12 d
Test Started: 11.2.00 1230	Test Ended: 11.6.00 1230
Test Conditions: x Non - Renewal	

Conc & Rep	Number Alive					Dissolved Oxygen					Temperature °C					pH					~~Cond.~~ SAL
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	~~umhos~~ ppt
250	3	1	1	0	0	5.5	2.6	6.1	6.3	—	25.2	25.6	24.7	24.6	—	8.2	7.5	7.9	8.0	—	20
125	3	0	0	0	0	5.4	3.3	—	—	—	25.2	25.6	—	—	—	8.1	7.5	—	—	—	20
62.5	3	2	2	2	2	5.4	2.3	6.2	6.3	6.0	25.2	25.6	24.7	24.3	24.6	8.1	7.4	7.9	8.0	8.0	20
31.25	3	2	2	2	2	5.4	2.5	6.3	6.2	6.1	25.1	25.5	24.7	24.3	24.6	8.1	7.3	7.9	8.0	7.9	20
15.625	3	3	3	3	3	5.5	3.2	6.3	6.4	6.5	25.1	25.3	24.2	24.2	24.6	8.1	7.3	7.9	8.0	7.9	20
0	3	3	3	3	3	5.7	2.6	6.5	6.7	6.4	24.9	25.2	24.1	24.2	24.6	8.1	7.2	7.9	7.8	7.9	20
Initials	Gt	SB	SB	Gt	Gt											Gt			Gt	Gt	

	Effluent #1	Receiving #1	Recon	Effluent #2	Receiving #2
Hardness (mg/l)					
Alkalinity (mg/l)					
Chlorine (mg/l)					
Ammonia Initial (mg/l)					
Ammonia Final (mg/l)					

PKC

```
   'NLQ 12cpi/ ♣2X☺#●{●°  ë?xxx≡↑>H┬☺x·§6►X►@Ä╒{±☺X●@·······      ·  ·
    ıd≡¶?♠┬☺d·§6►X►@Ä┼{±☺X●@·······      ·  ·                     G ♠_9♠є9<▄t<▌
♠╨R♠ΩLt▄â>τK tєδ╙╛Nb♠╡3║╟D►☺+└úXëúVëúTëúZëÇ╡f●ïN♦ï^♠♠MH♠;G♠    eë♠q¤ïσ]ˆY[X├SQR╖:
(δ"♠/ï╤ ╙<└s♠♠v9Bδ⌠♠▲♥╤<█uδï╧♠D:♠          9ZY[├Q♠6:♠/8Y├PV╛┴"THE SEACREST GROUP
                                                                Page ___________

***************************** Version  2.5 ******************************

                 Results calculated using the Summary Method.

*************************************************************************

               Sponsor              :                    CDR
               Species              :             LEPTOCHIRUS
               Study Number         :                REF TOX
               Dates of test        :   11/2/00  to  11/6/00
               Test Material        :                  CUSO4
               Concentration Units  :                    PPB
               Report run by        :                    KAC
               Date of report       :             01-20-2001

*************************************************************************
                              SEDIMENT TESTS
*************************************************************************

           Concentration      Number       Number       Percent
            (    PPB    )     Exposed       Dead          Dead
           -------------      -------      ------       ------
                250.0            3            3          100.0
                125.0            3            3          100.0
                 62.5            3            1           33.3
                 31.3            3            1           33.3
                 15.6            3            0            0.0
              Control            3            0            0.0

*************************************************************************

                                      95% Confidence Limits
Method              W          LC50      Lower          Upper        Slope
-------------------------------------------------------------------------

Binomial                      71.79      ******        ******       --N/A--
Moving Average                52.54      17.05         114.26       --N/A--
Probit                        54.43      19.44         147.26         3.87
Logit                         63.23       0.00         Infinity       2.87

-------------------------------------------------------------------------

  Note --  In order to produce this summary report, no warning or diag-
           nostic messages were given (if any occurred).  An asterisk
           appearing next to the method indicates that there was a
           warning associated with the corresponding method.  You should
           run the full report for this method to determine the problem.
           This report is intended for informational purposes only.

***************************** End Of Report *****************************
```

The SeaCrest Group
Broomfield, Colorado

Form No:048
Effective: November, 1998

STOCK PREPARATION

Substance: $CuSO_4$

Manufacturer: VWR

Lot No: 121189/41256

Date Received: 11·19 96

Expiration Date: 8 31·99

Solvent Used: DI H_2O

Manufacturer: N A

Lot No: N/A

Date Received: N.A

Expiration Date: N/A

Balance Used: 2

Date/Time of Calibration: 11·2 00

Amount Weighed or Volume Used: 250 mg

Volume Diluted To: 1 L

Calculated Nominal Stock Concentration: 100 mg/L

Expiration Date of Stock: 05 3 01

Special Preparation Procedures Used (heat, stirring, shaking, etc.): N/A

Purpose for stock: L Producing Ref Tox Solution

Stock prepared by: GH

Date: 11·2·00

Time: 1030

Notes and Comments: N/A

COPY

The SeaCrest Group
Broomfield, Colorado

Form No:048
Effective: November, 1998

STOCK PREPARATION

Substance: CuSO4 Solution

Manufacturer: SeaCrest Group

Lot No: —

Date Received: —

Expiration Date: —

Solvent Used: Salt H2O

Manufacturer: SeaCrest Group

Lot No: 00-02

Date Received: 10.31.00

Expiration Date: N/A

Balance Used: N/A

Date/Time of Calibration: N/A

Amount Weighed or Volume Used: 25 mls of 100 mg/L

Volume Diluted To: 1 L

Calculated Nominal Stock Concentration: 250 ppb

Expiration Date of Stock: 05.3.04

Special Preparation Procedures Used (heat, stirring, shaking, etc.): N/A

Purpose for stock: L. plumulosus Ref Tox

Stock prepared by: GA

Date: 11.2.00

Time: 1030

Notes and Comments: N/A

Appendix D.2

SKIDAWAY INSTITUTE OF OCEANOGRAPHY
(SURFACE SEDIMENT)

Protocols for Toxicity, Ovary Formation, Embryo Production and Embryo Development in Grass Shrimp *(Palaemonetes pugio)* Exposed to Test Sediments

Principal Investigator: Richard F. Lee
Skidaway Institute of Oceanography
10 Ocean Science Circle
Savannah, GA 31411
Telephone Number: 912-5982494
FAX: 912-5982310
E-mail: dick@skio.peachnet.edu

INTRODUCTION

Grass shrimp (*Palaemonetes pugio*) are an important component of the estuarine food web in the southeastern United States (Kneib,1987). For the tests described below, juvenile grass shrimp were exposed to test sediments for 2.0 months. If no toxicants are present in the sediments then juveniles grow into adults, adult females produce large ovaries, eggs are produced and fertilized, embryos develop and hatch into the free living zoea stage. The developing embryos, enclosed in egg sacs, are attached externally to the abdomen of the females. Embryos develop within the egg sac for approximately two weeks (at 27°C) after which the zoea stage emerges from the egg sac.

METHODS

Sediment exposure

Three groups (n=3) with each group consisting of 25 juvenile grass shrimp were exposed to test sediments (500g) in aquaria with 20 liters of estuarine water at 27°C (salinity 28ppt). Grass shrimp were fed *Artemia* and kept under 12hour light/12 hour dark regime. Every 5 days the following parameters were determined: (a) number of dead grass shrimp; (b) number of females with mature ovaries; (c) number of females with attached embryos. After embryos reach stage 9 they were removed by a cut at the stem attaching them to females. Twenty four embryos were transferred to 24 well polystyrene plates containing 2ml of estuarine water in each well and 1embryo was placed in each well. Embryos were collected from one female from each sediment exposure (n=3).. Culture plates were kept in the dark at 27°C and per cent of embryos hatching out from each female was determined. Hatching generally was completed within 48 hours after transfer to the culture plates.

QUALITY ASSURANCE

At the beginning and end of the study positive control experiments were carried out with late stages embryos using 1μM, 2μM, 5μM and 10μM 2,4-nitroquinoline-4-oxide. This is a known DNA damaging agent and previously shown to effect grass shrimp embryo hatching (Lee et al., 2000). A dose-response curve was prepared determining embryo hatching at each concentration. The dose-response curves was within one standard deviation of previously prepared dose-response curves. In addition, we included during the study a reference sediment from the Skidaway River estuary which previously has been shown to have very low effects on the reproduction, embryo production and embryo hatching tests.

REFERENCES

Kneib.R.T. 1987. Seasonal abundance, distribution and growth of postlarval and juvenile grass shrimp (*Palaemonetes pugio*) in a Georgia, USA, salt marsh. Mar. Biol. 96: 215-223.

Lee.R., G.B. Kim, K.A. Maruya, S.A. Steinert and Y. Oshima. 2000. DNA strand breaks (comet assay) and embryo development effects in grass shrimp (*Palaemonetes pugio*) embryos after exposure to genotoxicants. Mar. Environ. Res. 50: 553-557.

Table 1 - Data for Toxicity, Reproduction, Embryo Production and Embryo Hatching of Grass Shrimp Exposed to Test Sediments

Sample ID	Toxicity (% killed)	Reproduction (% forming mature ovaries)	Embryo Production (% females producing embryos)	Embryo Hatching (% hatchin
C-5	12,28,20	32,12,16	4,12,16	0
C-7	32,20,16	52,12,32	4,20,8	0
C-16	36,28,20	68,40,76	44,52,36	76,88,64
C-33	12,12,24	84,68,76	32,24,52	36,52,28
TC	12,16,8	52,60,44	44,36,52	76,88,88
MG-N2	12, 28,32	60,52,80	52,44,40	92,88.76
MG-B7	4,12,4	44,76,52	44,40,60	92,96,88
MG-D9	12,16,24	72,60,56	52,44,68	80,88,96
MG--K17	28,20,24	48,56,76	0	0
MG-H7	12,4,16	68,44,32	0	0
CR	4,16,4	80,64,76	76,72,72	100,96,92
reference sediment Skidaway River	4,8,8	76,84,60	80,52,76	96,96,88

Table 2 - Toxicity, Reproduction and Embryo Development Tests on Grass Shrimp Exposed to Sediments from the LCP Site and Reference Areas

Sample ID	Toxicity Tests (% grass shrimp killed during 2 months in test sediments)		Reproduction Tests (% of surviving females which produced mature ovaries)		Embryo Development (% of surviving female: which produced embryos)	
	Mean	S.D. (n=3)	Mean	S.D. (n=3)	Mean	S.D. (n=3)
C-5	20	8	20	11	11	6
C-7	23	8	32	20	11	8
C-16	28	8	61	19	44	8
C-33	16	7	76	8	36	14
TC	12	4	52	8	44	8
MG-N2	24	4	64	14	45	6
MG-B7	7	5	57	17	48	11
MG-D9	17	6	63	8	55	12
MG-K17	24	4	60	14	0	0
MG-H7	11	6	48	18	0	0
CR	8	7	73	2	73	2
reference sediment (SkIO)	7	2	~~69~~ 73 CDR	~~15~~ 12 CDR	69	15

Table 2, cont.

Sample ID	Embryo Hatching Test (% of embryos hatching) Mean	S.D. (n=3)
C-5	0	
C-7	0	
C-16	76	12
C-33	39	12
TC	84	7
MG-N2	85	8
MG-B7	92	4
MG-D9	88	8
MG-K17	0	
MG-H7	0	
CR	96	4
reference sediment (Skidaway River)	93	5

B. SUPPORTING TOXICOLOGICAL INFORMATION FOR ESTUARY AT LCP SITE

B.1 SEACREST GROUP (SURFACE SEDIMENT)

RESULTS OF CHRONIC SEDIMENT TESTS CONDUCTED ON SAMPLES FROM THE LCP PROJECT

Submitted to:

Mr. Curt Rose
CDR Environmental Specialists
6001 N. Ocean Drive
Suite 1103
Hollywood, Florida 33019

Submitted by:

The SeaCrest Group
1341 Cannon Street
Louisville, Colorado 80027
303-661-9324

January 6, 2003

INTRODUCTION

Sediment contamination is an environmental issue that can have widespread effects on aquatic systems. The sediment may serve as a reservoir for numerous contaminants that can detrimentally affect an aquatic ecosystem. However not all substances found and measured in sediments are bioavailable. Therefore tests conducted with aquatic organisms that utilize the sediment for feeding and/or protection provide information on the ability of the sediment to adversely affect the aquatic community.

MATERIALS AND METHODS

Sample Collection

Grab samples of sediment from ten sites; labeled CR-C, TC-C, H7-C, K7-C, D-C, 5-C, 6-C, 7-C, 15-C, and 45-C; were collected into clean, plastic containers from August 22 to August 23, 2002. The samples were chilled and shipped in coolers on August 26, 2002 for overnight delivery to the SeaCrest lab, where they arrived at 10:15 on August 27, 2002. At the lab the sediment samples were refrigerated at 4°C between uses. The Chain of Custody forms documenting sample collection and transfer times are included in Appendix 1.

Dilution Water

A 20 part-per-thousand ($^{\circ}/_{oo}$) artificial saltwater (Forty Fathoms^{R} sea salt) was used as the overlying water for the sediment tests. This water was created and aerated for a minimum of 48 hours before being adjusted to test temperature and used for the daily water change-outs.

Test Organisms

The chronic tests were conducted with a benthic estuarine invertebrate, the amphipod *Leptocheirus plumulosus*. It is recommended that the amphipods started in the chronic test be approximately one day old. However as they were purchased from a test organism supplier (Aquatic BioSystems, Inc in Ft. Collins, CO), the amphipods used in the present tests were "less than 48 hours old" at the start of the test. The Organism History record supplied with the test organisms is provided in Appendix 2.

The *Leptocheirus* were tested in a reference toxicant test using copper sulfate ($CuSO_4$) to measure health and test acceptability. An LC50 concentration was not achieved in the ref tox test, as there was no concentration at which 50% of the animals died. The animals were floating and appeared near death in the two highest test concentrations (125 ppb and 250 ppb) but since they moved slightly when touched they could not be considered dead. The facility that supplied the test organisms was contacted but they were unable to supply ref tox information as they do not perform reference toxicant testing on any of their amphipod cultures. If the animals in the 125 ppb and 250 ppb concentrations had died, the LC50 would have been around 75 ppb. Since we have only run this *Leptocheirus* sediment test this year,we have only this one number as reference. However a *Leptocheirus* ref tox test conducted at SeaCrest two years ago showed an LC50 concentration around 55 ppb, which would be considered within range of the 75 ppb LC50.

Test Procedures

The 28-day chronic tests followed the procedures outlined in the December, 1992 publication of the Chesapeake Bay Program guidelines for "Development of a Chronic Sediment Toxicity Test for Marine Benthic Amphipods" (CBP/TRS 89/93).

In preparation for the test, the sediments did not require sieving, but were thoroughly stirred and all large particles (i.e. branches, stones) were removed manually. Each sediment was visually inspected for indigenous organisms, none were observed. The control sediment and the test sediments were handled and tested in the same manner.

The test containers were 1 liter glass jars to which 175 ml of the homogenized sediment was added. Then 725 mls of 20°/$_{00}$ saltwater were poured over the sediment. The sediments were tested at the 100% concentration only, no dilution series was used. Five replicates were used for each sediment sample. A "performance control" sediment set was run in addition to the test sediments. The control was a clean, uncontaminated saltwater sediment obtained from Aquatic BioSystems, Inc. in Ft. Collins, CO, who in turn obtains this "culture sediment" from a collection facility located in Maryland.

The chronic *Leptocheirus* tests were started on September 4, 2002 and ran for 28 days, ending on October 2, 2002. All ten samples were tested, along with the saltwater control sediment. During the test the water over the sediments was changed once a day. Observations were made daily for the first week of the test and then three times a week thereafter. One random test container of each sediment was monitored three times a week for temperature, dissolved oxygen, and pH, before the water change.

Artificial saltwater used for the change-outs was held in the incubator at test temperature prior to use. Several batches of 20°/$_{00}$ saltwater were made during the chronic tests. The data sheet documenting the batch preparations and water quality checks is located in Appendix 3. The test chambers were fed 1 ml of fish flake food slurry solution (4 grams of flake food blended into 1 liter of deionized water) three times a week.

The water over each sediment sample was measured for pH, salinity, alkalinity, conductivity, and ammonia at the beginning and at the end of the 28-day tests. The data sheets containing the readings of temperature, dissolved oxygen, and pH; and the water quality readings taken at the beginning and end of the test; are located in Appendix 5. The tests were held at a temperature of 25 ± 1°C in an incubator with a programmed day cycle of 16 hours light and 8 hours dark. The daily temperature readings and monthly light intensity readings for the incubator are located in Appendix 4. The temperature readings for the incubator were higher than those recorded in the tests themselves (as seen on the test data sheets), however the incubator readings show consistency in the temperature that was maintained.

Dissolved oxygen levels were maintained by aerating all replicates of each sediment test throughout the test study, as suggested in the Chesapeake Bay test instructions.

Test Termination

The sediment tests were terminated at 28 days. Water was pulled from each replicate of one sediment test and composited for final water quality readings. Then the water and sediment was poured from each replicate jar into a clean plastic pan and searched thoroughly for live adult animals. Diligent effort was made to account for every adult test organism, either by retrieving them live or finding a body. After the live search, each replicate sediment was returned to its jar and saltwater solution containing Rose Bengal was added. The sediment was stirred to insure that the Rose Bengal stain contacted any organisms that were present. The next day (approximately 24 hours later) the Rose Bengal solution was removed and 99% Isopropyl alcohol was added to preserve all specimens until the sediment could be thoroughly searched for additional adults and to count any juveniles that might be present. All adults found during the live pick were also preserved in 99% Isopropyl alcohol.

After the preserved sediments were checked for adults and juveniles, all adults pulled from the sediments were sexed using a dissecting microscope. The adults were then dried for 24 hours in a drying oven at approximately 95°C. The dried animals were cooled and weighed the next day. The data sheets containing the total number, per replicate, of surviving *Leptocheirus* found at the end of the test; the number of males and females found in each test container; dry weight determinations for the adults; and the number of juveniles found in each

RESULTS

The *Leptocheirus* chronic test achieved acceptable performance control survival. Survival was 87% in the control sediment and ranged from 48-80% in the test sediment samples. Table 1 provides a summary of the test results, including survival numbers and mean weights per sample. Juveniles were found in several sediments but only the control and sample 15-C showed numbers in the double digits.

Table 1. Results of sediment tests run from September 4 to October 2, 2002.

Sediment	Survival (%)	Replicate Survival Range Low (%)	Replicate Survival Range High (%)	Survivor's Average Weight (mg)
Performance Control	87%	75%	100%	0.79
45-C	71%	40%	95%	0.60
15-C	77%	65%	90%	0.70
7-C	56%	25%	80%	0.43
6-C	48%	5%	80%	0.51
5-C	54%	40%	80%	0.42
D-C	63%	50%	80%	0.61
K7-C	68%	50%	90%	0.46
H7-C	80%	65%	100%	0.46
TC-C	80%	65%	95%	0.63
CR-C	53%	0%	95%	0.59

Table 2. Further results of sediment tests run from September 4 to October 2, 2002.

Sediment	Number Juveniles Found	Number Female Adults	Number Male Adults	Reproductive Response*
Performance Control	106	48	39	1.10
45-C	18	36	35	0.25
15-C	46	46	31	0.50
7-C	0	29	27	0.0
6-C	0	19	29	0.0
5-C	6	30	24	0.10
D-C	0	26	37	0.0
K7-C	0	36	32	0.0
H7-C	1	49	31	0.01
TC-C	2	46	34	0.02
CR-C	6	27	26	0.11

* Determined using the equation provided in the chronic sediment testing guideline:

$$\text{Fertility} = \frac{\text{No. Juveniles/2}}{\text{No. Surviving Females}}$$

REFERENCE TOXICANT TEST RESULTS

The amphipods used for the chronic test were tested in a reference toxicant test with $CuSO_4$ (the toxicant used at SeaCrest for saltwater organisms) to determine their health and test acceptability. The test guidelines recommended allowing the amphipods to obtain an age of at least one week before performing the reference test, since survival was very low if they were removed from sediment before that age.

The *Leptocheirus* reference toxicant test (called the "reference control") was conducted from September 17 to September 21, 2002. The test chambers were 30 ml plastic beakers containing water and a small piece of Nitex^R screen placed over the bottom of each beaker. The test was a static, non-renewal. The animals were fed 0.1 ml of fish flake slurry on days 0 and 2. The test concentrations run were 250, 125, 62.5, 31.25, and 15.63 ug/L copper (as $CuSO_4$). The LC50 concentration could not be determined since there was not enough death in the test at 96 hours to create one. However all organisms in the two highest concentrations of the test (125 and 250 ppb) were floating on the surface of the water and looked near death, only moving when prodded. If those animals are counted as dead, the LC50 produced would be 75.3 ppb, which is in line with reference toxicant tests run previously with these organisms in the SeaCrest laboratory.

REFERENCES

APHA/AWWA/WEF. 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. American Public Health Association.

Hach Company. 1992. Hach Water Analysis Handbook. 2nd Edition. Hach Company, Loveland, Colorado.

Chesapeake Bay Program. December, 1992. "Development of a Chronic Sediment Toxicity Test for Marine Benthic Amphipods". CBP/TRS 89/93.

APPENDIX 1. Chain of Custody Form

39

200

FedEx Express *USA Airbill* 8282 0425 5979

0215 Form ID No

SOR13

FedEx Copy

1 From

Date 8/26/02 Sender's FedEx Account Number 2272-6326-1

Sender's Name Curt Ron Phone 954 927-1165

Company CDR ENVIRONMENTAL SPECIALISTS

Address 6001 N OCEAN DR STE 1103

Dept/Floor/Suite/Room

City HOLLYWOOD State FL ZIP 33019

2 Your Internal Billing Reference

3 To

Recipient's Name Kelly Carr Phone 303 661-9324

Company SeaCrest Group

Address 1341 Cannon Street

To "HOLD" at FedEx location, print FedEx address

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Dept/Floor/Suite/Room

City Louisville State CO ZIP 80027

8282 0425 5979

L

0188128419

4a Express Package Service *Packages up to 150 lbs.*
Delivery commitment may be later in some areas.

1 ☑ FedEx Priority Overnight Next business morning
5 ☐ FedEx Standard Overnight Next business afternoon
6 ☐ FedEx First Overnight Earliest next business morning delivery to select locations
3 ☐ FedEx 2Day Second business day
20 ☐ FedEx Express Saver Third business day
FedEx Envelope rate not available. Minimum charge: One pound rate
77 ☐ NEW FedEx Extra Hours Later drop-off with next business afternoon delivery for select locations

4b Express Freight Service *Packages over 150 lbs.*
Delivery commitment may be later in some areas

7 ☐ FedEx 1Day Freight* Next business day
8 ☐ FedEx 2Day Freight Second business day
83 ☐ FedEx 3Day Freight Third business day

* Call for Confirmation:

5 Packaging * Declared value limit $500

6 ☐ FedEx Envelope*
2 ☐ FedEx Pak* Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak
1 ☑ Other Pkg Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling

3 ☐ SATURDAY Delivery Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
33 ☐ SUNDAY Delivery Available only for FedEx Priority Overnight to select ZIP codes
Include FedEx address in Section 3
1 ☐ HOLD Weekday at FedEx Location Not available with FedEx First Overnight
31 ☐ HOLD Saturday at FedEx Location Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods?
One box must be checked

☑ No
4 ☐ Yes As per attached Shipper's Declaration
6 ☐ Dry Ice Dry Ice 9, UN 1845 ____ x ____ kg
☐ Cargo Aircraft Only

Dangerous Goods (incl. Dry Ice) cannot be shipped in FedEx packaging or with FedEx Extra Hours service

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below

☐ Obtain Recip. Acct. No.

1 ☑ Sender Acct. No. in Section 1 will be billed.
2 ☐ Recipient
3 ☐ Third Party
4 ☐ Credit Card
5 ☐ Cash/Check

FedEx Acct. No. Credit Card No. Exp. Date

Total Packages	Total Weight	Total Declared Value†	Total Charges
4		$ 00	

Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the *FedEx Service Guide* for details.

8 Release Signature *Sign to authorize delivery without obtaining signature.*

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims.

406

SRS•Rev. Date 12/00•Part #155918S•©1994–2000 FedEx•PRINTED IN U.S.A.

The SeaCrest Group
An Environmental Services Company

1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number ______

Project Number (lab use only) ______

Client: Curt Rose
Contact: ______
Address: ______
Program/Site: LCP Brunswick
Phone: 603-356-6558

Collected by: Various personnel

22

3/4

22

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute ~~Cerio~~	Acute ~~FH Minnow~~	Acute ~~Accelerated~~	Chronic ~~Cerio~~	Chronic ~~FH Minnow~~	Chronic ~~Accelerated~~	~~TRE~~	28-Day Other Amphipod Test	These fields may be used for field test results				Total Units	Total Volume
1	CR-C	8/23/02	0945	G								✓					1	1 Gal
2	TC-C	8/23/02	1430	G													1	
3	H7-C	8/23/02	0840	C													1	
4	K7-C	8/23/02	0920	C													1	
5	D-C	8/23/02	1025	C													1	
6	5-C	8/22/02	0905	C													1	
7	6-C	8/22/02	0945	C													1	
8	7-C	8/22/02	0920	C													1	
9	15-G	8/24/02	1230	C													1	
10	45-C	8/24/02	1500	C								↓					1	↓

Comments and special testing instructions: ______

Relinquished by: Weber-Gaeke Representing: CDR To Whom: Federal Express Date/Time: 8/26/02 - 1000
Relinquished by: ______ Representing: ______ To Whom: ______ Date/Time: ______
Next recipient: ______ Relinquished by: ______ Rec'd by: ______ Date/Time: 8-27-02 1015

Appendix 2. Test Organism History Sheets from Supplier

AQUATIC BIO SYSTEMS
ABS
INC.

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-251

COPY

LP 020904

ORGANISM HISTORY

DATE: 9/4/02

SPECIES: Leptocheirus plumulosus

AGE: <48 hour

LIFE STAGE: Larvae

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: Tetramin® Flake Slurry

Water Chemistry Record:	**Mean**	**Range**
TEMPERATURE:	25 °C	21-30°C
SALINITY/CONDUCTIVITY:	17 ppt	14-24 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	145 mg/l	65-180 mg/l
pH:	8.36	7.57-8.50

$DO_{i_1} = 5.3$, $f_1 = 6$
$temp_i = 26.2$
$pH_i = 7.7$
$DO_{i_2} = 5.4$, $f_2 = 6$
$DO_{i_3} = 5.3$, $f_3 = 6$
$DO_{i_4} = 5.2$, $f_4 = 6.$
$DO_{i_5} = 5.2$, $f_5 = 6.$
$DO_{i_6} = 5.3$, $f_6 = 6.$

Comments:

Facility Supervisor

APPENDIX 3. Forty Fathoms^{R} Salt Water Batches

e SeaCrest Group
uisville, Colorado

COPY

Page No. : 1
Form No. : 025
Effective: January, 2000

SALTWATER LOG

Batch No.	Quantity Water Prepared	Salinity *	Date	Data By
02-001	50 gal	40	1-8-02	JW
02-002	35 gal	30	3-7-02	JW
02-003	40 gal	30	5-6-02	JW
02-004	50 gal	32	6-26-02	KS
02-005	40gal	30	8 22.02	Tom
02-006	50gal	20	9.11.02	Tom
02 007	50gal	20	9.25 02	Tom
~~02 008~~ SEE	~~50gal~~	~~20~~	~~9 26 0~~	
02008	50gal	30	10.18.02	
02009	50gal	28	12.6.02	

sured in parts per thousand (‰)

APPENDIX 4. Incubator Daily Temperature Readings and Monthly Light Intensity Readings

The SeaCrest Group
Louisville, Colorado

COPY

Page #:
Form #: 022
Effective: November 2001

TEMPERATURE RECORD

Incubator #: 1
Acceptable Temperature Range: 24-26°C
Acceptable Light Range: 50-100ft candles
Incubator Make: Dept. of Ag
Model: PC 678
NIST Correction:
Date of NIST Correction:
Initials:

Date	Temperature	Initials	Maintenance	Light Intensity (fc)	Notes
8-11-02	25.6	HB			
8-12-02	25.6	HB			
8-13-02	26.0	HB			
8-14-02	26.0	HB			
8-15-02	26.1	HB			Temp OK for Tests
8-16-02	26.4	gr			"
8-17-02	25.7	gr			
8-18-02	25.8	HB			
8-19-02	25.9	HB			
8-20-02	25.9	HB			
8-21-02	25.9	HB			
8-22-02	25.9	HB			
8-23-02	25.9	gr			
8-24-02	25.5	gr			
8-25-02	25.5	HB			
8-26-02	25.6	HB			
8-27-02	26.0	HB			
8-28-02	26.2	HB		62.0	Temp OK for Tests
8-29-02	26.5	HB			"
8-30-02	26.3	gr	Changed 1 light bulb 100( )		"
8-31-02	25.8	gr			
9-1-02	26.2	HB			Temp OK for Tests
9-2-02	26.3	HB			"
9-3-02	26.2	HB			"
9-4-02	26.1	HB	adjusted Temp.		"
9-5-02	27	HB	adjusted temp - placed probe in water bath of		
9-6-02	24.9	gr			Temp OK for Tests
9-7-02	26.8	gr			"
9-8-02	26.8	HB			"
9-9-02	25.6	HB			"
9-10-02	26.7	HB			"
9-11-02	27.2	HB	Adjusted Temp down		"
9-12-02	25.9	HB			
9-13-02	24.7	gr			
9-14-02	23.4	gr			
9-15-02	27.3	HB	adjusted Temp down		Temp OK for Tests
9-16-02	26.5	HB			

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Page #:
Form #: 022
Effective: November 2001

TEMPERATURE RECORD

Incubator #: 1
Acceptable Temperature Range: 24-26°C
Acceptable Light Range: 50-100 ft. candles
Incubator Make: Dept. of Ag.
Model: PC 678
NIST Correction:
Date of NIST Correction:
Initials:

Date	Temperature	Initials	Maintenance	Light Intensity (fc)	Notes
9.17.02	24.5	HB			
9.18.02	25.4	HB			
9.19.02	25.6	HB			
9.20-02	24.4	R		60.4	
9-21-02	25.3	R			
9.22-02	25.4	HB			
9.23-02	25.6	HB			
9-24-02	26.8	HB			
9-25-02	27.1	HB			Okay for Tests
9-26-02	27.4	HB	Temp adjusted		Temp probe may have been
9-27-02	24.8	R			
9-28-02	25.5	[illegible]			
9-29-02	27.3	HB			Probe not in H_2O
9-30-02	26.8	HB			
10-1-02	27.0	HB			
10-02-02	26.0	HB			
10-03-02	27.0	R			
10-4-02	26.7	R			
10-5-02	28.4	R			
10-6-02	27.4	HB			
10-7-02	27.3	HB			Turned down
10-8-02	23.7	R			
10-9-02	23.2	HB			Turned up
10-10-02	24.5	HB			
10-11-02	24.4	R			Turned up
10.12.02	24.2	R		58.9	
10-13-02	23.3	HB			Turned up
10.14.02	23.0	SF			
10 15-02	25.3	HB			
10 16 02	25.2	SF			
10.17.02	24.8	SF			
10.18.02	25.6	SF			
10.19.02	24.8	SF			Turned up
10-20-02	25.8	HB			
10 21-02	26.0	HB			
10 22 02	26.4	SF			
10-23-02	27.0	SF			Turned down

APPENDIX 5. Water Quality Readings for the Test

28-day Leptocheirus Benchsheet

Client Control Site — Lab # —
H_2O 20 ‰ Sea salt Sample Date — Species Info ABS LP 082904 (<48hr.)
Start Date 9 4 02 1700 End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175 ml sed + 675 ml H_2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/~~7~~		9/10		9/12		9/14		9/17	
rep	1	5		2		3		4		1		5	
DO	6.3	4.6	5.3	6.0	6.0	6.0	5.1	5.8	5.6	6.8	6.0	6.5	6.4
Temp °C	25.0	25.5	24.2	24.8	24.8	25.4	24.7	24.2	24.0	24.0	24.0	25.0	24.0
pH	7.6	6.9	7.7	7.85	8.0	7.67	7.77	7.86	7.86	7.9	8.2	7.6	7.8
alkalinity	105												
salinity	20												
ammonia	.241*												
conductivity	29200												

(9/7)
* not taken until day 3 due to no ammonia probe until then
sm

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	2		3		1		4		5		2		5
DO	5.9	5.7	5.9	6.0	7.2	6.9	5.9	5.7	6.1	5.8	6.7	6.4	5.7
Temp °C	25.2	24.0	24.8	24.8	25.0	24.5	24.1	24.2	24.0	24.0	24.8	24.0	25.8
pH	7.8	7.9	7.9	7.9	7.8	7.8	7.6	7.7	7.5	7.9	7.2	7.8	7.6
alkalinity													57
salinity													22
ammonia													<0.20
conductivity													31300

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28-day Leptocheirus Benchsheet

Client CDR
Site 45-C
Lab # 302323
H2O 20‰ sea salt
Sample Date 8 24.02
Species Info ABS LP 020,021 (<48hrs)
Start Date 9 4.02 1700
End Date 10-2-02
Test Conditions 20/rep. 5~~7~~ reps EE KC, 175ml sed + 675 ml H2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	d	d		a		~~55~~ EE b EE		a		d		a	
DO	6.2	5.4	5.4	5.8	6.3	~~5.7~~	5.6	6.2	6.1	5.7	6.0	5.6	5.7
Temp °C	25.0	25.0	24.1	25.4	25.0	26.0	25.2	24.5	24.3	24.2	24.0	25.0	24.0
pH	8.0	7.9	7.9	7.86	8.00	7.83	7.89	7.7	7.8	7.8	8.1	7.7	7.8
alkalinity	144												
salinity	25												
ammonia	2.86+												
conductivity	31,000												

~~* see control~~ EE KC

KC 9/7/02
+reading taken on Day 3
when new ammonia probe rec'd

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	c		b		3.6d 5.8		d		e		a		D
DO	5.7	5.9	6.0	5.9	*~~6.8~~	~~6.8~~*	5.7	5.7	6.5	6.0	5.6	5.7	2.6
Temp °C	24.4	24.1	24.5	24.3	25.9	24.5	24.7	24.2	24.0	24.1	24.7	24.0	24.7
pH	7.3	7.9	7.9	8.0	7.4	7.7	7.8	7.9	8.1	8.3	7.8	8.0	7.5
alkalinity													92
salinity													24
ammonia													0.283
conductivity													33300

*BS

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28-day Leptocheirus Benchsheet

Client CDR
Site 15-C
Lab # 302322
H_2O 20‰ sea salt
Sample Date 8·24·02
Species Info ABS LP C209C4 (<48hrs)
Start Date 9·4·02 1700
End Date 10·2·02
Test Conditions 20/rep, 5 reps, 175ml sed + 675ml H_2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	e	e		a		b		a		d		a	
DO	6.0	5.3	5.3	5.7	5.9	5.6	5.6	6.2	6.1	5.7	5.8	5.9	6.0
Temp °C	25.0	25.1	24.0	25.2	25.3	26.0	24.8	24.6	24.1	24.0	24.0	24.4	24.0
pH	8.0	7.9	7.9	8.03	8.01	8.01	7.96	7.9	7.9	8.0	8.2	8.0	7.9
alkalinity	171												
salinity	24												
ammonia	2.79												
conductivity	30,800												

* see control note
[illegible]

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	c		b		a		d		e		a		B
DO	5.5	5.7	5.8	6.0	3.6	6.2	5.6	5.8	6.3	5.9	5.9	5.7	5.9
Temp °C	24.4	24.1	24.9	24.6	25.6	24.6	24.4	24.3	24.3	24.1	24.0	24.0	24.4
pH	7.8	7.9	8.0	8.0	7.6	7.8	7.8	8.1	8.2	8.4	7.9	8.1	7.9
alkalinity													107
salinity													23
ammonia													0.247
conductivity													33100

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28-day Leptocheirus Benchsheet

Client CDR
Site 7 C
Lab # 302321
H_2O 20 ‰ sea salt
Sample Date 8.22.02
Species Info ABS LP 020904 (<48hrs)
Start Date 9.4.02 1700
End Date 10-2-03
Test Conditions 20/rep, 5 reps, 175 ml sed + 675 ml ~~sed~~ H_2O gmee

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	d	c		a		e		b		c		a	
DO	6.4	5.5	5.4	5.9	5.8	7.5	5.5	5.8	5.5	6.7	6.0	5.4	6.5
Temp °C	25.0	25.3	24.5	25.1	25.0	25.7	24.7	24.2	24.0	24.0	24.1	25.8	24.0
pH	7.9	8.0	7.6	8.1	8.1	7.77	7.86	8.10	8.03	8.0	8.3	7.8	7.9
alkalinity	180												
salinity	22												
ammonia	2.60	* see control note gm											
conductivity	30400												

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	b		c		e		d		e		b		e
DO	5.9	5.7	5.5	5.9	7.1	7.0	6.1	5.6	6.1	5.9	5.5	6.0	5.6
Temp °C	24.0	24.0	25.7	25.0	24.6	24.1	24.2	24.1	24.3	24.0	24.3	24.3	25.8
pH	7.6	7.9	7.9	7.9	7.9	8.0	7.7	7.8	7.9	8.2	7.6	8.1	7.8
alkalinity													98
salinity													23
ammonia													0.264
conductivity													30900

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28-day Leptocheirus Benchsheet

Client CDR
Site 6-C
Lab # 302320
H20 20‰ sea salt
Sample Date 8.22.02
Species Info NBS LP 020904 (<48hrs)
Start Date 9 4.02 1700
End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175ml sed + 675ml H2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	d	b		a		e		a		c		d	
DO	5.6	5.6	5.5	5.4	6.0	5.7	5.8	5.9	5.8	6.1	6.0	6.1	6.4
Temp °C	25.6	26.0	24.6	26.1	25.4	25.4	25.2	24.1	24.1	24.0	24.0	25.0	24.0
pH	7.9	7.9	7.9	7.77	7.91	8.07	8.02	7.7	7.8	8.0	8.2	7.8	7.9
alkalinity	167												
salinity	21												
ammonia	1.43												
conductivity	29700												

* see control note
BM

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tue		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	b		e		a		d		c		d		e
DO	5.7	5.7	5.9	6.1	7.0	6.9	6.3	6.3	5.8	5.9	6.4	6.3	~~7.7~~ 5.6
Temp °C	25.0	24.1	25.2	24.0	26.0	24.1	24.0	24.1	24.7	24.0	24.7	24.6	25.2
pH	7.8	7.9	7.9	7.9	7.9	7.9	7.5	8.0	7.9	8.1	7.7	8.0	7.7
alkalinity													112
salinity													23
ammonia													<0.200
conductivity													31800

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28-day Leptocheirus Benchsheet

Client CDR
Site 5-C
Lab # 302319
H_2O 20‰ sea salt
Sample Date 8-22-02
Species Info ABS LP 020904 (<48 hrs)
Start Date 9-4-02 1700
End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175 ml sed + 675 ml H_2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	c	d		a		e		a		c		d	
DO	5.2	5.4	5.2	5.9	6.1	5.4	5.6	5.9	5.9	6.1	6.2	6.3	6.6
Temp °C	25.6	26.0	24.7	26.1	25.6	26.0	25.3	24.1	24.1	24.0	24.0	25.0	24.0
pH	7.6	7.8	7.9	7.79	7.92	7.72	7.87	7.6	7.7	7.9	8.0	7.8	7.9
alkalinity	195												
salinity	22												
ammonia	1.78												
conductivity	29800												

* see control note
BM

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	b		e		a		d		c		e		a
DO	5.6	5.6	6.0	6.0	6.7	6.7	6.5	6.5	5.9	5.9	6.4	6.3	5.1
Temp °C	25.4	24.4	24.9	24.0	24.9	24.0	24.9	24.7	24.6	24.0	24.7	24.5	25.4
pH	7.7	7.9	7.9	7.9	7.8	7.9	7.5	8.0	7.8	8.1	7.8	8.1	7.7
alkalinity													98
salinity													21
ammonia													0.363
conductivity													30600

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site D-C
Lab # 302318
H₂0 20‰ sea salt
Sample Date 8.23.02
Species Info ABS LF 02 C9 04 (<48hrs)
Start Date 9.4.02 1700
End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175ml sed + 675ml H₂O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	e	a		c		b		e		a		b	
DO	5.6	4.6	5.2	5.8	5.7	5.8	7.4	5.9	5.9	5.0	5.7	5.7	5.8
Temp °C	25.0	25.9	24.1	24.7	24.7	25.7	24.9	24.3	24.2	24.2	24.4	24.7	24.0
pH	7.9	7.7	7.8	7.93	8.00	7.70	7.81	7.9	7.8	7.5	8.1	7.5	7.9
alkalinity	136												
salinity	24												
ammonia	1.38												
conductivity	30000												

* see control note
BM

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19												
rep	b		c		6.4	d	d		a		c		c
DO	6.2	6.3	6.4	5.9	~~6.7~~	6.7	5.7	5.0	5.2	5.2	5.7	5.2	5.4
Temp °C	25.6	24.6	24.0	24.0	24.0	24.1	24.4	24.1	25.4	24.2	24.4	24.7	25.1
pH	7.7	7.3	7.6	7.8	7.8	7.9	7.3	7.7	7.4	8.2	7.8	8.1	7.1
alkalinity													74
salinity													22
ammonia													0.243
conductivity													30200

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client: CDR
Site: K7-C
Lab #: 302317
H_2O: 20‰ ~~[illegible]~~ sea salt
Sample Date: 8.23.02
Species Info: LP 020904 (<48hrs)
Start Date: 9.4.02 1700
End Date: 10-2-02
Test Conditions: 20/rep, 5 reps, 175ml sed+675ml H_2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	e	a		5.7 [illegible]	c	b		c		a		b	
DO	4.6	5.1	5.4	~~[illegible]~~*	5.7	5.9	7.4	5.7	5.7	6.6	6.5	5.3	5.6
Temp °C	25.0	25.9	24.1	24.7	25.0	25.4	24.9	24.1	24.2	24.0	24.4	25.0	24.0
pH	7.9	7.9	7.9	7.97	8.01	7.81	7.90	7.8	7.9	8.1	8.2	7.7	7.9
alkalinity	178												
salinity	22												
ammonia	3.19												
conductivity	29600												

* see control note
BM

	15		17		20		22		24		27		28	
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed	
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2	
rep	a		d		6.1 a		d		a		c		e	SM EE
DO	6.2	6.3	5.8	5.9	~~3.6~~	6.8	5.5	5.5	6.2	6.1	5.1	4.5	~~6.1~~	5.6
Temp °C	26.0	24.6	24.3	24.0	24.0	24.3	24.3	24.1	24.4	24.4	26.0	25.3	25.5	
pH	7.9	7.5	7.7	7.8	7.5	7.8	7.7	7.8	8.0	8.3	7.6	8.1	7.7	
alkalinity													101	
salinity													22	
ammonia													<0.20	
conductivity													30200	

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28-day Leptocheirus Benchsheet

Client CDR
Site H7-C
Lab # 302316
H_2O 20 ‰ Sea Salt
Sample Date 8.23 02
Species Info ABS iP 020904 (<48hrs)
Start Date 9.4.02 1700
End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175ml sed + 675ml H_2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	d	e		a		b		c		d		a	
DO	6.2	5.4	5.3	6.2	6.2	5.7	5.6	6.2	6.0	6.0	6.1	6.0	5.9
Temp °C	25.0	25.3	24.1	25.2	24.8	26.0	25.2	24.0	24.3	24.0	24.0	24.5	24.0
pH	7.6	7.9	8.0	8.00	8.01	7.97	7.44	7.8	7.6	8.0	8.2	8.0	7.9
alkalinity	173												
salinity	22												
ammonia	2.59	* see control note BM											
conductivity	30,300												

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	c		b		a		d		e		a		c
DO	5.8	5.8	5.9	6.0	6.8	6.7	5.6	5.7	6.4	6.0	5.9	5.7	6.1
Temp °C	24.5	24.1	24.5	24.6	25.6	24.6	24.5	24.3	24.1	24.1	24.0	24.0	23.7
pH	7.[illegible] 8	7.9	8.0	8.0	7.9	7.9	7.9	8.0	8.1	8.3	7.9	8.0	8.0
alkalinity													107
salinity													24
ammonia													<0.20
conductivity													33200

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Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site TC-C
Lab # 302315
H_20 20‰ sea salt
Sample Date 8.23.02
Species Info ABS LP 020904 (<48 hrs)
Start Date 9.4.02 1700
End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175 ml sed + 675 ml H_2O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	c	d		b		e		a		c		d	
DO	6.3	5.5	24.0	5.8	5.9	7.5	5.5	5.9	5.7	6.8	6.0	6.3	6.4
Temp °C	25.0	25.3	5.5	24.8	25.0	24.8	24.7	25.0	24.0	24.0	24.0	25.4	24.0
pH	8.0	7.7	7.8	8.1	8.1	7.90	7.92	8.04	7.96	8.1	8.2	8.0	8.0
alkalinity	155												
salinity	23												
ammonia	1.43												
conductivity	29900												

* see control note
BM

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	b		c		e		d		e		a		e
DO	5.9	5.9	6.0	6.0	7.0	7.0	5.9	5.8	6.1	5.8	6.4	6.5	5.7
Temp °C	24.2	24.0	25.0	24.8	25.0	24.4	24.2	24.0	24.1	24.0	24.8	24.0	25.8
pH	8.1	8.0	8.2	8.1	8.0	8.0	7.9	7.9	7.9	8.2	8.0	8.1	7.4
alkalinity													118
salinity													25
ammonia													<0.20
conductivity													31900

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Form #: 31
Effective. September 2002

28-day Leptocheirus Benchsheet

Client CDR
Site CR - C
Lab # 302314
H$_2$0 20‰ sea salt
Sample Date 8 23 02
Species Info ABS LP 020904 (<48hrs)
Start Date 9.4.02 1700
End Date 10-2-02
Test Conditions 20/rep, 5 reps, 175ml sed + 675ml H$_2$O

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	9/4	9/5		9/7		9/10		9/12		9/14		9/17	
rep	d	a		c		b		d		a		c	
DO	5.7	5.5	5.5	5.9	5.8	6.0	7.4	5.9	5.9	4.9	6.0	5.3	5.8
Temp °C	25.0	25.8	24.0	24.9	25.4	25.0	24.6	24.2	24.0	24.0	24.4	24.6	24.0
pH	7.7	7.8	7.8	7.84	7.93	7.88	7.87	7.8	7.9	7.5	8.1	7.5	7.8
alkalinity	90												
salinity	25												
ammonia	<.150												
conductivity	31200												

*see control note
BM

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	9/19		9/21		9/24		9/26		9/28		10/1		10/2
rep	~~EE SB~~ d		a		6.1 b		d		a		c		e
DO	6 ~~4.7~~	6.4	6.1	5.8	~~3.8~~	6.0	5.3	5.2	6.3	6.1	5.3	5.3	~~6.1~~ 5.4 SG 10/5
Temp °C	26.0	24.6	24.7	24.0	24.0	24.1	24.4	24.1	24.0	24.2	25.4	25.1	25.5
pH	7.8	7.9	7.6	7.7	7.2	7.4	7.3	7.5	7.9	8.3	7.7	8.0	7.6
alkalinity													79
salinity													22
ammonia													<0.20
conductivity													29000

EEWD

Appendix 6. Total Number of Animals Surviving, Adult Sex Ratios, Dry Weight Determinations of Adults, and Numbers of Juveniles Found, Per Test Container

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Leptocheirus Dry Weights

Page #:
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Effective December 2002

Lab # Control

Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29 - 30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)	for clarity (mg)
1 (a)	51	1.0445	1.0307	13.8	21	.6.6	0.66
2 (b)	52	1.0731	1.0581	15.0	16	.9.4	0.94
3 (c)	53	1.0625	1.0441	18.4	19	.9.7	0.97
4 (d)	54	1.0646	1.0515	13.1	16	.8.2	0.82
5 (e)	55	1.0559	1.0474	8.5	15	~~.57~~ .57	0.57
					87%	$\bar{X}$ - 0.79	

NOTES

Juveniles		♂	♀
a - 2	a	6	15
b - 30	b	7	9
c - 50	c	9	10
d - 20	d	5	11
e - 4	e	12	3

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Leptocheirus Dry Weights

Page #
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Lab # 302323 45-C
Oven temp (°C) 99
Drying time (hr) 24
Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	46	1.0662	1.0578	8.4	11	.76
b	47	1.0587	1.0544	4.3	8	.54
c	48	1.0479	1.0357	12.8	17	.75
d	49	1.0660	1.0589	7.1	16	.44
e	50	1.0700	1.0607	9.3	19	.49
					71%	$\bar{x} = 0.60$ mg

NOTES

Juveniles		♂	♀
a- 4	a	4	7
b- 9	b	[illegible] ~~16~~ 3	5
c- 0	c	9	8
d- 1	d	10	6
e- 4	e	9	10

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Leptocheirus Dry Weights

Page #:
Form #: 31c
Effective: December 2002

Lab # 302322 15-C

Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	41	1.0641	1.0530	11.1	13	.85
b	42	1.0646	1.0559	8.7	14	.62
c	43	1.0573	1.0452	12.1	18	.67
d	44	1.0670	1.0556	11.4	18	.63
e	45	1.0488	1.0384	10.4	14	.74
					77%	$\bar{x}$ = 0.70 mg

NOTES

Juveniles		♂	♀
a- 11	a	5	8
b- 1	b	6	8
c- 22	c	8	10
d- 10	d	5	13
e- 2	e	7	7

Leptocheirus Dry Weights

Lab # 302321 7-C

Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	36	1.0482	1.0420	6.2	[illegible] ~~14~~ 16	.39
b	37	1.0420	1.0350	7.0	12	.58
c	38	1.0433	1.0392	4.1	10	.41
d	39	1.0522	1.0458	6.4	13	.49
e	40	1.0555	1.0540	1.5	[illegible] ~~3~~ 5	.30
					56%	$\bar{X}$ = 0.43 mg

NOTES

Juveniles		♂	♀
a- 0	a	7	9
b- 0	b	5	7
c- 0	c	4	6
d- 0	d	8	5
e- 0	e	3	2

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Leptocheirus Dry Weights

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Effective: December 2002

Lab # 302320 6-C

Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	31	1.0561	1.0482	7.9	13	.61
b	32	1.0605	1.0523	8.2	16	.51
c	33	1.0547	1.0502	4.5	7	.64
d	34	1.0354	1.0340	1.4	1	.14
e	35	1.0575	1.0501	7.4	11	.67
					48%	$\bar{X}$ = 0.51 mg

NOTES

Juveniles		♂	♀
a - 0	a	8	5
b - 0	b	10	6
c - 0	c	3	4
d - 0	d	1	0
e - 0	e	7	4

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Leptocheirus Dry Weights

Page #
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Lab # 302319 5-C

Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	26	1.0514	1.0481	3.3	9	.37
b	27	1.0432	1.0362	7.0	12	.58
c	28	1.0399	1.0369	3.0	9	.33
d	29	1.0424	1.0398	2.6	8	.33
e	30	1.0509	1.0432	7.7	16	.48
					54%	$\bar{X}$ = 0.42 mg

NOTES

Juveniles		♂	♀
a - 0	a	6	3
b - 0	b	4	8
c - 0	c	6	3
d - 1	d	2	6
e - 5	e	6	10

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Leptocheirus Dry Weights

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Lab # 302318 D-C

Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	21	1.0578	1.0506	7.2	10	.7.2
b	22	1.0396	1.0333	6.3	12	.5.3
c	23	1.0503	1.0391	11.2	16	.7.0
d	24	1.0561	1.0502	5.9	12	.49
e	25	1.0469	1.0388	8.1	13	.6.2
					63%	$\bar{X}$ = 0.61 mg

NOTES

Juveniles		♂	♀
a- 0	a	7	3
b- 0	b	5	7
c- 0	c	10	6
d- 0	d	8	4
e- 0	e	7	6

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Leptocheirus Dry Weights

Page #
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Lab # 302317 X7-C
Oven temp (°C) 99
Drying time (hr) 24
Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	16	1.0613	1.0534	7.9	14	.56
b	17	1.0461	1.0389	7.2	18	.40
c	18	1.0464	1.0422	4.2	11	.38
d	19	1.0493	1.0444	4.9	15	.33
e	20	1.0404	1.0340	6.4	10	.64
					48%	$\bar{x}$ = 0.46 mg

NOTES

Juveniles		♂	♀
a - 0	a	6	8
b - 0	b	10	8
c - 0	c	4	7
d - 0	d	6	9
e - 0	e	6	4

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Leptocheirus Dry Weights

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Lab # 302316 H7-C
Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	11	1.0446	1.0389	5.7	13	.44
b	12	1.0523	1.0452	7.1	15	.47
c	13	1.0522	1.0459	6.3	15	.42
d	14	1.0561	1.0473	8.8	14	.63
e	15	1.0458	1.0380	7.8	23	.34
					80%	$\bar{x}$=0.46 mg

NOTES

Juveniles		♂	♀
a- 0	a	3	10
b- 0	b	8	7
c- 0	c	5	10
d- 1	d	5	9
e- 0	e	10	13.

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Leptocheirus Dry Weights

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Lab # 302315 TC-C
Oven temp (°C) 99 Drying time (hr) 24 Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	6	1.0698	1.0643	5.5	13	.42
b	7	1.0641	1.0529	11.2	16	.70
c	8	1.0567	1.0450	11.7	17	.69
d	9	1.0531	1.0410	12.1	19	.64
e	10	1.0499	1.0392	10.7	15	.71
					80%	$\bar{X}$ = 0.63 mg

NOTES

Juveniles		♂	♀
a – ~~13~~ 0	a	4	9
b – ~~16~~ 2	b	8	8
c – ~~17~~ 0	c	8	9
d – ~~19~~ 0	d	5	14
e – ~~15~~ 0	e	9	6

*

HC 1/8/03 Wrong numbers recorded first time.

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Leptocheirus Dry Weights

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Lab # 302314 CR-C
Oven temp (°C) 99
Drying time (hr) 24
Leptocheirus age 29-30 d.

Replicate	#	Leptocheirus & Tare (g)	Tare (g)	Weight (mg)	Survivor #	Mean weight (mg)
a	1	1.0451	1.0451	0	0	0
b	2	1.0617	1.0530	8.7	13	.67
c	3	1.0519	1.0489	3.0	8	.38
d	4	1.0564	1.0455	10.9	19	.57
e	5	1.0629	1.0532	9.7	13	.75
					53%	$\bar{X}$ = 0.59 mg

NOTES

Juvenile counts:		
a - ~~0~~ —	♂	♀
b - ~~13~~ 1	8	5
c - ~~8~~ 1	5	3
d - ~~19~~ 1	7	12
e - ~~13~~ 3	6	7

1/8/03 KC Wrong numbers recorded first time.

B.2 SKIDAWAY INSTITUTE OF OCEANOGRAPHY (SURFACE SEDIMENT AND INDIGENOUS GRASS SHRIMP)

FINAL REPORT

Mortality, Ovary Formation, Embryo Production, Embryo Hatching and DNA Strand Damage in Grass Shrimp (*Palaemonetes pugio*) Exposed to Sediments from Sites in Southeastern Georgia. Embryo Hatching and DNA Strand Damage in Grass Shrimp Embryo Collected from Several Sites in Southeastern Georgia.

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INTRODUCTION

In the present study juvenile grass shrimp (*Palaemonetes pugio*) were exposed to test sediments provided by Curt Rose and to reference sediments from the Skidaway River for approximately 2 months. The following changes occur when grass shrimp are held in aquarium with test sediments: (1)juveniles grow into adults: (2) adult females produce large mature ovaries: (3) eggs are produced and fertilized; (3) embryos develop and hatch into the free living zoea stage. The developing embryos, enclosed in eggs sacs, are attached externally to the abdomen of the female. Embryos develop within the egg sac for approximately two weeks (at 27°C) after which the zoea emerge. The following data were collected: (1) mortality during the 2 months of the study; (2) per cent of females which formed mature ovaries; (3) per cent of females which produced embryos; (4) per cent of embryos which hatched into zoea; (5) amount of DNA strand damage (DNA tail moment) in late stage embryos.

MATERIALS AND METHODS

Sediment exposure

_Three groups (n=3) with each group consisting of 20 juvenile grass shrimp were exposed to test sediments (1000g) in aquaria with 20 liters of estuarine water kept at 27°C (salinity 28ppt). Grass shrimp were fed *Artemia* and kept under 12hour light/12 hour dark regime. Every 5 days the following parameters were determined: (a) number of dead grass shrimp; (b) number of females with mature ovaries; (c) number of females with attached embryos. After embryos reached stage 8 they were removed by a cut at the stem attaching them to females. Forty eight embryos were transferred to two 24 well polystyrene plates with each well containing 1.2ml of estuarine water and 1 embryo was placed in each well. Embryos were collected from one female from each sediment exposure (n=3).. Culture plates were kept in the dark at 27°C and per cent of embryos hatching out from each female was determined. Hatching generally was completed within 48 hours after transfer to the culture plates. Embryos from stage 7 were used to asses DNA strand damage, i.e. comet assay (see below for procedures).

Hatching Tests and DNA Strand Damage on Embryos from Grass Shrimp Collected at Field Sites

Grass shrimp with embryos were collected with dip nets in October 21, 2002 from a number of sites, including two sites at the LCP canal, Crescent River (Sapelo Sound), Troop Creek (Brunswick area) and Skidaway River (reference site). Hatching rates (see above) and DNA strand damage (Comet assay – see below) were determined with embryos taken from 3 different females at each collection site.

Single-Cell Electrophoresis(SCG)Assays for DNA Strand Damage

All chemicals were purchased from Sigma or Fisher Scientific. The procedures for the SCG asay are described by Singh et al. (1988) with modifications for marine animals by (Steinert et al., 1998). The procedures described by Steinert et al.(1998) were used along with a few modifications for grass shrimp embryos (Lee et al., 2000). Prior to the assay, agarose-coated microscope slides were made by inserting slides into a Coplin jar containing 1% normal melting-point agarose diluted in TAE solutions (0.04 M Tris-acetate and 1 mM EDTA), wiping the rear side of slide with tissue and then drying in air. Ten to 20 embryos from a single female were used and pooled for each assay. Embryos were ground with a glass homogenizer and left to stand for 5 min to allow heavy materials, e.g. embryonic coats, in the extract to settle. The supernatant was transferred to a microcentrifuge tube and centrifuged for 5 min (1000 x g). The supernatant was discarded, the precipitate was suspended using 50 µl of 0.65% low melting-point agarose diluted in Kenny's salt solution (0.4M NACL, 9mM KCL, 0.7 mM K_2HPO_4, 2mM $NaHCO_3$) then added onto the prepared agarose-coated slide, covered with a cover slip, and spread. After gel solidification (3min at 4°C for 2 hours), slides were soaked three times for 2 min each in cold distilled water in a chilled Coplin jar to remove salt. For DNA strand unwinding, slides were transferred into chambers filled with electrophoresis and unwinding buffer (0.1N NaOH and 1mM EDTA, >pH13). After standing for 15 min, electrophoresis was carried out for 20 min at 25 V and 300 mA. Slides were soaked three times for 2 min each in 0.4M TRIS (pH 7.5) in a chilled Coplin jar to neutralize the gels, followed by transfer to ethanol in a Coplin jar for 5 min. The slides were then placed on a paper towel. Preparations were stained with 15µl of the DNA stain, ethidium bromide (20µg/ml).

The amount of DNA strand damage was determined in cells using a Nikon Eclipse E400 inverted fluorescent microscope (x200 magnification). Fifty randomly selected cells per slide were used for calculation of DNA tail moments (amount of DNA in tail times tail length) The cell images are projected onto a high-sensitivity CCD camera. The computerized image-analysis system (Komet Version 4.01, Kinetic Imaging Ltd) was used to determine DNA tail moments.

Quality assurance

At the beginning and end of the study positive control experiments were carried out with late stages embryos using 1µM, 2µM, 5µM and 10µM 2,4-nitroquinoline-4-oxide. This is a known DNA damaging agent and previously shown to effect grass shrimp embryo hatching (Lee et al., 2000). A dose-response curve was prepared where embryo hatching at each concentration was determined. The dose-response curves were within one standard deviation of previously prepared dose-response curves. In addition, we included during the study a reference sediment from the Skidaway River estuary which previously has been shown to have very low effects on the reproduction, embryo production and embryo hatching tests compared to controls. Controls were grass shrimp reproducing without sediment in the aquarium.

RESULTS

Juvenile grass shrimp exposed to test and reference sediments were allowed to grow into adults and reproduce. The reference sediments from the Skidaway had good ovary formation, good production of embryos, high hatching rates and very low DNA damage. Grass shrimp exposed to sediments with low levels of genotoxicants generally have DNA tail moments ranging from 1.2 to3.0. Grass shrimp exposed to sediments from 5-C, 6-C, 7-C had DNA tail moments higher than this normal range. It should be noted that DNA tail moments of 10 to 20 were common in embryos collected from the LCP canal before and during remediation of this site. There was high mortality of grass shrimp exposed to sediments from 15-C, 6-C, H7-C. Grass shrimp from K7-C did not form ovaries and thus there was no reproduction of grass shrimp exposed to sediment from this station. Embryo production was low for grass shrimp exposed to sediments from stations H7-C, K7-C, D-C, 7-C. and 45-C. Hatching rates were signficantly lower for embryos from shrimp exposed to sediments from stations 6-C, 5-C and H7-C. There was an odor of fuel oil or some other petroleum product in sediments from stations 6-C and K7-C. Grass shrimp zoea which hatched from shrimp exposed to sediment from station 6C were very weak swimmers. The embryos from shrimp exposed to sediments from station 5C had unusally large eyes and possibly deformed eyes. The water above sediment from 45-C was very turbid, even though the water was changed several times during the course of the tests. It seems likely that the low amount of reproduction in grass shrimp exposed to this sediment may have been in part due to this high turbidity since the grass shrimp uses sunlight as a cue for reproduction (they will not reproduce in the dark). Much of the sediments from 45-C contained very fine clay sized particles which remained suspended in the water during the tests. There was very little light penetration in the aquaria with sediments from 45-C. Only sediments from station 45-C showed this high level of resuspension.

REFERENCES

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Singh.N.P., M.T. McCoy, R.R. Tice and E.L. Schneider. 1988. A simple technique for the quantitation of low levels of DNA damage in individual cells. Experimental Cell Research 175: 184-191.

Steinert,SA., R. Streib-Montee, J.M. Leather and D.B. Chadwick. 199. DNA damage in mussels at sites in San Diego Bay. Mutation Res. 399: 65-85.

Table 1 - Data for Mortality, Reproduction, Embryo Production, Embryo Hatching and DNA Damage of Grass Shrimp Exposed to Test Sediments
Study began on Sept 2,2002 and ended on December 10, 2002

Sample ID	Mortality (% mortality)	Reproduction (% of females forming mature ovaries)	Embryo Production (% of females producing embryos)
CR-C	20,25,35	80,63,75	60,50,50
TC-C	5,15,20	75,90,89	63,80,89
H7-C	85,65,90	50,25,33	25,0,0
K7-C	40,65,50	0,0,0	0,0,0
D-C	55,20,25	60,50,60	20,25,40
5-C	35,45,60	50,40,29	33,17,14
6-C	80.90,80	50,17,29	33,0,14
7-C	65,80,55	40,50,25	20,33,0
15-C	5,20,15	90,100,88	80,78,63
45-C	40,65,75	33,50,33	17,25,33
Reference Sediment (Skidaway River)	10,20,10	83,100,71	83,57,43

Table 1, cont.

Sample ID	Embryo Hatching Test (% hatching into zoea stage)	DNA Strand Damage Test - Comet Assay (DNA tail moment)
CR-C	88,92,83	1.7,2.4,2.6
TC-C	96,85,90	2.4,1.9,2.1
H7-C	70,67,58	2.9,4.7,3.7
K7-C	no embryos	no embryos
D-C	92,83,88	2.2,1.7,3.0
5-C	70,65,48	3.7,5.2,3.9
6-C	46,65,40	3.8,2.9,4.1
7-C	88,67,75	3.2,4.9,3.5
15-C	92,81,94	1.5,2.7,2.2
45-C	79,83,90	2.3,1.9,2.6
Reference Sediment (Skidaway River)	94,85,96	1.3,2.4,2.9

Table 2 - Means and Standard Deviation ofr Mortality, Reproduction, Embryo Production, Embryo Hatching and DNA Damage of Grass Shrimp Exposed to Test Sediments

Sample ID	Mortality (% mortality of grass shrimp during 2 months in test sediments)		Reproduction Test (% of females which produced mature ovaries)		Embryo Development (% of females which produced embryos)	
	Mean	S.D. (n=3)	Mean	S.D. (n=3)	Mean	S.D. (n=3)
CR-C	27	8	73	9	53	6
TC-C	13	8	85	8	77	13
H7-C	80	14	36	13	8	14
K7-C	52	13	no mature ovaries		no embryos produced	
D-C	33	19	57	6	28	10
5-C	43	13	40	11	21	10
6-C	85	6	32	17	16	17
7-C	77	11	38	13	18	17
15-C	13	8	93	6	74	9
45-C	60	18	39	10	25	8
Reference Sediment	13	6	85	15	61	20

Table 2, cont.

Sediment ID	Embryo Hatching Test (% hatching into zoea stage)		DNA Strand Damage Test - Comet Assay (DNA tail moment)	
	Mean	S.D. (n=3)	Mean	S.D.(n=3)
CR-C	88	5	2.2	0.5
TC-C	90	6	2.1	0.3
H7-C	65	6	3.8	0.9
K7-C	no embryos		no embryos	
D-C	88	5	2.3	0.7
5-C	61	12	4.3	0.8
6-C	50	13	3.6	0.6
7-C	77	11	3.9	0.9
15-C	89	7	2.1	0.6
45-C	84	6	2.3	0.4
Reference Sediment	92	6	2.2	0.8

Table 3 - Hatching Tests and DNA Strand Damage Tests (Comet Assay) on Embryos from Grass Shrimp Collected at Various Sites in Coastal Georgia

Collection Site	Hatching Test (% hatching into zoea stage)			DNA Strand Damage Test (Comet Assay) (DNA tail moment)		
		Mean	S.D.(n=3)		Mean	S.D.(n=3)
Canal at LCP site (rock rubble station)	63,~~35~~,~~20~~ 46 53 CDR	~~42~~ 54 CDR	~~16~~ CDR	5.7,4.6,3.3	4.6	1.1
LCP canal where it empties into Purvis Creek (entrance to Purvis Creek station)	79,88,90	86	6	3.9,2.9,3.1	3.3	0.5
Crescent River (Sapelo Sound area)	90,98,85	91	7	1.5,3.1,2.0	2.2	0.8
Troop Creek (Brunswick area)	88.94,83	88	6	2.2,3.3,1.9	2.5	0.7
Skidaway River (reference site)	90,94,81	89	6	2.4,1.3,2.7	2.1	0.7

matrix = gass shrimp embryos (not sediment tox assay)

These need sample IDs.

Did we collect this data?

Do we want to include it if we didn't?

Table A - Hatching Rates and DNA Strand Damage from Grass Shrimp Embryos Collected in 1997, 1998 and 1999 from LCP Site

Collection # 1

Date of collection - October, 1997
Collection site - pond with very high concentration of Hg at LCP site
No evidence of grass shrimp reproduction in grass shrimp collected at this site

Collection site - canal leading away from LCP site into Purvis Creek

Hatching Rate (% of embryos hatching into zoea stageJ)	DNA Strand Damage (DNA tail moment
35,63, 29	3.7, 5.9, 8.8

Collection # 2

Date of collection - October, 1999
Pond with very high concentration of Hg no longer here. Cleanup of the site has begun

Collection site - canal leading away from LCP site into Purvis Creek, rock rubble site within the canal, grass shrimp collected at mid-tide

Hatching Rate (% of embryos hatching into zoea stage)	DNA Strand Damage (DNA tail moment)
4, 31,2	10.5, 15.8, 20.5

ECOLOGICAL MONITORING INVESTIGATION FOR THE ESTUARY AT THE LCP CHEMICAL SITE IN BRUNSWICK, GEORGIA

-- 2003 Monitoring Investigation --

Volume I

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June 2004

SUMMARY

An ecological monitoring investigation of the estuary at the LCP Site in Brunswick, Georgia, was conducted during October of 2003. The investigation was performed according to an experimental design that was predicated on the design employed for a baseline ecological risk assessment (BERA) conducted for the estuary in 2000 and a subsequent monitoring investigation in 2002. Four chemicals of potential concern (COPC) – mercury, Aroclor 1268, lead, and polynuclear aromatic hydrocarbons (PAHs) – were addressed.

COPC in Surface Water

Surface water of Purvis Creek was characterized by concentrations of **total mercury** that ranged from 33.3 to 48.2 ng/L, as contrasted to levels ranging from 1.24 to 2.10 ng/L at two reference locations in Troup Creek and the Crescent River. Values of total mercury in Purvis Creek were marginally higher than the generic chronic ecological screening value (ESV) of 25 ng/L established for mercury by Region 4 of the U. S. EPA. The percentage of total mercury that was in the form of **methylmercury** ranged from 1.8 to 2.6%. Methylmercury was not detected at the reference locations.

Aroclor 1268, for which there is no specific ESV, was detected (1.0 ug/L) only at the mouth of Purvis Creek. **Lead** was never detected in the study area.

COPC in Surface Sediment

Surface sediment (0 – 15 cm in depth) **in creeks** at the LCP site was characterized by concentrations of **total mercury** that ranged from 0.15 to 80 mg/kg (dry wt). However, preliminary ecological remedial sediment goals (PERSGs) identified by the U. S. EPA for mercury (4 mg/kg for all ecological resources except the federally endangered wood stork, *Mycteriaa americana*, for which 1 mg/kg was established) were commonly exceeded only in the Main Canal (also termed the LCP Ditch), Eastern Creek (or North-South Tributary), and Marsh Grid. Concentrations of **Aroclor 1268** in creek sediment at the site ranged from <0.28 to 33 mg/kg. However, only the 33 mg/kg value, which occurred at one sampling station in the Eastern Creek, exceeded the more stringent of two PERSGs for Aroclor 1268 (150 mg/kg for all ecological resources except the wood stork, for which 24 mg/kg was established). **Lead** concentrations in creek sediment ranged from 11 to 52 mg/kg, with only sediment from the Eastern Creek routinely exceeding the PERSG for lead (30 mg/kg for all ecological resources including the wood stork). Concentrations of **total PAHs** in creek sediment ranged from 0 to 11.60 mg/kg, with some sediment in all areas except the Western Stream Complex and mouth of Purvis Creek exceeding the PERSG for total PAHs (0.486 mg/kg for all ecological resources including the wood stork).

Concentrations of all four COPC in **marsh sediment** at the site typically were lower than levels described above for creek sediment. Only **mercury** concentrations recorded near the Eastern Creek exceeded the 4 mg/kg PERSG for mercury, although sediment near the Main Canal and at some stations in the western part of the site additionally exceeded the 1 mg/kg

PERSG. **Aroclor 1268** concentrations exceeded the more rigorous 24 mg/kg PERSG at only one station near the Eastern Creek, and, even there, the recorded concentration was just 25 mg/kg. **Lead** concentrations exceeded the applicable 30 mg/kg PERSG only at the same station near the Eastern Creek. **Total PAH** levels were greater than the applicable 0.486 mg/kg PERSG at some stations near the Main Canal, Eastern Creek, and western part of the site.

A **supplemental study** was conducted to document statistically reliable (i. e., accurate and precise) estimates of concentrations of **total mercury and Aroclor 1268 in surface sediment of major areas at the site** -- the Main Canal, Eastern Creek, and Marsh Grid. This effort, which was based on random sampling in each area, generated the following 80% confidence intervals (CIs) for mean concentrations of the two COPC in the three areas – mercury in Main Canal: 5.50 to 11.70 mg/kg; Aroclor 1268 in Main Canal: 2.59 to 4.35 mg/kg; mercury in Eastern Creek: 9.14 to 24.22 mg/kg; Aroclor 1268 in Eastern Creek: 21.68 to 79.94 mg/kg; mercury in Marsh Grid: 0.36 to 1.50 mg/kg; and Aroclor 1268 in Marsh Grid: 0.61 to 1.57 mg/kg.

COPC in Biota

Body burdens of COPC were determined in whole bodies of several types of biota – fiddler crabs (*Uca* spp.), mummichogs (*Fundulus heteroclitus*), blue crabs (*Callinectes sapidus*), and several species of sciaenid fishes that included silver perch (*Bairdiella chrysoura*) and red drum (*Sciaenops ocellatus*). Concentrations of **total mercury** in **fiddler crabs** collected from the southern part of the LCP Site (mean mercury concentrations ranging from 0.18 to 0.82 mg/kg; dry wt) were typically an order-of-magnitude higher than mean concentration of mercury in fiddler crabs from the Troup Creek reference location (0.034 mg/kg). A difference of similar magnitude occurred for **mummichogs** obtained from the Main Canal (mean mercury concentration of 0.54 mg/kg), Eastern Creek (0.50 – 0.71 mg/kg), and northern part of the site (0.39 mg/kg) vs. reference fish (0.077 mg/kg). **Blue crabs** (*Callinectes sapidus*) from Purvis Creek were characterized by mercury body burdens (mean concentrations ranging from 1.48 to 1.60 mg/kg) that approached two orders-of-magnitude greater than body burdens of crabs from the reference location (0.073 mg/kg). The highest mean concentration of mercury in **sciaenid fishes** (1.61 mg/kg) occurred in silver perch. Lowest mean concentrations of mercury characterized red drum, (0.67 mg/kg), and black drum, *Pogonias cromis* (0.61 mg/kg).

Body burdens of **Aroclor 1268** in **fiddler crabs** collected from two sampling stations in the southern part of the site (mean concentrations of Aroclor 1268 ranging from 1.83 to 2.06 mg/kg) were about 2X higher than mean concentration of Aroclor 1268 in fiddler crabs from the Troup Creek reference location (0.99 mg/kg). However, Aroclor 1268 was not detected in fiddler crabs obtained from near the mouth of Purvis Creek. **Mummichogs** from all locations evaluated at the site displayed mean concentrations of Aroclor 1268 (1.09 – 7.97 mg/kg) that were as much as an order-of-magnitude greater than observed in reference fish (0.45 mg/kg). **Blue crabs** from Purvis Creek were characterized by body burdens of Aroclor 1268 (mean concentrations ranging from 2.76 to 3.60 mg/kg) that approached an order-of-magnitude greater than body burdens of crabs from the reference location (0.43 mg/kg). The highest mean body burden of Aroclor 1268 in **sciaenid fishes** occurred in silver perch (3.83 mg/kg), whereas the lowest concentration was exhibited by red drum (1.02 mg/kg).

Body burden of **lead** in **fiddler crabs** collected from the AB seepage area at the site (mean lead concentration of 32.86 mg/kg) was dramatically higher than mean concentration in reference fiddler crabs (0.41 mg/kg). In addition, mean lead concentration in fiddler crabs from near the Main Canal (1.55 mg/kg) was about 3X higher than in reference organisms (0.41 mg/kg); whereas mean lead level in fiddler crabs from near the mouth of Purvis Creek (0.56 mg/kg) was only marginally higher than in reference organisms. The mean concentration of lead in **mummichogs** from the northern part of the site was 1.27 mg/kg, as contrasted to a reference value of 0.54 mg/kg. Lead was seldom detected **in blue crabs** or **sciaenid fishes** from the study area.

Chronic Toxicity of Surface Sediment to Biota

In a laboratory-based study, **amphipods** exposed for 28 days to creek surface sediment collected from eight sampling stations at the LCP Site exhibited impaired **survival** (from a statistical perspective) in sediment from six of these stations – sediment from the Main Canal, two stations in the Eastern Creek, a station in the Western part of the site, and two stations in the Marsh Grid – vs. survival of reference organisms (i. e., organisms exposed to sediment from either Troup Creek or the Crescent River). Conversely, amphipods exposed to sediment from the Western Creek Complex and from a second station in the western part of the site were characterized by survival that was statistically indistinguishable from survival of at least one cohort of reference organisms. **Growth** (weight) of organisms exposed to sediment from all eight stations was significantly less than growth of reference organisms. **Reproductive response** of organisms at all site stations and reference locations was statistically similar.

Grass shrimp exposed in the laboratory for 2 months to creek surface sediment from the same eight stations at the site were characterized by **survival** that was generally higher than survival of amphipods. Indeed, only survival for one station in the Marsh Grid and a station in the Western Creek Complex was significantly lower than survival of reference organisms. **Percent of surviving female grass shrimp forming mature ovaries** generated results that were similar to survival of shrimp except that just shrimp exposed to sediment from the station in the Marsh Grid displayed ovarian formation that was statistically distinguishable from that of reference organisms. **Percent of surviving female grass shrimp producing embryos** was impaired only in sediment from one station in the Marsh Grid, and **percent of embryos hatching** was impaired in sediment from the same station. Assessment of **DNA strand damage** in embryos (which is a reversible condition) generated information that is largely redundant to information generated by the other measurement endpoints.

Coefficients of determination (r^2) derived from paired data addressing concentrations of COPC in creek surface sediment vs. toxicity of sediment to amphipods and grass shrimp indicate that COPC played only a limited role in sediment toxicity. In the case of the **chemical-toxicological relationships** for amphipod toxicity, greatest correlation occurred between concentration of lead in sediment and survival of organisms (r^2 = 0.57), concentration of total PAHs and survival ($r^2 = 0.61$), as well as concentration of lead and growth of organisms ($r^2 = 0.63$). However, even this last correlation value merely implies that only 63% of the variation in amphipod growth can be explained in terms of variation in concentration of lead in sediment. The relationships (r^2 values) between concentrations of COPC in sediment and grass shrimp toxicity are all unremarkable. These findings are supported by the U. S. EPA in its conclusion that many inorganic chemicals (e. g., arsenic, cadmium, chromium, copper, and silver) are present in site sediment at concentrations (or detection limits) exceeding generic ecological effects values (EEVs) established by Region 4 of the U. S. EPA.

Toxicological Condition of Indigenous Grass Shrimp

Percent of embryos hatching (mean hatching success) from indigenous female grass shrimp collected from a sampling station located mid-way in the Main Canal at the LCP Site and from a station situated in the Main Canal at its confluence with Purvis Creek was statistically similar to hatching of reference and control shrimp. **DNA strand damage** in embryos from female shrimp obtained from these two site stations was statistically indistinguishable from damage in reference and control organisms.

Time-series Differences in Toxicological Condition of Indigenous Grass Shrimp

Percent of embryos hatching (mean hatching success) from indigenous female grass shrimp collected from a sampling station located mid-way in the Main Canal at the LCP Site in 1999 (about 3 months after removal activities in the estuary at the site were completed), 2002, and in this investigation (2003) increased by over 7-fold (from 12 to 87%) between 1999 and 2003, an increase that is statistically significant and, also, reflective of baseline conditions for the site. Hatching success of grass shrimp obtained from the Main Canal at its confluence with Purvis Creek in 1997 (about 3 months before removal activities were initiated), 2002, and in this investigation (2003) increased from 42% to 85-86%, also a statistically significant increase and reflective of baseline conditions for the site.

DNA strand damage of embryos from the Main Canal, as measured by DNA tail moment, significantly decreased from 15.6 in 1999 to 2.6 in 2003. However, a decrease in DNA tail moment of embryos from the Main Canal at its confluence with Purvis Creek from 1997 (a 6.1 value) to 2003 (2.4) is not statistically significant. DNA damage recorded for both locations in 2003 appears to be approaching baseline conditions for the site.

Time-series Differences in Concentrations of COPC in Environmental Media

Qualitative (i. e., non-statistical) time-series comparisons of concentrations of COPC in environmental media routinely monitored at the LCP Site indicate that the highest levels of COPC in environmental media typically occurred in 1995, with substantially decreasing levels recorded thereafter.

In one of the more extreme examples, concentration of total mercury in surface water in the Main Canal at the site was 7,400 ng/L in 1995, decreased dramatically to 170 ng/L in 1996, and decreased again to 14 – 59 ng/L in 2000 (the last year in which water chemistry was monitored in the Main Canal). Similarly, concentration of total mercury in creek sediment from the Marsh Grid decreased from 330 mg/kg in 1995 to 4.3 - 46 mg/kg in 1996, and to 2.2 – 22 mg/kg in 2003. Also, concentration of Aroclor 1268 in creek sediment from the Marsh Grid decreased from 910 mg/kg in 1995 to 3.3 - 21 mg/kg in 1996 and to 0.94 – 3.5 mg/kg in 2000, appeared to increase in 2002 (6.5 – 92 mg/kg), and decreased again in 2003 (0.79 – 24 mg/kg).

Decreases in concentrations of COPC in environmental media were still occurring in 2003 at a number of locations at the site. These cases were total mercury in creek sediment, marsh sediment, and mummichogs; Aroclor 1268 in creek sediment, marsh sediment, fiddler crabs, mummichogs, and sciaenid fishes; and lead in marsh sediment, fiddler crabs, mummichogs, blue crabs, and most sciaenid fishes. Other cases were observed in 2003 – notably Aroclor 1268 in blue crabs from Purvis Creek and lead in fiddler crabs from the AB seepage area – that clearly merit continued evaluation.

The numerous and dramatic decreases in concentrations of COPC documented in environmental media shortly after 1995, the decreases in concentrations of COPC in some environmental media that occurred in 2003, and the need to further evaluate levels of COPC observed in other environmental media in 2003 collectively constitute a rationale for continued ecological monitoring of the estuary at the LCP Site.

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Appendix

A. SUPPORTING CHEMISTRY INFORMATION FOR ESTUARY AT LCP SITE

B. SUPPORTING TOXICOLOGICAL INFORMATION FOR ESTUARY AT LCP SITE

LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

ANOVA – analysis of variance
ASTM – American Society for Testing and Materials
BERA – baseline ecological risk assessment
CI – confidence interval
COPC – chemical of potential concern
cm – centimeter
CVAFS – cold vapor atomic fluorescence spectrometry
DNA – deoxyribose nucleic acid
EEV – ecological effects value
ESV – ecological screening value
g – gram
kg – kilogram
L – liter
LCP – Linden Chemicals and Plastics
ug – microgram
ug/L – parts per billion
mg – milligram
mg/kg – parts per million
mS/cm – milliSiemens per centimeter
n = sample size (number of samples)
ng/L – parts per trillion
PAH – polynuclear aromatic hydrocarbon
PERSG – preliminary ecological remedial sediment goal
ppt – parts per thousand
r^2 – linear coefficient of determination
RT = regulatory threshold
TOC – total organic carbon
U – undetected
U. S. EPA – U. S. Environmental Protection Agency

1. INTRODUCTION

This report presents the results of the 2003 ecological monitoring investigation of the estuary at the Linden Chemicals and Plastics (LCP) Site in Brunswick, Georgia (Figure 1). The report consists of two volumes. This volume (Volume I) contains the most germane information generated in the investigation. Volume II contains the laboratory reports and raw data that constitute the basis of Volume I.

The 2003 monitoring investigation was conducted according to the same basic experimental design that was employed in a monitoring investigation performed for the estuary in 2002 (CDR Environmental Specialists and GeoSyntec Consultants, 2003a). That earlier investigation, and, in turn, this investigation, reflected modifications of the design of a baseline ecological risk assessment (BERA) conducted for the estuary in 2000 (CDR Environmental Specialists and GeoSyntec Consultants, 2001). These modifications were implemented primarily in response to a critique by Region 4, U. S. Environmental Protection Agency (U. S. EPA, 2001a), of the results of the BERA. The modifications included a focus on the "holistic" Purvis Creek system, as contrasted to individual, isolated sampling stations within the system. This focus resulted in a reduction in the number of sampling stations employed in the 2002 and 2003 investigations, which also represented the natural evolution from the scientific requirements of a BERA to those of a subsequent, routine monitoring investigation.

An additional modification in the 2002 and 2003 monitoring investigations was a strict focus on chemicals of potential concern (COPC) at the LCP Site – mercury, Aroclor 1268, lead, and polynuclear aromatic hydrocarbons (PAHs) – as contrasted to analyses of extensive suites of chemicals in the BERA. Similarly, studies and analyses that did not generate useful information in the BERA were curtailed or eliminated. Consequently, chemical studies of surface water, evaluation of environmental media for mercury species other than total mercury, and use of reference locations were de-emphasized. Toxicological studies of surface water, community studies of indigenous macrobenthos, and normalization of concentrations of COPC in sediment and biota according to various abiotic variables were completely eliminated.

In the 2002 and 2003 monitoring investigations, additional sampling stations were established in western part of the site to better characterize that part of the estuary than occurred in the BERA. The number of sampling stations evaluated for sediment toxicity was also increased from the number evaluated in the BERA to include those stations characterized by the highest concentrations of COPC in the BERA. Measurement endpoints in toxicity tests with "laboratory" (i. e., uncontaminated) grass shrimp (*Palaemonetes pugio*) exposed to sediment obtained from the site included DNA strand damage in embryos, which was not evaluated in the BERA. New studies were also conducted of the condition of grass shrimp indigenous to (collected from) the site. Red drum (*Sciaenops ocellatus*), a target species not collected in the BERA, and other sciaenid fishes, were captured in 2002 and 2003 and evaluated for body burdens of COPC.

Finally, this report presents both statistical and qualitative (i. e., non-statistical) comparisons between historical and contemporary estuarine conditions at the LCP Site. In particular, a statistically rigorous sampling design was employed to estimate concentrations of total mercury and Aroclor 1268 in surface sediment of major areas of the estuary at the site.

2. PROCEDURES

Field activities conducted during the 2003 monitoring investigation of the estuary at the LCP Site occurred during October (usually during the period of October 14 – 17, 2003).

The 2003 monitoring investigation was conducted according to a work plan developed by CDR Environmental Specialists and GeoSyntec Consultants (2003b). The fundamental sampling frame employed in the 2003 monitoring investigation was identical to the sampling frame established for the 2002 investigation. Consequently, the 2003 investigation focused on three general strata at the site: 1) creek surface water (and associated biota); 2) creek surface sediment (and biota); and 3) marsh surface sediment (and biota). The sampling stations occupied in these basic areas and the environmental media sampled are illustrated in, respectively, Figures 2, 3, and 4. (It should be noted that these sampling stations are not sequentially numbered because they are a subset of the more numerous sampling stations initially established in the BERA.) In addition, Troup Creek and the Crescent River were selectively utilized as reference locations.

The basic experimental design of the 2003 monitoring investigation (Table 1) is best reviewed in the context of Figures 2, 3, and 4. In addition to this basic design, a supplemental study based on statistically rigorous protocols was employed to estimate concentrations of total mercury and Aroclor 1268 in surface sediment of the Main Canal (also termed the LCP Ditch), Eastern Creek (or North-South Tributary), and Marsh Grid (where sediment removal actions occurred during 1998 – 1999) in the southern part of the site.

Surface water samples intended for analyses of total mercury and methylmercury were collected by the "clean-hands" technique and analyzed by Frontier Geosciences, located in Seattle, Washington. All other chemical analyses were performed by the STL Laboratory in Mobile, Alabama. Toxicity tests with amphipods (*Leptocheirus plumulosus*) exposed to surface sediment were conducted by The SeaCrest Group, located in Louisville, Colorado. Sediment toxicity tests with grass shrimp were conducted at the Skidaway Institute of Oceanography (Savannah, Georgia) and were supervised by Dr. Richard Lee according to protocols developed by him. Both types of laboratory toxicity tests were conducted with sub-samples of the same surface sediment analyzed for COPC. The term "surface sediment," as used in this report, refers to a layer of sediment approximately 0 to 15 cm in depth.

3. RESULTS OF 2003 MONITORING INVESTIGATION AT LCP SITE

The 2003 monitoring investigation consisted of a basic study and a supplemental sediment study. In this section of the report, key elements or concepts of the investigation are often identified in **bold print** to facilitate reading of the report.

3.1 Basic Study

The basic study addressed presence of COPC in environmental media, chronic toxicity of surface sediment to biota, and toxicological condition of grass shrimp indigenous to the LCP Site.

3.1.1 Presence of Chemicals of Potential Concern in Environmental Media

Surface water, surface sediment, and biota at the LCP Site are sequentially addressed.

3.1.1.1 Surface Water

General water quality characteristics of surface water at the LCP Site, as reflected by conditions at several sampling stations in Purvis Creek, and at the two reference locations were generally similar (Table 2). Water temperature ranged from approximately 23 to 25^0 C. Salinity, and the related variables of conductivity and total dissolved solids, were typical of estuarine water. However, these values for Troup Creek were substantially lower than values for the other stations. Values of pH ranged from 6.6 to 7.2, and dissolved oxygen concentrations ranged from 6.1 to 7.4 mg/L.

Concentrations of **total mercury** in surface water of Purvis Creek (33.3 – 48.2 ng/L) were an order-of-magnitude higher than levels at the reference locations (1.24 – 2.10 ng/L), and were marginally higher than the generic chronic ecological screening value (ESV) of 25 ng/L established for mercury by Region 4 of the U. S. EPA (Table 3). The percentage of total mercury that was in the form of methylmercury ranged from 1.8 to 2.6% for Purvis Creek. Methylmercury was not detected at the reference locations.

Aroclor 1268, for which there is no specific ESV, was detected (1.0 ug/L) only at the mouth of Purvis Creek. **Lead** was never detected in the study area.

3.1.1.2 Surface Sediment

Surface sediment in creek habitat and marsh habitat of the LCP Site is separately addressed.

a) Creek Habitat

Silt and clay content of creek sediment at the LCP Site ranged from 9.0% at Station 33 to 99.2% at Station D, whereas silt and clay content at the reference locations ranged from 28.6 to 39.1% (Table 4). Total organic carbon (TOC) content generally exhibited the expected positive relationship with silt/clay content and ranged from 0.94 to 5.9%.

Total mercury concentrations in creek sediment at the site (0.15 – 80 mg/kg) ranged from about 1 to 3 orders-of-magnitude higher than mercury levels at the reference locations (<0.02 - 0.044 mg/kg). All mercury concentrations recorded at the site exceeded the gereric ecological effects value (EEV) of 0.13 mg/kg established for mercury by Region 4 of the U. S. EPA. However, preliminary ecological remedial sediment goals (PERSGs) identified by the U. S. EPA (2001b) for mercury – 4 mg/kg for all ecological resources except the federally endangered wood stork, *Mycteriaa americana*, for which 1 mg/kg was established – were commonly exceeded only in the Main Canal, Eastern Creek, and Marsh Grid. (Concentrations of mercury [and Aroclor 1268] in creek sediment from the Main Canal and Eastern Creek are definitively addressed in Section 3.2 of this report.)

Aroclor 1268 concentrations in creek sediment at the site (<0.28 – 33 mg/kg) were always greater than levels at the reference locations (<0.20 mg/kg). However, the more stringent PERSG identified by the U. S. EPA (2001b) for Aroclor 1268 – 24 mg/kg for the wood stork as contrasted to 150 mg/kg for all ecological resources – were exceeded only at one sampling station in the Eastern Creek (where the above-referenced 33 mg/kg value recorded at that station exceeded just the 24 mg/kg PERSG for the wood stork).

Lead concentrations in creek sediment at the site (11 – 52 mg/kg) were always greater than levels at the reference locations (7.5 – 9.4 mg/kg). However, only stations situated in the Eastern Creek (and, also, the single station evaluated in the northern part of the site) routinely exceeded the generic EEV of 30.2 mg/kg established for lead by Region 4 of the U. S. EPA and the PERSG identified by the U. S. EPA (2001b) for lead (30 mg/kg for all ecological resources including the wood stork).

Total PAH concentrations in creek sediment at the site (0 – 11.60 mg/kg) were usually elevated over levels observed at the reference locations (0 - 0.03 mg/kg). In addition, all evaluated areas, with the exception of the Western Stream Complex and mouth of Purvis Creek, were characterized by concentrations of total PAHs at some stations that exceeded the generic EEV of 1.684 mg/kg established for total PAHs by Region 4 of the U. S. EPA and/or the PERSG identified by the U. S. EPA (2001b) for total PAHs (0.486 mg/kg for all ecological resources including the wood stork).

b) Marsh Habitat

Concentrations of **all four COPC** in marsh sediment at the LCP Site (Table 5) were typically lower than levels described above for creek sediment. However, all **mercury** concentrations recorded at the site except at the AB seep location exceeded the generic EEV of 0.13 mg/kg. Conversley, the 4 mg/kg PERSG for mercury was exceeded only near the Eastern Creek, and the 1 mg/kg PERSG was additionally exceeded only near the Main Canal and at some stations in the western part of the site. (Concentrations of mercury [and Aroclor 1268] in sediment from the Marsh Grid are definitively addressed in Section 3.2 of this report.)

Aroclor 1268 concentrations exceeded the 24 mg/kg PERSG (the more rigorous criterion for Aroclor 1268) only at one station near the Eastern Creek, and, even there, the recorded concentration was just 25 mg/kg. **Lead** concentrations exceeded the 30 mg/kg PERSG and generic 30.2 EEV only at the same station near the Eastern Creek. **Total PAH** levels exceeded the generic 1.684 EEV at that same station and, also, at one station in the western part of the site; the 0.486 PERSG was additionally exceeded near the Main Canal and at another station near the Eastern Creek.

3.1.1.3 Biota

Body burdens of **total mercury** in whole bodies of **fiddler crabs** (*Uca* spp.) collected from the southern part of the LCP Site (mean mercury concentrations ranging from 0.18 to 0.82 mg/kg, dry wt) were typically an order-of-magnitude higher than mean concentration of mercury (0.034 mg/kg) in fiddler crabs from the Troup Creek reference location (Table 6). A difference of similar magnitude occurred for **mummichogs** (*Fundulus heteroclitus*) obtained from the Main Canal (mean mercury concentration of 0.54 mg/kg), Eastern Creek (0.50 – 0.71 mg/kg), and northern part of the site (0.39 mg/kg) vs. reference fish (0.077 mg/kg).

Blue crabs (*Callinectes sapidus*) from Purvis Creek were characterized by mercury body burdens (mean concentrations ranging from 1.48 to 1.60 mg/kg) that approached two orders-of-magnitude greater than body burdens of crabs from the reference location (0.073 mg/kg).

Sciaenid fishes were captured only from Purvis Creek, and not from a reference location. The highest mean body burden of mercury (1.61 mg/kg) occurred in silver perch (*Bairdiella chrysoura*). Lowest mean concentrations of mercury characterized red drum, *Sciaenops ocellatus* (0.67 mg/kg), and black drum, *Pogonias cromis* (0.61 mg/kg).

Body burdens of **Aroclor 1268** in **fiddler crabs** collected from two locations in the southern part of the site (mean concentrations of Aroclor 1268 ranging from 1.83 to 2.06 mg/kg) were about 2X higher than mean concentration of Aroclor 1268 in fiddler crabs from the Troup Creek reference location (0.99 mg/kg). However, Aroclor 1268 was not detected in fiddler crabs obtained near the mouth of Purvis Creek (mean default value for Aroclor 1268 was 0.44 mg/kg). **Mummichogs** from all locations evaluated at the site displayed mean concentrations of Aroclor 1268 (1.09 – 7.97 mg/kg) that were as much as an order-of-magnitude greater than observed in reference fish (0.45 mg/kg).

Blue crabs from Purvis Creek were characterized by body burdens of Aroclor 1268 (mean concentrations ranging from 2.76 to 3.60 mg/kg) that approached an order-of-magnitude greater than body burdens of crabs from the reference location (0.43 mg/kg). The highest mean body burden of Aroclor 1268 in **sciaenid fishes** occurred in silver perch (3.83 mg/kg), whereas the lowest concentration was exhibited by red drum (1.02 mg/kg).

Body burden of **lead** in **fiddler crabs** collected from the AB seepage area at the site (mean lead concentration of 32.86 mg/kg) was dramatically higher than mean concentration in reference fiddler crabs (0.41 mg/kg). In addition, mean lead concentration in fiddler crabs from near the Main Canal (1.55 mg/kg) was about 3X higher than in reference organisms (0.41 mg/kg); whereas mean lead level in fiddler crabs from near the mouth of Purvis Creek (0.56 mg/kg) was only marginally higher than in reference organisms. The mean concentration of lead in **mummichogs** from the northern part of the site was 1.27 mg/kg, as contrasted to a reference value of 0.54 mg/kg.

Lead was seldom detected in **blue crabs** or **sciaenid fishes** from the study area.

3.1.2 Chronic Toxicity of Creek Surface Sediment to Biota

Chronic toxicity of creek surface sediment at the LCP Site to amphipods and grass shrimp is sequentially addressed, followed by an evaluation of the relationships between concentrations of COPC in sediment and observed toxicity.

3.1.2.1 Amphipods

Survival (mean survival) of amphipods (i. e., uncontaminated organisms) exposed in the laboratory for 28 days to creek surface sediment collected from eight sampling stations at the LCP Site was most severely impacted (from a statistical perspective) at Station 7 in the Eastern Creek (Table 7). In addition, survival of amphipods exposed to sediment from a number of stations – both stations in the Marsh Grid (H7 and K7), Station 6 in the Eastern Creek, Station 45 in the western part of the site, and Station 5 in the Main Canal – was significantly lower than survival of reference organisms (i. e., organisms exposed to sediment from either Troup Creek or the Crescent River). Conversely, amphipods exposed to sediment from the Western Creek Complex (Station 15) and from a second station in the western part of the site (Station D) were characterized by survival that was statistically indistinguishable from survival of at least one cohort of reference organisms.

Growth (weight) of amphipods exposed to sediment from the eight site stations generally reflected the above-described pattern of survival. One major exception is that the least affected amphipods (organisms exposed to sediment from Stations 15 and D) exhibited growth that was significantly less than that of both cohorts of reference organisms.

Reproductive response of amphipods at all site stations and reference locations was statistically similar.

It is important to note that all sediment samples evaluated for toxicity were composite samples (typically consisting of five grab samples) and, consequently, represent substantial areas of the estuary.

3.1.2.2 Grass Shrimp

Grass shrimp exposed in the laboratory for 2 months to creek surface sediment collected at the LCP Site (Table 8) were characterized by **survival** that was generally higher than the above-referenced survival of amphipods. However, sediment from Station H7 in the Marsh Grid was identified as being toxic to grass shrimp, as well as to amphipods; and Station 15 in the Western Creek Complex was additionally determined to be toxic. Sediment from all other stations at the site was no more toxic than both reference sediments and even control sediment.

Evaluation of **percent of surviving female grass shrimp forming mature ovaries** generated results that were similar to those described above for survival of grass shrimp. However, one notable exception was that ovarian formation of shrimp exposed to sediment from Station 15 in the Western Creek Complex, as well as ovarian formation for all stations except H7 in the Marsh Grid, was statistically indistinguishable from that of reference and control shrimp.

Assessment of **percent of surviving female grass shrimp producing embryos** indicated a more complex statistical relationship among individual stations than was the case for survival and ovarian formation of shrimp (note the more numerous horizontal lines in Part 3 of Section C of Table 8). However, the primary relationship between site stations and reference locations was fairly constant; namely, that Station H7 in the Marsh Grid was the only station for which ovarian production was significantly impaired as compared to reference conditions. (Note that only the Crescent River reference location is employed in this comparison because of the high variance (s^2) associated with Troup Creek, which, in turn, would have precluded the use of parametric analysis of variance [ANOVA] in the overall assessment.)

Evaluation of **percent of embryos hatching** indicated no statistically significant differences in hatching among site and reference stations. However, Station H7 in the Marsh Grid was not included in the statistical analysis because of the high variance (s^2) related to hatching for that station. On a qualitative basis, Station H7 was clearly characterized by impaired embryo hatching.

Assessment of **DNA strand damage in embryos** (which is a reversible condition) offered little additional information regarding toxicity of sediment at the site. This relatively sophisticated measurement endpoint identified only Station H7 in the Marsh Grid as exhibiting significantly greater DNA damage than damage at a reference location.

It is important to again note that all sediment samples evaluated for toxicity were composite samples (typically consisting of five grab samples) and, consequently, represent substantial areas of the estuary.

3.1.2.3 Chemical and Toxicological Relationships

Coefficients of determination (r^2) derived from paired data addressing concentrations of COPC in creek surface sediment (Table 4) vs. toxicity of sediment to amphipods (Table 7) and grass shrimp (Table 8) indicate that COPC played only a limited role in sediment toxicity (Table 9).

In the case of chemical-toxicological relationships for amphipod toxicity, greatest correlation occurred between concentration of lead in sediment and survival of organisms ($r^2 = 0.57$), concentration of total PAHs and survival ($r^2 = 0.61$), as well as concentration of lead and growth of organisms ($r^2 = 0.63$). However, even this last correlation value merely implies that only 63% of the variation in amphipod growth can be explained in terms of variation in concentration of lead in sediment.

The relationships (r^2 values) between concentrations of COPC in sediment and grass shrimp toxicity are all unremarkable. Indeed, the numerous cases, for both amphipods and shrimp, in which "reverse correlation" occurred, or for which r^2 values were extremely low, indicates that toxicity of sediment is caused largely by chemicals other than COPC. The U. S. EPA (2001b) supports this finding in its conclusion that many inorganic chemicals (e. g., arsenic, cadmium, chromium, copper, and silver) are present in site sediment at concentrations (or detection limits) exceeding EEVs promulgated by Region 4 of the U. S. EPA.

3.1.3 Toxicological Condition of Indigenous Grass Shrimp

Percent of embryos hatching (mean hatching success) from indigenous female grass shrimp collected from a sampling station (Station 25) located mid-way in the Main Canal at the LCP Site and from a station situated in the Main Canal at its confluence with Purvis Creek (Station 5) was statistically similar to hatching of reference and control shrimp (Table 10).

DNA strand damage in embryos from female shrimp obtained from the same two site stations was statistically indistinguishable from damage in reference and control organisms.

3.2 Supplemental Sediment Study

The objective of this supplemental study was to document **statistically reliable estimates** of concentrations of **total mercury and Aroclor 1268** (together with general sediment quality variables) in **surface sediment of major areas of the estuary at the LCP Site**. The areas addressed in this study are the Main Canal, Eastern Creek, and Marsh Grid (Table 11). Sediment data derived in this study for these areas are intended to serve as definitive substitutes for the limited sediment data presented in Table 4 of this report.

Statistically reliable estimates of any variable must be **accurate** and **precise** (i. e., sufficiently precise to achieve the objective of the study). Accuracy is usually achieved by some form of random sampling, thereby ensuring that each unit in a population (e. g., every location in each of the three major areas at the site) has a theoretically equal chance of being sampled and measured. Appropriate precision is most commonly achieved by taking enough samples from the population. In this study, the appropriate number of sediment samples to collect from each of the three main areas was determined by use of the following formula (U. S. EPA, 1982):

$$n = (t^2_{.20}) (s^2) / \Delta^2, \qquad \text{(Equation 1)}$$

with n = number of samples; t = "t" value for a "two-tailed" confidence interval and a probability of 0.20; s^2 = variance of sample; $\Delta = RT - x$; RT = regulatory threshold (PERSG of 1 mg/kg for total mercury and 24 mg/kg for Aroclor 1268); and x = mean of sample. The basic principles involved in estimating the appropriate number of samples to collect is clearly evident from this equation. Appropriate sample size is a direct function of the estimated variance of a sample and is inversely related to the magnitude of the difference between the estimated mean of the sample and the regulatory threshold.

Both s^2 and x in the above-referenced equation were estimated for all three major areas from results of a sampling effort in the Marsh Grid during the monitoring investigation in 2002. The resulting estimation of sample size for total mercury and Aroclor 1268 in sediment indicated that a greater number of samples were required for Aroclor 1268 to achieve desired precision than for mercury. The required sample size was 22, which was increased to 25 to provide an extra margin of safety. This number of sediment samples (25 samples) was then randomly collected in 2003 from each of the three major areas by use of a random numbers table applied to a grid developed for each area. Each of the 25 sediment samples was then analyzed for mercury, Aroclor 1268, and associated sediment quality variables (TOC and grain-size distribution).

The results of this supplemental sediment study (Table 11) indicate that surface sediment from the **Main Canal** was characterized by a mean concentration of **total mercury** of 8.60 mg/kg, with an 80% confidence interval (CI) ranging from 5.50 to 11.70 mg/kg. For **Aroclor 1268**, mean sediment concentration was 3.47 mg/kg, with a CI of from 2.59 to 4.35 mg/kg. Consequently, it can be concluded with 80% confidence that mean levels of mercury and Aroclor 1268 in sediment from the Main Canal were, respectively, greater than and less than applicable PERSGs (1 mg/kg for mercury and 24 mg/kg for Aroclor 1268).

The **Eastern Creek** contained sediment in which the mean concentration of **mercury** was 16.68 mg/kg, with an 80% CI of from 9.14 to 24.22 mg/kg. For **Aroclor 1268**, mean sediment concentration was 50.81 mg/kg, with a CI of 21.68 to 79.94 mg/kg. Once more, it can be concluded with 80% confidence that the mean level of mercury in sediment was greater than the 1 mg/kg PERSG for mercury. However, for Aroclor 1268, sample size was not quite large enough to clearly indicate (with 80% confidence) if the applicable 24 mg/kg PERSG was exceeded, although the "closeness" of the lower limit of the 80% CI (21.68 mg/kg) to the PERSG (24 mg/kg) suggests that the PERSG was probably exceeded.

The **Marsh Grid** was characterized by mean concentrations of **mercury** and **Aroclor 1268** in sediment that were substantially lower than observed in the Main Canal or Eastern Creek.

4. COMPARISONS OF HISTORICAL AND CONTEMPORARY ECOLOGICAL CONDITIONS AT LCP SITE

This section of the report addresses time-series differences in toxicological condition of grass shrimp indigenous to the LCP Site and, additionally, time-series differences in concentrations of COPC in environmental media routinely monitored at the site.

4.1 Toxicological Condition of Indigenous Grass Shrimp

Percent of embryos hatching (mean hatching success) from indigenous female grass shrimp collected from mid-way in the Main Canal at the LCP Site (Station 25) was evaluated in October of 1999 (Lee, 2004), October of 2002 (CDR Environmental Specialists and GeoSyntec Consultants, 2003a), as well as in this investigation (Table 12). (October of 1999 was about 3 months after removal activities in the estuary at the site were completed.) Hatching success increased by over 7-fold (from 12% to 87%) between 1999 and 2003, an increase that is statistically significant and, also, reflective of baseline conditions for the site (Table 10).

Hatching success of grass shrimp obtained from the Main Canal at its confluence with Purvis Creek (Station 5) in October of 1997 (Lee, 2004), October of 2002, and in this investigation increased from 42% to 85-86%, also a statistically significant increase and reflective of baseline conditions for the site (Table 10). (October of 1997 was about 3 months before removal activities in the estuary at the site were initiated.)

DNA strand damage of embryos from Station 25, as measured by DNA tail moment, significantly decreased from 15.6 in 1999 to 2.6 in 2003 (Table 12). However, a decrease in DNA tail moment of embryos for Station 5 from 1997 (a 6.1 value) to 2003 (2.4) is not statistically significant. DNA damage recorded for both stations in 2003 appears to be approaching baseline conditions for the site (Table 10).

4.2 Concentrations of Chemicals of Potential Concern in Environmental Media

Qualitative (i. e., non-statistical) time-series comparisons of concentrations of COPC in environmental media routinely monitored at the LCP Site (Table 13) indicate that the highest levels of COPC in environmental media (indicated by red coding in the table) typically occurred in 1995, with substantially decreasing levels (identified by green coding in the table) recorded thereafter. (Note that these time-series comparisons are based on a number of different investigations and reporting protocols. In addition, although sampling stations in the earlier investigations [1995 to 1997] were selected to conform to the general site locations addressed in the later investigations [2000 – 2003], this "matching" of stations may not be precise. Also, only selected site locations are included in this evaluation. Consequently, the general, qualitative character of this table merits emphasis.)

In one of the more extreme examples, concentration of total mercury in surface water in the Main Canal at the site was 7,400 ng/L in 1995, decreased dramatically to 170 ng/L in 1996, and decreased again to 14 – 59 ng/L in 2000 (the last year in which water chemistry was monitored in the Main Canal). Similarly, concentration of total mercury in creek sediment from the Marsh Grid decreased from 330 mg/kg in 1995 to 4.3 - 46 mg/kg in 1996, and to 2.2 – 22 mg/kg in 2003. Also, concentration of Aroclor 1268 in creek sediment from the Marsh Grid decreased from 910 mg/kg in 1995 to 3.3 - 21 mg/kg in 1996 and to 0.94 – 3.5 mg/kg in 2000, appeared to increase in 2002 (6.5 – 92 mg/kg), and decreased again in 2003 (0.79 – 24 mg/kg).

Decreases in concentrations of COPC in environmental media were still occurring in 2003 at a number of locations at the site. These cases were total mercury in creek sediment, marsh sediment, and mummichogs; Aroclor 1268 in creek sediment, marsh sediment, fiddler crabs, mummichogs, and sciaenid fishes; and lead in marsh sediment, fiddler crabs, mummichogs, blue crabs, and most sciaenid fishes.

Other cases were observed in 2003 – notably Aroclor 1268 in blue crabs from Purvis Creek and lead in fiddler crabs from the AB seepage area – that clearly merit continued evaluation. These cases are indicated by orange coding in Table 13.

The numerous and dramatic decreases in concentrations of COPC documented in environmental media shortly after 1995, the decreases in concentrations of COPC in some environmental media that occurred in 2003, and the need to further evaluate levels of COPC observed in other environmental media in 2003 collectively constitute a rationale for continued ecological monitoring of the estuary at the LCP Site.

5. REFERENCES

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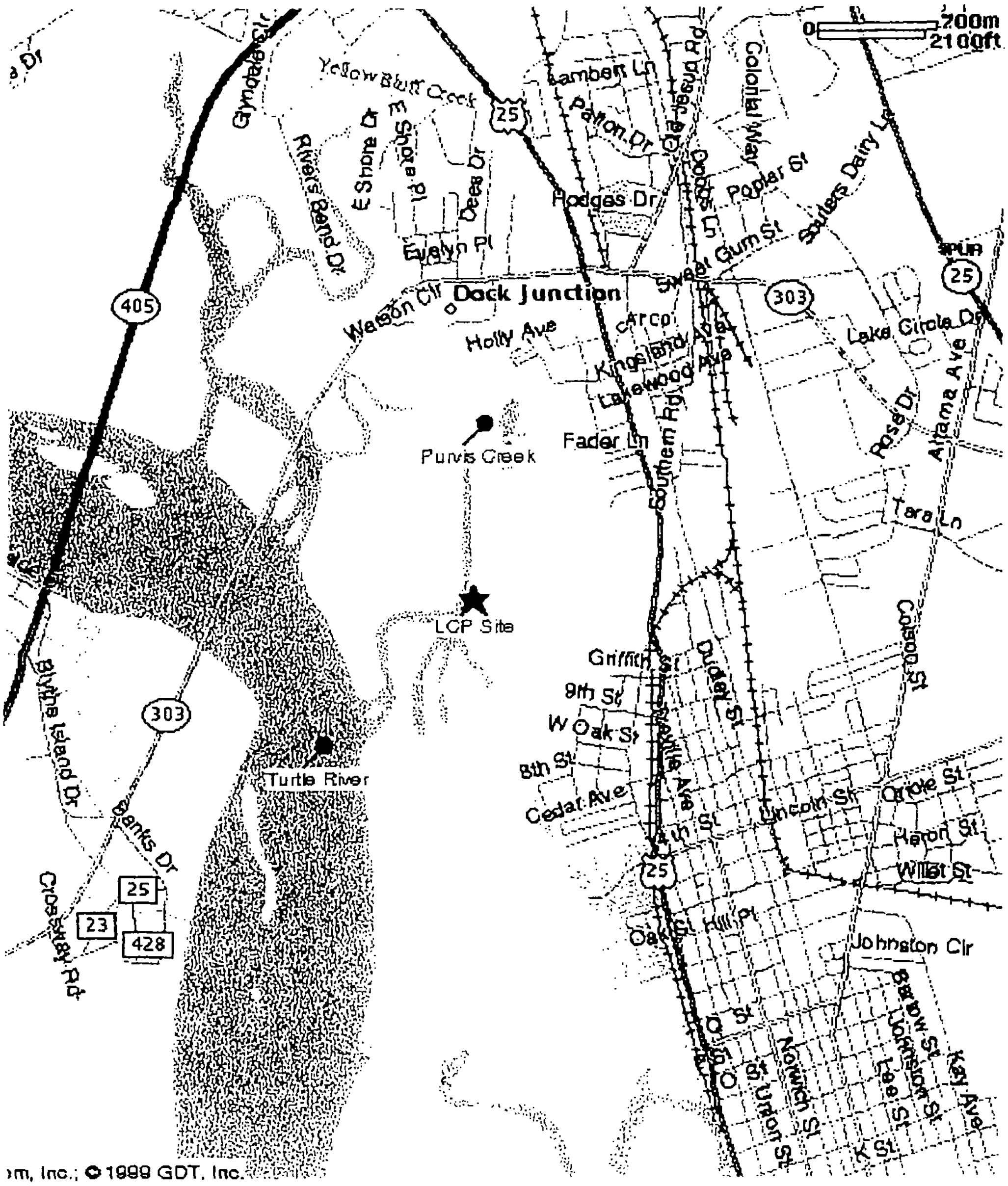
FIGURES

Figure 1.__ Location of LCP Site in Brunswick, Georgia



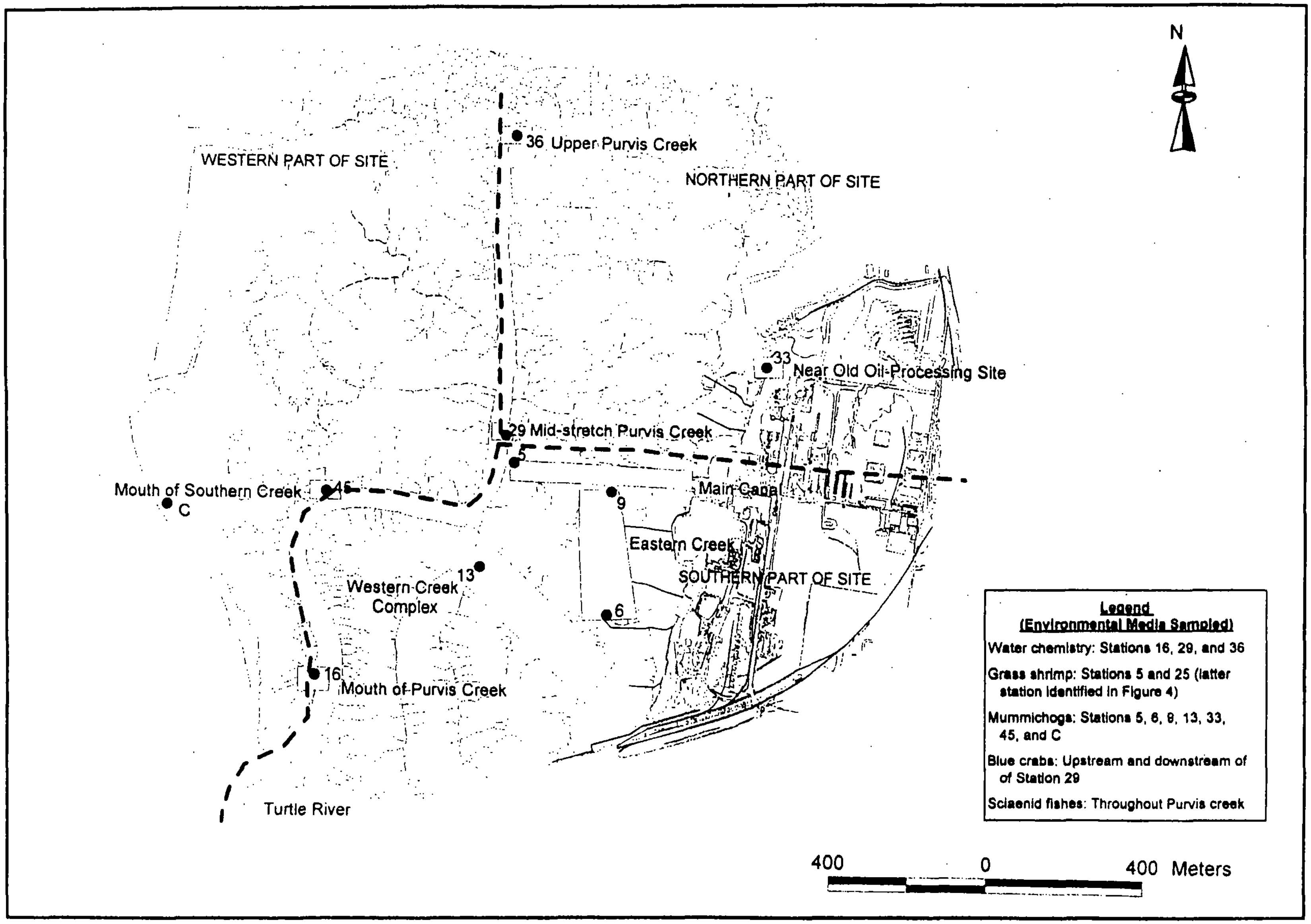


Figure 2.__Locations of sampling stations for creek surface water and associated biota of estuary at LCP Site

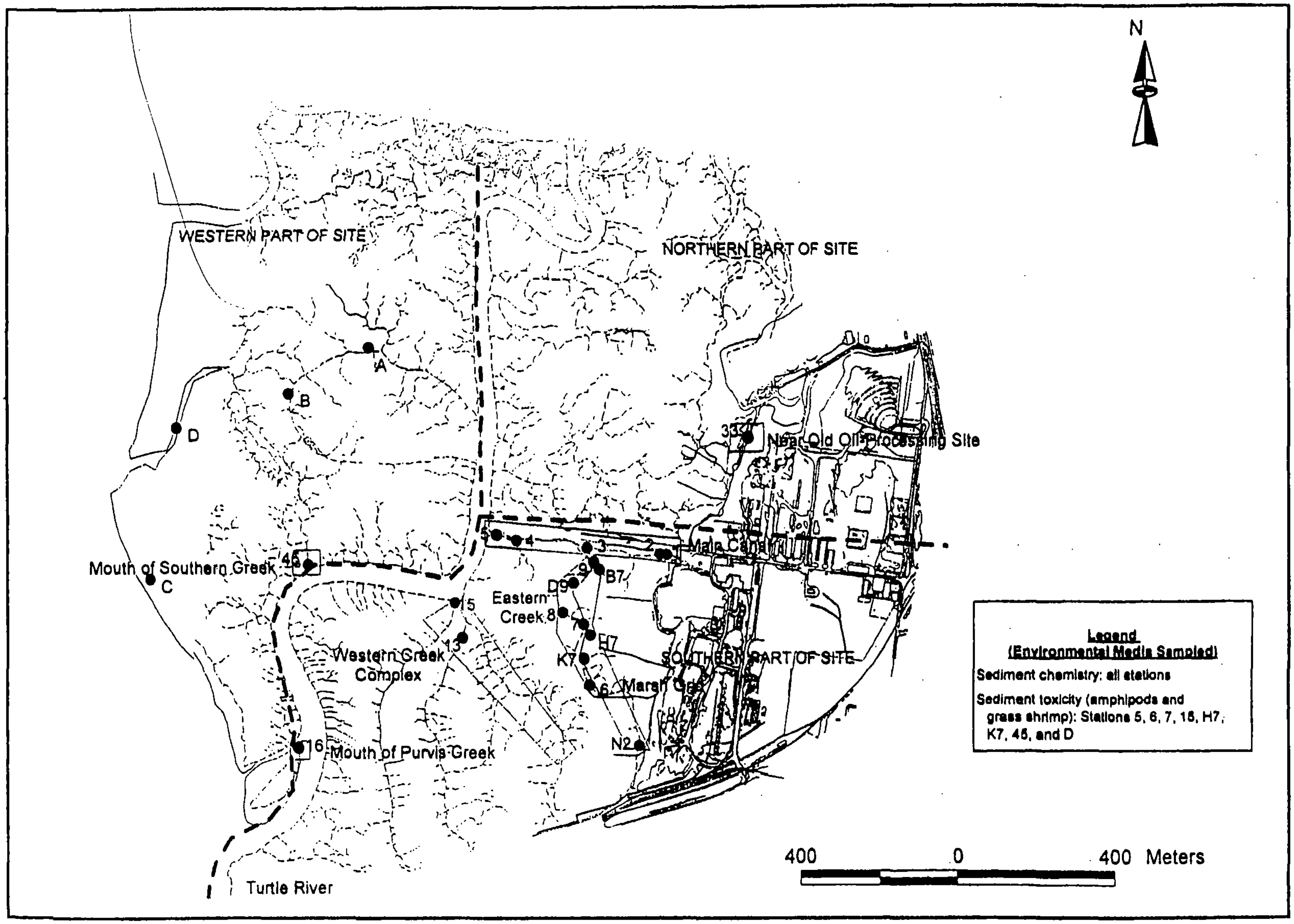


Figure 3.__Locations of sampling stations for creek surface sediment and associated biota of estuary at LCP Site

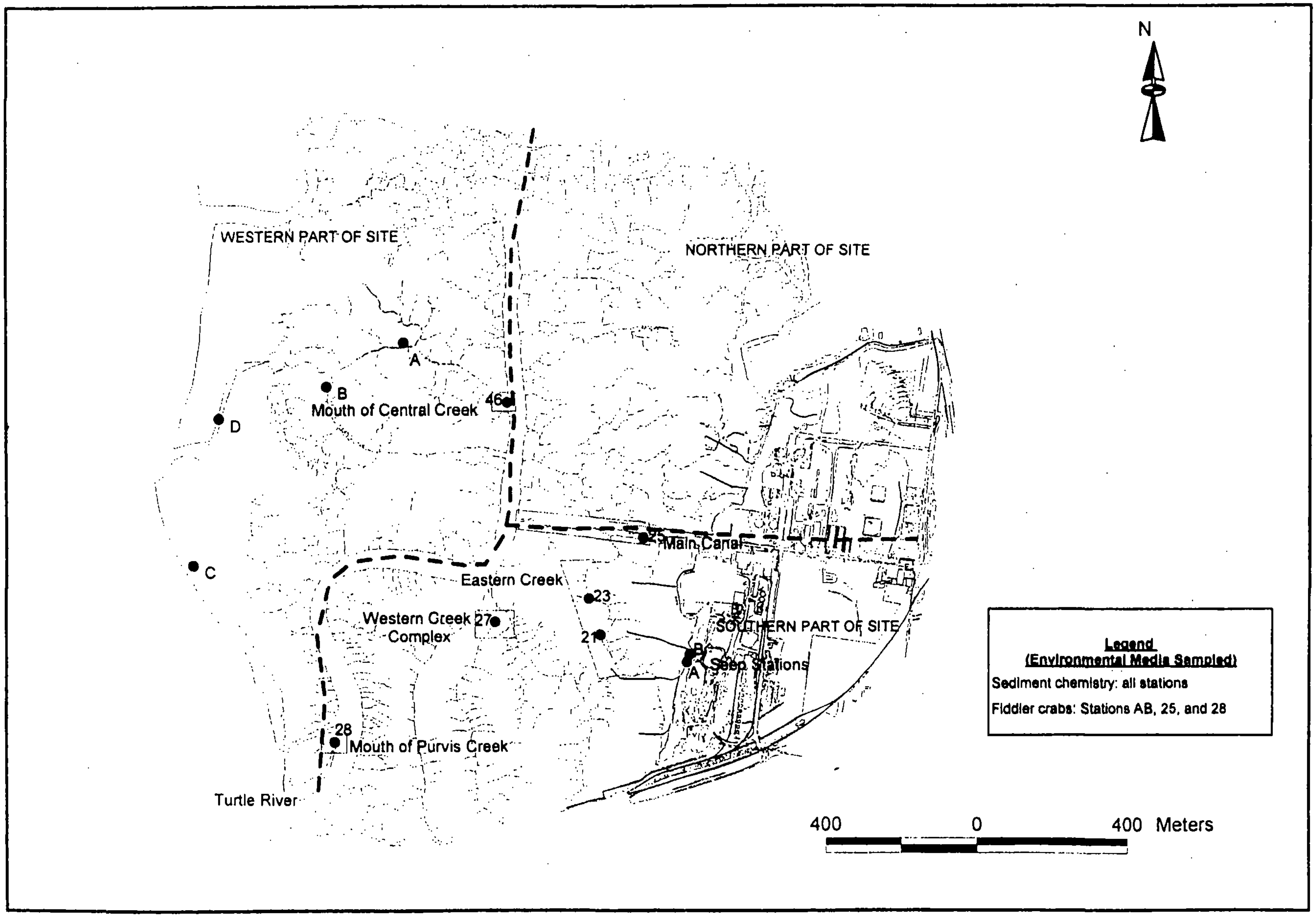


Figure 4.__Locations of sampling stations for marsh surface sediment and associated biota of estuary at LCP Site

TABLES

Table 1.__Basic experimental design for data generation and analysis in investigation of estuary at LCP Site[a]

Measurement	Number of sampling stations[b]	Analytical method[c]	Typical reporting limit	Other details
Surface Water Chemistry – Creek Water				
General water quality characteristics	5	Hydrolab	—	—
Total mercury	5	CVAFS; FGs-069	0.15 ng/L	Sampling performed by "clean-hands" technique
Methylmercury	5	CVAFS; FGs-070	0.025 ng/L	Sampling performed by "clean-hands" technique
Aroclor 1268	5	8082	0.5 ug/L	—
Lead	5	6010B	0.005 ug/L	—
Surface Sediment Chemistry – Creek Sediment)[d]				
Grain-size distribution	25	ASTM D422	—	—
Total organic carbon	25	9060	0.05% (dry wt)	—
Total mercury	25	7471A	0.02 mg/kg (dry wt)	
Aroclor 1268	25	8082	0.2 mg/kg (dry wt)	—
Lead	25	6010B	1.0 mg/kg (dry wt)	—
PAHs	25	8270C	0.007 mg/kg (dry wt)	18 different PAHs evaluated
Surface Sediment Chemistry – Marsh Sediment)[d]				
Grain-size distribution	13	ASTM D422	—	—
Total organic carbon	13	9060	0.1% (dry wt)	—
Total mercury	13	7471A	0.02 mg/kg (dry wt)	
Aroclor 1268	13	8082	0.1 mg/kg (dry wt)	—
Lead	13	6010B	0.5 mg/kg (dry wt)	—
PAHs	13	8270C	0.007 mg/kg (dry wt)	18 different PAHs evaluated
Surface Sediment Toxicity – Creek Sediment[d]				
Amphipods	10	CBP/TRS 89/93	—	28-day chronic test; 5 replicates per sampling station; evaluation of survival, growth, and reproduction of amphipods exposed to sediment in laboratory
Grass shrimp	10	Standard Lee test	—	2-month chronic test; 3 replicates per sampling station; evaluation of survival, reproduction, and DNA strand damage (Comet Test) of shrimp exposed to sediment in laboratory
Grass shrimp	4	Special Lee test	—	Direct evaluation of reproduction and DNA strand damage (Comet Test) of shrimp collected in field (no laboratoty exposure to sediment)
Chemical Body Burdens of Biota (Whole Bodies) – Creek and Marsh Stations				
Biota Collected				
Fiddler crabs	4	—	—	5 to 7 replicates of about 10 - 40 composited male crabs per sampling station; replicate weight = about 10 - 30 g;
Mummichogs	8	—	—	2 to 3 replicates of 3 - 40 composited fish (about 50 - 70 mm in length) per sampling station; replicate weight = 20 - 100 g
Blue crabs	3	—	—	7 replicates of individual male crabs per sampling station; crab length (point-to-point on carapace) = about 110 - 175 mm (102 - 375 g)
Silver perch	1	—	—	8 replicates of individual silver perch per sampling station; fish length (total length) = 145 - 195 mm (39 - 103 g)
Red drum	1	—	—	8 replicates of individual red drum per sampling station; fish length (total length) = 340 - 390 mm (431 - 628 g)
Black drum	1	—	—	8 replicates of individual black drum per sampling station; fish length (total length) = 155 - 245 mm (52 - 238 g)
Spotted seatrout	1	—	—	8 replicates of individual spotted seatrout per sampling station; fish length (total length) = 280 - 420 mm (222 - 800 g)

Table 1.__Continued

Measurement	Number of sampling stations[b]	Analytical method[c]	Typical reporting limit	Other details
		Chemical Analyses Performed on Whole Bodies of Biota		
Total mercury	—	7471A	0.02 mg/kg (dry wt)	—
Aroclor 1268	—	8082	0.1 mg/kg (dry wt)	—
Lead	—	6010B	0.25 mg/kg (dry wt)	—

[a] In addition to this basic experimental design (or basic monitoring program), a statistically based study was conducted in which 25 surface sediment samples were collected from the Main Canal, Eastern Creek, and Marsh Grid. These samples (a total of 75 samples) were analyzed for total mercury and Aroclor 1268 (also, total organic content and grain-size distribution).

[b] Number of sampling stations sometimes includes up to two reference locations – Troup Creek and the Crescent River.

[c] Analytical methods are U. S. EPA methods unless otherwise indicated.

[d] Surface sediment is defined as between 0 and 15 cm in depth.

Table 2.__General water quality characteristics of creek surface water of estuary at LCP Site[a]

Sampling station	Temperature (^{0}C)	Salinity (ppt)	Conductivity (mS/cm)	Total dissolved solids (mg/L)	pH (pH units)	Dissolved oxygen (mg/L)
		Purvis Creek				
Upper Purvis Creek (36)	24.6	21	33.3	20	7.1	6.1
Mid-stretch Purvis Creek (29)	24.8	21	33.7	21	7.0	6.9
Mouth of Purvis Creek (16)	25.2	22	34.2	21	7.2	7.4
		Reference Locations				
Troup Creek	22.9	10	18.4	11	6.6	6.5
Crescent River	23.0	25	39.5	24	6.9	6.2

[a] Surface water in Purvis Creek was evaluated between 1500 and 1545 on October 14, 2003, during ebb tide. Water at the Troup Creek reference location was measured at 1000 - 1015 on October 14, during ebb tide. Water at the Crescent River reference location was measured at 1100 - 1115 on October 14, 2003, during end of flood tide.

Table 3.__Chemicals of potential concern (COPC) in creek surface water of estuary at LCP Site[a]

Sampling station	Mercury (ng/L or ppt)[b] Total	Mercury (ng/L or ppt)[b] Methyl (% of total)	Aroclor 1268[c] (ug/L or ppb)	Lead[d] (ug/L or ppb)
	Southern Part of Site			
Mouth of Purvis Creek (16)	33.3	0.613 (1.8)	1.0	<5
	Northern Part of Site			
Mid-stretch Purvis Creek (29)	44.1	1.01 (2.3)	<0.50	<5
Upper Purvis Creek (36)	48.2	1.23 (2.6)	<0.50	<5
	Reference Locations			
Troup Creek	2.10	<0.025 (<1.2)	<0.50	<5
Crescent River	1.24	<0.025 (<2.0)	<0.50	<5

[a] Creek surface water samples were collected on October 14, 2003 (most samples) and October 16, 2003 (site samples analyzed for Aroclor 1268 and lead) usually during ebb tide.

[b] The U. S. EPA Region 4 chronic ecological screening value (ESV) for mercury (total mercury) is 25 ng/L.

[c] There is no U. S. EPA Region 4 chronic ESV for Aroclor 1268. However, the Region 4 ESV for Aroclor 1254, which is generally considered to be a more toxic Aroclor, is 0.03 ug/L.

[d] The U. S. EPA Region 4 chronic ESV for lead (total lead) is 8.5 ug/L.

Table 4.__Physical/chemical characteristics and chemicals of potential concern (COPC) in creek surface sediment of estuary at LCP Site (all measurements in dry weight)[a]

Sampling station	Silt and clay (%)	Total organic carbon (%)	Total mercury[b] (mg/kg or ppm)	Aroclor 1268[c] (mg/kg or ppm)	Lead[d] (mg/kg or ppm)	Total PAHs[e] (mg/kg or ppm)
			Southern Part of Site			
Main Canal (upstream to downstream)						
1	24.5	1.3	3.3	3.3	11	0.02
2	89.3	3.8	8.4	11	32	0.30
3	53.2	1.4	8.0	3.5	21	0.47
4	92.1	3.4	4.0	9.9	26	0.68
5	68.7	3.2	10	24	27	2.45
Eastern Creek (upstream to downstream)						
6	82.7	3.7	80	19	47	0.72
7	90.4	3.1	4.2	3.7	43	11.60
8	84.5	4.3	36	33	37	0.13
9	75.7	3.6	15	0.60	46	1.36
Western Creek Complex (upstream to downstream)						
13	91.4	3.6	0.48	1.3	23	0.41
15	88.4	3.5	2.8	0.79	28	0.34
Mouth of Purvis Creek (16)	90.9	3.7	0.59	0.71	27	0.09
			Northern Part of Site			
Near old oil-processing site (33)	9.0	0.94	0.34	0.32	50	0.64
			Western Part of Site			
Mouth of southern creek (45)	98.1	3.0	0.62	0.70	17	0.00
Northern stretch of "U" creek (A)	90.9	4.2	3.4	0.73	25	0.53
Western stretch of "U" creek (B)	96.3	4.3	1.5	0.87	22	0.48
Western inlet from Turtle River (C)	96.7	3.6	0.15	<0.28	13	0.26
Northwestern inlet from Turtle River (D)	99.2	3.2	0.56	0.87	22	0.08

Table 4.__Continued

Sampling station	Silt and clay (%)	Total organic carbon (%)	Total mercury[b] (mg/kg or ppm)	Aroclor 1268[c] (mg/kg or ppm)	Lead[d] (mg/kg or ppm)	Total PAHs[e] (mg/kg or ppm)
			Marsh Grid			
B7	92.6	3.7	2.2	0.79	31	3.19
D9	78.6	3.6	14	6.3	28	0.93
H7	93.3	3.0	6.8	2.2	21	0.08
K7	70.7	3.3	22	24	26	4.97
N2	92.0	5.9	3.6	1.8	52	1.10
			Reference Locations			
Troup Creek	39.1	1.3	0.044	<0.20	9.4	0.00
Crescent River	28.6	1.1	<0.02	<0.20	7.5	0.03

[a] Creek surface sediment (0 - 15 cm in depth) was collected during the period of October 14 - 16, 2003.

[b] Preliminary ecological remedial sediment goals (PERSGs) for total mercury are 4 mg/kg for all ecological resources except for protection of the federally endangered wood stork, for which 1 mg/kg has been established (U. S. EPA, 2001b).

[c] PERSGs for Aroclor 1268 are 150 mg/kg for all ecological resources except for protection of the federally endangered wood stork, for which 24 mg/kg has been established (U. S. EPA, 2001b).

[d] The PERSG for total lead is 30 mg/kg (U. S. EPA, 2001b).

[e] PAH values reflect only detected PAHs (i. e., no adjustments are made for undetected values; e. g., assigning these values 1/2 of their detection limits). The PERSG for total PAHs is 0.486 mg/kg (U. S. EPA, 2001b).

Table 5.__Physical/chemical characteristics and chemicals of potential concern (COPC) in marsh surface sediment of estuary at LCP Site (all measurements in dry weight)[a]

Sampling station	Silt and clay (%)	Total organic carbon (%)	Total mercury[b] (mg/kg or ppm)	Aroclor 1268[c] (mg/kg or ppm)	Lead[d] (mg/kg or ppm)	Total PAHs[e] (mg/kg or ppm)
Southern Part of Site						
Main Canal						
25	90.7	3.9	2.0	3.3	24	1.11
Eastern Creek (upstream to downstream)						
21	93.0	4.9	32	25	42	3.35
23	93.3	4.0	6.3	5.3	28	0.59
Western Creek Complex (27)	98.8	3.7	0.64	0.87	22	0.23
Mouth of Purvis Creek (28)	30.8	1.2	0.28	0.48	8.8	0.10
Seep location (AB)	2.7	0.1	0.03	<0.12	2.1	0.00
Western Part of Site						
Mouth of central creek (46)	35.8	1.7	0.59	0.66	16	0.34
Northern stretch of "U" creek (A)	99.3	4.1	2.1	0.84	26	0.12
Western stretch of "U" creek (B)	99.1	4.1	2.2	0.77	26	0.05
Western inlet from Turtle River (C)	84.0	4.4	0.62	0.79	28	3.43
Northwestern inlet from Turtle River (D)	96.2	3.8	1.0	0.82	24	0.06
Reference Locations						
Troup Creek	94.4	4.2	0.076	<0.33	21	0.00
Crescent River	66.0	1.7	0.039	<0.25	12	0.00

[a] Marsh surface sediment (0 - 15 cm in depth) was collected during the period of October 14 - 16, 2003.

[b] Preliminary ecological remedial sediment goals (PERSGs) for total mercury are 4 mg/kg for all ecological resources except for protection of the federally endangered wood stork, for which 1 mg/kg has been established (U.S. EPA, 2001b).

[c] PERSGs for Aroclor 1268 are 150 mg/kg for all ecological resources except for protection of the federally endangered wood stork, for which 24 mg/kg has been established (U.S. EPA, 2001b).

dThe PERSG for lead is 30 mg/kg (U.S. EPA, 2001b).

[e] PAH values reflect only detected PAHs (i. e., no adjustments are made for undetected values; e. g., assigning these values 1/2 of their detection limits). PERSG for total PAHs is 0.486 mg/kg (U.S. EPA, 2001b).

Table 6.__Chemicals of potential concern (COPC) in whole bodies of biota of estuary at LCP Site[a]

Biota and sampling station	Replicate								Mean	95% confidence
	1	2	3	4	5	6	7	8	(x)[b]	interval[c]
Total Mercury (mg/kg or ppm,dry wt)										
Fiddler Crabs (all marsh stations)										
Southern Part of Site										
By "AB" seepage from land	0.91	0.97	0.56	0.86	1.00	0.76	0.66	–	0.82	0.67 - 0.97
Main Canal – upstream (25)	0.37	0.44	0.42	0.45	0.39	0.38	0.41	–	0.41	0.38 - 0.44
Mouth of Purvis Creek (28)	0.16	0.17	0.18	0.17	0.20	0.20	0.21	–	0.18	0.16 - 0.20
Reference Location										
Troup Creek	0.043	0.032	0.035	0.033	0.025	–	–	–	0.034	0.026 - 0.042
Mummichogs (all creek stations)										
Southern Part of Site										
Main Canal – downstream (5)	0.54	0.54	–	–	–	–	–	–	0.54	0.54
Eastern Creek – upstream (6)	0.71	0.69	0.73	–	–	–	–	–	0.71	0.66 - 0.76
Eastern Creek – downstream (9)	0.45	0.49	0.56	–	–	–	–	–	0.50	0.36 - 0.64
Western Creek Complex (13)	0.19	0.20	0.13	–	–	–	–	–	0.17	0.08 - 0.26
Northern Part of Site										
Near old oil-processing site (33)	0.51	0.34	0.31	–	–	–	–	–	0.39	0.12 - 0.66
Western Part of Site										
Mouth of Southern Creek (45)	0.16	0.15	0.15	–	–	–	–	–	0.15	0.14 - 0.16
Western inlet from Turtle River (C)	0.13	0.11	0.13	–	–	–	–	–	0.12	0.09 - 0.15
Reference Location										
Troup Creek	0.047	0.100	0.083	–	–	–	–	–	0.077	0.010 - 0.144
Blue Crabs										
Site										
Upper Purvis Creek	1.8	3.1	0.93	0.86	1.9	1.2	1.4	–	1.60	0.89 - 2.31
Lower Purvis Creek	0.76	2.5	3.6	1.3	0.84	0.74	0.59	–	1.48	0.42 - 2.54
Reference Location										
Troup Creek	0.049	0.076	<0.02	0.04	0.27	<0.02	0.058	–	0.073	–
Silver Perch										
Purvis Creek	1.4	1.8	1.0	1.2	1.4	1.5	2.4	2.2	1.61	1.20 - 2.02
Red Drum										
Purvis Creek	1.3	0.38	0.64	0.59	0.30	1.2	0.30	0.68	0.67	0.35 - 0.99
Black Drum										
Purvis Creek	0.53	0.59	0.53	0.67	0.75	0.42	0.90	0.51	0.61	0.48 - 0.74
Spotted Seatrout										
Purvis Creek	1.5	1.7	1.4	1.5	1.3	1.6	1.2	1.2	1.43	1.28 - 1.58
Aroclor 1268 (mg/kg or ppm,dry wt)										
Fiddler Crabs (all marsh stations)										
Southern Part of Site										
By "AB" seepage from land	2.0	2.4	3.1	1.9	1.4	1.8	1.8	–	2.06	1.55 - 2.57
Main Canal – upstream (25)	1.4	2.2	1.1	1.9	2.1	1.8	2.3	–	1.83	1.42 - 2.24
Mouth of Purvis Creek (28)	<0.87	<0.77	<0.91	<0.83	<0.10	<0.10	<0.77	–	0.44	–
Reference Location										
Troup Creek	<0.69	<0.61	1.8	1.3	1.2	–	–	–	0.99	–
Mummichogs (all creek stations)										
Southern Part of Site										
Main Canal – downstream (5)	5.7	9.1	–	–	–	–	–	–	7.40	0 - 29.06
Eastern Creek – upstream (6)	6.8	11	6.1	–	–	–	–	–	7.97	1.39 - 14.55
Eastern Creek – downstream (9)	3.5	4.3	2.9	–	–	–	–	–	3.57	1.83 - 5.31
Western Creek Complex (13)	1.0	1.4	1.5	–	–	–	–	–	1.30	0.64 - 1.96
Northern Part of Site										
Near old oil-processing site (33)	1.6	2.2	1.1	–	–	–	–	–	1.63	0.26 - 3.00
Western Part of Site										
Mouth of Southern Creek (45)	0.97	1.1	1.2	–	–	–	–	–	1.09	0.80 - 1.38
Western inlet from Turtle River (C)	1.1	1.4	1.1	–	–	–	–	–	1.20	0.77 - 1.63
Reference Location										
Troup Creek	<0.87	<0.95	<0.87	–	–	–	–	–	0.45	–

Table 6.__Continued

Biota and sampling station	Replicate 1	2	3	4	5	6	7	8	Mean (x)[b]	95% confidence interval[c]
				Aroclor 1268 (mg/kg or ppm,dry wt) – Continued						
Blue Crabs										
Site										
Upper Purvis Creek	2.1	1.7	2.2	3.7	3.0	4.7	1.9	–	**2.76**	1.74 - 3.78
Lower Purvis Creek	2.2	1.8	5.0	1.7	4.0	7.9	2.6	–	**3.60**	-1.52 - 5.68
Reference Location										
Troup Creek	<0.45	<0.28	<0.33	<0.45	<0.26	2.0	<0.26	–	0.43	–
Silver Perch										
Purvis Creek	3.9	3.0	2.8	5.9	2.8	4.1	4.3	3.8	3.83	2.97 - 4.69
Red Drum										
Purvis Creek	0.97	1.0	1.0	1.1	1.1	1.0	0.98	0.98	1.02	0.98 - 1.06
Black Drum										
Purvis Creek	4.9	1.1	3.6	4.2	4.0	1.8	2.2	1.2	2.88	1.65 - 4.11
Spotted Seatrout										
Purvis Creek	2.3	7.1	2.6	1.5	1.4	5.2	4.8	4.4	3.66	1.96 - 5.36
				Lead (mg/kg or ppm,dry wt)						
Fiddler Crabs (all marsh stations)										
Southern Part of Site										
By "AB" seepage from land	20	34	39	52	38	36	11	–	**32.86**	20.42 - 45.30
Main Canal – upstream (25)	0.95	2.1	1.0	4.2	1.1	0.79	0.72	–	**1.55**	0.39 - 2.71
Mouth of Purvis Creek (28)	0.70	0.57	0.66	0.54	0.42	0.27	0.77	–	0.56	0.40 - 0.72
Reference Location										
Troup Creek	0.42	0.55	0.82	<0.25	<0.25	–	–	–	0.41	–
Mummichogs (all creek stations)										
Southern Part of Site										
Main Canal – downstream (5)	0.59	0.55	–	–	–	–	–	–	0.57	0.32 - 0.82
Eastern Creek – upstream (6)	0.31	0.38	0.52	–	–	–	–	–	0.40	0.13 - 0.67
Eastern Creek – downstream (9)	0.36	0.43	0.44	–	–	–	–	–	0.41	0.30 - 0.52
Western Creek Complex (13)	1.1	0.62	0.65	–	–	–	–	–	0.79	0.12 - 1.46
Northern Part of Site										
Near old oil-processing site (33)	1.3	1.0	1.5	–	–	–	–	–	1.27	0.64 - 1.90
Western Part of Site										
Mouth of Southern Creek (45)	0.46	0.37	0.56	–	–	–	–	–	0.46	0.22 - 0.70
Western inlet from Turtle River (C)	0.58	0.44	0.48	–	–	–	–	–	0.50	0.32 - 0.68
Reference Location										
Troup Creek	0.49	0.49	0.63	–	–	–	–	–	0.54	0.34 - 0.74
Blue Crabs										
Site										
Upper Purvis Creek	0.30	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	–	0.15	–
Lower Purvis Creek	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	–	0.12	–
Reference Location										
Troup Creek	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	–	0.12	–
Silver Perch										
Purvis Creek	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	–
Red Drum										
Purvis Creek	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	–
Black Drum										
Purvis Creek	<0.25	<0.25	0.36	<0.25	<0.25	<0.25	0.38	0.30	0.21	–
Spotted Seatrout										
Purvis Creek	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.12	–

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[a] Biota were collected during the period of October 14 - 17, 2003, by hand (fiddler crabs), baited minnow traps (mummichogs and blue crabs), as well as hook-and-line and nets (sciaenid fishes). Two of the four types of bait employed in minnow traps contained low concentrations of two COPC (freshwater catfish: 0.033 mg/kg of total mercury; pork neckbones: 0.51 mg/kg of lead).

[b] **Bold print** identifies mean body burdens at site sampling stations that appear to differ substantially in comparison to mean body burdens at reference location. Mean values include undetected chemical values calculated as 1/2 of their detection limits.

[c] **Bold print** identifies body burdens at site sampling stations that are statistically greater in comparison to body burdens at reference location (i. e., lower limit of 95% confidence interval at site station > upper limit of 95% confidence interval at reference location). Confidence intervals are not determined for sets of chemical data that include undetected values.

Table 7.__Statistical analysis of survival, growth, and reproductive response of amphipods (*Leptocheirus plumulosus*) exposed for 28 days to creek surface sediment of estuary at LCP Site[a]

A. SURVIVAL OF AMPHIPODS

1. Raw Data (number of survivors)[b]

Sediment source (S)	Replicate -- r 1	2	3	4	5	Mean (x)	Variance (s^2)
Control	20	16	15	20	15	17.2	6.7
Southern Part of Site							
Main Canal (Stat. 5)	10	7	8	4	8	7.4	4.8
Eastern Creek							
Station 6	7	9	3	8	8	7.0	5.5
Station 7	1	0	0	0	0	0.20	0.2
Western Creek Complex (Stat. 15)	9	13	6	17	16	12.2	21.7
Marsh Grid							
Station H7	3	6	9	3	9	6.0	9.0
Station K7	10	12	8	15	9	10.8	7.7
Western Part of Site							
Mouth of southern creek (Stat. 45)	12	5	16	9	8	10.0	17.5
Northwestern inlet from Turtle River (Stat. D)	11	9	14	14	14	12.4	5.3
Reference (R) Locations							
Troup Creek	10	13	17	13	16	13.8	7.7
Crescent River	12	18	11	19	16	15.2	12.7

2. Cochran's (C) test for homogeneity of variances of amphipod survival[c]

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 21.7 / 98.8 = 0.22$ ns,

as compared to $C_{(tab.)} = 0.31$

for $P = 0.05$, $k = 11$ and $v = 4$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of amphipod survival[d]

Source of variation in survival	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	F(cal.)
Sediment source (S):	s - 1 = 10	1,159.60	115.96	12.91 **,
Error (R):	s (r - 1) = 44	395.20	8.98	
Total (T):	sr - 1 = 54	1,554.80		

as compared to $F_{(tab.)} = 2.84$ for $P = 0.01$, 10 numerator df, and 44 denominator df

Sediment source (S):	7	H7	6	5	45	K7	15	D	TC	CR	Cont.
Mean (x) survival:	0.2	6.0	7.0	7.4	10.0	10.8	12.2	12.4	13.8	15.2	17.2

$w_{(P = 0.05)}$ = q (square root of error MS / r)
= 4.80 (square root of 8.98 / 5)
= 2.88

Table 7.__ Continued

B. GROWTH (WEIGHT) OF AMPHIPODS

1. Raw Data (mean weight of survivors; mg. dry wt)

Sediment source (S)	Replicate – r					Mean	Variance
	1	2	3	4	5	(x)	(s^2)
Control	0.31	0.36	0.33	0.27	0.29	0.312	0.001
Southern Part of Site							
Main Canal (Stat. 5)	0.07	0.07	0.14	0.10	0.16	0.108	0.002
Eastern Creek							
Station 6	0.13	0.11	0.03	0.06	0.05	0.076	0.002
Station 7	0.10	0	0	0	0	0.020	0.002
Western Creek Complex (Stat. 15)	0.16	0.19	0.07	0.21	0.21	0.168	0.003
Marsh Grid							
Station H7	0.07	0.07	0.12	0.07	0.14	0.094	0.001
Station K7	0.18	0.07	0.18	0.23	0.11	0.154	0.004
Western Part of Site							
Mouth of southern creek (Stat. 45)	0.11	0.12	0.10	0.07	0.11	0.102	0.0004
Northwestern inlet from Turtle River (Stat. D)	0.22	0.17	0.16	0.17	0.12	0.168	0.001
Reference (R) Locations							
Troup Creek	0.34	0.50	0.30	0.32	0.31	0.354	0.007
Crescent River	0.49	0.33	0.36	0.33	0.32	0.366	0.005

2. Cochran's (C) test for homogeneity of variances of amphipod weight[c]

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 0.007 / 0.028 = 0.25$ ns,

as compared to $C_{(tab.)} = 0.31$

for $P = 0.05$, $k = 11$ and $v = 4$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of amphipod weight[d]

Source of variation in weight	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	F(cal.)
Sediment source (S):	s - 1 = 10	0.690	0.069	23.00 **,
Error (R):	s (r - 1) = 44	0.115	0.003	
Total (T):	sr - 1 = 54	0.805		

as compared to

$F_{(tab.)} = 2.84$ for $P = 0.01$,
10 numerator df, and 44
denominator df

Sediment source (S):	7	6	H7	45	5	K7	15	D	Cont.	TC	CR
Mean (x) weight:	0.020	0.076	0.094	0.102	0 108	0.154	0.168	0.168	0.312	0.354	0.366

$w_{(P = 0.05)}$ = q (square root of error MS / r)
= 4.80 (square root of 0.003 / 5)
= 0.053

Table 7.__ Continued

C. REPRODUCTIVE RESPONSE OF AMPHIPODS

1. Raw Data (reproductive response)[e]

Sediment source (S)[b]	Replicate -- r 1	2	3	4	5	Mean (x)	Variance (s^2)
Control	0.04	0.15	0	0.04	0.06	0.058	0.003
Southern Part of Site							
Main Canal (Stat. 5)	0.14	0	0.10	0.50	0	0.148	0.043
Eastern Creek							
Station 6	0	0.17	0.50	0	0.38	0.210	0.051
Station 7	0	0	0	0	0	0	0
Western Creek Complex (Stat. 15)	0.12	0	0	0	0	0.024	0.003
Marsh Grid							
Station H7	0.50	0.20	0.25	0	0	0.190	0.043
Station K7	0	0.07	0.10	0	0	0.034	0.002
Western Part of Site							
Mouth of southern creek (Stat. 45)	0.06	0.25	0.06	0.07	0.00	0.088	0.009
Northwestern inlet from Turtle River (Stat. D)	0 07	0	0	0.07	0.12	0.052	0.003
Reference (R) Locations							
Troup Creek	0.08	0	0.07	0.07	0.17	0.078	0.004
Crescent River	0.10	0.04	0.10	0	0	0.048	0.003

2. Cochran's (C) test for homogeneity of variances of amphipod reproducyive response[c]

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 0.051 / 0.164 = 0.31$ ns,

as compared to $C_{(tab.)} = 0.31$
for $P = 0.05$, $k = 11$ and $v = 4$

3. Parametric one-way analysis of variance (ANOVA) of amphipod reproductive response[d]

Source of variation in reproductive response	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	F(cal.)
Sediment source (S):	s - 1 = 10	0.237	0.024	1.60 ns,
Error (R):	s (r - 1) = 44	0.649	0.015	
Total (T):	sr - 1 = 54	0.886		

as compared to
$F_{(tab.)} = 2.06$ for $P = 0.05$,
10 numerator df, and 44
denominator df

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[a] Surface sediment (0 - 15 cm in depth) employed in amphipod toxicity test was collected on October 14 - 16, 2003. Control sediment was formulated in the laboratory. Laboratory dilution water was formulated with artificial sea salt to a salinity of 20 ppt.

[b] Each replicate (r) consisted of 20 amphipods at start of test (i. e., 20 amphipods at end of test = 100% survival).

[c] Cochran's (C) test indicates homogeneity of variances when $C_{(cal.)}$ is identified by the symbol "ns" (P = 0.05).

[d] A parametric ANOVA indicates statistically significant differences among sediment sources when $F_{(cal.)}$ is identified by the symbol "**" (P = 0.01) and absence of significant differences when associated with the symbol "ns" (P = 0.05). Tukey's (w) test indicates the specific sources of any significant differences detected in an ANOVA. In Tukey's test, data underscored by the same horizontal line are not significantly different, whereas data not underscored by the same horizontal line are significantly different (P = 0.05).

[e] Reproductive response is calculated as 1/2 of the number of juveniles produced in a replicate / number of surviving adult females.

Table 8.__Statistical analysis of survival, reproduction, and DNA strand damage of grass shrimp (*Palaemonetes pugio*) exposed for 2 months to creek surface sediment of estuary at LCP Site[a]

A. SURVIVAL OF SHRIMP (JUVENILE TO ADULT)

1. Raw survival data (% survival)

Sediment source (S)	Replicate – r[b] 1	2	3	Mean (x)	Variance (s2)
Control (Skidaway River)	80	90	75	82	58
Southern Part of Site					
Main Canal (Stat. 5)	90	75	90	85	75
Eastern Creek					
Station 6	75	85	55	72	233
Station 7	85	75	70	77	58
Western Creek Complex (Stat. 15)	55	70	50	58	108
Marsh Grid					
Station H7	25	20	35	27	58
Station K7	90	85	75	83	58
Western Part of Site					
Mouth of southern creek (Stat. 45)	85	75	95	85	100
Northwestern inlet from Turtle river (Stat. D)	85	80	85	83	8
Reference (R) Locations					
Troup Creek (TC)	90	75	85	83	58
Crescent River (CR)	95	80	85	87	58

2. Cochran's (C) test for homogeneity of variances of survival data[c]

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 233 / 872 = 0.27$ ns,
as compared to $C_{(tab.)} = 0.42$
for $P = 0.05$, $k = 11$ and $v = 2$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of survival data[d]

Source of variation in survival	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S)	s - 1 = 10	9,646.97	964.70	12.13 **,
Error (R)	s (r - 1) = 22	1,750.00	79.55	
Total (T)	sr - 1 = 32	11,396.97		as compared to $F_{(tab.)} = 3.26$ for P = 0.01, 10 numerator df, and 22 denominator df

Sediment source (S):	H7	15	6	7	Cont.	K7	D	TC	5	45	CR
Mean (x) survival (%):	27	58	72	77	82	83	83	83	85	85	87

$w_{(P = 0.05)}$ = q (square root of error MS / r)
= 5.06 (square root of 79.55 / 3)
= 15.0

Table 8.__Continued

B. PERCENT OF SURVIVING FEMALES FORMING MATURE OVARIES

1. Raw data (% females)

Sediment source (S)	Replicate -- r 1	 2	 3	Mean (x)	Variance (s^2)
Control (Skidaway River)	79	92	70	80	122
Southern Part of Site					
Main Canal (Stat. 5)	55	89	73	72	289
Eastern Creek					
Station 6	78	73	75	75	6
Station 7	63	82	89	78	181
Western Creek Complex (Stat. 15)	78	73	67	73	30
Marsh Grid					
Station H7	27	55	18	33	372
Station K7	63	91	60	71	292
Western Part of Site					
Mouth of southern creek (Stat. 45)	78	82	67	76	60
Northwestern inlet from Turtle river (Stat. D)	54	90	78	74	336
Reference (R) Locations					
Troup Creek (TC)	91	82	78	84	44
Crescent River (CR)	75	92	70	79	133

2. Cochran's (C) test for homogeneity of variances of data[c]

$C_{(cal.)} = s^2(\text{max.}) / s^2(\text{total})$

$C_{(cal.)} = 372 / 1{,}865 = 0.20$ ns,

as compared to $C_{(tab.)} = 0.42$

for $P = 0.05$, $k = 11$, and $v = 2$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of data[d]

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S)	s - 1 = 10	5,442.00	544.20	3.21 *,
Error (R)	s (r - 1) = 22	3,735.33	169.79	
Total (T)	sr - 1 = 32	9,177.33		as compared to $F_{(tab.)} = 2.30$ for $P = 0.05$, 10 numerator df, and 22 denominator df

Sediment source (S):	H7	K7	5	15	D	6	45	7	CR	Cont.	TC
Mean (x) -- %:	33	71	72	73	74	75	76	78	79	80	84

$w_{(P = 0.05)}$ = q (square root of error MS / r)

= 5.06 (square root of 169.79 / 3)

= 22.0

Table 8.__Continued

C. PERCENT OF SURVIVING FEMALES PRODUCING EMBRYOS

1. Raw data (% females)

Sediment source (S)	Replicate – *r* 1	2	3	Mean (x)	Variance (s^2)
Control (Skidaway River).	38	42	40	40	4
Southern Part of Site					
Main Canal (Stat. 5)	27	22	36	28	50
Eastern Creek					
Station 6	44	27	25	32	109
Station 7	27	18	44	30	174
Western Creek Complex (Stat. 15)	22	18	22	21	5
Marsh Grid					
Station H7	9	18	0	9	81
Station K7	18	8	20	15	41
Western Part of Site					
Mouth of southern creek (Stat. 45)	33	45	56	45	132
Northwestern inlet from Turtle river (Stat. D)	27	22	38	29	67
Reference (R) Locations					
Troup Creek (TC)	82	36	33	50	754
Crescent River (CR)	27	22	38	29	67

2. Cochran's (C) test for homogeneity of variances of data (excluding Troup Creek)[c]

$C_{(cal.)} = s^2(\text{max.}) / s^2(\text{total})$

$C_{(cal.)} = 174 / 673 = 0.26$ ns,

as compared to $C_{(tab.)} = 0.44$

for $P = 0.05$, $k = 10$, and $v = 2$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of data (excluding Troup Creek)[d]

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S)	s - 1 = 9	3,052.03	339.11	4.63 **,
Error (R)	s (r - 1) = 20	1,463.33	73.17	
Total (T)	sr - 1 = 29	4,515.36		as compared to $F_{(tab.)} = 3.48$ for P = 0.01, 9 numerator df, and 20 denominator df

Sediment source (S):	H7	K7	15	5	D	CR	7	6	Cont.	45
Mean (x) – (%):	9	15	21	28	29	29	30	32	40	45

$w_{(P = 0.05)}$ = q (square root of error MS / r)
= 5.01 (square root of 73.17 / 3)
= 14.3

Table 8.__Continued

D. PERCENT OF EMBRYOS HATCHING

1. Raw data (% hatching)

Sediment source (S)	Replicate – r 1	 2	 3	Mean (x)	Variance (s^2)
Control (Skidaway River)	95	100	85	93	58
Southern Part of Site					
Main Canal (Stat. 5)	90	85	90	88	8
Eastern Creek					
Station 6	90	85	90	88	8
Station 7	100	90	90	93	33
Western Creek Complex (Stat. 15)	95	85	80	87	58
Marsh Grid					
Station H7	65	25	15	35	700
Station K7	90	90	80	87	33
Western Part of Site					
Mouth of southern creek (Stat. 45)	96	82	86	88	52
Northwestern inlet from Turtle river (Stat. D)	90	90	80	87	33
Reference (R) Locations					
Troup Creek (TC)	80	75	90	82	58
Crescent River (CR)	100	95	95	97	8

2. Cochran's (C) test for homogeneity of variances of data (excluding Station H7)[c]

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 58 / 349 = 0.17$ ns,

as compared to $C_{(tab.)} = 0.44$

for $P = 0.05$, $k = 10$, and $v = 2$

3. Parametric one-way analysis of variance (ANOVA) (excluding Station H7)[d]

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S)	s - 1 = 9	504.97	56.11	1.59 ns,
Error (R)	s (r - 1) = 20	704.00	35.20	
Total (T)	sr - 1 = 29	1,208.97		as compared to $F_{(tab.)} = 2.39$ for P = 0.05, 9 numerator df, and 20 denominator df

Table 8.__Continued

E. DNA STRAND DAMAGE IN EMBRYOS

1. Raw data (DNA tail moment)

Sediment source (S)	Replicate – r 1	 2	 3	Mean (x)	Variance (s^2)
Control (Skidaway River)	0.9	1.7	1.3[e]	1.30	0.16
Southern Part of Site					
Main Canal (Stat. 5	2 8	3 1	2.2	2.70	0.21
Eastern Creek					
Station 6	1.9	2.6	2.2	2.23	0.12
Station 7	2.1	1.3	2.2	1.87	0.24
Western Creek Complex (Stat. 15)	2.2	1.1	2.5	1.93	0.54
Marsh Grid					
Station H7	2.9	3.7	4.3	3.63	0.49
Station K7	1.7	2.1	2.8	2.20	0.31
Western Part of Site					
Mouth of southern creek (Stat. 45)	2.2	1.1	1.9	1.73	0.32
Northwestern inlet from Turtle river (Stat. D)	0.9	1.9	2.5	1.77	0.65
Reference (R) Locations					
Troup Creek (TC)	2.3	2.1	2.8	2.40	0.13
Crescent River (CR)	0.9	1.9	2.3	1.70	0.52

2. Cochran's (C) test for homogeneity of variances of data[c]

$C_{(cal.)} = s^2(\text{max.}) / s^2(\text{total})$

$C_{(cal.)} = 0 65 / 3.69 = 0.18$ ns,

as compared to $C_{(tab.)} = 0.42$

for $P = 0.05$, $k = 11$, and $v = 2$

3. Parametric one-way analysis of variance (ANOVA) followed by Tukey's (w) test of data[d]

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Sediment source (S)	s - 1 = 10	11.83	1 18	3.47 **,
Error (R)	s (r - 1) = 22	7.42	0.34	
Total (T)	sr - 1 = 32	19.25		as compared to $F_{(tab.)} = 3.26$ for P = 0 01, 10 numerator df, and 22 denominator df

Sediment source (S):	H7	5	TC	6	K7	15	7	D	45	CR	Cont.
Mean (x) – (%):	3.63	2.70	2.40	2.23	2.20	1.93	1.87	1.77	1.73	1.70	1.30
	—	—									
		—	—	—	—	—	—	—	—		
			—	—	—	—	—	—	—	—	
				—	—	—	—	—	—	—	—

$w_{(P = 0.05)}$ = q (square root of error MS / r)

= 5.06 (square root of 0.34 / 3)

= 0.98

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[a] Surface sediment (0 - 15 cm in depth) employed in grass shrimp toxicity test was collected on October 14 - 16, 2003. Laboratory control sediment was uncontaminated marine sediment obtained from the Skidaway River. Laboratory dilution water was estuarine water (28 ppt).

[b] Each replicate (r) consisted of 20 grass shrimp at start of test (i. e., 20 grass shrimp at end of test = 100% survival).

[c] Cochran's (C) test indicates homogeneity of variances when $C_{(cal.)}$ is identified by the symbol ns (P = 0.05).

[d] A parametric ANOVA indicates statistically significant differences among sediment sources when $F_{(cal.)}$ is identified by the symbol "*" (P = 0.05) or "**" (P = 0.01). The symbol "ns" indicates the absence of statistically signinicant differences (P = 0.05). Tukey's (w) test indicates the specific sources of any significant differences detected in an ANOVA. In Tukey's test, data underscored by the same horizontal line are not significantly different, whereas data not underscored by the same horizontal line are significantly different (P = 0.05).

[e] Only two replicates were conducted for this control sediment. A symmetrical statistical design was achieved by assigning the mean value of those two replicates (i. e., 1.3) to a hypothetical 3rd replicate.

Table 9.__ Coefficients of determination for relationships between concentrations of chemicals of potential concern (COPC) and toxicity of creek surface sediment of estuary at LCP Site[a]

Relationship		Linear coefficient of determination (r^2)[c]
Chemical of potential concern (COPC) in sediment[b]	Toxicological endpoint evaluated in sediment[b]	
	Amphipod (*Leptocheirus plumulosus*) Study[d]	
Total mercury	Survival	0.079
Aroclor 1268	—	0.15
Lead	—	0.57
Total PAHs	—	0.61
Total mercury	Growth (Weight)	0.11
Aroclor 1268	—	0.12
Lead	—	0.63
Total PAHs	—	0.24
Total mercury	Reproduction	Reverse correlation
Aroclor 1268	—	Reverse correlation
Lead	—	Reverse correlation
Total PAHs	—	0.19
	Grass Shrimp (*Palaemonetes pugio*) Study[d]	
Total mercury	Survival	0.0021
Aroclor 1268	—	Reverse correlation
Lead	—	0.020
Total PAHs	—	Reverse correlation
Total mercury	Formation of ovaries	Reverse correlation
Aroclor 1268	—	Reverse correlation
Lead	—	0.0001
Total PAHs	—	Reverse correlation
Total mercury	Production of embryos	0.0052
Aroclor 1268	—	0.078
Lead	—	0.055
Total PAHs	—	0.020
Total mercury	Hatching of embryos	Reverse correlation
Aroclor 1268	—	Reverse correlation
Lead	—	Reverse correlation
Total PAHs	—	Reverse correlation
Total mercury	DNA strand damage in embryos	0.0089
Aroclor 1268	—	0.050
Lead	—	Reverse correlation
Total PAHs	—	Reverse correlation

[a] Creek surface sediment was 0 - 15 cm in depth.

[b] Toxicity reflected in this table could be associated with chemicals other than COPC. For example, numerous metals other than mercury and lead were probanly present in sediment, and dioxin was not evaluated in sediment.

[c] Linear coefficient of determination (r^2) describes the percent of variability in toxicological endpoints that can be explained by variation in chemical concentrations. The term "reverse correlation" refers to cases where decreased toxicity is associated with increased concentrations of COPC.

[d] The amphipod study (Table 7) and grass shrimp study (Table 8) were conducted with sediment from eight creek sampling stations and two reference locations.

Table 10.__Statistical analysis of reproduction and DNA strand damage of indigenous grass shrimp (*Palaemonetes pugio*) collected from estuary at LCP Site[a]

A. PERCENT OF EMBRYOS HATCHING

1. Raw data (% hatching)

Location	Replicate – r			Mean	Variance
	1	2	3	(x)	(s^2)
Control (Skidaway River)	90	95	90	88	8
Southern Part of Site					
Main Canal					
Station 25 (mid-way in Main Canal)	85	80	95	87	58
Station 5 (in Main Canal at confluence with Purvis Creek)	75	90	90	85	75
Reference (R) Locations					
Troup Creek (TC)	90	100	85	92	58
Crescent River (CR)	90	80	85	85	8

2. Cochran's (C) test for homogeneity of variances of data[b]

$C_{(cal.)} = s^2(\text{max.}) / s^2(\text{total})$

$C_{(cal.)} = 75 / 207 = 0.36$ ns,

as compared to $C_{(tab.)} = 0.68$

for $P = 0.05$, $k = 5$, and $v = 2$

3. Parametric one-way analysis of variance (ANOVA)[c]

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Location (L)	l - 1 = 4	73.33	18.33	0.44 ns,
Error (R)	l (r - 1) = 10	416.67	41.67	
Total (T)	lr - 1 = 14	490.00		as compared to $F_{(tab.)} = 3.48$ for $P = 0.05$, 4 numerator df, and 10 denominator df

Table10.__Continued

B. DNA STRAND DAMAGE OF EMBRYOS

1. Raw data (DNA tail moment)

Location	Replicate – r 1	2	3	Mean (x)	Variance (s^2)
Control (Skidaway River)	2.9	1.1	1.6	1.9	0.86
Southern Part of Site					
Main Canal					
Station 25 (mid-way in Main Canal)	2.8	1.9	3.1	2.6	0.39
Station 5 (in Main Canal at confluence with Purvis Creek	2.2	3.1	1.9	2.4	0.39
Reference (R) Locations					
Troup Creek (TC)	1.9	2.9	1.3	2.0	0.65
Crescent River (CR)	1,1	2.9	1.8	1.9	0.82

2. Cochran's (C) test for homogeneity of variances of dat[b]

$C_{(cal.)} = s^2(max.) / s^2(total)$

$C_{(cal.)} = 0.86 / 3.11 = 0.28$ ns,

as compared to $C_{(tab.)} = 0.68$

for P =0.05, k = 5, and v = 2

3. Parametric one-way analysis of variance (ANOVA)[c]

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	F (cal.)
Location (L)	l - 1 = 4	1.21	0.30	0.48 ns,
Error (R)	l (r - 1) = 10	6.24	0.62	
Total (T)	lr - 1 = 14	7.45		as compared to F (tab.) = 3.48 for P = 0.05, 4 numerator df, and 10 denominator df

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[a] Grass shrimp (three females from each location) were collected in October 2003.

[b] Cochran's (C) test indicates homogeneity of variances when $C_{(cal.)}$ is identified by the symbol "ns" (P = 0.05).

[c] A parametric ANOVA indicates the absence of statistically significant differences among locations when $F_{(cal.)}$ is identified by the symbol "ns" (P = 0.05).

Table 11.__Statistically based concentrations of total mercury, Aroclor 1268, and general sediment quality variables in surface sediment of major areas of estuary at LCP Site (all measurements in dry weight)[a]

	Main Canal (Sample No. 1 at mouth; Sample No. 25 at headwater)				**Eastern Creek** (Sample No. 1 at mouth; Sample No. 25 at headwater)				**Marsh Grid** (Sample No. 1 at NW corner; Sample No. 25 at SE corner)			
Sample number	Total mercury (mg/kg)[b]	Aroclor 1268 (mg/kg)[c]	Total organic content (%)	Silt/clay (%)	Total mercury (mg/kg)[b]	Aroclor 1268 (mg/kg)[c]	Total organic content (%)	Silt/clay (%)	Total mercury (mg/kg)[b]	Aroclor 1268 (mg/kg)[c]	Total organic content (%)	Silt/clay (%)
1	3.9	6.4	4.0	85.4	4.2	1.1	4.1	92.6	0.11	0.15	0.47	9.5
2	1.7	6.6	2.9	78.3	2.2	0.94	2.9	91	1.7	2.5	1.5	34.5
3	5.3	6.2	3.3	87.4	3.6	2.2	4.1	89.8	0.12	0.10	0.46	9.2
4	1.7	3.0	3.8	87.8	3.8	15	3.8	90.3	0.17	0.29	0.56	13.1
5	3.2	5.1	2.8	84.2	0.062	0.25	3.3	93.5	1.1	0.26	1.1	39
6	5.5	1.3	3.9	93.7	0.86	4.5	4.9	95.5	0.47	0.23	0.86	18.5
7	11	3.3	2.8	70.4	0.13	0.24	3.7	92.7	0.45	0.35	1.1	27
8	3.4	1.1	3.8	78.5	53	390	4.1	88.6	0.79	0.42	1.5	18.9
9	2.3	0.99	3.0	73.5	19	140	3.4	74.9	11	9.1	5.3	83.8
10	5.3	1.3	2.5	68.8	30	78	4.3	78.4	1.8	1.8	1.6	43.2
11	20	9.8	3.8	21.3	9.6	1.6	3.9	94.2	0.14	0.18	0.31	81.2
12	7.9	10	4.0	87.8	140	410	4.6	93.2	0.44	0.44	0.72	16.3
13	9.6	9.2	3.2	79.3	17	57	4.1	92.9	0.24	0.31	0.56	11.4
14	6.2	3.4	4.3	93.6	24	45	4.1	75.7	0.33	0.20	0.75	15.9
15	7.4	9.6	3.4	85.8	17	33	4.6	78.5	0.34	0.65	0.80	13.3
16	12	1 8	3.6	81.9	0.42	2.1	2.4	52.8	0.38	0.83	1.3	27.9
17	20	1.3	3.9	85	31	71	5.7	69.1	0.34	0.65	0.92	7.7
18	55	2.0	3.5	83.6	5.3	3.4	3.3	58.8	0.64	1.7	1.9	32.6
19	3.7	0.28	4.6	83.1	0.069	0.33	2.8	92.8	0.44	0.24	0.92	17.8
20	26	0.26	2.6	82.8	6.0	3.8	4.5	95	0.48	1.7	1.2	22.8
21	1.3	1.4	2.5	78.1	10	2.6	4.5	68.9	0.95	1.0	1.5	24.7
22	0.90	0.75	7.8	17.8	11	1.4	5.6	77.8	0.03	0.13	0.19	7.5
23	0.48	0.70	0.85	25	16	3.9	3.4	62.8	0.15	2.7	0.32	7.7
24	0.52	0.32	0.91	40.8	1.8	1.2	2.7	38.8	0.01	0.43	0.30	9.5
25	0.72	0.55	1.2	26.1	11	1.7	8.1	93.6	0.62	0.84	0.42	9.6
Mean (x):	**8.60**	**3.47**	**3.32**	**71.2**	**16.68**	**50.81**	**4.12**	**81.3**	**0.93**	**1.09**	**1.06**	**24.1**
Stand. dev. (s):	**11.75**	**3.36**	**1.36**	**24.0**	**28.60**	**110.50**	**1.17**	**15.4**	**2.16**	**1.83**	**1.00**	**20.3**
80% conf. inter. (CI):	**5.50 - 11.70**	**2.59 - 4.35**	--	--	**9.14 - 24.22**	**21.68 - 79.94**	--	--	**0.36 - 1.50**	**0.61 - 1.57**	--	--
Recal. sample size[d]**:**	5	1	--	--	6	30	--	--	1,641	1	--	--

[a] Surface sediment (0 - 15 cm in depth) was collected during the period of October 14 - 22, 2003. Sample collection was based on a random procedure in which 25 sediment samples were collected from midstream of consecutive 20-meter long segments in the Main Canal (~420 meters in length) and Eastern Creek (~840 meters in length). In the Marsh Grid, sediment samples were randomly obtained from 25 of 83 coordinates (A-1 through P-1) of a ~30-meter-square grid system.

[b] Preliminary ecological remedial sediment goals (PERSGs) for total mercury are 4 mg/kg for all ecological resources except for protection of the federally endangered wood stork, for which 1 mg/kg has been established (U. S. EPA, 2001b).

[c] PERSGs for Aroclor 1268 are 150 mg/kg for all ecological resources except for protection of the federally endangered wood stork, for which 24 mg/kg has been established (U. S. EPA, 2001b).

[d] Sample size for this evaluation (n = 22, increased to 25, for each evaluated area) was based on an objective of estimating with 80% confidence if mean sedimentary concentrations of total mercury and Aroclor 1268 in the three areas exceeded worst-case PERSGs (1 mg/kg for total mercury and 24 mg/kg for Aroclor 1268). This estimation was based on a sample-size equation applied to a data set obtained in 2002 addressing concentrations of Aroclor 1268 in sediment from the Marsh Grid (n = 5, x = 36.80, and s = 38.94). (Aroclor 1268 was always determined to require a greater number of samples than total mercury to achieve the desired precision.) **Recalculated sample size** for each chemical in each area is based on the new (2003) values for sample size (n), mean (x), and standard deviation (s).

Table 12.__Statistical analysis of time-series differences in reproduction and DNA strand damage of indigenous grass shrimp *(Palaemonetes pugio)* collected from estuary at LCP Site[a]

A. PERCENT OF EMBRYOS HATCHING

1. Raw data (% hatching)

Location	Year (Y)	Replicate – r			Mean	Variance
		1	2	3	(x)	(s^2)
		Main Canal in Southern Part of Site				
Station 25 (mid-way in Main Canal)	1999	4	31	2	12	262
	2002	63	46	53	54	73
	2003	85	80	95	87	58
Station 5 (in Main Canal at confluence with Purvis Creek)	1997	35	63	29	42	329
	2002	79	88	90	86	34
	2003	75	90	90	85	75

2. Cochran's (C) test for homogeneity of variances of data[b]

$C_{(cal.)} = s^2(max.) / s^2(total)$

Station 25

$C_{(cal.)} = 262 / 393 = 0.67$ ns,

Station 5

$C_{(cal.)} = 329 / 438 = 0.75$ ns,

as compared to $C_{(tab.)} = 0.87$
for $P = 0.05$, $k = 3$, and $v = 2$

3. Parametric one-way analysis of variance (ANOVA)[c]

Station 25

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Year (Y)	y - 1 = 2	8,328.67	4,164.34	31.74 **,
Error (R)	y (r - 1) = 6	787.33	131.22	
Total (T)	yr - 1 = 8	9,116.00		

Station 5

Source of variation	Degrees of freedom (df)	Sum of squares (SS)	Mean square (MS)	$F_{(cal.)}$
Year (Y)	y - 1 = 2	3,698.67	1,849.34	12.65 **,
Error (R)	y (r - 1) = 6	877.33	146.22	
Total (T)	yr - 1 = 8	4,576.00		

as compared to $F_{(tab.)} = 10.92$ for $P = 0.01$, 2 numerator df, and 6 denominator df

Table 12.__Continued

B. DNA STRAND DAMAGE IN EMBRYOS

1. Raw data (DNA tail moment)

Location	Year (Y)	Replicate – r 1	2	3	Mean (x)	Variance (s^2)
Main Canal in Southern Part of Site						
Station 25 (mid-way in Main Canal)	1999	10.5	15.8	20.5	15.6	25.0
	2002	5.7	4.6	3.3	4.5	1.4
	2003	2.8	1.9	3.1	2.6	0.39
Station 5 (in Main Canal at confluence with Purvis Creek)	1997	3.7	5.9	8.8	6.1	6.5
	2002	3.9	2.9	3.1	3.3	0.3
	2003	2.2	3.1	1.9	2.4	0.39

2. Cochran's (C) test for homogeneity of variances of data[b]

$$C_{(cal.)} = s^2(max.) / s^2(total)$$

Station 25

$C_{(cal.)} = 25.0 / 26.8 = 0.93$ *,

Station 5

$C_{(cal.)} = 6.5 / 7.2 = 0.90$ *,

as compared to $C_{(tab.)} = 0.87$
for P = 0.05, k = 3, and v = 2

3. Nonparametric one-way analysis of variance (ANOVA)
(Kruskal-Wallis Test; H)[d]

$$H = \left[12 / n(n+1) \textstyle\sum_i R^2 / n_i\right] - 3\,(n+1)\,,$$

with n_i = number of data points in the $_i$th sample,
$n = \sum n_i$, and R_i = sum of ranks for $_i$th sample

Station 25

$H = [(0.13)\,(279)] - 30$
$H = 6.27$ *,

Station 5

$H = [(0.13)\,(265)] - 30$
$H = 4.45$ ns,

as compared to chi square = 5.99
for P = 0.05, and 2 df

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[a] Grass shrimp (three females from each location) were collected during the month of October in 1997, 1999, 2002, and 2003.

[b] Cochran's (C) test indicates homogeneity of variances when $C_{(cal.)}$ is identified by the symbol "ns" and heteroscedasticy when associated by the symbol "*" (P = 0.05).

[c] The parametric ANOVA indicates statistically significant differences among years since $F_{(cal.)}$ is identified by the symbol "**" (P = 0.01).

[d] The nonparametric ANOVA indicates statistically significant differences among years whrn "H" is identified by the symbol "*" (P = 0.05) and the absence of statistically significant differences among years when "H" is identified by the symbol "ns" (P = 0.05).

Table 13.__ Qualitative analysis of time-series differences in concentrations of chemicals of potential concern (COPC) in environmental media of estuary at LCP Site[a]

Environmental medium (unit of measurement)	Site Location[b]	Year of evaluation					
		1995[c]	1996[d]	1997[e]	2000[f]	2002[g]	2003[h]
			<u>**Total Mercury**</u>				
Surface water (ng/L)	<u>Southern Part of Site</u>						
(unfiltered)	Main Canal	[redacted]	[redacted]	32 - 398	[redacted]	–	–
	Mouth of Purvis Creek	–	22	26 - 43	16	11.3	33.3
	Reference locations	–	3.6 - 5.8	<5 - 26	1.7 - 3.3	1.14 - 1.24	1.24 - 2.10
Surface sediment	<u>Southern Part of Site</u>						
in creek	Main Canal	[redacted]	[redacted]	24 - 65	[redacted]	1.2 - 11	5.50 - 11.70
(mg/kg, dry wt)	Eastern Creek	[redacted]	[redacted]	9.5	1.1 - 110	3.8 - 48	9.14 - 24.22
	Western Creek complex	1.9	1.4 - 2.6	1.8 - 2.6	2.0 - 9.7	1.3 - 1.5	0.48 - 2.8
	Mouth of Purvis Creek	[redacted]	[redacted]	1.8	*0.28*	*0.23*	*0.59*
	Northern Part of Site	[redacted]	[redacted]	–	0.048 - 4.6	[redacted]	0.34
	Western Part of Site	–	–	–	0.15	0.24 - 1.4	0.15 - 3.4
	Marsh Grid	[redacted]	[redacted]	–	1.3 -50	2.6 - 62	[redacted]
	Reference locations	0.13	0.05U - 0.13	0.008 - 0.027	0.0076 - 0.24	0.025 - 0.038	<0.02 - 0.044
Surface sediment	<u>Southern Part of Site</u>						
in marsh	Main Canal	[redacted]	–	[redacted]	[redacted]	8.5	2.0
(mg/kg, dry wt)	Eastern Creek	[redacted]	[redacted]	13	[redacted]	[redacted]	6.3 - 32
	Western Creek complex	–	–	0.97 - 1.8	3.3	2.1	[redacted]
	Mouth of Purvis Creek	–	–	0.75	0.53	1.0	[redacted]
	Northern Part of Site	[redacted]	[redacted]	–	0.12 - 3.2	–	–
	Western Part of Site	[redacted]	–	–	[redacted]	0.030 - 0.79	[redacted]
	Marsh Grid	[redacted]	–	–	–	–	[redacted]
	Reference locations	0.13	.088 - 0.13	0.047 - 0.050	0.0032 - 0.28	0.032 - 0.094	0.039 - 0.076
Fiddler crabs	<u>Southern Part of Site</u>						
(mg/kg, dry wt)	AB seepage area	–	–	–	1.1	0.95	0.82
	Main Canal	[redacted]	–	[redacted]	0.74	0.67	0.41
	Eastern Creek	–	–	0.45	–	–	–
	Western Creek complex	–	0.27	0.14 - 0.30	–	–	–
	Mouth of Purvis Creek	–	–	0.11	0.16	0.13	0.18
	Northern Part of Site	–	0.50	–	–	–	–
	Western Part of Site	–	0.44	–	–	–	–
	Marsh grid	–	1.8	–	–	–	–
	Reference locations	0.05	0.01 -.0.043	0.01 - 0.02	0.018 - 0.031	0.027	0.034
Mummichogs	<u>Southern Part of Site</u>						
(mg/kg, dry wt)	Main Canal	[redacted]	–	[redacted]	–	1.0	[redacted]
	Eastern Creek	–	–	[redacted]	[redacted]	[redacted]	[redacted]
	Western Creek complex	–	–	0.38 - 0.55	0.33	0.43	[redacted]
	Mouth of Purvis Creek	–	–	0.22	–	–	–
	Northern Part of Site	[redacted]	–	–	[redacted]	0.34	0.39
	Western Part of Site	–	–	–	–	0.18 - 0.27	0.12 - 0.15
	Reference locations	0.10	–	0.02 - 0.04	0.025 - 0.041	0.12	0.077
Blue crabs	Purvis Creek	[redacted]	–	–	[redacted]	0.97 - 1.0	1.5 - 1.6
(mg/kg, dry wt)	*Reference locations*	*0.10*	–	–	*0.069 - 0.078*	*0.14*	*0.073*
Silver perch	Purvis Creek	–	–	–	[redacted]	[redacted]	1.6
(mg/kg, dry wt)	Reference locations	–	–	–	0.15	–	–
Red drum	Purvis Creek	–	–	–	–	0.81	0.67
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–
Black drum	Purvis Creek	–	–	–	0.92	0.41	0.61
(mg/kg, dry wt)	*Reference locations*	–	–	–	–	–	–
Spotted seatrout	Purvis Creek	–	–	–	0.64	0.90	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–

Table 13.__ Continued

Environmental medium (unit of measurement)	Site Location[b]	Year of evaluation 1995[c]	1996[d]	1997[e]	2000[f]	2002[g]	2003[h]
			Aroclor 1268				
Surface water (ug/L)	Southern Part of Site						
(unfiltered)	Main Canal	[redacted]	[redacted]	<0.2 - 5.5	1.0U	–	–
	Mouth of Purvis Creek	–	U	<0.2	1.0U	1.0U	1.0
	Reference locations	0.22	U	<0.2	0.33 - 1.0U	1.0U	<0.5
Surface sediment	Southern Part of Site						
in creek	Main Canal	62	[redacted]	[redacted]	[redacted]	0.25 - 23	[redacted]
(mg/kg, dry wt)	Eastern Creek	[redacted]	[redacted]	63	[redacted]	[redacted]	[redacted]
	Western Creek complex	–	[redacted]	[redacted]	[redacted]	2.1 - 2.8	[redacted]
	Mouth of Purvis Creek	[redacted]	[redacted]	11	[redacted]	1.9	0.71
	Northern Part of Site	[redacted]	[redacted]	–	[redacted]	0.14	0.32
	Western Part of Site	[redacted]	–	–	[redacted]	[redacted]	[redacted]
	Marsh Grid	[redacted]	[redacted]	–	[redacted]	[redacted]	[redacted]
	Reference locations	0.081	0.006 - 0.06	<0.028	0.044U - 0.089U	0.092U - 0.19	<0.20
Surface sediment	Southern Part of Site						
in marsh	Main Canal	[redacted]	–	[redacted]	[redacted]	[redacted]	[redacted]
(mg/kg, dry wt)	Eastern Creek	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Western Creek complex	–	–	[redacted]	[redacted]	[redacted]	[redacted]
	Mouth of Purvis Creek	–	–	[redacted]	[redacted]	[redacted]	[redacted]
	Northern Part of Site	[redacted]	[redacted]	–	[redacted]	–	–
	Western Part of Site	[redacted]	–	–	[redacted]	0.61 - 1.5	0.66 - 0.84
	Marsh Grid	[redacted]	–	–	–	–	[redacted]
	Reference locations	0.081	0.0077 - 0.027	<0.028	0.046U - 0.063U	0.061U - 0.10U	<0.25 - <0.33
Fiddler crabs	Southern Part of Site						
(mg/kg, dry wt)	AB seepage area	–	–	–	[redacted]	2.8	[redacted]
	Main Canal	[redacted]	–	[redacted]	[redacted]	2.8	[redacted]
	Eastern Creek	–	–	–	–	–	–
	Western Creek complex	–	0.81	0.53 - 1.9	–	–	–
	Mouth of Purvis Creek	–	–	[redacted]	[redacted]	[redacted]	[redacted]
	Northern Part of Site	–	1.5	–	–	–	–
	Western Part of Site	–	1.2	–	–	–	–
	Marsh grid	–	73	–	–	–	–
	Reference locations	0.08	0.08 - 0.13	0.04 - 0.06	0.15 - 0.17	0.18	0.99
Mummichogs	Southern Part of Site						
(mg/kg, dry wt)	Main Canal	[redacted]	–	[redacted]	–	[redacted]	7.4
	Eastern Creek	–	–	[redacted]	[redacted]	7.9 - 8.6	3.6 - 8.0
	Western Creek complex	–	–	[redacted]	[redacted]	[redacted]	[redacted]
	Mouth of Purvis Creek	–	–	0.66	–	–	–
	Northern Part of Site	[redacted]	–	–	[redacted]	2.2	1.6
	Western Part of Site	–	–	–	–	0.21 - 2.4	1.1 - 1.2
	Reference locations	–	–	0.08	0.20 - 0.22	0.11	0.45
Blue crabs	Purvis Creek	[redacted]	–	–	[redacted]	1.9 - 2.4	[redacted]
(mg/kg, dry wt)	Reference locations	2.7	–	–	0.15 - 0.21	0.09	0.43
Silver perch	Purvis Creek	–	–	–	2.9	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	0.33	–	–
Red drum	Purvis Creek	–	–	–	–	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–
Black drum	Purvis Creek	–	–	–	4.2	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–
Spotted seatrout	Purvis Creek	–	–	–	0.99	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–		–	–	–

Table 13.__ Continued

Environmental medium (unit of measurement)	Site Location[b]	Year of evaluation 1995[c]	1996[d]	1997[e]	2000[f]	2002[g]	2003[h]
			Lead				
Surface water (ug/L)	Southern Part of Site						
(unfiltered)	Main Canal	[redacted]	[redacted]	[redacted]	[redacted]	–	–
	Mouth of Purvis Creek	–	U	<2	–	50U	<0.005
	Reference locations	–	U	<2 - 11	5.0 U	50U	<0.005
Surface sediment	Southern Part of Site						
in creek	Main Canal	[redacted]	[redacted]	[redacted]	[redacted]	11 - 24	11 - 32
(mg/kg, dry wt)	Eastern Creek	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Western Creek complex	[redacted]	[redacted]	20 - 23	23 - 29	31 - 32	23 - 28
	Mouth of Purvis Creek	[redacted]	[redacted]	20	–	[redacted]	[redacted]
	Northern Part of Site	[redacted]	[redacted]	–	13 - 63	[redacted]	[redacted]
	Western Part of Site	–	–	–	–	14 - 19	13 - 25
	Marsh Grid	[redacted]	[redacted]	–	24 - 35	13 - 35	21 - 52
	Reference locations	24	5.0 - 20	1.7 - 6.3	2.0 - 12	12 - 14	7.5 - 9.4
Surface sediment	Southern Part of Site						
in marsh	Main Canal	[redacted]	–	[redacted]	[redacted]	12	24
(mg/kg, dry wt)	Eastern Creek	[redacted]	[redacted]	23	25 - 34	20 - 21	28 - 42
	Western Creek complex	–	–	18 - 23	26	34	22
	Mouth of Purvis Creek	–	–	16	–	[redacted]	[redacted]
	Northern Part of Site	[redacted]	[redacted]	–	14 - 91	–	–
	Western Part of Site	[redacted]	–	–	–	[redacted]	16 - 28
	Marsh Grid	[redacted]	–	–	–	–	–
	Reference locations	24	16 - 19	10 - 11	5.9 - 24	16 - 24	12 - 21
Fiddler crabs	Southern Part of Site						
(mg/kg, dry wt)	AB seepage area	–	–	–	[redacted]	[redacted]	[redacted]
	Main Canal	–	–	2.2	1.9	2.8	1.6
	Eastern Creek	–	–	–	–	–	–
	Western Creek complex	–	1.1	1.0 - 2.2	–	–	–
	Mouth of Purvis Creek	–	–	0.42	1.0	[redacted]	[redacted]
	Northern Part of Site	–	1.8	–	–	–	–
	Western Part of Site	–	0.87	–	–	–	–
	Marsh Grid	–	8.7	–	–	–	–
	Reference locations	–	0.66 - 0.77	0.36 - 0.41	0.96 - 1.3	1.4	0.41
Mummichogs	Southern Part of Site						
(mg/kg, dry wt)	Main Canal	–	–	0.18 - 0.21	–	0.62	0.57
	Eastern Creek	–	–	0.22	0.98 - 1.2	[redacted]	[redacted]
	Western Creek complex	–	–	0.10 - 0.39	[redacted]	[redacted]	[redacted]
	Mouth of Purvis Creek	–	–	0.11	–	–	–
	Northern Part of Site	–	–	–	[redacted]	[redacted]	[redacted]
	Western Part of Site	–	–	–	–	[redacted]	[redacted]
	Reference locations	–	–	0.26 - 0.39	0.87 - 2.8	1.3	0.54
Blue crabs	Purvis Creek	–	–	–	0.71 - 1.1	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	.75 - 1.1	1.2	0.12
Silver perch	Purvis Creek	–	–	–	1.6U	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	2.2U	–	–
Red drum	Purvis Creek	–	–	–	–	0.50	0.12
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–
Black drum	Purvis Creek	–	–	–	1.8U	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–
Spotted seatrout	Purvis Creek	–	–	–	1.8U	[redacted]	[redacted]
(mg/kg, dry wt)	Reference locations	–	–	–	–	–	–

Table 13.__ Continued

Environmental medium	Site	Year of evaluation					
(unit of measurement)	Location[b]	1995[c]	1996[d]	1997[e]	2000[f]	2002[g]	2003[h]
		Polynuclear Aromatic Hydrocarbons (PAHs)					
Surface water (ug/L)	Southern Part of Site						
(unfiltered)	Main Canal	–	U	–	U	–	–
	Mouth of Purvis Creek	–	U	–	U	–	–
	Reference locations	–	U	–	U	–	–
Surface sediment	Southern Part of Site						
in creek	Main Canal	0.44	[illegible]	–	[illegible]	0.21 - 1.4	[illegible]
(mg/kg, dry wt)	Eastern Creek	–	0.39 - 0.67	–	[illegible]	0.28 - 4.3	[illegible]
	Western Creek complex	–	[illegible]	–	[illegible]	U - 0.081	[illegible]
	Mouth of Purvis Creek	–	[illegible]	–	[illegible]	0.33	0.09
	Northern Part of Site	0.56	[illegible]	–	[illegible]	[illegible]	0.64
	Western Part of Site	–	–	–	0.027	0.030 - 0.42	0 - 0.53
	Marsh Grid	U	–	–	U - 0.22	U - 1.0	[illegible]
	Reference locations	U	0.17 - 0.89	–	U	U	0 - 0.03
Surface sediment	Southern Part of Site						
in marsh	Main Canal	0.83	–	–	U - 0.52	0.39	[illegible]
(mg/kg, dry wt)	Eastern Creek	–	–	–	0.007 - 0.17	[illegible]	[illegible]
	Western Creek complex	–	–	–	U	0.18	0.23
	Mouth of Purvis Creek	–	–	–	0.010	0.20	0.93
	Northern Part of Site	0.28	–	–	U - 0.80	–	–
	Western Part of Site	[illegible]	–	–	[illegible]	[illegible]	[illegible]
	Marsh Grid	U	0.69	–	–	–	–
	Reference locations	U	–	–	U - 0.005	U	0

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[a] Color scheme employed in this table is intended to suggest general, qualitative (i. e., non-statistically based) trends over the years in concentrations of COPC in environmental media from various locations at the LCP Site. Red color is employed to identify levels of COPC prior to 2003 that have clearly not yet decreased to a point of equilibrium. Orange color signifies levels of COPC in 2003 that are apparently in the same state of flux. Green color identifies years in which levels of COPC decreased substantially in comparison to previous years.

[b] Site locations are relatively large areas in which numerous samples of environmental media were often taken at different points in the locations during a year.

[c] Data for 1995 were generated by the U. S. EPA (Sprenger et al., 1997) and are mean values derived from parts of Tables 24 and 25 (surface water); Tables 3, 4, 9, 10, and 12 (creek and marsh surface sediment); Table 31 (fiddler crabs); Table 42 (mummichogs); and Table 37 (blue crabs).

[d] Data for 1996 were generated by PTI Environmental Services and CDR Environmental Specialists (1998) and are single values derived from parts of Table 5-1(surface water); a range of values, sometimes from several sampling stations in the same location, and always at different depths at the sampling stations, from parts of Table 5-2 (creek sediment); mean values for several depths from Figure 4-4 (most marsh sediment); and mean values from parts of Table 5-4 (marsh grid) and Figure 4-6 (fiddler crabs).

[e] Data for 1997 were generated by NOAA and Region 4, U. S. EPA (1998) and are typically a range of values, sometimes from several sampling stations in the same general location, derived from parts of Figure 3.1, Section 3.2.2, and Section 3.2.3 (surface water); mean values, sometimes a range of mean values from several sampling stations in the same general location, from Figures 3.4, 3.5, and 3.6 (creek and marsh [bank] surface sediment); and mean values, sometimes a range of mean values from several sampling stations in the same general location from Figures 3.20, 3.22, and 3.23 (fiddler crabs) and Figures 3.13, 3.15, and 3.16 (mummichogs).

[f] Data for 2000 were generated by CDR Environmental Specialists and GeoSyntec Consultants (2001) and are typically mean values or a range in values derived from parts of Table 3 (surface water), Table 4 (creek sediment), Table 5 (marsh sediment), and Table 6 (fiddler crabs, mummichogs, blue crabs, silver perch, black drum, and spotted seatrout).

[g] Data for 2002 were generated by CDR Environmental Specialists and GeoSyntec Consultants (2003a) and are typically mean values or a range in values derived from parts of Table 3 (surface water), Table 4 (creek sediment), Table 5 (marsh sediment), and Table 6 (fiddler crabs, mummichogs, blue crabs, silver perch, red drum, black drum, and spotted seatrout).

[h] Data for 2003 are abstracted from the following tables in this report: Table 3 (surface water), Table 4 (most creek sediment), Table 5 (most marsh sediment), Table 11 (total mercury and Aroclor 1268 in sediment from Main Canal, Eastern Creek and Marsh Grid), and Table 6 (fiddler crabs, mummichogs, blue crabs, silver perch, red drum, black drum, and spotted seatrout).

RESULTS OF SEDIMENT TESTS CONDUCTED FOR CDR ENVIRONMENTAL SPECIALISTS USING SAMPLES FROM BRUNSWICK, GEORGIA

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February 22, 2005

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INTRODUCTION

Procedures have been established as a means to monitor the potential effects of contamination on aquatic systems. These test procedures can provide a measure of the impact on mortality, reproduction, and growth in acute and chronic exposures. The present report details the results of chronic testing on an aquatic invertebrate, *Leptocheirus plumulosus,* from sediments collected from sites near Brunswick, Georgia.

MATERIALS AND METHODS

Sample Collection

Grab samples of sediment were collected at twelve sites from October 19, 2004 to October 25, 2004. These samples were placed in clean, plastic containers. Federal Express shipped the samples in two separate coolers on October 27, 2004 for overnight delivery to the SeaCrest lab. They arrived at 12:40 pm on October 27, 2004. After delivery, the sediment samples were refrigerated at 4°C when not in use. The Chain of Custody forms documenting sample collection and transfer times is included in Appendix 1.

Dilution Water

Moderately hard laboratory reconstituted water was used as the overlying water for the sediment. Reconstituted water was prepared by mixing sodium bicarbonate, calcium sulfate, magnesium sulfate, and potassium chloride in deionized water

Test Organisms

The tests were conducted with a benthic estuarine amphipod *Leptocheirus plumulosus*. The amphipods used in the sediment tests were between one and two days old as prescribed by the test procedures. Organisms were tested in a reference toxicant test using copper sulfate to insure their health and test acceptability.

Test Procedures

The tests followed the procedures outlined in USEPA (1994) [3]. The *Leptocheirus plumulosus* tests were started on January 12, 2005 with the addition of water over the sediments. Animals were added to the test containers on the next day. The tests ran for 28 days, ending on February 9, 2005.

The sediments did not require sieving but were thoroughly stirred and all large particles (i.e. branches, stones) were removed manually. Each of the sediments was visually inspected for indigenous organisms but none were observed. All sample sediments were treated in the same manner in regards to processing and addition to the test containers.

Test containers were 300 ml glass jars to which 100 ml of the homogenized sediments were added. To this was added 175 ml of reconstituted water. The sediments were tested at the 100% concentration only. Twelve replicates were used for each sediment sample. Two sets of controls were run for the nineteen sediment samples. The control set used clean, uncontaminated sediment created with medium-to-fine grain sand mixed with a small amount of organic material (decaying leaves) and potting soil.

The water over the sediments was changed twice daily. The test containers were monitored for temperature and dissolved oxygen, before and after a daily water change. Water used for the change-outs was held in the incubator at test temperature. The containers for the reconstituted water were refilled immediately after each change-out so that the water would be at test temperature by the next change-out. The data sheets documenting the batch preparation and water quality checks are located in Appendix 2.

Test animals were fed once a day. All *Leptocheirus plumulosus* test chambers received 1 ml of "Gorp" solution. Observations of mortality and/or effects were made at water change-out.

The water over each sediment sample was measured for pH, salinity, alkalinity, conductivity, and ammonia at the beginning and at the end of the tests. The data sheets containing the daily readings of temperature and dissolved oxygen, and the water quality readings taken at the beginning and end of both tests, are located in Appendix 6. The tests were held at a temperature of 25 ± 1°C in an incubator with a programmed day cycle of 16 hours light and 8 hours dark. The daily temperature readings for the incubator are located in Appendix C. The temperature readings for the incubator were higher than those recorded in the tests themselves (as seen on the test data sheets), however, the incubator readings show consistency and adjustments to the temperatures in the incubators were made, as needed.

Dissolved oxygen levels were maintained above 4.0 mg/L, as per the sediment toxicity test guidelines. All sediments in both tests were aerated from the beginning of the tests due to low initial dissolved oxygen levels.

At the end of the *Leptocheirus plumulosus* test, water was pulled from each replicate of each sediment test and composited by test sediment for final water quality readings. The water was poured from the samples into a clean plastic pan and searched thoroughly for live animals. Then the sediment was added to the pans and thoroughly searched. Diligent effort was made to account for every test organism, either by retrieving them live or finding a body. The *Leptocheirus plumulosus* were sexed and present juveniles were counted. Live organisms were euthanized and placed in a drying oven at 60°C overnight. The *Leptocheirus plumulosus* were then weighed on a four-place analytical balance to determine average dry weights. The data sheets containing the dry weight determinations, the number of surviving *Leptocheirus plumulosus* per replicate for each sample, sexed adults and produced juveniles are located in Appendix 8.

RESULTS

Leptocheirus plumulosus Test

The amphipod test was run with all nineteen collected sediments. Two control sediments, using clean sand mixed with leave litter and potting soil, was run along with the sediments. Daily comment sheets for the test are located in Appendix 7. Table 1 summarizes test results.

TABLE 1. TEST SURVIVAL AND WEIGHT RESULTS FOR THE *LEPTOCHEIRUS PLUMULOSUS* SEDIMENT EXPOSURES.

[illegible] SAMPLE	Survival Range (%)	Average Survival (%)	Weight Range (mg)	Average Weight (mg)
Control-20	80-100	92	0.11-0.64	0.32
Control-21	75-95	86	0.14-0.32	0.22
1-04293-C6	20-55	37	0.16-0.54	0.38
2-04294-MGH7	15-30	24	0.38-0.60	0.50
3-04299-C103	50-95	72	0.11-0.35	0.23
4-04295-A-C	25-45	33	0.16-0.97	0.41
5-04299-C101	35-80	55	0.24-0.38	0.31
6-04299-C102	40-60	47	0.24-0.57	0.40
7-04299-C105	0	0	0	0
8-04296-D-C	45-75	49	0.14-0.38	0.23
9-04299-C100	65-90	76	0.28-0.31	0.29
10-04299-C104	50-90	66	0.27-0.34	0.32
11-04295-CR	25-50	40	0.05-0.28	0.18
12-04295-C45	0-45	23	0.00-0.50	0.26
13-04294-MGK7	10-70	41	0.21-0.35	0.29
14-04293-C5	45-75	63	0.34-0.50	0.40
15-04295-TC	25-60	42	0.30-0.43	0.36
16-04293-C7 car	5-30	15	0.22-0.90	0.45
17-04295-C1~~5~~33	30-60	42	0.19-0.43	0.35
18-04294-C15	0-10	3	0.00-0.85	0.25
19-04295-MAB	5-35	15	0.10-0.62	0.30
Beginning of Test	NA	NA	0.09	0.09

The amphipod *Leptocheirus plumulosus* was also tested to measure the fertility and sex ratio responses. Sexed adults and juvenile production for the tests are located in Appendix 7. Table 2 summarizes these test results.

TABLE 2. TEST SPECIES SEXING AND JUVENILE PRODUCTION RESULTS FOR THE *LEPTOCHEIRUS PLUMULOSUS* SEDIMENT EXPOSURES.

[illegible]	Average Sexed Species (Females per sediment)	Average Juvenile Production per sediment [illegible]
Control-20	8	29
Control-21	8	53
1-04293-C6	5	30
2-04294-MGH7	3	4
3-04299-C103	10	3
4-04295-A-C	4	2
5-04299-C101	6	17
6-04299-C102	6	30
7-04299-C105	0	0
8-04296-D-C	7	10
9-04299-C100	9	29
10-04299-C104	8	44
11-04295-CR	5	45
12-04295-C45	3	1
13-04294-MGK7	5	2
14-04293-C5	8	7
15-04295-TC	5	30
16-04293-C7	2	0
17-04295-C15	6	24
18-04294-C15	1	4
19-04295-MAB	2	1

REFERENCE TOXICANT TEST RESULTS

Leptocheirus plumulosus

The test organism history sheets from the supplier (Aquatic BioSystems, Inc., Ft. Collins, CO) are located in Appendix 4. The amphipod animal batches used in the sediment tests were tested against the reference toxicant copper (the toxicant recommended in the guidelines) to determine their health and test acceptability. This non-toxic substance was used instead of cadmium and the results should be interpreted with this in mind. The *Leptocheirus plumulosus* test was conducted from January 12 of 2005. The test consisted of 5 replicates per concentration, two organisms per replicate. The test beakers contained water and a small amount of sand placed over the bottom of each beaker. The test was a static, non-renewal; meaning the water was not changed daily. The animals were fed 0.1 ml of gorp on days 0 and 2. The test concentrations run were 250, 125, 62.5, 31.25, and 15.63 ppb copper.

The LC50 created was 121.85 ppb copper using the Probit statistical method. This method produced control results and followed methods according to the guidelines. There was no information in the guidelines as to what statistical method or LC50 range was used in order to produce the results for an acceptable reference toxicity tests for copper.

REFERENCES

1. **APHA/AWWA/WEF.** 1998. *Standard Methods for the Examination of Water and Wastewater.* 20th Edition. American Public Health Association, Washington, D.C.
2. **Hach Chemical Company.** 2002. *Hach Water Analysis Handbook.* Hach Chemical Company, Loveland, Colorado. 1260pp.
3. **USEPA.** 1994. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.* EPA-600-R-94-024.

Appendix 1 – Chain of Custody Form

1 of 2

The SeaCrest Group
An Environmental Services Company

1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number ____________

Project Number (lab use only) 304308

Client: Curt Rose
Contact: ____________
Address: ____________
Program/Site: LCP Brunswick
Phone: 954-297-1165

Collected by: ____________

These fields may be used for field test results

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute			Chronic									Total Units	Total Volume
					Cerio	FH Minnow	Accelerated	Cerio	FH Minnow	Accelerated	TRE	Other						
1	04293-C5	10/19/04	—	Composite		28-Day Amphipod Test											1	
2	04293-C6	10/19/04	—														1	
3	04293-C7	10/19/04	—														1	
4	04294-C15	10/20/04	—														1	
5	04294-MG-H7(C)	10/20/04	—														1	
6	04294-MG-K7(C)	10/20/04	—														1	
7	04295-TC	10/21/04	—														1	
8	04295-CR	10/21/04	—														1	
9	04295-MAB	10/21/04	—														1	
10	04295-C33	10/21/04	—	↓				↓									1	

Comments and special testing instructions:

① Run 1 positive control and 2 negative controls

② Five digit date not indicated on containers. However, report date plus other sample identification in report.

Relinquished by: Curt Rose
Representing: CDR Environmental
To Whom: Federal Express
Date/Time: 10/26/04; 1400

Relinquished by: ____________
Representing: ____________
To Whom: ____________
Date/Time: ____________

Next recipient: ____________
Relinquished by: ____________
Rec'd by: ____________
Date/Time: 102704 - 1240

WHITE COPY: Accompanies samples

CANARY COPY: Client

2 of 2

The SeaCrest Group
An Environmental Services Company

1341 Cannon Street • Louisville, Colorado 80027
303-661-9324 • FAX 303-661-9325

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number:

Project Number (lab use only): 304308

Client: Curt Ron
Contact:
Address:
Program/Site: LCP Brunswick
Phone: 954-927-1165

Collected by:

These fields may be used for field test results

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute			Chronic									Total Units	Total Volume
					~~Cerio~~	~~FH Minnow~~	~~Accelerated~~	~~Cerio~~	~~FH Minnow~~	~~Accelerated~~	~~TIE~~	~~Other~~						
1	04295-C4.5	10/21/04	/	↓		28 Day Amphipod Test											1	
2	04295-A-C	10/21/04	/					↓									1	
3	04296-D-C	10/22/04	/														1	
4	04299-C100	10/25/04	/														1	
5	04299-C101	10/25/04	/														1	
6	04299-C102	10/25/04	/														1	
7	04299-C103	10/25/04	/														1	
8	04299-C104	10/25/04	/														1	
9	04299-C105	10/25/04	/														1	
10																		

Comments and special testing instructions:

Relinquished by: Representing: To Whom: Date/Time:
Relinquished by: Representing: To Whom: Date/Time:
Next recipient: Relinquished by: Rec'd by: Date/Time: 102704-1240

WHITE COPY: Accompanies samples
CANARY COPY: Client

The SeaCrest Group
Louisville, CO

Sample Receipt Form

Form #: 42
Effective: November 2003

Project #: 304308 (1-18)
Date: 102704
Sample #: —
Initials: SP

Samples Were:

1. Shipped Hand Delivered [✓ Messengered] (circle one)
   Notes:
2. Airbill Present [✓ Y] N NA
   Notes:
3. Chilled to Ship Ambient [✓ Chilled] (circle one)
   Notes:
   [✓ Ice] Blue Ice (circle one)
4. Cooler Received Broken or Leaking Y [✓ N] NA
   Notes:
5. Sample Received Broken or Leaking Y [✓ N] NA
   Notes:
6. Received Within Holding Times [✓ Y] N
   Notes:
7. Aeration necessary Y N [✓ NA]
   Notes:
8. Sample Received at Temperature between 0-6° C . Y N [✓ NA]
   Notes: Sample received on Ice
9. Description of Sample (Color, Odor, and/or Presence of Particulate Matter):
   eff:

   rec'g

	DO	Temp	pH	Cl
Eff				
Rec'g				

Aeration	Time	DO	pH

COC Tape Was:

1. Present on Outer Package [✓ Y] ~~N~~ EESP
2. Unbroken on Outer Package [✓ Y] N NA
3. Present on Sample Y [✓ N]
4. Unbroken on Sample Y N [✓ NA]

COC Record Was:

1. Present Upon Receipt of Sample [✓ Y] N

Appendix 2 – Water Batches Used for the *Leptocheirus plumulosus* Tests

eaCrest Group
ville, CO

Saltwater Log

Page #:
Form #: 29a
Effective: January 2003

Batch #	Quantity DI	Salt Added	Date	Initials	Salinity *	Date	Initials	Notes
05-001	50gal	5cups	010405	SG	~19	010505		Added 1cup Sea Salt
05-002	50gal	4.3cups	011905	AA	20	012005		
05-003	50gal	43 cups	020505		15	020705	BB	Cleaned Bucket Added 1.5cups &stirred

* Measured in parts per thousand ($^{0}/_{00}$)

Appendix 3 – Daily Temperature Readings of the Incubator during the *Leptocheirus plumulosus* Test

[redacted]

The SeaCrest Group
Louisville, CO

Incubator 1 Temperature Record

Page #: 1
Form #: 77a
Effective: January 2004

Incubator #: 1	
Incubator Make: Dept. of Ag	Incubator Model: PC678
Acceptable Temperature Range: 24-26°C	Acceptable Light Range: 50-100 foot candles
NIST Correction:	Date of NIST Correction:
Date: Initials:	Light Meter Reading Top:
Light Meter Reading Middle:	Light Meter Reading Bottom:

Date	Temperature	Initials	Maintenance	Notes
122704	26.0	SP		
122804	26.0	SP		
122904	25.8	SP		
123004	25.6	RPM		
123104	25.6	RPM		
010104	26.0	SP		
010204	25.9	SP		
010304	25.8	SP		
010405	25.6	RPM		
010505	26.0	RPM		
010605	26.0	AD	Calibration performed AD	temp checked using cal. therm.
010705	26.5	RPM		
010805	26.0	RPM		
010905	26.5	AD		
011005	25.1	AD		
011105	26.0	RPM		
011205	23.6	AD		turned up.
011305	19.6	RPM	REPLACED BULB 5	turned up ↑
011405	26.4	RPM		
011505	26.4	RPM		
011605	26.4	AD		
011705	26.5	AD		
011805	27.0	RPM		
011905	26.6	RPM		
012005	27.0	RPM		

[redacted]

[redacted]

The SeaCrest Group
Louisville, CO

Incubator 1 Temperature Record

Page #: 2
Form #: 77a
Effective: January 2004

Incubator #: 1	
Incubator Make: Dept. of Ag	Incubator Model: PC678
Acceptable Temperature Range: 24-26°C	Acceptable Light Range: 50-100 foot candles
NIST Correction:	Date of NIST Correction:
Date: Initials:	Light Meter Reading Top:
Light Meter Reading Middle:	Light Meter Reading Bottom:

Date	Temperature	Initials	Maintenance	Notes
012105	26	SP		
012205	26.0	RPM		
012305	26.7	AD		
012405	26.8	AD		
012505	26.8	AD		
012605	26.8	RPM		
012705	26.6	AD		
012805	26.5	RPM	CHANGED LIGHT BULBS 2+3	DAPHNIA CHRONICS ARE AT GOOD TEMP
012905				
013005	27.1	AD		
013105	26.6	AD		
020105	26.8	RPM		
020205	26.0	RPM		
020305	26.1	AD		
020405	26.0	RPM		
020505	25.9	RPM		
020605	26.5	AD		
020705	26.1	AD	replaced lightbulbs 1+4.	
020805	26.5	AD		
020905	26.6	RPM		
021005	26.4	AD		
021105	26.5	RPM	TURNED DOWN SLIGHTLY	
021205	24.9	RPM		
021305	24.9	AD		
021405	25.0	AD		
021505	25.0	AD		
021605	25.0	AD		
021705	25.0	RPM		
021805	24.9	RPM		
021905	25.0	RPM		

Appendix 4 – Test Organism Supplier History Sheets

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

received
1/13/05

ORGANISM HISTORY

DATE: 1/13/05

SPECIES: Leptocheirus plumulosus

AGE: <1 week

LIFE STAGE: Larvae

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: Flake Slurry

pH	DO
7.8	6.8

Temp
20.1°C

Water Chemistry Record:	Current	Range
TEMPERATURE:	22°C	21-26°C
SALINITY/CONDUCTIVITY:	17 ppt	15-22 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	100 mg/l	100-160 mg/l
pH:	8.37	8.05-8.62

Comments:

Facility Supervisor

Appendix 5 – Reference Toxicant Test Bench Sheets

The SeaCrest Group
Louisville, CO

Sediment Organism Reftox Benchsheet

Form #: 108
Effective: October 2002

Purpose: L. plumulosus reftox
Salt Used: CuSO4
Date Made: 1/13/05
Dilution Series: 50%
Template #: ———
Dilution Water: Salt H2O seamix (20‰)
Name, age & source: lp ABS 011205 (~7d)
Test Start: 011205 (1630)
Test End: 011605 (1640)
Test Conditions: * Feed at 48 hrs (2-3 drops per replicate) (Nonrenewal)

	0	24	48	72	96
(C) 0	2	2	2	2	2
	2	2	2	2	2
	2	2	2	2	2
	2	2	2	2	2
	2	2	2	2	2
DO	7.1	6.5	5.6	5.4	5.2
Temp	24.2	24.8	24.2	24.1	24.3
pH	8.1	7.7	7.9	7.7	7.9
Cond	30,300				
(1)	2	2	2	2	2
15.625	2	2	2	2	2
ppb	2	2	2	2	2
	2	2	2	2	2
	2	2	2	2	2
DO	6.9	5.1	5.3	5.1	
Temp	24.3	24.8	24.3	24.1	
pH	8.1	7.6	7.9	7.8	
Cond	30,300				
(2)	2	2	2	2	2
31.25	2	2	2	2	1
ppb	2	2	2	2	2
	2	2	2	2	2
	2	2	2	2	2
DO	6.9	5.2	5.4	5.2	5.1
Temp	24.1	24.7	24.2	24.1	24.3
pH	8.1	7.6	7.9	7.4	7.9
Cond	30,300				
Initials	AD			AD	AD

	0	1	2	3	4
(3)	2	2	2	2	2
62.5	2	2	2	2	1
ppb	2	2	2	1	1
	2	2	2	2	2
	2	2	2	2	2
DO	6.9	5.1	5.4	5.2	5.1
Temp	24.3	24.8	24.3	24.4	24.3
pH	8.1	7.5	7.9	7.4	7.8
Cond	30,300				
(4)	2	2	2		2
125	2	2	2		1
ppb	2	2	1		1
	2	2	2		1
	2	2	2		0
DO	6.9	5.1	5.3	5.3	5.2
Temp	24.3	24.7	24.1	24.3	24.2
pH	8.1	7.7	8.0	8.0	7.9
Cond	30,200	[illegible]			
(5)	2	2	1	0	—
250	2	2	2	1	—
ppb	2	2	2	2	1
	2	2	2	2	1
	2	1	1	0	0
DO	6.9	5.3	5.4	5.2	5.1
Temp	24.1	24.6	24.3	24.4	24.6
pH	8.0	7.7	7.9	8.0	7.9
Cond	30,200				
food	Fed	—	Fed	—	—

	Reftox1	Reftox2	Recon #1	Recon #2
Hardness				
Alkalinity				
Chlorine				
Ammonia				

1. Exposure Chamber
Total Capacity: 30 ml
Test Solution Surface Area: ____ cm^2
Test Solution Volume: 20 ~~15 ml~~
Water Depth (constant): ____ cm
(cyclic): ____ to ____ cm

2. Feeding Schedule
Not fed: ____
Fed Daily: ____
Fed Irregularly: 0 & 48 hours
Food Used: ____

3. Aeration
Slow: ____
Med: ____
Fast: ____

4. Screened Animal Enclosers
Not Used: X
Used: ____ cm diameter

5. Condition/appearance of surviving organisms at end of test (i.e., alive but immobile; loss of orientation; erratic movement; etc.):

6. Comments:

```
********* Version 2.5 ***********************************

          Results calculated using the Summary Method.

***************************************************************

          Sponsor                  :                      CDR
          Species                  :                    LEPTO
          Study Number             :                   304308
          Dates of test            :  01-12-05  to   01-16-05
          Test Material            :                      KCL
          Concentration Units      :                     ML
          Report run by            :                       SP
          Date of report           :               02-23-2005

***************************************************************

***************************************************************

        Concentration      Number      Number      Percent
          (    ML    )     Exposed      Dead        Dead
        -------------      -------     ------      ------
             250.0            10          8          80.0
             125.0            10          5          50.0
              62.5            10          2          20.0
              31.3            10          1          10.0
              15.6            10          0           0.0
           Control            10          0           0.0

***************************************************************

                                      95% Confidence Limits
Method            W         LC50       Lower        Upper         Slope
-----------------------------------------------------------------------

Binomial                  125.00       31.25         0.00       --N/A--
Moving Average    *       125.00       77.45       303.52       --N/A--
Probit                    121.85       81.64       215.50         2.58
Logit                     121.50       77.22       245.27         3.82

-----------------------------------------------------------------------

  Note --  In order to produce this summary report, no warning or diag-
           nostic messages were given (if any occurred).  An asterisk
           appearing next to the method indicates that there was a
           warning associated with the corresponding method.  You should
           run the full report for this method to determine the problem.
           This report is intended for informational purposes only.

***************************** End Of Report *****************************
```

Appendix 6 – Daily Instrument Readings

Daily Temperature, Dissolved Oxygen and Beginning/Ending Water Quality Readings for *Leptocheirus plumulosus* Tests

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

CWR

Client Curt Rose
Site ~~Pedricktown~~ Bernsmuk (+ all following sheets)
Lab #
H₂0 NaCl - seamix 20‰
Sample Date
Species Info ABS011105 (L. plumulosus
Start Date 011205
End Date 020905
Test Conditions * sample # 1 (Sample ID = C6)

	0	1		3		6		8		10		13	
Day	Wed	THURS		SATURDAY		TUES		THURSDAY		SAT		TUES	
Date	1/12	011305		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		D	
DO	4.4	6.2	5.8	5.8	6.1	5.8	5.9	4.0	5.4	7.9	7.0	5.7	5.5
Temp °C	24.2	24.8	24.3	24.5	24.9	24.1	24.2	24.2	24.6	24.1	24.5	24.1	24.7
pH	7.4	7.9	7.7	7.8	7.5	8.1	7.9	7.8	8.0	8.1	7.9	8.1	[illegible]
alkalinity	195												
salinity	20‰												
ammonia	1.65												
conductivity	3,400												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		Thurs		Sat		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	B		C		E		F		A		B		C
DO	4.2	5.3	5.1	5.6	4.9	6.2	4.4	5.8	4.5	5.3	4.2	5.6	5.2
Temp °C	24.1	24.2	24.2	24.6	24.8	25.3	24.6	24.8	25.4	25.0	24.3	25.4	24.6
pH	7.8	8.1	7.6	7.8	7.8	8.0	7.8	7.9	7.6	7.8	7.7	7.9	8.0
alkalinity													165
salinity													22‰
ammonia													1.95
conductivity													33 Scc

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

Client Curt Rose
Site ~~Pedricktown~~ Brunswick COR
Lab #
H₂0 NaCl - Seamix (20‰)
Sample Date
Species Info AB5011105 (L. plumulos
Start Date 011205
End Date 022905
Test Conditions * Sample #2 (MG-H7(C) ⇒ sample IO

	0	1		3		6		8		10		13	
Day	1/12	THURS		SATURDAY		TUESDAY		THURS		SAT		TUES	
Date	1/12	011305		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		D	
DO	4.3	56	5.6	4.9	6.8	5.8	6.0	4.9	5.4	7.6	7.0	5.9	6.1
Temp °C	24.1	24.3	24.2	24.8	25.3	24.0	24.1	24.5	24.9	24.2	24.1	24.2	25.1
pH	7.1	7.8	7.8	7.0	7.6	7.6	7.9	7.9	7.9	7.7	7.5	7.6	8.6
alkalinity	121												
salinity	20‰												
ammonia	1.05												
conductivity	31700												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUESDAY		Thurs		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0208
rep	B		C		E		A		B		C		D
DO	4.1	5.1	5.3	5.6	6.0	6.2	6.8	6.3	6.1	6.4	5.9	6.5	5.3
Temp °C	25.2	24.2	25.1	25.3	24.6	25.1	24.1	24.4	24.9	25.1	24.1	25.2	24.6
pH	6.9	7.5	7.7	7.9	7.8	8.0	7.2	7.6	7 —	7.6	7.2	7.7	7.5
alkalinity													102
salinity													23‰
ammonia													3.56
conductivity													32.6

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

Client: Curt Rose
Site: ~~[illegible]~~ Brunswick CSR
Lab #:
H_2O: NaCl - Seamix 22‰
Sample Date:
Species Info: ABS 011105 (L. plumulosus,
Start Date: 011205
End Date: 020905
Test Conditions: Sample #3 (sample ID# - C-103)

	0	1		3		6		8		10		13	
Day	Wed	Thurs		SATURDAY		Tuesday		THURSDAY		SAT		TUES	
Date	1/12	1/13/05		011504		011805		012005		012205		012505	
rep	A	C		B		D		E		A		D	
DO	4.4	5.8	5.7	6.0	5.9	6.0	6.0	5.5	6.0	7.2	6.[illegible]	4.7	5.6
Temp °C	24.3	24.1	24.0	24.5	25.0	24.3	24.5	24.3	25.1	24.4	24.6	[illegible]	25.3
pH	7.0	7.7	7.8	7.6	7.9	7.5	7.9	7.8	8.0	7.7	7.9	7.2	8.4
alkalinity	89												
salinity	20‰												
ammonia	0.887												
conductivity	31600												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		Thurs		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	B		C		E		A		B		C		D
DO	4.0	4.9	5.1	6.0	4.9	5.9	5.2	6.1	5.3	6.2	5.0	6.4	5.3
Temp °C	25.2	24.1	24.9	25.1	24.1	25.3	24.3	24.7	24.3	24.7	24.4	24.7	24.6
pH	7.2	8.1	7.8	7.7	7.7	7.9	7.5	7.7	7.3	7.6	7.4	7.7	7.7
alkalinity													143
salinity													22‰
ammonia													7.31
conductivity													32500

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CueT Rose
Site
Lab #
H$_2$0 NaCl-Seamix (20‰)
Sample Date
Species Info ABS011105 (L. plumulo
Start Date 011205
End Date 020905
Test Conditions * (Sample #4) ⇒ A-C

	0	1		3		6		8		10		13	
Day	Wed	Thurs		~~Fri~~ Sat		~~Sat~~ Tues		~~Sun~~ Thur		~~Mon~~ Sat		Tues	
Date	1/12	1/13		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		D	
DO	4.4	5.9	5.6	5.2	5.9	5.9	6.1	5.6	5.9	7.0	6.7	5.6	6.2
Temp °C	24.1	24.0	24.1	24.3	24.6	24.1	24.0	24.3	25.0	24.5	24.4	24.0	24.8
pH	7.6	7.9	7.8	7.9	7.6	7.9	8.1	7.9	8.0	8.0	7.9	7.7	8.5
alkalinity	156												
salinity	20‰												
ammonia	309												
conductivity	32300												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		Thurs		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	B		C		E		A		B		C		D
DO	4.9	5.5	5.3	5.7	5.8	6.3	5.2	6.1	5.4	6.1	5.2	6.0	5.4
Temp °C	25.0	24.9	24.8	25.1	24.3	25.1	24.3	24.8	24.3	25.1	24.1	24.6	24.6
pH	7.8	8.1	9.0	8.0	7.9	8.1	7.2	7.8	7.3	7.7	7.1	7.6	7.8
alkalinity													148
salinity													23‰
ammonia													0.313
conductivity													33100

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site
Lab #
H_2O NaCl Seamix w/tc
Sample Date
Species Info ABS011105 (L. plumulosus)
Start Date 011205
End Date 020905
Test Conditions Sample # 5 — sample ID# = C-101

	0	1		3		6		8		10		13	
Day	Wed	Thurs		Sat		Tues		Thurs		Sat		Tues	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		D		B		E		A		C	
DO	3.7	5.1	5.6	6.0	5.1	6.5	6.5	6.3	6.6	6.8	7.3	4.2	5.3
Temp °C	24.1	24.4	24.7	24.2	24.3	24.7	25.1	24.2	24.0	24.1	24.2	24.0	24.4
pH	7.0	7.4	7.3	7.9	7.6	7.7	7.8	7.0	7.6	7.4	7.7	6.8	8.3
alkalinity	132												
salinity	20‰												
ammonia	1.31												
conductivity	25700												

	15		17		20		22		24		27		28
Day	Thurs		Sat		Tues		Thurs		Sat		Tues		Wed
Date	012705		012805		020105		020305		020505		020805		0209
rep	D		B		E		A		B		C		D
DO	4.3	5.2	6.5	6.5	4.2	5.6	4.6	4.5	4.9	5.6	4.5	5.1	4.6
Temp °C	24.3	24.0	24.6	25.3	24.3	25.2	24.6	25.3	24.3	24.5	24.3	24.6	24.1
pH	6.8	7.8	7.3	7.8	6.8	7.5	7.2	7.5	7.0	7.6	7.1	7.5	7.0
alkalinity													48
salinity													24‰
ammonia													0.058
conductivity													28,900

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site 6
Lab #
H_20 NaCl - Seamix 20‰
Sample Date
Species Info ABS 011105 (L. plumulos
Start Date 011205
End Date 020905
Test Conditions Sample #6 → C-102

	0	1		3		6		8		10		13	
Day	WED	Thurs		SAT		Tues		Thurs		SAT		Tues	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		D		B		E		A		C	
DO	0.3	4.9	5.4	5.5	5.3	5.2	6.1	5.5	6.0	5.5	6.0	4.8	5.5
Temp °C	24.6	24.7	25.1	24.1	24.7	24.8	25.3	24.1	24.0	24.2	24.3	24.0	24.3
pH	7.1	7.4	7.5	7.9	7.9	7.7	7.9	7.0	7.8	7.6	7.8	7.6	8.4
alkalinity	213												
salinity	20‰												
ammonia	2.69												
conductivity	25400												

	15		17		20		22		24		27		28
Day	Thurs		SATURDAY		Tues		Thurs		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	D		B		E		A		B		C		D
DO	4.9	5.8	5.8	6.1	4.1	5.2	3.4	3.8	4.2	5.0	4.3	5.1	5.0
Temp °C	24.4	24.2	24.6	25.2	25.0	25.3	24.6	25.2	24.6	25.0	25.1	25.3	24.3
pH	7.4	8.0	7.7	7.9	7.4	7.9	7.5	7.6	7.3	7.9	7.2	7.8	7.4
alkalinity													136
salinity													24‰
ammonia													.366
conductivity													30400

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site ~~Petricktown~~ Brunswick CDR
Lab #
H_20 NaCl - Scamix 20‰
Sample Date
Species Info AB501105
Start Date 011205
End Date 020905
Test Conditions Sample # 7 => C-105

	0	1		3		6		8		10		13	
Day	Wed	thurs		SAT		Tues		Thurs		SAT		Tues	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		D		D		B		A		C	
DO	2.3	4.9	5.1	4.2	4.5	6.4	6.4	5.2	6.0	6.7	6.9	4.5	5.6
Temp °C	24.5	24.3	24.7	24.4	24.5	24.4	25.3	24.1	24.3	24.3	24.4	24.1	24.2
pH	7.3	7.5	7.4	7.7	7.7	7.9	8.0	7.6	7.9	8.0	8.0	7.6	8.4
alkalinity	189												
salinity	20‰												
ammonia	3.73												
conductivity	25400												

	15		17		20		22		24		27		28
Day	Thurs		SATURDAY		Tues		thurs		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	D		B		E		A		B		C		D
DO	5.3	5.4	6.4	6.5	6.1	6.2	3.9	2.5	2.3	5.6	4.5	5.4	4.1
Temp °C	24.3	24.3	24.8	25.1	24.7	25.7	24.5	25.1	24.8	25.2	25.1	25.5	24.5
pH	7.4	8.0	7.9	8.0	7.9	8.0	7.4	7.5	7.3	8.0	7.3	7.9	7.5
alkalinity													138
salinity													22‰
ammonia													.264
conductivity													27,800

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site
Lab #
H20 NaCl - Seamix 2‰ Sample Date
Species Info ABS 011105
Start Date 011205
End Date 020905
Test Conditions Sample # 8 — DC
Sample ID

	0	1		3		6		8		10		13	
Day	WED	Thurs		Sat		Tues		Thurs		SAT		Tues	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		D		B		E		A		C	
DO	3.0	5.4	5.9	5.7	5.4	5.9	6.2	5.8	6.3	6.4	6.9	4.6	5.9
Temp °C	24.7	24.6	25.0	24.3	24.4	24.7	25.0	24.1	24.2	24.1	24.3	24.3	24.6
pH	7.4	7.3	7.7	7.9	7.5	7.3	7.9	7.9	8.0	7.7	7.8	7.4	8.4
alkalinity	154												
salinity	20‰												
ammonia	3.23												
conductivity	25300												

	15		17		20		22		24		27		28
Day	Thurs		SATURDAY		Tues		Thurs		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	D		B		E		A		B		C		D
DO	4.3	5.6	5.8	6.2	5.5	6.1	4.0	4.3	4.0	5.2	4.3	5.4	4.4
Temp °C	24.3	24.5	24.3	25.2	24.3	25.1	24.5	25.0	24.8	25.1	24.5	25.1	24.1
pH	7.3	8.1	7.8	7.9	7.5	7.8	7.2	7.4	7.1	7.5	7.3	7.4	7.3
alkalinity													45
salinity													23‰
ammonia													0.165
conductivity													31800

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client ¿DR
Site
Lab #
H₂0 NaCl Seamix 20‰
Sample Date
Species Info ABS
Start Date 011205
End Date 020905
Test Conditions Sample # 9 - sample ID# ⇒ C-100

	0	1		3		6		8		10		13	
Day	Wed	Thurs		SATURDAY		TUESDAY		Thursday		SAT		Tues	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		C	
DO	3.2	6.7	6.0	5.2	5.1	4.9	6.3	5.6	6.1	5.5	6.1	5.8	6.2
Temp °C	25.2	25.6	25.1	24.2	25.1	24.2	24.9	24.1	24.6	24.3	24.9	24.0	24.5
pH	7.9	8.1	8.1	7.7	8.0	7.6	8.0	8.0	8.0	7.9	8.0	7.6	8.1
alkalinity	172												
salinity	20‰												
ammonia	2.13												
conductivity	25100												

	15		17		20		22		24		27		28
Day	THURSDAY		SATURDAY		TUES		THURSDAY		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		029
rep	B		D		E		A		B		C		D
DO	5.0	6.3	5.6	6.1	5.2	5.0	5.3	6.1	5.0	6.8	4.9	6.9	4.8
Temp °C	24.7	25.1	24.3	24.5	24.2	24.6	24.3	24.6	25.1	25.8	24.8	25.1	24.2
pH	7.6	7.9	7.7	8.0	7.7	8.1	7.9	8.1	7.6	8.0	7.5	7.9	7.6
alkalinity													122
salinity													24‰
ammonia													.237
conductivity													36,00

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR Site ______ Lab # ______

H_20 NaCl - Scam: * 20/oo Sample Date ______ Species Info ABS011105

Start Date 011205 End Date 020905

Test Conditions Sample #10 – Sample ID# ⇒ (C-104)

	0	1		3		6		8		10		13	
Day	WED	Thurs		SATURDAY		TUESDAY		Thursday		SATURDAY		Tuesday	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		C	
DO	7.1	6.5	6.7	5.0	5.1	5.2	6.6	5.3	6.4	5.5	6.2	5.9	6.2
Temp °C	25.1	24.9	25.0	24.2	25.0	24.3	24.5	24.1	24.7	24.3	24.8	24.1	24.2
pH	7.8	7.9	7.9	7.8	8.0	7.9	8.0	7.9	7.9	7.9	8.0	7.7	8.3
alkalinity	159												
salinity	20‰												
ammonia	0.990												
conductivity	25000												

	15		17		20		22		24		27		28
Day	THURSDAY		SATURDAY		TUES		THURS		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	B		D		E		A		B		C		D
DO	5.5	6.3	5.3	6.3	5.1	4.8	5.3	5.9	5.4	6.0	5.3	6.1	5.1
Temp °C	24.6	24.9	24.3	24.9	24.1	24.3	24.3	24.7	24.0	25.3	24.7	25.0	24.3
pH	7.6	8.0	7.9	8.0	7.8	8.1	7.8	8.1	7.9	8.1	7.8	8.0	7.7
alkalinity													106
salinity													24‰
ammonia													.523
conductivity													36,800

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site ~~Patricktown~~ Barnwick CDR
Lab #
H_20 NaCl Seamix 20/00
Sample Date
Species Info AB501105
Start Date 011205
End Date 020905
Test Conditions Sample #11 = Sample ID ⇒ CR-C

	0	1		3		6		8		10		13	
Day	Wed	Thurs		SATURDAY		TUESDAY		Thursdas		SATURDAY		Tue	
Date	011205	011305		011405		011805		012005		012205		012505	
rep	A	C		B		D		E		A		C	
DO	1.3	6.5	6.7	5.6	5.8	5.2	6.3	5.4	6.0	5.6	6.2	6.0	6.1
Temp °C	25.0	25.2	25.3	24.3	25.3	24.2	24.6	24.1	24.6	24.3	25.2	24.3	24.6
pH	7.6	7.7	7.9	7.7	7.9	7.8	8.0	7.8	7.9	7.9	8.0	7.7	8.3
alkalinity	62												
salinity	20‰												
ammonia	0.220												
conductivity	38.000												

	15		17		20		22		24		27		28
Day	THURSDAY		SATURDAY		TUES		THURSDAY		SATURDAY		Tuesday		Wed
Date	012705		012405		020105		020305		020505		020805		0209
rep	B		D		E		A		B		C		D
DO	5.6	6.3	5.2	6.3	5.5	5.0	4.6	6.3	5.2	6.0	4.9	5.6	4.8
Temp °C	25.1	24.9	24.6	24.9	24.1	24.3	24.2	24.9	24.8	25.0	24.5	25.1	24.4
pH	7.7	8.1	7.8	8.0	7.6	8.1	~~4.6~~ 7.7	8.1	7.1	8.0	7.4	7.9	7.3
alkalinity													95
salinity													24.5‰
ammonia													2.06
conductivity													41.800

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site
Lab #
$H_2$0 NaCl Scenic 20/00
Sample Date
Species Info AB5011105
Start Date 011205
End Date 020905
Test Conditions Sample # 12 – sample ID# => C-45

	0	1		3		6		8		10		13	
Day	Wed			SATURDAY		TUESDAY		Thursday		SATURDAY		Tues	
Date	01,205			011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		C	
DO	1.7	6.4	6.6	6.0	6.1	5.8	6.0	5.7	6.1	5.6	6.9	6.2	6.5
Temp °C	25.2	24.8	25.0	24.5	25.2	24.5	25.3	24.1	24.8	24.2	25.0	24.2	24.6
pH	7.8	7.9	7.9	7.7	8.0	7.9	8.0	7.9	8.0	7.9	8.1	7.4	8.2
alkalinity	143												
salinity	20‰												
ammonia	1.04												
conductivity	32,600												

	15		17		20		22		24		27		28
Day	THURSDAY		SATURDAY		TUES		THURSDAY		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	B		D		E		A		B		C		D
DO	5.7	6.5	5.7	6.1	4.7	4.7	5.1	6.2	5.7	6.1	5.6	6.2	5.2
Temp °C	24.9	25.2	25.0	25.1	24.5	24.5	24.3	24.6	24.7	24.9	24.5	25.2	24.7
pH	7.5	8.1	7.9	8.0	7.8	8.1	7.8	8.1	7.8	8.1	7.9	8.1	7.6
alkalinity													112
salinity													22‰
ammonia													0.179
conductivity													37,100

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client Kurt Rose
Site ~~Patricktown~~ Brunswick CHR
Lab #
H₂0 NaCl - Seamix
Sample Date
Species Info AB501105
Start Date 011205
End Date 020905
Test Conditions SAMPLE # 13 = Sample ID# -> MG-K7-(C)

	0	1		3		6		8		10		13	
Day	Wed	Thurs.		Sat.		TUES		THURS		SATURDAY		TUESDAY	
Date	1/12	1/13		1/15		1/18		012005		012205		012505	
rep	A	B		D		C		E		A		B	
DO	3.5	5.0	5.3	5.7	5.7	5.6	6.4	6.5	6.0	5.8	6.1	5.6	5.9
Temp °C	24.6	24.1	24.3	24.6	24.9	25.7	25.2	24.2	24.6	24.2	24.9	24.3	25.1
pH	7.2	7.7	7.8	7.8	7.3	7.8	7.9	7.4	7.9	7.5	7.9	7.4	7.9
alkalinity	100												
salinity	20‰												
ammonia	1.24												
conductivity	27.500												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		THURS		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	C		D		E		B		A		C		D
DO	5.7	5.6	5.5	5.5	4.4	4.7	4.7	5.3	4.6	5.2	4.4	5.3	5.1
Temp °C	24.2	24.5	24.3	24.7	24.4	24.0	24.2	24.5	25.2	25.3	25.0	25.3	24.3
pH	7.6	8.2	7.7	7.6	7.4	7.9	7.4	7.8	7.5	7.9	7.6	7.8	7.4
alkalinity													113
salinity													22‰
ammonia													1.39
conductivity													32.100

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site Brunswick COR Pedi
Lab #
H_2O Nacl - Seamix 20‰
Sample Date
Species Info A3S011105
Start Date 011205
End Date 020905
Test Conditions SAMPLE 18 - Sample ID# - C-45

	0	1		3		6		8		10		13	
Day	WED	Thurs		Sat		Tues		THURS		SATURDAY		TUESDAY	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	B		D		C		E		A		B	
DO	1.4	4.5	53	5.3	5.3	6.3	6.5	5.7	5.5	5.6	6.0	5.7	6.1
Temp °C	24.4	24.2	24.3	24.5	24.9	24.5	25.0	24.0	24.8	24.3	25.1	25.3	25.0
pH	7.6	7.5	7.9	8.0	8.0	7.8	8.0	7.9	8.0	7.4	8.0	7.9	8.0
alkalinity	203												
salinity	20‰												
ammonia	4.20												
conductivity	29 400												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		THURS		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	C		D		E		B		A		C		D
DO	5.7	5.7	5.6	5.8	4.4	4.9	4.4	5.8	4.7	5.1	4.6	5.0	~~4~~5.2
Temp °C	24.0	24.7	24.3	24.6	24.5	24.3	24.2	24.6	25.1	25.3	24.6	25.1	24.1
pH	8.2	8.4	8.2	8.2	7.9	8.0	8.1	8.0	8.1	8.0	8.1	8.0	8.0
alkalinity													175
salinity													21‰
ammonia													0.0791
conductivity													27,800

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

Client CDR
Site ~~Patrick Lawn~~ Bamsuck CDR
Lab #
H_2O NaCl-seamix
Sample Date
Species Info A3S 011105
Start Date 011205
End Date 020905
Test Conditions SAMPLE 15 - Sample ID# => TC-C

	0	1		3		6		8		10		13	
Day	WED	Thurs		SaT		Tue		THURS		SATURDAY		TUESDAY	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	B		D		C		E		A		B	
DO 4.1 ←	~~24.6~~	4.8	5.6	5.4	5.5	5.7	5.9	5.6	5.6	5.6	5.9	5.7	6.0
Temp °C	24.6	24.1	24.3	24.3	24.7	24.8	24.6	25.0	25.2	24.2	24.9	24.8	24.9
pH	7.4	7.8	7.3	7.9	7.9	7.7	7.9	8.2	8.1	8.0	8.1	8.0	8.0
alkalinity	154												
salinity	2‰												
ammonia	1.12												
conductivity	27,600												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		THURS		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020705		
rep	C		D		E		B		A		C		D
DO	4.4	5.2	5.3	5.0	4.3	5.0	4.2	4.7	5.3	6.1	5.0	5.9	4.4
Temp °C	24.7	25.3	24.3	24.6	24.8	24.6	24.2	24.6	24.1	24.7	24.6	24.9	24.2
pH	7.9	8.2	7.7	7.8	7.6	7.9	7.5	7.9	7.6	7.9	7.6	8.0	7.7
alkalinity													176
salinity													30.7‰
ammonia													1.05
conductivity													27,100

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

Client CDR
Site
Lab #
H20 NaCl-seamix
Sample Date
Species Info AB5011105
Start Date 011305
End Date 020905
Test Conditions SAMPLE 16 = Sample ID# - C-7

	0	1		3		6		8		10		13	
Day	WED	Thu.		SAT		TUES		THURS		SATURDAY		TUESDAY	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	B		D		C		E		A		B	
DO	4.2	4.4	4.7	4.9	4.9	5.9	6.3	6.4	5.7	5.8	6.2	5.8	6.0
Temp °C	24.8	24.3	24.5	24.7	24.9	25.2	25.1	24.9	25.0	24.3	25.2	24.6	24.8
pH	7.2	7.5	7.8	7.8	7.9	7.9	7.9	8.0	8.0	7.9	8.1	7.9	8.0
alkalinity	197												
salinity	20‰												
ammonia	3.63												
conductivity	29 200												

	15		17		20		22		24		27		28
Day	THURS		SAT		TUES		THURS		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	C		D		E		B		A		C		D
DO	5.0	5.2	5.1	5.0	4.1	5.1	4.1	4.4	4.7	5.1	4.8	5.3	4.6
Temp °C	24.4	24.9	24.7	24.4	24.0	24.1	24.1	24.2	25.1	25.1	24.9	24.3	24.0
pH	7.7	8.2	7.2	7.5	7.8	8.0	7.1	7.5	7.3	7.7	7.2	7.6	7.6
alkalinity													179
salinity													21‰
ammonia													0.37
conductivity													30,200

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

Client COR
Site
Lab #
H_20 NaCl - Scemix 20‰
Sample Date
Species Info AB3011105
Start Date 011205
End Date 020905
Test Conditions Sample # 17 = Sample ID# ⇒ C-33

	0	1		3		6		8		10		13	
Day	WED	THURS		SAT		TUES		THURS		SATURDAY		TUES	
Date	011204	011305		011505		011805		012005		012205		012505	
rep	A	C		D		E		B		A		D	
DO	6.9	5.7	6.4	5.9	5.5	6.1	6.2	7.5	7.6	5.5	5.9	5.5	6.1
Temp °C	25.7	25.1	24.2	24.3	24.2	24.0	24.5	24.1	25.0	24.3	25.2	24.0	24.7
pH	7.1	~~7.4~~	7.9	8.0	7.9	8.1	8.0	8.1	8.1	8.0	8.1	8.3	8.6
alkalinity	152	7.2 EE											
salinity	20‰												
ammonia	1.52												
conductivity	28100												

	15		17		20		22		24		27		28
Day	Thurs		SAT		TUES		THURS		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020705		02095
rep	C		D		E		A		B		C		D
DO	5.5	6.1	5.7	6.3	5.6	6.2	5.4	6.2	5.3	6.2	5.6	6.3	4.7
Temp °C	24.2	25.1	24.5	24.7	24.6	25.3	24.3	24.8	25.2	25.3	24.9	25.3	24.3
pH	8.1	8.2	8.3	8.3	8.1	8.3	8.2	8.3	8.1	8.2	8.1	8.0	8.0
alkalinity													190
salinity													23‰
ammonia													1.23
conductivity													~~35000~~ EE 3700

The SeaCrest Group
Louisville, CO

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Effective: September 2002

28-day Leptocheirus Benchsheet

Client	COR	Site		Lab #	
$H_2$0	NaCl - Seanux 20‰	Sample Date		Species Info	ABS011105
Start Date	011205	~~End Date~~			020905

Test Conditions Sample #18 - Sample ID# - C-15

	0	1		3		6		8		10		13	
Day	WED	THURS		SAT		TUES		THURS		SATURDAY		TUES	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		D		E		B		A		D	
DO	0.4	4.4	5.0	5.4	5.3	5.7	6.0	6.9	7.2	5.5	6.3	6.7	5.9
Temp °C	24.3	24.2	24.2	24.1	24.3	24.1	24.3	24.2	25.2	24.2	24.9	24.1	24.3
pH	7.5	7.9	8.0	8.2	8.2	8.2	8.1	8.1	8.2	8.0	8.1	8.2	8.5
alkalinity	317												
salinity	20‰												
ammonia	9.00												
conductivity	31,900												

	15		17		20		22		24		27		28
Day	Thurs		SAT		TUES		THURS		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	C		B		E		A		B		C		D
DO	5.1	5.6	5.7	6.1	5.5	6.0	5.1	6.0	5.2	5.5	5.1	5.9	4.6
Temp °C	24.1	25.4	24.4	25.0	24.3	24.9	24.4	24.9	25.1	24.8	24.1	24.5	24.2
pH	7.9	8.3	8.1	8.1	8.0	8.1	7.8	8.3	7.7	8.1	7.6	8.0	7.8
alkalinity													156
salinity													24‰
ammonia													.718
conductivity													~~3900~~ EESG 43000

The SeaCrest Group
Louisville, CO

Form #: 109a
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28-day Leptocheirus Benchsheet

Client CDR
Site
Lab #
H_2O NaCl - Seamix 20/oo
Sample Date
Species Info ABS 011105
Start Date 011205
End Date 020905
Test Conditions Sample #19 - (Sample ID# => M-AB)

	0	1		3		6		8		10		13	
Day	Wed	THURS		SAT		TUES		THURSDAY		SAT		Tues	
Date	011205	011305		011505		011805		012005		012205		012505	
rep	A	C		D		E		B		A		~~B~~ D	
DO	6.5	5.7	5.8	6.0	5.6	6.0	5.9	7.3	7.3	5.8	6.9	6.7	6.0
Temp °C	25.0	24.2	24.0	24.3	24.1	24.1	24.5	24.3	25.3	24.4	25.2	24.1	24.7
pH	7.2	7.5	7.9	7.1	8.0	8.3	8.2	8.3	8.1	8.0	8.1	8.2	8.6
alkalinity	176												
salinity	2‰												
ammonia	1.32												
conductivity	29,500												

	15		17		20		22		24		27		28
Day	Thurs		SAT		TUES		THURSDAY		SAT		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	C		B		E		A		D		C		D
DO	4.9	6.2	5.3	5.8	5.6	6.0	5.0	6.3	5.3	6.0	5.1	5.8	4.7
Temp °C	24.2	24.9	24.5	24.9	24.6	25.0	24.3	24.7	25.1	24.7	24.3	24.5	24.3
pH	8.3	8.2	7.8	7.9	7.9	8.0	7.9	8.1	7.9	8.2	7.8	8.1	7.8
alkalinity													132
salinity													22‰
ammonia													1.0
conductivity													~~35600~~ 33500

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site
Lab #
H_2O NaCl - seamix 20‰
Sample Date
Species Info ABS 011105
Start Date 1/12/05
End Date 020905
Test Conditions sample #20 - Control +

	0	1		3		6		8		10		13	
Day	Wed	Thurs		SATURDAY		TUES		THURS		Sat		Tues	
Date	1/12	011305		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		C	
DO	4.4	6.3	6.9	5.6	6.5	6.2	6.2	4.5	5.6	7.1	7.6	6.8	6.9
Temp °C	24.4	24.4	25.3	25.9	25.1	24.9	24.8	25.5	25.9	24.4	24.3	24.1	25.1
pH	7.5	7.5	7.8	7.2	7.4	7.9	8.0	7.6	7.9	7.9	7.9	7.2	8.5
alkalinity	128												
salinity	20‰												
ammonia	1.07												
conductivity	25,800												

	15		17		20		22		24		27		28
Day	Thurs		SATURDAY		Tues		Thurs		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	D		B		E		A		B		C		D
DO	5.4	5.8	6.8	6.9	5.0	6.1	4.9	4.7	5.2	6.0	5.0	5.8	4.5
Temp °C	24.5	24.4	24.2	24.9	25.3	25.3	24.3	24.7	24.3	24.8	24.9	25.3	24.2
pH	7.4	8.1	7.8	8.2	7.9	8.0	7.5	7.7	7.7	7.9	7.6	7.8	7.3
alkalinity													113
salinity													22‰
ammonia													.767
conductivity													27,300

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: September 2002

28-day Leptocheirus Benchsheet

Client CDR Site Lab #
H_20 Nacl - seamix 20% Sample Date Species Info L. plumulosus (A8501105,
Start Date 1/12/05 End Date 020905
Test Conditions sample #21 — Control 2

	0	1		3		6		8		10		13	
Day	Wed	Thurs		SATURDAY		TUES		THURS		SAT		Tues	
Date	1/12	011305		011505		011805		012005		012205		012505	
rep	A	C		B		D		E		A		C	
DO	4.7	6.4	6.7	4.6	6.5	6.2	6.1	6.1	6.2	7.6	7.6	6.5	6.9
Temp °C	24.9	24.7	24.5	25.0	25.1	25.1	25.0	25.2	25.7	24.3	24.4	24.9	25.9
pH	7.3	7.7	7.9	7.5	7.8	7.8	7.9	7.9	8.0	7.9	7.9	7.9	8.6
alkalinity	120												
salinity	20‰												
ammonia	1.22												
conductivity	25900												

	15		17		20		22		24		27		28
Day	Thurs		SATURDAY		Tuesday		Thurs		SATURDAY		Tues		Wed
Date	012705		012905		020105		020305		020505		020805		0209
rep	D		B		E		A		B		C		D
DO	5.8	6.2	5.9	6.3	5.2	6.2	3.3	3.7	3.2	6.0	4.5	5.6	4.8
Temp °C	25.3	25.2	25.2	24.9	24.1	24.9	24.5	24.8	24.9	25.3	24.1	24.8	24.7
pH	7.8	8.2	7.9	8.2	7.7	7.9	7.5	7.6	7.6	7.8	7.5	7.9	7.4
alkalinity													103
salinity													22‰
ammonia													1.30
conductivity													27,300

Appendix 8 – Number Surviving, Dry Weight Determinations Per Replicate, Sexed Males, and Juvenile Production for the *Leptocheirus plumulosus* Test

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 1	a	5	2	1	1.1491	1.1499	0.8000	0.16
04293-C6	b	8	3	1	1.1405	1.1436	3.1000	0.39
	c	11	2	>100	1.1465	1.1524	5.9000	0.54
	d	9	3	1	1.1432	1.1468	3.6000	0.40
	e	4	1	>50	1.1506	1.1523	1.7000	0.43
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 2	a	4	2	0	1.1387	1.1411	2.40	0.60
04294-MGH7	b	6	2	1	1.1422	1.1445	2.30	0.38
	c	3	1	0	1.1456	1.1471	1.50	0.50
	d	5	1	>20	1.1512	1.1539	2.70	0.54
	e	6	2	1	1.1382	1.1411	2.90	0.48
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 3	a	14	5	5	1.1499	1.1543	4.40	0.31
04299-C103	b	10	4	3	1.1534	1.1569	3.50	0.35
	c	19	5	2	1.1367	1.1388	2.10	0.11
	d	16	5	2	1.1564	1.1581	1.70	0.11
	e	13	3	1	1.1583	1.1618	3.50	0.27

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 4	a	6	2	1	1.1411	1.1434	2.30	0.38
04295-A-C	b	6	2	2	1.1537	1.1595	5.80	0.97
	c	9	4	4	1.1508	1.1531	2.30	0.26
	d	5	2	0	1.1486	1.1499	1.30	0.26
	e	7	3	2	1.1440	1.1451	1.10	0.16
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 5	a	8	3	5	1.1597	1.1622	2.50	0.31
04299-C101	b	12	4	>10	1.1443	1.1489	4.60	0.38
	c	16	10	>20	1.1509	1.1559	5.00	0.31
	d	12	5	>20	1.1577	1.1613	3.60	0.30
	e	7	3	>30	1.1506	1.1523	1.70	0.24
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 6	a	8	3	>15	1.1445	1.1491	4.6	0.57
04299-C102	b	12	1	>30	1.1435	1.1498	6.3	0.52
	c	9	4	>40	1.1398	1.1433	3.5	0.39
	d	9	5	>40	1.1404	1.1426	2.2	0.24
	e	9	4	>25	1.1463	1.1487	2.4	0.27

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 7	a	0	xx	xx	xx	xx	xx	xx
04299-C105	b	0	xx	xx	xx	xx	xx	xx
	c	0	xx	xx	xx	xx	xx	xx
	d	0	xx	xx	xx	xx	xx	xx
	e	0	xx	xx	xx	xx	xx	xx
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 8	a	11	5	0	1.1456	1.1473	1.70	0.15
04296-D-C	b	10	4	>15	1.1678	1.1692	1.40	0.14
	c	15	7	5	1.1499	1.1528	2.90	0.19
	d	9	2	>20	1.1417	1.1445	2.80	0.31
	e	13	6	>10	1.1442	1.1492	5.00	0.38
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 9	a	14	6	>25	1.1522	1.1563	4.10	0.29
04299-C100	b	18	7	>25	1.1164	1.1217	5.30	0.29
	c	15	9	>20	1.1410	1.1452	4.20	0.28
	d	13	2	>50	1.1448	1.1487	3.90	0.30
	e	16	7	>25	1.1496	1.1546	5.00	0.31

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 10	a	10	3	>15	1.1513	1.1547	3.40	0.34
04299-C104	b	13	4	>75	1.1459	1.1502	4.30	0.33
	c	18	9	>30	1.1425	1.1474	4.90	0.27
	d	11	6	>50	1.1427	1.1463	3.60	0.33
	e	14	6	>50	1.1446	1.1489	4.30	0.31
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 11	a	8	3	>50	1.1530	1.1534	0.40	0.05
04295-CR	b	5	1	>100	1.1498	1.1512	1.40	0.28
	c	10	2	5	1.1473	1.1494	2.10	0.21
	d	10	6	>40	1.1420	1.1435	1.50	0.15
	e	7	3	>30	1.1374	1.1388	1.40	0.20
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 12	a	3	1	0	1.1489	1.1499	1.00	0.33
04295-C45	b	9	4	1	1.1355	1.1400	4.50	0.50
	c	0	xx	xx	xx	xx	xx	xx
	d	8	5	3	1.1628	1.1641	1.30	0.16
	e	3	0	0	1.1480	1.1490	1.00	0.33

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 13	a	7	2	0	1.1490	1.1512	2.20	0.31
04294-MGK7	b	5	3	1	1.1419	1.1431	1.20	0.24
	c	2	0	1	1.1611	1.1618	0.70	0.35
	d	14	7	5	1.1442	1.1472	3.00	0.21
	e	13	3	4	1.1451	1.1493	4.20	0.32
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 14	a	9	3	>15	1.1470	1.1515	4.50	0.50
04293-C5	b	14	4	3	1.1584	1.1635	5.10	0.36
	c	15	7	6	1.1617	1.1673	5.60	0.37
	d	14	5	8	1.1419	1.1467	4.80	0.34
	e	11	3	2	1.1462	1.1509	4.70	0.43
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 15	a	8	3	>25	1.1413	1.1439	2.60	0.32
04295-TC	b	12	5	>25	1.1592	1.1628	3.60	0.30
	c	10	6	>50	1.1408	1.1450	4.20	0.42
	d	5	1	>25	1.1430	1.1447	1.70	0.34
	e	7	2	>25	1.1471	1.1501	3.00	0.43

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 16	a	6	2	0	1.1438	1.1451	1.30	0.22
04293-C7	b	2	1	0	1.1540	1.1548	0.80	0.40
	c	1	0	0	1.1439	1.1443	0.40	0.40
	d	5	2	0	1.1405	1.1422	1.70	0.34
	e	1	1	0	1.1447	1.1456	0.90	0.90
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 17	a	12	5	>50	1.1452	1.1498	4.60	0.38
04295-C33	b	7	2	>30	1.1466	1.1491	2.50	0.36
	c	10	1	>25	1.1503	1.1542	3.90	0.39
	d	7	3	6	1.1575	1.1588	1.30	0.19
	e	6	2	8	1.1505	1.1531	2.60	0.43
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 18	a	0	xx	xx	xx	xx	xx	xx
04294-C15	b	0	xx	xx	xx	xx	xx	xx
	c	2	0	9	1.1475	1.1492	1.70	0.85
	d	1	0	>10	1.1385	1.1389	0.40	0.40
	e	0	xx	xx	xx	xx	xx	xx

Date: 02/21/2005								
Species:*Leptocheirus p.*								
Facility: SeaCrest Group								
Test: 28 Day Chronic								
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 19	a	4	2	0	1.1504	1.1529	2.50	0.62
04295-MAB	b	7	2	3	1.1524	1.1544	2.00	0.29
	c	1	0	0	1.1524	1.1525	0.10	0.10
	d	2	0	1	1.1622	1.1628	0.60	0.30
	e	1	0	0	1.1463	1.1465	0.20	0.20
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 20	a	18	15	>25	1.1437	1.1487	5.00	0.28
Control 1	b	20	10	>25	1.1391	1.1448	5.70	0.29
	c	20	10	>50	1.1640	1.1699	5.90	0.30
	d	16	5	>20	1.1270	1.1287	1.70	0.11
	e	18	12	>25	1.1364	1.1480	11.60	0.64
			Sexed Adults					
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Sediment # 21	a	18	8	>100	1.1516	1.1574	5.80	0.32
Control 2	b	19	8	>25	1.1656	1.1710	5.40	0.28
	c	17	10	>20	1.1740	1.1763	2.30	0.14
	d	17	7	>20	1.1584	1.1623	3.90	0.23
	e	15	11	>100	1.1390	1.1413	2.30	0.15
			Sexed Adults				**Dry Weight(mg)**	
Treatment	**Rep**	**Surviving**	**(males)**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Pre-Treated	XX	60	N/A	N/A	1.1459	1.1514	5.5	0.09166667

CDR Appendix

SKIDAWAY INSTITUTE OF OCEANOGRAPHY
(TOXICITY OF SEDIMENT
TO GRASS SHRIMP))

INTRODUCTION

In the present study juvenile grass shrimp (*Palaemonectes pugio*) were exposed for 60 days to test sediments collected by Curt Rose and to reference sediments collected by us from the Skidaway River. When juvenile grass shrimp are held in aquaria for 60 days with test sediments the following should occur in the process of normal development: (1) juveniles should grow into adults; (2) adult females should produce large mature ovaries; (3) eggs should be produced and fertilized; (3) embryos should develop and hatch into the free living zoea stage. The developing embryos, enclosed in egg sacs, are attached externally to the abdomen of the female. While attached to the female, embryos go through a 14 day development (at 27° C) followed by hatching into a free swimming zoea stage. The following data were collected over the 60 day exposure period: (1) mortality after 60 days; (2) per cent of females which formed mature ovaries; (3) per cent of females which produced embryos; (4) per cent of embryos which hatched into zoea; (5) amount of DNA strand damage (DNA tail moment) in late stage embryos. Previous work showed that females exposed to high concentrations of certain contaminants did not produce embryos or if embryos were produced there was poor development (low hatching rates) and/or DNA strand damage.

In addition to sediment toxicity tests, a series of tests (embryo hatching and DNA strand damage) were conducted on embryos taken from females collected from the LCP site, Crescent River (Sapelo Sound area), Troop Creek (Brunswick area) and Skidaway River (reference site).

MATERIALS AND METHODS

Sediment exposure

To each aquarium with test sediment (1000g) were added 20 juvenile grass shrimp along with 20 liters of estuarine water and the aquarium was maintained at 27°C (salinity 28 ppt). Sediments from each station was tested in triplicate (n=3). Juvenile grass shrimp for the tests were collected from the Skidaway River. We have collected grass shrimp for many years from this river and found them to show normal reproduction and both the sediments and grass shrimp from this river were found to have very low concentrations of standard contaminants (various metals, organochlorines and polycyclic aromatic hydrocarbons). Grass shrimp in the aquaria were fed *Artemia* daily and kept under a 12 hour light/12 hour dark regime. Every 5 days the following parameters were determined: (a) number of dead grass shrimp; (b) number of females with mature ovaries; (c) number of females with attached embryos. For the hatching tests, stage 8 embryos were removed by a cut at the stem attaching them to females. One female containing embryos was tested for hatching in each aquarium Forty eight embryos from a single female were transferred to two 24 well polystyrene plates with each well containing 1 embryo and 1.2 ml of estuarine water. Culture plates were kept in the dark at 27°C and per cent of embryos hatching from each female was determined. Hatching generally was completed within 48 hours after transfer to the culture plates. Stage 7 embryos from each aquarium were used to assess DNA strand damage (comet assay).

Hatching Tests and DNA Strand on Embryos from Grass Shrimp Collected at

Field Sites

Grass shrimp with embryos were collected with dip nets in October 2004 from a number of sites, including two sites at the LCP canal, Crescent River (sapelo Sound), Troup Creek (Brunswick area) and Skidaway River (reference site). Hatching rates and DNA strand damage (Comet assay) were determined with embryos taken from 3 different females at each collection site.

Single-Cell Electrophoresis (SCG) Assays for DNA Strand Damage – Comet Assay

All chemicals were purchased from Sigma or Fisher Scientific. The procedures for the comet assay described by Singh et al. (1988) and Steinert et al. (1998) were used along with a few modifications for grass shrimp embryos (Lee et al., 2000). Prior to the assay, agarose-coasted microscope slides were made by inserting slides into a Coplin jar containing 1% normal melting-point agarose diluted in TAE solution (0.04 M Tris-acetate and 1 mM EDTA), wiping the rear side of slide with tissue and then drying in air. Ten to 20 embryos from a single female were used and pooled for each assay. Embryos were ground with a glass homogenizer and left to stand for 5 min to allow heavy materials, e.g embryonic coats, in the extract to settle. The supernantant was transferred to a microcentrifuge tube and centrifuged for 5 min (1000 x g). The supernant was discarded, the precipitate was suspended using 50 µl of 0.65% low melting-point agarose diluted in Kenny's salt solution (0.4 M NaCl, 9 mM KCl, 0.7 mM K_2HPO_4, 2mM $NaHCO_3$) then added onto the prepared agarose-coated slide, covered with a cover slip, and spread. After gel solidification (3 min at 4°C for 2 hours), slides were soaked three times for 2 min each in cold distilled water in a chilled Coplin jar to remove salt. For DNA strand unwinding, sldies were transferred into chambers filled with electrophoresis and unwinding buffer (0.1N NaOH and 1 mM EDTA, > pH 13). After standing for 15 min, electrophoresis was carried out for 20 min at 25 V and 300 mA. Slides were soaked three times for 2 min each in 0.4 M TRIS (pH 7.5) in a chille3d Coplin jar to neutralize the gels, followed by transfer to ethanol in a Coplin jar for 5 min. The slides were then placed on a paper towel. Preparations were stained with 15 µl of the DNA stain, ethidium bromide (20 µg/ml).

The amount of DNA strand damage was determined in cells using a Nikon Eclipse E400 inverted fluorescent microscope (x200 magnification). Fifty randomly selected cells per slide were used for calculation of DNA tail moments (amount of DNA in tail times tail length). The cell images were projected onto a high-sensitiviy CCD camera. The computerized image-analysis system (Komet Version 4.01, Kinetic Imaging Ltd.) was used to determimne DNA tail moments.

Quality assurance

At the beginning of each test, positive control experiments were carried out with late stage embryos using 1 µM, 2µM, 5µM and 10 µM 2,4-nitroquinoline-4-oxide m(NQO). This is a known DNA damaging agent and has been shown to effect hatching of grass shrimp embryos (Lee and Steinert, 2003;Lee et al., 2000). The percent of embryos hatching at each concentration of NQO was used to prepared a dose-response curve. Dose-response curve were within one standard deviation of previously prepared dose-response curves. In addition, we included a reference sediment from the Skidaway

River. Earlier work showed that this reference sediment did not affect reproduction, embryo production and embryo hatching rates compared with control shrimp not exposed to sediment.

RESULTS

Juvenile grass shrimp exposed to test and reference sediments were followed as they grew into adults and as reproduction took place. Grass shrimp exposed to the reference sediments (Skidaway River sediments) showed good ovary formation, good production of embryos, high hatching rates and very low DNA damage. Grass shrimp exposed with low level of genotoxicants generally have DNA tail moments ranging from 1.2 to 3.0. None of the grass shrimp exposed to the different test sediments showed significant DNA damage relative to grass shrimp exposed to reference sediment. It should be noted that DNA tail moments of 10 to 20 were noted in embryos collected from the LCP canal before and immediately after remediation of this site. There was high mortality of shrimp exposed to C101 and C7 sediments and embryo production was low in females exposed to sediments from stations C105, C33, C7 and C101 (Table 2). Embryo hatching rates were reduced in females exposed to C7, C 33 and MG-K7 sediments (Table 2). Reproduction and embryo production in grass shrimp exposed to sediments from the other stations were in the normal range.

Female grass shrimp with embryos collected from several stations showed normal hatching rates and no significant DNA damage with the exception of embryos from the females in the canal at LCP site which had a mean DNA tail moments of 3.7 and mean hatching rate of 60 (Table 3).

REFERENCES

Lee, R.F. and S. Steinert. 2003, Use of the single cell gel electrophoresis/comet assay for detecting DNA damage in aquatic (marine and freshwater) animals. Mutation Research.

Lee,R.F., G.B. Kim, K.A. Maruya, S. A. Steinert and Y. Oshima. 2000. DNA strand breaks (comet assay) and embryo development effects in grass shrimp (*Palaemonetes pugio*) embryos after exposure to genotoxicants. Mar. Environ. Res. 50: 553-557.

Singh, N.P., M.T. McCoy, R.R. Tice and E.L. Schneider. 1988. A simple technique for the quantitation of low levels of DNA damage in individual cells. Experimental Cell Research 175:184-191.

Steinert, S.A., R. Streib-Montee, J.M. Leather and D.B. Chadwick. 1999. DNA damage in mussels at sites in San Diego Bay. Mutation Res. 399: 65-85.

Table 1 - Data for Mortality, Reproduction, Embryo Production, Embryo Hatching and DNA Damage of Grass Shrimp Exposed to Test Sediments

Study began on October 29,2004 and ended on January 10.2005

Sample ID	Mortality (% mortality over 60 days)	Reproduction (% of females forming mature ovaries)	Embryo Production (% of females producing embryos)
C15	45,30,30	58,43,75	42,36,53
C5	25,35,40	58,57,46	42,21,23
C7	85,65,70	58,60,56	8,0,0
C6	75,55,50	80,78,58	40,33,25
C102	65,55,85	55,56,58	36,22,25
C105	25,35,50	55,63,46	9,25,0
C45	65,55,40	31,63,67	15,27,44
C104	75,50,85	50,64,69	40,54,53
C33	80.55,40	75,80,78	17,10,0
C103	85,60,70	85,78,67	31,33,22
C101	90,80,90	82,78,67	18,11,0
C100	20,25,35	83,78,73	25,33,18
CR-C	10,15,15	85,78,77	38,44,31
A-C	50,40,55	64,67,54	27,33,31
TC-C	15,20,20	85,64,67	38,36,44
M-AB	10,25,15	83,73,78	33,36,33
D-C	35,55,30	73,67,85	18,22,23
MG-K7	35,25,40	79,67,64	14,11,27
MG-H7	15,30,20	82,78,67	45,44,,25
Reference sediment	10,20,10	64,72,78	29,45,33

Table 1, cont.

Study began on October 29,2004 and ended on January 10,2005

Sample ID	Embryo Hatching Test (% hatching into zoea stage)	DNA Strand Damage Test - Comet Assay (DNA tail moment)
C15	85,90,90	2.2,2.4,1.8
C5	90,80,80	2.4,2.2., 2.0
C7	45.35,55*	3.0, 2.4, 5.0*
C6	75,90,80	2.4, 2.7, 2.2
C102	85, 80,95	1.9, 2.3, 2.7
C105	65.50. 80	2.7, 3.4, 2.2
C45	95,85,95	2.1, 1.7, 2.3
C104	95, 80, 80	1.9, 2.2, 2.7
C33	55, 70, 75	2.5, 3.1, 2.2
C103	95, 80, 85	1.6, 2.4, 2.7
C101	50, 75, 65	2.7, 3.4, 3.0
C100	90, 80, 80	2.7, 2.1, 2.2
CR-C	95, 90, 95	2.4, 1.5, 2.0
A-C	95, 95, 85	1.8, 1.7, 2.3
TC-C	75, 60, 85	2.2, 3.1, 2.2
M-AB	85, 80, 90	1.5, 2.4, 1.9
D-C	80, 65, 70	3.7, 2.4, 2.1
MG-K7	65, 75,70	2.4, 1.7, 2.9
MG-H7	85, 90, 70	1.8, 2.4, 2.5
Reference sediment	90, 80, 90	1.7, 2.3, 2.4

Table 2 - Means and Standard Deviations of Mortaity, Reproduction, Embryo Production, Embryo Hatching and DNA Damage of Grass Shrimp Exposed to Test Sediments from Coastal Georgia

Sample ID	Mortality (% mortality of grass shrimp during 60 days in test sediments)		Reproduction Test (% of females which produced mature ovaries)		Embryo Development (% of females which produced embryos)	
	Mean	S.D. (n=3)	Mean	S.D.(n=3)	Mean	S.D. (n=3)
C15	35	9	59	16	44	9
C5	33	6	~~63~~ 54	10	~~26~~ 29	11
C7	73	10	58	2	~~2~~ 3	5
C6	60	13	72	12	33	8
C102	68	15	56	2	28	7
C105	37	13	55	9	11	13
C45	53	13	54	20	29	15
C104	70	18	61	10	49	8
C33	58	20	78	3	9	9
C103	72	13	77	10	29	1
C101	87	6	76	8	10	9
C100	27	8	~~70~~ 78	3	25	8
CR-C	13	3	80	4	38	7
A-C	48	8	62	7	26	8
TC-C	18	3	72	11	39	4
M-AB	17	8	78	5	34	2
D-C	40	13	75	9	21	3
MG-K7	~~30~~ 33	5	70	8	17	9
MG-H7	22	8	76	8	38	11
Reference sediment	13	6	71	6	36	8

SDR corrections

Table 2 - Means and Standard Deviations of Mortaity, Reproduction, Embryo Production, Embryo Hatching and DNA Damage of Grass Shrimp Exposed to Test Sediments from Coastal Georgia, cont. October, 2005

Sample ID	Embryo Hatching Test (% hatching into zoea stage)		DNA Strand Damage Test - Comet Assay (DNA tail moment)	
	Mean	S.D. (n=3)	Mean	S.D. (n=3)
C15	88	3	2.1	0.3
C5	~~88~~ 83	6	2.2	0.2
C7	45	10	3.5	1.4
C6	82	8	2.4	0.3
C102	87	8	2.3	0.4
C105	65	15	~~2.1~~ 2.8	0.6
C45	92	6	2	0.3
C104	85	9	2.3	0.4
C33	67	10	2.6	0.5
C103	87	8	2.2	0.6
C101	63	18	3	0.5
C100	~~85~~ 83	6	2.3	0.3
CR-C	93	3	2	0.5
A-C	92	6	1.9	0.3
TC-C	73	13	2.5	0.5
M-AB	85	5	1.9	0.5
D-C	72	8	2.7	0.9
MG-K7	70	5	2.3	0.6
MG-H7	82	10	2.2	0.4
Reference sediment	87	6	2.1	0.4

CDR corrections

Table 3 - Hatching Tests and DNA Strand Damage Tests (Comet Assay) on Embryos from Grass Shrimp Collected at Various Sites in Coastal Georgia
October, 2004

Collection Site	Hatching Test (% hatching into zoea stage)			DNA Strand Damage Test (Comet Assay) (DNA tail moment)		
	Data	Mean	S.D. (n=3)	Data	Mean	S.D. (n=3)
Canal at LCP site (rock rubble station)	65, 45,70	60	13	4.5,3.4,3.1	3.7	0,7
LCP canal at a point where the canal empties into Purvis Creek (entrance to Purvis Creek station)	80,90,75	82	8	3.2,2.0,2.1	2.4	0.7
Crescent River (Sapelo Sound area)	90,75,95	87	10	3.2,3.1,2.2	2.8	0.6
Troop Creek (Brunswick area)	65,90,80	78	13	1.9,3.0,2.2	2.4	0.6
Skidaway River (reference site)	95,80,85	87	8	2.1,2.3,2.7	2.4	0.3

Skidaway Institute of Oceanography (Dr. Dick Lee)

1 of 2

The SeaCrest Group
An Environmental Services Company
134~~1 Cannon Street • Louisville, Colorado~~ 80027
~~303-661-9324 • FAX 303-661-9325~~

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number

Project Number (lab use only)

Client: Curt Rose
Contact:
Address:
Program/Site: LCP Brunswick
Phone: 954-797-1165

Collected by:

					Acute			Chronic					These fields may be used for field test results					
	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	~~Cerio~~	~~FH Minnow~~	~~Accelerated~~	~~Cerio~~	~~FH Minnow~~	~~Accelerated~~	~~TRE~~	~~Other~~					Total Units	Total Volume
1	04293-C5	10/19/04	—	Composite	Grass shrimp toxicity test (5 measurement endpoints)												1	
2	04293-C6	10/19/04	—														1	
3	04293-C7	10/19/04	—														1	
4	04294-C15	10/20/04	—														1	
5	04294-MG-H7(C)	10/20/04	—														1	
6	04294-MG-K7(C)	10/20/04	—														1	
7	04295-TC	10/21/04	—														1	
8	04295-CR	10/21/04	—														1	
9	04295-MAB	10/21/04	—														1	
10	04295-C33	10/21/04	—	↓				↓									1	

Comments and special testing instructions:

① Five digit date not indicated on containers. However, report date plus other sample identification in report

Relinquished by: Curt Rose
Representing: CDR Environmental
To Whom: Dick Lee
Date/Time: 10/26/04, 9:00 AM

Relinquished by:
Representing:
To Whom:
Date/Time:

Next recipient:
Relinquished by:
Rec'd by:
Date/Time:

WHITE COPY: Accompanies samples
CANARY COPY: Client

Skidaway Institute of Oceanography (Dr Dick Lee)

2 of 2

~~The SeaCrest Group~~
An Environmental Services Company
1341 ~~Cannon Street • Louisville, Colorado~~ 80027
~~303-661-9324 • FAX 303-661-9325~~

Chain of Custody Record

(enclose with each shipping container)

Purchase Order Number

Project Number (lab use only)

Client: Curt Ron
Program/Site: LCP Brunswick
Contact:
Phone: 954-927-1165
Address:

Collected by:

	Sample Identification (Effluent, Receiving, Sediment, list other)	Date Sampled	Time	Sample Type (composite, grab)	Acute: ~~Cerio~~	Acute: FH Minnow	Acute: Accelerated	Chronic: Cerio	Chronic: FH Minnow	Chronic: Accelerated	~~TRE~~	~~Other~~	These fields may be used for field test results				Total Units	Total Volume
1	04295-C45	10/21/04	/			Grass shrimp toxicity test (5 measurement endpoints)											1	
2	04295-A-C	10/21/04	/														1	
3	04296 D-C	10/22/04	/														1	
4	04299-C100	10/25/04	/														1	
5	04299-C101	10/25/04	/														1	
6	04299-C102	10/25/04	/														1	
7	04299-C103	10/25/04	/														1	
8	04299-C104	10/25/04	/														1	
9	04299-C105	10/25/04	/	↓				↓									1	
10																		

Comments and special testing instructions:

Relinquished by: Curt Ron
Representing: CDR Environmental
To Whom: Dick Lee
Date/Time: 10/26/04 : 9:00 AM

Relinquished by:
Representing:
To Whom:
Date/Time:

Next recipient:
Relinquished by:
Rec'd by:
Date/Time:

WHITE COPY: Accompanies samples CANARY COPY: Client

Site: LCP CHEMICALS
Break: 4.2
Other: V.31

ECOLOGICAL MONITORING INVESTIGATION FOR THE ESTUARY AT THE LCP CHEMICAL SITE IN BRUNSWICK, GEORGIA

-- 2006 Monitoring Investigation -- Appendices (Laboratory Reports)

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April 2007

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B. TOXICITY IDENTIFICATION EVALUATION (AQUA SURVEY)

C. APPARENT EFFECTS THRESHOLDS (SEACREST GROUP)

CDR Appendix

A. CHRONIC AMPHIPOD TOXICITY TESTS
(SEACREST GROUP and AQUA SURVEY)

A.1 SEACREST GROUP

RESULTS OF SEDIMENT TESTS CONDUCTED FOR CDR ENVIRONMENTAL SPECIALISTS USING SAMPLES FROM BRUNSWICK, GEORGIA

Prepared for:

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January 19, 2007

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INTRODUCTION

Procedures have been established by the United States Environmental Protection Agency (USEPA)[1,2] as a means to monitor the potential effects of contamination on aquatic systems. These test procedures can provide a measure of the impact on mortality, reproduction and growth in acute and chronic exposures. The present report details the results of chronic tests on one species of aquatic invertebrate, *Leptoceirus plumulosus (L. plumulosus),* from sediments collected from Brunswick, Georgia.

MATERIALS AND METHODS

Sample Collection

Grab samples of sediment were collected at twenty-four sites during October 2006. These samples were placed in clean, plastic containers. Federal Express shipped the samples in three separate coolers on October 17 and 19, 2006 for overnight delivery to the SeaCrest lab. They arrived at approximately 1000 on October 18 and 20, 2006. After delivery, the sediment samples were refrigerated at 4°C, in the dark, in sealed containers with minimal headspace. The Chain of Custody forms documenting sample collection and transfer times are included in Appendix 1.

Sediment grain size

L. plumulosus are found in very fine mud and muddy sands and are tolerant of variable grain size. Although sediment grain sizes were not established prior to testing, observations of the sampled sediments suggest a mix of silts and clays with no one sediment characterized as a purely sandy sample.

Sieving and Homogenization

The sediment did not require sieving but were thoroughly stirred and all large particles (i.e. branches, stones) were removed manually. Each of the sediments was visually inspected for indigenous organisms, but none were observed prior to test initiation. All sample sediments were treated in the same manner in regards to processing and addition to the test containers

Pore water quality

Total ammonia, salinity, temperature and pH of pore water from surrogate containers were taken on days zero and 28. Isolation of interstitial water was accomplished by the centrifugation of 50 ml of each homogenized sample collected. Samples were centrifuged for 30-45 minutes at 4,000 rpm. Results indicate pore water ammonia levels below 2.0 mg/l in all collected sediments. The pore water chemistry results are located in Appendix 2.

Overlying Water

Pore water quality determinations for salinity averaged 20 parts per 1,000 for the collected sediments. From this result, deionized water was mixed with the marine mix, Crystal Sea, at a rate of 20 parts per 1,000, in order to create the salt water environment used as the overlying water during the sediment tests.

Test Organisms

The tests were conducted with benthic estuarine amphipod *Leptocheirus plumulosus* purchased from Chesapeake Cultures. The amphipods used in the sediment tests were size selected using a 600 and 250 micron mesh screen method as prescribed by the test procedures. The *Leptocheirus plumulosus* organisms were tested in reference toxicant tests using copper sulfate to insure their health and test acceptability. Along with the reftox, one set of twenty animals were randomly selected as a pre-weight criterion to compare growth endpoints for the 28 day tests.

Test Procedures

The tests followed the procedures outlined in USEPA[1] guidelines EPA600/R-01/020. The *Leptocheirus plumulosus* tests were started on October 22, 2006 (Day -1) with the addition of water over the sediments. Pore water total ammonia was also measured on Day -1 and is included in Appendix 2. Twenty animals were added to each test container on October 23, 2006 (Day 0). The test ran for 28-days, ending on November 20, 2006.

Test containers were 1 L glass jars with a 10 cm inner diameter to which 175 ml of the homogenized sediments were added. To this was added 750 ml of reconstituted salt water. The sediments were tested at the 100% concentration. Five replicates were used for each sediment sample. Two sets of negative controls were run during the testing period.

400 ml of water was replaced in each test container during the change-outs. Change-outs were done three times per week. The test containers were monitored for temperature, dissolved oxygen, pH and salinity before and after the water change-outs. Water used for the change-outs were held in the incubator at test temperature. The containers for the reconstituted salt water were refilled immediately after each change-out so that the water would be at test temperature by the next change-out. The data sheets documenting the water batch preparations are located in Appendix 3.

Test animals were fed three times a week after each water change-out. All *Leptocheirus plumulosus* test chambers received 1.0 ml of Tetramin solution. Days 0-13 received a 20 mg Tetramin solution and days 14-28 received a 40 mg Tetramin solution. Observations of mortality, feeding regimes and/or effects were made at water change-outs and are located in Appendix 4.

The water over each sediment sample was measured for pH, salinity, alkalinity, conductivity, dissolved oxygen and ammonia at the beginning and at the end of the tests. The data sheets containing the daily readings of temperature and dissolved oxygen, and the water quality readings taken at the beginning and end of the tests are located in Appendix 5. The tests were held at temperature of 25 ± 2°C in an incubator with programmed day cycle of 16-hours light and 8-hours dark under a wide spectrum florescent light bank at 700 lux illumination. The daily temperature readings for the incubator are located in Appendix 3. The temperature readings for the incubator were higher than those recorded in the test themselves, as seen on the test data sheets; however, the incubator readings show consistency and adjustments to the temperatures in the incubators were made, as needed.

Dissolved oxygen levels were maintained above 4.0 mg/L, as per the sediment toxicity test guidelines. Any deviations in dissolved oxygen levels were corrected as discovered. All sediments in both tests were aerated from the beginning of the tests due to low initial dissolved oxygen levels.

At the end of the *Leptocheirus plumulosus* test, water was pulled from each replicate of each sediment test and composited by test sediment for final water quality readings. Each sediment replicate was sieved into a clean plastic pan and searched thoroughly for live animals. Diligent effort was made to account for every test organism, either by retrieving them live or finding a body. The *Leptocheirus plumulosus* were sexed and present juveniles were counted. Live organisms were euthanized and placed in a drying oven at 70°C for a 24-hour period of drying. The *Leptocheirus plumulosus* were then weighed on a four-place analytical balance to determine average dry weights. The summary tables containing the dry weight determinations, the number of surviving *Leptocheirus plumulosus* per replicate for each sample, sexed adults and produced juveniles are located in Appendix 7.

RESULTS

Leptocheirus plumulosus Test

The amphipod test was run with all twenty-four collected sediments. A negative control, using purchased control sediment from Chesapeake Cultures, was run along with the twenty-four sediments. Pre-weight animals were collected on Day 0 and are included within Table 1 test results. All tabular data is located in Appendix 7.

TABLE 1. TEST SURVIVAL AND WEIGHT RESULTS FOR THE *LEPTOCHEIRUS PLUMULOSUS* SEDIMENT EXPOSURES.

Sample	Survival Range (%)	Average Survival (%)	Weight Range (mg)	Average Weight per animal (mg)
C-103	45-95	80	0.38-0.72	0.58
C-104	70-95	80	0.25-0.43	0.36
C-105	70-90	82	0.34-0.59	0.49
FS-AREA-1	30-50	42	0.28-0.39	0.32
FS-AREA-4	70-95	85	0.25-0.84	0.65
FS-AREA-5	80-95	88	0.38-0.52	0.43
FS-AREA-6	60-90	78	0.24-0.42	0.35
C-45	50-80	60	0.24-0.37	0.34
C-36	70-95	84	0.37-0.48	0.43
C-15	70-95	79	0.39-0.71	0.62
C-29	80-90	84	0.21-0.55	0.38
C-33	45-90	70	0.52-0.88	0.76
C-16	70-100	87	0.29-0.51	0.38
FS-AREA-3	75-95	87	0.26-0.57	0.43
C-5	65-100	87	0.59-0.85	0.71
FS-AREA-2	0-5	1	0-0.50	0.10
M-AB	45-100	81	0.21-0.45	0.32
D-C	60-100	87	0.47-0.55	0.53
C-7	80-100	91	0.49-0.61	0.56
C-6	40-90	67	0.41-0.67	0.59
CR-C	65-95	88	0.18-0.48	0.32
TC-C	40-85	72	0.27-0.51	0.40
MG-K7	60-75	71	0.39-0.89	0.74
MG-H7	50-80	66	0.35-0.53	0.46
Control 1	90-100	95	0.60-0.97	0.74
Pre-weight	NA	NA	NA	0.14

The amphipod *Leptocheirus plumulosus* was also tested to measure the fertility and sex ratio responses. Sexed adults and juvenile production for the tests are located in Appendix 7. Table 2 summarizes these test results.

TABLE 2. TEST SPECIES SEXING AND JUVENILE PRODUCTION RESULTS FOR THE *LEPTOCHEIRUS PLUMULOSUS* SEDIMENT EXPOSURES.

Sample	Males (ave.)	Females (ave.)	Juvenile (ave.)
C-103	3	13	2
C-104	5	11	7
C-105	5	11	8
FS-AREA-1	3	5	1
FS-AREA-4	7	10	<1
FS-AREA-5	4	15	12
FS-AREA-6	4	12	1
C-45	5	7	0
C-36	6	11	12
C-15	6	10	15
C-29	6	11	3
C-33	5	9	19
C-16	8	10	13
FS-AREA-3	7	10	15
C-5	9	9	10
FS-AREA-2	0	<1	0
M-AB	4	12	4
D-C	6	11	8
C-7	5	13	10
C-6	4	9	3
CR-C	5	13	9
TC-C	4	10	1
MG-K7	4	10	2
MG-H7	2	10	3
Control 1	7	12	14

REFERENCE TOXICANT TEST RESULTS

Leptocheirus plumulosus

The test organism history sheets from the supplier, Chesapeake Cultures, and reftox are located in Appendix 6. The amphipod animal batches used in the sediment tests were tested against the reference toxicant copper sulfate to determine their health and test acceptability. The *Leptocheirus plumulosus* test was conducted from October 21, 2006 to October 25, 2006. The test consisted of 2 replicates per concentration, 10 organisms per replicate. The test jars contained salt water and a small amount of sand placed over the bottom. The test was a static, non-renewal; meaning the water was not changed out daily. The animals were fed 1.0 ml of Tetramin on days 0 and 2. The test concentrations ran was 0, 30.5, 61, 122, 244 and 488 ppb copper sulfate.

The LC50 created was 165.98 ppb copper sulfate using the Probit Statistical Method. This method produced acceptable control results and followed methods according to the guidelines.

REFERENCES

1. **USEPA.** March 2001. *Method for Assessing the Chronic Toxicity of Marine and Estuarine Sediment-associated Contaminants with the Amphipod Leptocheirus plumulosus.* First Edition. EPA600/R-01/020.

2. **USEPA.** 1994. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.* EPA600/R-94/024.

APPENDIX 1 – CHAIN OF CUSTODY FORM

bia
Analytical
Services INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

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PAGE 1 OF 2

SR #

CAS Contact

Project Name: LCP CHEMICALS
Project Number:
Project Manager: K. KESSLER
Email Address:
Company/Address:
900 ASHWOOD PARKWAY, SUITE 350
ATLANTA, GA 30338
EPS
Phone #: 404-315-9113
FAX#: 404-315-8509
Sampler's Signature:
Sampler's Printed Name:

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

REMARKS/ ALTERNATE DESCRIPTION

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	28-Day Leptocheirus Plumulosus test	REMARKS/ ALTERNATE DESCRIPTION
06289-C-103	306727 #1	10/16/06	1055	SD	1		
06289-C-104	306727 #2	10/16/06	1130	SD			
06289-C-105	306727 #3	10/16/06	1255	SD			
06289-FS-AREA-1	306727 #4	10/16/06	1447	SD			
06289-FS-AREA-4	306727 #5	10/16/06	1429	SD			
06289-FS-AREA-5	306727 #6	10/16/06	1221	SD			
06289-FS-AREA-6	306727 #7	10/16/06	1400	SD			
06290-C-45	306727 #8	10/17/06	1055	SD			
06290-C-36	306727 #9	10/17/06	955	SD			
06290-C-15	306727 #10	10/17/06	1040	SD			

SPECIAL INSTRUCTIONS/COMMENTS

Test all 24 samples at same time (. You will receive all 24 samples by Friday, Oct. 20. Run positive + negative Controls.

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ STANDARD
REQUESTED FAX DATE ______
REQUESTED REPORT DATE ______

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Speicalized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO#
BILL TO:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ________ CUSTODY SEALS: Y N

	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Sofie L. Weber-Snapp					
Printed Name	SOFIE WEBER-SNAPP					Dustin J. Facteau
Firm	EPS					the SeaCrest Group
Date/Time	10/17/06 1300					10/18/06 - 1053

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

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An Employee - Owned Company
www.caslab.com

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PAGE 2 OF 2

SR #

CAS Contact

Project Name: LCP CHEMICALS
Project Number:
Project Manager: K. KESSLER
Email Address:
Company/Address: EPS
900 ASHWOOD PARKWAY, SUITE 350
ATLANTA, GA 30338
Phone #: 404-315-9113
FAX#: 404-315-8509
Sampler's Signature:
Sampler's Printed Name:

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE

28-Day Leptocir. plumulosus test

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	REMARKS/ ALTERNATE DESCRIPTION
06290-C-29	306727 #11	10/17/06	1005	SD	1	
06290-C-33	306727 #12	10/17/06	910	SD	↓	
06290-C-16	306727 #13	10/17/06	1105	SD		
06290-FS-Area-3	306727 #14	10/17/06	839	SD		
06290-C-5	306727 #15	10/17/06	1020	SD		
06290-FS-Area-2	306727 #16	10/17/06	812	SD		

SPECIAL INSTRUCTIONS/COMMENTS

Test all 24 samples at same time (You will receive all 24 samples by Friday Oct. 20. Run positive + negative controls).

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ STANDARD
REQUESTED FAX DATE ______
REQUESTED REPORT DATE ______

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
_____ V. Speicalized Forms / Custom Report
Edata _____ Yes _____ No

INVOICE INFORMATION
PO#
BILL TO:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ______ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Sofie Weber-Snapp	Signature	Signature	Signature	Signature	Signature
Printed Name: SOFIE WEBER-SNAPP	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name: Dustin J. Facteau
Firm: EPS	Firm	Firm	Firm	Firm	Firm: The SeaCrest Group
Date/Time: 10/17/06 1300	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time: 10/18/06 1053

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

The SeaCrest Group
Louisville, CO

Sample Receipt Form

Form #: 42
Effective: November 2003

Project #: 306727
Date: 10/18/06

Sample #: 1-16
Initials: D

Samples Were:

1. Shipped Hand Delivered [✓ Messengered] (circle one)
   Notes:

2. Airbill Present Y [✓ N] NA
   Notes:

3. Chilled to Ship Ambient [✓ Chilled] (circle one)
   Notes:
   [✓ Ice] Blue Ice (circle one)

4. Cooler Received Broken or Leaking Y [✓ N] NA
   Notes:

5. Sample Received Broken or Leaking [✓ Y] N NA
   Notes:

6. Received Within Holding Times [✓ Y] N
   Notes:

7. Aeration necessary Y N NA
   Notes:

8. Sample Received at Temperature between 0-6° C . Y N NA
   Notes: 2.5 from temp Blank from cooler B1
   2.7 from temp Blank from cooler 307

9. Description of Sample (Color, Odor, and/or Presence of Particulate Matter):
   eff:

   rec'g

	Cond	DO	Temp	pH	Cl
Eff			2.5		
Rec'g			2.7		

Aeration

Time	DO	pH

COC Tape Was:

1. Present on Outer Package [✓ Y] N
2. Unbroken on Outer Package [✓ Y] N NA
3. Present on Sample Y [✓ N]
4. Unbroken on Sample Y N [✓ NA]

COC Record Was:

1. Present Upon Receipt of Sample [✓ Y] N

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PAGE 1 OF 1

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Project Number:
Project Manager: K. KESSLER
Email Address:
Company/Address: EPS
900 ASHWOOD PARKWAY, SUITE 350
ATLANTA, GA 30338
Phone #: 404-315-9113
FAX#: 404-315-8509
Sampler's Signature:
Sampler's Printed Name:

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	28-Day leptocheirus plumulosus test	REMARKS/ ALTERNATE DESCRIPTION
06290-M-AB	306727 #17	10/17/06	1405	SD	1	1	
06291-D-C	306727 #18	10/18/06	1041	SD	1	1	
06291-C-7	306727 #19	10/18/06	1000	SD	1	1	
06291-C-6	306 727 #20	10/18/06	0940	SD	1	1	
06291-CR-C	306 727 #21	10/18/06	1425	SD	1	1	
06291-TC-C	306 727 #22	10/18/06	1710	SD	1	1	
06291-MG-K7(M)	306 727 #23	10/18/06	1705	SD	1	1	
06291-MG-H7(M)	306 727 #24	10/18/06	1659	SD	1	1	

SPECIAL INSTRUCTIONS/COMMENTS

Test all 24 samples at same time (You will receive all 24 samples by Friday. Run positive + negative controls).

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ STANDARD
REQUESTED FAX DATE ______
REQUESTED REPORT DATE ______

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
_____ V. Speicalized Forms / Custom Report
Edata _____ Yes _____ No

INVOICE INFORMATION
PO#
BILL TO:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ______ CUSTODY SEALS: Y N

	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Sofie Weber-Snapp					
Printed Name	SOFIE WEBER-SNAPP					CRAIG W[illegible]
Firm	EPS					The SeaCrest Group
Date/Time	10/19/06 1600					102006 1015

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

The SeaCrest Group
Louisville, CO

Sample Receipt Form

Form #: 42
Effective: November 2003

Project #: 306727
Sample #: 17-24
Date: 102006
Initials: CW

Samples Were:

1. Shipped Hand Delivered [✓ Messengered] (circle one)
   Notes:

2. Airbill Present [✓ Y] N NA
   Notes:

3. Chilled to Ship Ambient [✓ Chilled] (circle one)
   Notes:
   [✓ Ice] Blue Ice (circle one)

4. Cooler Received Broken or Leaking Y [✓ N] NA
   Notes:

5. Sample Received Broken or Leaking Y [✓ N] NA
   Notes:

6. Received Within Holding Times [✓ Y] N
   Notes:

7. Aeration necessary Y N [✓ NA]
   Notes:

8. Sample Received at Temperature between 0-6° C . [✓ Y] N NA
   Notes:

9. Description of Sample (Color, Odor, and/or Presence of Particulate Matter):
   eff:

   rec'g

	Cond	DO	Temp	pH	Cl
Eff			3.6		
Rec'g					

Aeration	Time	DO	pH

COC Tape Was:

1. Present on Outer Package [✓ Y] N
2. Unbroken on Outer Package [✓ Y] N NA
3. Present on Sample Y [✓ N]
4. Unbroken on Sample Y N [✓ NA]

COC Record Was:

1. Present Upon Receipt of Sample [✓ Y] N

APPENDIX 2 – PORE WATER CHEMSITRY RESULTS

Bulk Sediment Pore Water Total Ammonia

Project Name: CDR Environmental Specialists **Project Number: 306727**

Test Day: 102206 (day-minus 1) **Test Type: 28 day**

Bulk Sample (Client Sample ID)	Pore Water Total Ammonia (mg/L)
C-103	0.028
C-104	0.098
C-105	0.022
FS-AREA-1	2.08
FS-AREA-4	0.071
FS-AREA-5	1.69
FS-AREA-6	0.090
C-45	0.045
C-36	0.065
C-15	0.008
C-29	0.170
C-33	0.018
C-16	0.092
FS-AREA-3	0.066
C-5	0.048
FS-AREA-2	0.081
M-AB	0.021
D-C	0.059
C-7	0.073
C-6	0.090
CR-C	0.089
TC-C	0.011
MG-K7(M)	0.037
MG-H7(M)	0.041
Control #1	2.101

Recorder: SP

Sediment Pore Water Quality

Project Name: CDR Environmental Specialists **Project Number: 306727**

Test Day: 102306 (day-0) **Type: 28 day**

Bulk Sample (Client Sample ID)	Pore Water Total Ammonia (mg/L)	Salinity (ppt)	Temperature (Degrees C)	p.H (SI units)
C-103	0.018	21	24.1	7.7
C-104	0.090	21	24.1	7.7
C-105	0.021	20	24.3	7.3
FS-AREA-1	2.00	21	24.3	7.5
FS-AREA-4	0.061	20	24.6	7.4
FS-AREA-5	1.60	20	24.0	7.5
FS-AREA-6	0.090	20	24.2	7.6
C-45	0.045	21	24.3	7.7
C-36	0.055	21	24.6	7.8
C-15	0.008	20	24.2	7.5
C-29	0.162	20	24.0	7.9
C-33	0.018	21	24.0	7.6
C-16	0.090	20	24.1	8.0
FS-AREA-3	0.069	21	24.0	7.5
C-5	0.048	21	24.5	7.7
FS-AREA-2	0.081	20	24.3	7.7
M-AB	0.021	20	24.0	7.9
D-C	0.059	20	24.0	7.8
C-7	0.065	19	24.1	7.5
C-6	0.090	20	24.3	8.0
CR-C	0.081	21	24.0	7.9
TC-C	0.011	20	24.1	8.0
MG-K7(M)	0.035	20	24.1	8.0
MG-H7(M)	0.036	20	24.1	7.9
Control #1	2.042	20	23.6	7.3

Recorder: SP

Sediment Pore Water Quality

Project Name: CDR Environmental Specialists **Project Number: 306727**

Test Day: 112006 (day-28) **Type: 28 day**

Bulk Sample (Client Sample ID)	Pore Water Total Ammonia (mg/L)	Salinity (ppt)	Temperature (Degrees C)	p.H (SI units)
C-103	0.004	20	25.7	8.0
C-104	0.010	20	24.9	7.6
C-105	0.003	20	24.9	7.9
FS-AREA-1	0.089	21	24.1	7.8
FS-AREA-4	0.006	20	25.9	7.8
FS-AREA-5	0.024	20	24.2	8.0
FS-AREA-6	0.001	20	25.3	7.9
C-45	ND	21	24.3	7.7
C-36	0.002	21	24.1	7.8
C-15	ND	20	23.7	7.9
C-29	0.037	20	24.6	7.9
C-33	0.010	21	24.1	7.6
C-16	0.090	20	25.2	8.0
FS-AREA-3	0.009	21	25.6	7.9
C-5	0.002	20	25.9	7.7
FS-AREA-2	0.011	20	24.9	8.0
M-AB	ND	20	24.2	7.9
D-C	0.014	20	24.0	7.8
C-7	0.002	20	24.1	8.1
C-6	0.019	20	24.9	8.0
CR-C	0.004	21	23.5	8.0
TC-C	ND	20	25.8	8.0
MG-K7(M)	ND	20	25.5	8.0
MG-H7(M)	ND	20	24.1	7.9
Control #1	0.069	20	23.8	7.7

Recorder: SP

APPENDIX 3 – WATER BATCH PREPARATION AND DAILY TEMPERATURE READINGS FROM INCUBATORS

The SeaCrest Group
Louisville, Colorado

Saltwater Log

Page #: 1
Form #: 29A
Effective: Janaury 2006

Date	Initials	Batch #	Quantity DI	Salt Added	Date	Initials	Sailinity[1]	Notes
010306	D	06-001	25gal	2.6 scoop	D 10406	D	23/21	
021406	D	06-002	25gal	2.6 "	D 21506	D	23/20	
031706	D	06-003	50gal	~~2.6~~ 5.2 "	D	D	24/20	
050506	HG	06-004	50gal	5.25 scoops	050606	HG	18;20	Added 0.5 scoops then
"							23 ✓	checked again
"								Added another 0.5 scoops
062006		06-005	50gal	5.2 scoops	062006	D	23/21	
072606	D	06-006	50gal	5.2 scoops	072606	D	30/20	+ 5gal DI
091506	D	06-007	~~50~~ 25gal	1 package				
101906	D	06-008	40 gal	~~to~~ 20cups	102006 102006	AC AC	20 21	SEDS TESTING
101906	D	06-009	40gal	~~to~~ 20cups	102006 102206	AC D	27 20	"
~~10~~ 110106	D	06-010	40gal	20cups	110206	D	20/20	"
111006	D	06-011	40gal	20 cups	111106	HW	20/20	"
				13½ cups				

[1] Measured in parts per thousand (‰)

[redacted]

The SeaCrest Group
Louisville, CO

Incubator 1 Temperature Record

Page #: 11
Form #: 77a
Effective: January 2006

Incubator #: 1

Incubator Make: Dept. of Ag	Incubator Model: PC678
Acceptable Temperature Range: 24-26°C	Acceptable Light Range: 50-100 foot candles
NIST Correction:	Date of NIST Correction:
Date: Initials:	Light Meter Reading Top:
Light Meter Reading Middle:	Light Meter Reading Bottom:

Date	Temperature	Initials	Maintenance	Notes
101606	25.3	HW		
101706	25.2	AC		
101806	25.0	HW		
101906	25.0	AC		
102006	25.3	AC		
102106	25.3	AC		
102206	25.0	HW		
102306	24.9	HW		
102406	25.0	HW		
102506	25.3	AC		
102606	25.2	HW		
102706	25.3	NA		
102806	25.4	AC		
102906	25.5	HW		
103006	25.4	HW		
103106	25.1	NA		
110106	25.3	HW		
110206	25.2	HW		
110306	25.2	NA		
110406	25.3	AC		
110506	25.4	HW		
110606	25.4	HW		
110706	25.4	AC		
110806	25.5	HW		
110906	25.8	AC		
111006	25.7	HW		
111106	25.0	AC		
111206	25.3	HW		
111306	25.3	HW		
111406	25.5	HW		

[redacted]

[redacted]

The SeaCrest Group
Louisville, CO

Incubator 1 Temperature Record

Page #: 12
Form #: 77a
Effective: January 2006

Incubator #: 1	
Incubator Make: Dept. of Ag	Incubator Model: PC678
Acceptable Temperature Range: 24-26°C	Acceptable Light Range: 50-100 foot candles
NIST Correction:	Date of NIST Correction:
Date: Initials:	Light Meter Reading Top:
Light Meter Reading Middle:	Light Meter Reading Bottom:

Date	Temperature	Initials	Maintenance	Notes
111506	25.1	HW		
111606	25.1	HW		
111706	25.2	AC		
111806	25.5	NA		
111906	25.2	AC		
112006	25.0	AC		
112106	25.3	AC		
112206	25.5	AC		
112306	25.4	AC		
112406	25.4	NA		
112506	25.3	HW		
112606	25.2	HW		
112706	25.2	HW		
112806	24.9	HW		
112906	25.2	HW		
113006	25.1	AC		
120106	25.0	AC		
120206	25.0	AC		
120306	25.0	HW		
120406	25.2	HW		
120506	25.3	HW		
120606	25.0	NA		
120716	25.3	HW		
120806	25.0	NA		
120906	25.4	AC		
121006	25.3	HW		
121106	25.2	HW		
121206	25.4	HW		
121306	25.6	AC		
121406	25.3	HW		

[redacted]

The SeaCrest Group
Louisville, CO

Drying Oven Temperature Record

Page #:
Form #: 77h
Effective: January 2006

Drying Oven: 1
Make: American Scientific
Model:
Acceptable Temperature Range: 90-110°C * TURNED DOWN FOR SED TESTS
NIST Correction:
Date of NIST Correction:

Date	Temperature	Initials	Maintenance	Notes
112006	110	HW	TURNED DOWN ↓	
112106	73	HW		
112206	71	HW		
			LOOK BACK AT NEW	SHEET FOR NEXT TEMP

APPENDIX 4 – OBSERVATIONS OF *L. PLUMULOSUS*

Note: This appendix contains daily records of the observations made on amphipods exposed to 24 samples of sediment for 28 days. Because of the voluminous nature of the appendix, it is not included in this report. Please contact CDR Environmental Specialists for a copy of this appendix.

APPENDIX 5 – DATA SHEETS CONTAINING DAILY CHEMISTRY READINGS

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06289-C-103
Lab # 306727 #1
H₂0 20 o/oo
Sample Date 10/16
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon.	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	7.2	6.6	6.4	6.5	6.8	6.2	6.1	7.3	7.2	6.6	6.3	6.8	6.8
Temp °C	223	23.0	23.1	23.2	23.7	24.7	24.8	23.8	23.2	23.5	23.4	22.1	22.8
pH	7.8	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.7	8.0	8.0	7.9	8.0
salinity	21	21	20	21	20	20	20	21	21	21	20	20	21
alkalinity	87												
ammonia	0.0376												
conductivity	23200												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.9	6.1	6.0	6.4	6.7	6.7	6.4	6.5	6.2	6.8	7.0
Temp °C	247	24.8	22.8	22.9	23.9	23.9	23.5	23.8	23.5	24.7	25.1
pH	7.9	8.0	8.0	7.9	7.7	7.9	8.1	8.1	7.9	7.9	8.0
salinity	20	21	20	20	20	20	22	20	21	20	21
alkalinity											105
ammonia											0.0386
conductivity											21600

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client: CDR
Site: 06289-C-104
Lab #: 306727 #2
$H_2$0: 20 o/oo
Sample Date: 10/16
Species Info: L. Plumulosus
Start Date: 10/23/06
End Date: 11/20/06
Test Conditions:

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		E		D		C		A		B	
DO	4.0	6.1	6.0	6.6	6.9	5.1	5.5	7.3	7.1	6.1	6.0	6.6	6.6
Temp °C	222	22.8	22.8	23.4	24.4	25.0	25.6	22.9	23.2	23.6	23.9	24.6	22.1
pH	7.7	7.4	7.5	7.5	7.6	7.5	7.6	7.4	7.7	7.3	7.5	7.7	7.9
salinity	21	21	20	21	20	20	20	22	21	23	22	20	21
alkalinity	92												
ammonia	0.0678												
conductivity	28600												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		C
DO	6.0	6.1	5.9	6.5	6.7	6.8	6.5	6.6	6.2	6.7	6.8
Temp °C	24.1	24.6	22.6	23.0	24.9	25.2	23.9	23.9	23.8	24.7	23.0
pH	7.5	7.8	7.5	7.7	7.4	7.0	7.9	8.0	7.7	7.7	7.6
salinity	21	21	22	21	22	20	22	20	21	20	21
alkalinity											41
ammonia											0.0723
conductivity											27200

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06289-C-105
Lab # 306727 #3
$H_2$0 20 o/oo
Sample Date 10/16
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	5.8	6.3	6.0	6.6	6.9	5.2	5.6	7.4	7.1	6.2	5.8	6.2	6.2
Temp °C	22.2	22.9	23.1	23.2	24.6	25.6	25.6	23.2	23.2	23.6	23.4	22.8	22.8
pH	7.3	7.5	7.5	7.7	7.7	7.6	7.4	7.8	7.8	7.8	7.8	7.1	7.9
salinity	20	22	21	22	21	21	20	20	21	22	21	20	21
alkalinity	86												
ammonia	0.116												
conductivity	23100												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	6.4	5.9	6.0	6.4	6.8	6.8	6.7	6.7	6.9	6.9	6.5
Temp °C	24.7	24.9	22.7	23.2	25.2	25.4	23.9	23.9	23.9	24.8	21.5
pH	7.8	7.9	7.7	7.8	7.8	7.9	8.0	~~7.0~~ 8.0	7.7	7.7	8.0
salinity	21	21	21	20	20	20	20	20	20	20	21
alkalinity											99
ammonia											0.0314
conductivity											26700

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client	CDR	Site	06289-FS-Area-1	Lab #	306727 #4
H_2O	20 o/oo	Sample Date	10/16	Species Info	L. Plumulosus
Start Date	10/23/06	End Date	11/20/06		

Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep A	~~7.0~~	B		C		E		D		A		B	
DO	~~22.3~~ 2	7.0	6.5	7.1	7.4	4.9	5.3	5.8	6.0	5.7	5.9	6.9	7.0
Temp °C	22.3	22.9	23.0	24.0	23.3	25.3	25.7	23.1	22.9	24.0	23.8	24.4	23.7
pH	7.5	7.7	7.7	7.6	7.7	7.6	7.7	7.6	7.5	7.5	7.6	7.6	7.8
salinity	21	19	20	22	21	20	21	20	21	21	22	20	20
alkalinity	119												
ammonia	1.50												
conductivity	26900												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		~~D~~ C		E		A		B		A
DO	5.8	5.9	5.4	6.0	7.0	6.4	6.6	6.6	6.7	6.6	6.7
Temp °C	24.5	25.0	24.6	24.9	23.8	23.2	23.6	23.1	24.0	23.9	24.8
pH	7.7	7.8	7.7	7.8	7.7	7.8	7.9	8.0	7.8	7.7	7.8
salinity	21	21	21	20	24	21	24	24	23	21	25
alkalinity											65
ammonia											0.0151
conductivity											29000

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06289-FS-Area-4
Lab # 306727 #5
H_2O 20 o/oo
Sample Date 10/16
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep Q	~~S~~A	B		D		C		E		A		B	
DO	4.2	6.0	5.7	6.3	7.2	5.8	5.6	6.1	6.3	5.6	5.7	4.2	6.0
Temp °C	22.1	22.7	22.1	23.9	23.4	25.7	25.6	23.9	22.9	24.6	24.2	24.9	23.5
pH	7.4	7.1	7.6	7.0	7.7	7.4	7.7	7.9	7.7	7.8	7.8	7.6	7.7
salinity	20	21	20	22	21	22	22	21	21	23	22	21	21
alkalinity	88												
ammonia	0.0164												
conductivity	28400												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	C		D		E		A		B		
DO	5.4	5.3	5.0	5.7	5.6	6.1	5.5	6.3	5.4	6.2	6.6
Temp °C	24.7	24.6	25.0	24.9	24.4	23.6	24.4	24.0	24.3	24.8	24.7
pH	7.2	7.8	8.0	8.1	7.8	7.9	8.0	8.0	7.9	7.8	8.0
salinity	22	21	20	20	23	20	20	20	20	20	21
alkalinity											121
ammonia											0.0163
conductivity											28200

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06289-FS-Area-5
Lab # 306727 #6
H_2O 20 o/oo
Sample Date 10/16
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		E		D		C		A		B	
DO	3.6	6.0	6.3	7.6	7.3	5.1	5.3	6.5	6.6	5.5	5.7	5.6	6.2
Temp °C	22.2	22.8	23.2	24.2	23.4	24.6	25.9	24.7	23.8	24.7	24.5	25.3	24.2
pH	7.5	7.9	7.9	7.9	7.8	7.8	7.8	8.0	8.0	8.1	8.1	7.9	7.9
salinity	20	20	22	21	21	22	22	22	21	21	21	21	21
alkalinity	87												
ammonia	1.18												
conductivity	28400												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		D		E		A		B		C
DO	5.7	5.8	5.2	5.8	6.3	6.3	6.0	6.5	6.4	6.6	6.2
Temp °C	24.5	25.0	25.0	25.1	24.1	23.7	24.4	24.2	24.7	25.2	24.8
pH	8.0	8.0	8.0	8.0	8.1	8.2	8.2	8.2	7.9	7.8	8.0
salinity	22	23	21	20	24	22	20	20	25	20	21
alkalinity											139
ammonia											0.0179
conductivity											27400

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06289-FS-Area-6
Lab # 306727 #7
$H_2$0 20 o/oo
Sample Date 10/16
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A	6.4	B	
DO	5.1	4.5	5.5	4.8	5.3	5.0	5.3	6.6	6.8	6.5	~~6.0~~	5.3	6.2
Temp °C	22.3	22.7	23.2	24.6	24.2	25.4	25.6	23.5	23.0	24.3	24.2	24.9	23.8
pH	7.6	7.3	7.5	7.8	7.7	7.8	7.8	7.9	7.8	8.0	8.0	7.5	7.7
salinity	20	23	21	22	21	21	21	21	22	23	22	20	21
alkalinity	95												
ammonia	.0411												
conductivity	31500												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.8	6.0	6.1	6.0	6.1	6.4	6.3	6.6	6.5	6.7	6.1
Temp °C	24.7	25.2	24.4	24.8	24.3	23.7	24.8	24.2	24.8	24.8	24.7
pH	7.8	7.8	8.0	8.0	8.0	8.0	8.1	8.1	7.6	~~7.8~~	7.8
salinity	23	23	21	20	21	20	21	20	20	20	21
alkalinity											134
ammonia											0.0282
conductivity											27500

7.5
Dss

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06290-C-45
Lab # 306727 #8
H_2O 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		C		E		D		A		B	
DO	3.5	4.8	5.7	7.2	7.0	5.1	5.4	6.9	6.9	5.6	5.5	6.4	6.5
Temp °C	22.2	22.7	23.1	24.0	24.4	25.4	25.5	23.7	23.5	24.9	24.8	25.2	24.4
pH	7.6	7.6	7.7	7.7	7.7	7.8	7.8	7.7	7.8	7.7	7.7	7.7	7.8
salinity	21	23	20	20	21	21	22	22	21	24	22	21	21
alkalinity	90												
ammonia	0.101												
conductivity	31200												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.7	5.8	6.2	6.0	5.9	6.0	5.9	6.2	5.3	5.9	6.3
Temp °C	24.7	25.2	24.7	24.7	24.4	23.9	25.3	24.8	24.9	24.4	25.0
pH	7.8	7.8	7.9	7.9	7.7	7.9	8.0	8.0	7.8	7.6	7.9
salinity	23	23	22	21	20	20	20	20	20	20	21
alkalinity											88
ammonia											0.0183
conductivity											2300

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client CDR
Site 06290-C-36
Lab # 306727 #9
H$_2$0 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep [illegible]	A	B		E		D		C		A		B	
DO 5.2	~~22.8~~	7.1	6.7	7.2	7.0	4.9	5.1	6.3	6.1	6.0	5.9	6.4	6.5
Temp °C 2	2 8	22.8	23.2	24.7	24.5	25.5	25.4	24.0	24.0	24.7	24.7	25.4	24.1
pH	7.8	8.0	8.0	7.9	7.9	7.9	7.9	7.9	7.9	8.1	8.1	8.1	8.1
salinity	21	21	20	21	21	22	22	22	21	22	22	20	21
alkalinity	103												
ammonia	0.195												
conductivity	31000												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.8	6.0	6.4	6.3	6.2	6.1	6.4	6.4	6.3	6.4	5.9
Temp °C	24.8	25.3	24.9	24.9	24.3	24.1	25.4	25.2	25.0	24.7	24.8
pH	7.8	7.8	7.8	7.9	8.0	8.0	8.1	8.1	7.9	7.9	8.1
salinity	23	22	22	21	21	20	20	20	20	20	20
alkalinity											128
ammonia											0.0171
conductivity											27500

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client	CDR	Site	06290-C-15	Lab #	306727 #10
H_2O	20 o/oo	Sample Date	10/17	Species Info	L. Plumulosus
Start Date	10/23/06	End Date	11/20/06		

Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		C		E		D		A		B	
DO	5.0	6.3	6.6	7.1	6.6	5.8	7.2	7.2	7.1	6.2	6.0	6.3	6.6
Temp °C	22.2	22.9	23.3	27.0	26.4	25.1	23.9	24.0	23.5	23.3	23.2	23.0	22.6
pH	7.9	6.0	7.9	7.7	7.9	7.8	7.9	7.9	7.7	7.9	7.9	7.6	7.7
salinity	20.	23	21	20	20	22		22	22	23	22	21	21
alkalinity	98												
ammonia	0.377												
conductivity	31400												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	6.0	6.1	5.5	5.9	6.7	6.4	6.7	6.6	6.3	6.5	6.5
Temp °C	24.8	24.6	22.9	23.1	24.7	24.7	23.4	23.0	23.6	23.8	24.3
pH	8.2	8.2	8.1	8.1	8.3	8.3	8.3	8.2	7.8	7.7	8.1
salinity	22	23	23	21	21	20	21	20	21	20	22
alkalinity											195
ammonia											0.0253
conductivity											27900

The SeaCrest Group
Louisville, CO

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28-day Leptocheirus Benchsheet

Client	CDR	Site	0690-C-29	Lab #	306727-#11
H_20	20 o/oo	Sample Date	10/17	Species Info	L. Plumulosus
Start Date	10/23/06	End Date	11/20/06		

Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	4.7	5.6	5.9	5.1	5.2	5.2		7.2	7.1	6.1	5.9	6.4	6.8
Temp °C	22.1	22.8	23.3	27.0	26.7	23.8		23.6	23.5	23.4	23.3	23.0	22.4
pH	7.7	7.7	7.7	7.6	7.7	7.7		7.9	7.9	7.7	7.8	7.7	7.9
salinity	20	23	21	22	21	22		21	22	22	23	21	21
alkalinity	87												
ammonia	0.0104												
conductivity	31300												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	6.0	6.2	6.8	6.7	6.4	6.4	6.6	6.5	4.9	5.8	6.0
Temp °C	24.3	24.5	22.8	23.3	25.3	24.8	23.0	23.2	23.6	23.7	22.3
pH 2.	~~24.6~~0	8.0	7.8	7.7	8.0	8.1	7.9	8.1	7.4	7.5	7.7
salinity	22	23	23	22	21	20	20	20	20	20	21
alkalinity											132
ammonia											0.0429
conductivity											~~27400~~ 27600

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site 0690-C-33
Lab # 306727 #12
H_2O 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	6.2 B	6.3	E		D		C		A		B	
DO	4.0	~~5.6~~	~~6.2~~ 5.1	4.8	4.9	4.9	5.3	7.0	7.0	6.1	6.0	6.6	6.5
Temp °C	22.0	23.3	23.3	27.0	26.8	24.1	24.0	23.4	23.4	23.6	23.4	23.0	22.5
pH	7.5	7.8	7.6	7.5	7.4	7.4	7.7	7.6	7.6	8.2	8.2	8.1	8.1
salinity	21	21	20	21	21	21	20	21	21	21	22	21	21
alkalinity	89													
ammonia	0.303													
conductivity	30900													

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B, ~~B~~ B		A
DO	5.1	6.0	6.5	6.5	6.1	6.1	6.4	6.5	6.5	6.7	6.9
Temp °C	24.6	24.9	22.8	23.6	25.3	24.9	23.7	23.3	23.9	23.7	24.7
pH	7.9	7.9	7.9	7.9	7.9	7.9	8.2	8.2	7.9	7.9	8.2
salinity	22	21	23	20	21	20	20	20	20	20	20
alkalinity											141
ammonia											0.0233
conductivity											27200

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site 06290-C-16
Lab # 306727 #13
H_2O 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14		
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday		
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06		
rep	A	B		D		C		E		A		B		
DO	3.5	6.8	6.8	6.0	6.2	5.5	6.2	~~7~~ 6.9	6.7	6.2	5.9	6.8	6.8	
Temp °C	22.2	22.9	23.4	23.6	23.0	24.5	25.1	23.5	23.2	7.7	24.4	24.5	23.7	
pH	7.9	7.8	7.8	7.8	7.7	7.8	7.9	7.9	7.9	24.3	7.8	7.8	7.8	
salinity	20	21	20	21	21	21	21	23	22	21	21	20	21	
alkalinity	80													
ammonia	0.037													
conductivity	27500													

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.7	6.0	6.3	6.2	6.6	6.5	6.6	6.4	6.7	6.6	5.9
Temp °C	25.1	24.9	24.6	24.5	24.0	25.3	23.8	24.1	25.3	25.1	25.5
pH	7.6	7.9	7.8	7.8	8.0	8.0	7.8	7.9	7.8	7.7	7.8
salinity	21	20	21	20	20	20	20	20	20	20	20
alkalinity											100
ammonia											0.0231
conductivity											27700

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client	CDR	Site	0629-FS-Area-3	Lab #	306727 #14
H_2O	20 o/oo	Sample Date	10/17	Species Info	L. Plumulosus
Start Date	10/23/06	End Date	11/20/06		

Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		C		E		D		A		B	
DO	3.6	4.2	5.5	5.8	6.0	6.2	6.0	6.6	6.6	5.1	5.0	6.7	6.8
Temp °C	22.3	23.0	23.5	23.4	23.6	25.1	25.5	24.4	23.7	24.8	24.7	24.6	24.1
pH	7.0	7.1	7.4	7.3	7.7	7.6	7.8	7.6	7.6	7.4	7.5	7.8	7.9
salinity	21	20	20	21	21	21	21	20	20	20	20	20	21
alkalinity	99												
ammonia	0.896												
conductivity	26400												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		C
DO	5.9	6.4	5.7	5.9	6.5	6.3	6.6	6.5	6.8	6.8	6.8
Temp °C	24.9	24.9	25.1	24.5	24.4	25.6	23.3	24.8	25.4	25.0	24.1
pH	7.2	7.6	7.6	7.7	7.8	7.9	7.8	7.9	7.4	7.6	7.3
salinity	20	20	21	20	20	20	20	20	20	20	20
alkalinity											57
ammonia											0.0238
conductivity											27500

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site 06290-C-5
Lab # 306727 A15
H_20 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		E		D		C		A		B	
DO	4.4	6.7	6.8	5.9	6.5	5.7	5.6	6.8	6.7	5.5	5.4	6.4	6.5
Temp °C	22.1	23.0	23.4	23.0	23.5	25.4	25.5	25.0	24.5	24.9	24.9	24.7	24.6
pH	7.0	8.0	8.0	7.8	7.8	7.8	7.9	8.2	8.2	8.1	8.1	8.3	8.1
salinity	21	21	20	22	21	22	22	21	21	21	20	21	21
alkalinity	98												
ammonia	0.316												
conductivity	27700												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	6.0	6.6	6.3	6.5	6.0	6.0	6.5	6.7	6.9	6.8	5.8
Temp °C	24.9	25.2	25.1	24.5	24.1	25.0	24.4	24.8	24.8	24.9	23.8
pH	8.0	8.0	7.7	7.8	8.1	8.0	8.0	8.0	7.8	7.7	7.7
salinity	21	22	21	20	20	20	20	20	20	20	21
alkalinity											162
ammonia											0.0197
conductivity											27200

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site 06290-FS-Area-2
Lab # 306727-#16
H_2O 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		E		D		E		A		B	
DO	2.0	6.5	6.6	6.3	6.4	4.9	5.1	7.4	7.2	5.8	5.8	6.3	6.4
Temp °C	22.2	22.9	23.2	23.5	23.4	25.0	24.8	23.3	23.6	23.4	24.1	25.6	24.2
pH	7.0	7.9	8.0	8.1	7.9	7.9	7.8	8.3	8.3	8.2	8.2	8.2	8.2
salinity	21	18	20	20	20	21	21	20	20	19	20	20	20
alkalinity	148												
ammonia	0.791												
conductivity	25700												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		B
DO	5.6	6.3	6.8	6.7	6.4	6.6	5.9	6.1	6.1	6.4	6.1
Temp °C	25.2	25.1	25.7	25.0	24.4	24.6	24.6	24.4	25.1	25.1	25.0
pH	8.3	8.2	8.0	7.9	8.3	8.1	8.3	8.2	8.0	8.0	7.9
salinity	20	21	20	20	22	22	20	20	20	20	20
alkalinity											170
ammonia											0.0153
conductivity											27600

The SeaCrest Group
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28-day Leptocheirus Benchsheet

Client CDR
Site 06290-M-AB
Lab # 306727 #17
H_2O 20 o/oo
Sample Date 10/17
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	C.S	B ok	D		C		E		A		B	
DO	4.7	~~7.9~~	6.8 ~~7.7~~	6.4	6.6	4.7	6.0	7.7	7.2	5.7	5.9	6.9	6.8
Temp °C	22.2	23.0	23.3	24.0	23.6	25.2	25.1	23.6	23.2	24.7	24.5	25.5	24.7
pH	7.3	7.9	7.9	7.9	7.7	7.8	7.7	8.1	8.1	8.0	8.0	8.1	8.1
salinity	20	21	20	20	20	21	21	20	20	21	20	20	20
alkalinity	80												
ammonia	0.0928												
conductivity	28800												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	E		C		B		A		B		A
DO	5.4	6.0	6.6	6.7	6.8	6.9	6.1	6.1	6.1	6.4	6.4
Temp °C	25.6	25.2	25.8	25.3	24.6	24.7	24.8	24.7	25.8	25.3	23.5
pH	8.0	8.1	8.1	8.1	8.3	8.2	8.2	8.2	8.0	8.0	8.0
salinity	25	24	25	21	25	24	22	20	23	20	21
alkalinity			23								173
ammonia			8.1								0.0515
conductivity											29200

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28-day Leptocheirus Benchsheet

Client CDR
Site 06291-D-C
Lab # 306727 #18
H_2O 20 o/oo
Sample Date 10/18
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	6.1	7.2	7.0	5.9	6.1	4.3	4.8	7.3	7.1	5.6	5.7	6.8	6.5
Temp °C	22.1	22.9	23.3	23.5	23.9	25.2	25.0	23.4	23.3	24.6	24.3	23.8	23.9
pH	7.9	7.7	7.8	7.8	7.7	7.8	7.7	7.8	7.4	7.7	7.8	8.0	8.0
salinity	20	20	20	20	20	20	20	21	21	21	21	20	21
alkalinity	86												
ammonia	0.056												
conductivity	27300												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.0	5.7	6.8	6.9	6.4	6.6	6.6	6.5	6.8	6.7	5.6
Temp °C	24.9	25.4	25.5	25.1	24.3	24.5	23.3	23.7	25.7	25.1	24.6
pH	7.8	8.0	~~7.9~~	7.9	7.9	8.0	8.1	8.1	7.9	7.9	7.6
salinity	23	23	22	21	22	21	21	21	21	20	20
alkalinity											65
ammonia											0.0249
conductivity											28400

7.9
D..

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28-day Leptocheirus Benchsheet

Client CDR
Site 06291-C-7
Lab # 306727 #19
H_20 20 o/oo
Sample Date 10/18
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		E		C		A		B	
DO	5.9	6.0	6.3	5.0	5.2	6.3	6.2	7.4	7.4	5.6	5.5	6.3	6.5
Temp °C	22.2	22.8	23.4	23.2	24.1	24.4	24.8	23.4	23.3	24.7	24.9	26.0	24.7
pH	7.9	7.5	7.7	7.2	7.6	7.6	7.4	7.8	8.0	7.9	7.7	~~8~~ 7.7	7.9
salinity	20	21	20	20	20	21	21	21	21	20	22	20	21
alkalinity	84												
ammonia	0.042												
conductivity	28100												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.5	5.8	6.0	6.6	6.8	6.8	7.0	6.6	6.9	6.8	6.7
Temp °C	24.9	24.8	26.3	25.6	25.0	24.7	25.0	24.6	25.9	25.7	25.8
pH	7.6	7.7	7.5	7.6	7.6	7.9	7.9	7.9	7.6	7.8	7.8
salinity	23	23	23	20	24	23	22	20	21	20	20
alkalinity											102
ammonia											0.0179
conductivity											~~28500~~ HC 28300

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client: CDR
Site: 06291-C-6
Lab #: 306727 020
H_2O: 20 o/oo
Sample Date: 10/18
Species Info: L. Plumulosus
Start Date: 10/23/06
End Date: 11/20/06
Test Conditions:

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		C		E		D		A		B	
DO	4.9	6.3	6.2	4.8	5.0	6.4	6.1	7.1	7.0	5.6	5.6	6.2	6.2
Temp °C	22.2	22.9	23.5	24.8	24.5	25.1	25.2	24.5	24.0	25.3	25.1	25.8	25.8
pH	7.9	7.7	7.7	7.7	7.6	7.8	7.7	7.7	7.7	7.8	7.8	7.8	7.9
salinity	21	20	20	21	20	22	21	21	21	20	20	20	21
alkalinity	82												
ammonia	0.0767												
conductivity	28000												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.4	5.6	6.9	6.6	6.7	6.6	7.0	6.5	6.8	6.8	6.4
Temp °C	24.9	24.8	26.2	26.3	25.1	24.9	26.6	26.0	25.4	26.2	25.4
pH Q	~~2~~ 7.9	7.8	7.6	7.8	7.7	7.9	8.1	8.0	7.7	7.8	7.9
salinity	21	21	22	21	24	23	22	20	21	20	21
alkalinity											132
ammonia											0.0202
conductivity											28600

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06241-CR-C
Lab # 306727 #21
H_2O 20 o/oo
Sample Date 10/18
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		E		D		C		A		B	
DO	4.3	6.9	6.8	5.1	4.9	6.1	6.3	7.1	7.0	5.5	5.6	5.8	6.2
Temp °C	22.2	22.9	23.4	23.8	25.6	26.0	25.5	23.9	23.7	25.4	25.3	27.0	26.2
pH	7.7	7.8	7.8	7.8	7.7	7.8	7.7	7.7	7.7	7.9	7.9	~~7.8~~ 7.9	8.0
salinity	20	20	20	20	20	20	21	21	21	21	21	20	20
alkalinity	83												
ammonia	0.035												
conductivity	28100												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.0	5.5	6.4	6.4	6.5	6.5	6.8	6.6	6.8	6.8	5.9
Temp °C	24.9	25.2	26.5	26.2	25.3	25.4	26.2	26.4	25.6	26.3	25.2
pH	8.0	7.9	8.0	8.0	7.9	8.0	8.1	8.1	7.9	7.9	7.9
salinity	21	21	23	21	22	22	21	20	21	20	20
alkalinity											113
ammonia											0.0176
conductivity											29200

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client: CDR
Site: 06291-TC-C
Lab #: 306727 #22
H₂0: 20 o/oo
Sample Date: 10/18
Species Info: L. Plumulosus
Start Date: 10/23/06
End Date: 11/20/06
Test Conditions:

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		C		D		E		A		B	
DO	4.6	5.3	5.5	4.7	5.1	6.2	5.2	7.5	7.3	5.6	5.5	5.5	6.4
Temp °C	22.3	22.9	23.3	24.3	23.4	25.8	25.2	23.6	23.1	24.7	24.9	27.0	24.2
pH	7.6	8.0	8.0	7.7	7.8	7.9	7.8	7.7	7.7	7.4	7.7	7.6	7.8
salinity	21	20	20	20	20	21	21	21	21	20	22	20	20
alkalinity	100												
ammonia	0.438												
conductivity	28000												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	5.0	5.4	5.9	5.8	6.1	6.6	6.3	6.5	6.5	6.5	6.0
Temp °C	24.6	25.2	25.6	25.4	25.1	25.3	24.6	23.4	26.1	24.9	24.8
pH	7.8	7.8	7.9	7.8	7.7	7.8	7.9	7.9	7.6	7.7	7.4
salinity	20	20	23	21	20	20	20	20	20	20	20
alkalinity											76
ammonia											0.0169
conductivity											23500

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client	CDR	Site	06291-MG-K7(M	Lab #	306727 #23
H_2O	20 o/oo	Sample Date	10/18	Species Info	L. Plumulosus
Start Date	10/23/06	End Date	11/20/06		

Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	4.0	6.3	6.4	5.5	5.6	6.4	6.4	7.5	7.9	5.6	5.6	5.3	6.1
Temp °C	22.3	22.9	25.2	23.9	24.0	25.2	25.1	23.0	23.1	23.9	23.8	26.8	25.1
pH	7.6	7.9	7.8	7.8	7.8	7.8	7.7	7.8	7.8	7.8	7.8	7.7	7.9
salinity	21	21	20	21	20	21	21	21	21	20	20	20	21
alkalinity	83												
ammonia	0.022												
conductivity	28200												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		B		A
DO	4.9	5.5	5.6	5.9	6.6	6.5	6.3	6.7	6.5	6.6	5.7
Temp °C	24.9	25.1	26.4	25.6	25.2	25.3	26.4	24.5	26.7	25.0	24.5
pH Da	8 7.9	7.8	8.0	8.0	8.0	8.0	~~8.9~~	7.9	8.0	7.9	7.4
salinity	20	21	22	22	20	20	21	20	20	20	20
alkalinity											155
ammonia											0.0181
conductivity											30400

pH 7.9
Da

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client CDR
Site 06291-MG-H7(M)
Lab # 306727 #24
H$_2$0 20 o/oo
Sample Date 10/18
Species Info L. Plumulosus
Start Date 10/23/06
End Date 11/20/06
Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	4.1	6.6	6.6	5.2	5.5	6.4	6.3	7.9	7.9	5.5	5.6	5.8	6.3
Temp °C	22.3	22.8	22.4	23.9	24.1	25.3	25.0	23.4	23.3	24.4	24.3	27.1	24.6
pH	7.6	7.8	7.6	7.7	7.8	7.7	7.7	7.8	8.0	7.9	7.9	7.9	7.9
salinity	20	21	20	21	20	22	21	21	21	21	21	20	21
alkalinity	84												
ammonia	0.0195												
conductivity	28000												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	D		C		E		A		D		B
DO	5.6	5.8	5.9	6.1	6.0	6.4	6.1	6.6	6.4	6.6	6.6
Temp °C	25.1	25.4	26.3	25.5	25.0	25.4	26.9	24.8	26.7	25.5	24.2
pH	7.9	7.9	7.7	7.7	7.6	7.9	8.1	8.1	8.0	7.9	8.0
salinity	20	20	21	20	20	20	20	20	20	20	21
alkalinity											133
ammonia											0.0391
conductivity											29700

The SeaCrest Group
Louisville, CO

Form #: 109a
Effective: January 2006

28-day Leptocheirus Benchsheet

Client	CDR	Site	Control 1	Lab #	306727 # C1
H_2O	20 o/oo	Sample Date		Species Info	L. Plumulosus
Start Date	10/23/06	End Date	11/20/06		

Test Conditions

	0	2		4		7		9		11		14	
Day	Mon	Wednesday		Friday		Monday		Wednesday		Friday		Monday	
Date	10/23	10/25/06		10/27/06		10/30/06		11/01/06		11/03/06		11/06/06	
rep	A	B		D		C		E		A		B	
DO	3.7	7.1	6.9	5.7	6.1	5.4	5.5	7.5	7.3	6.6	5.5	6.2	6.5
Temp °C	22.3	22.6	22.8	23.0	22.3	23.0	23.1	23.0	23.1	22.9	23.0	23.0	228
pH	7.5	8.0	7.4	7.6	7.6	7.8	7.8	7.9	7.9	7.8	7.8	7.6	7.6
salinity	20	20	20	20	20	20	20	21	21	20	20	20	21
alkalinity	98												
ammonia	1.38												
conductivity	25000												

	16		18		21		23		25		28
Day	Wednesday		Friday		Monday		Wednesday		Friday		Mon
Date	11/08/06		11/10/06		11/13/06		11/15/06		11/17/06		11/20
rep	G		C		E		A		B		A
DO	6.3	6.7	6.6	7.6	6.4	6.5	6.7	6.6	6.8	6.8	6.4
Temp °C	244	247	244	24.4	245	24.8	232	23.1	237	24.0	23.5
pH	7.5	7.7	7.6	7.7	7.8	7.9	79	7.9	7.9	7.6	7.7
salinity	7.5	20	20	20	20	20	20	20	20	20	20
alkalinity	20										100
ammonia	Du										0.0367
conductivity											26100

APPENDIX 6 – *L. PLUMULOSUS* HISTORY SHEETS FROM THE SUPPLIER, CHESAPEAKE CULTURES AND REFTOX

Chesapeake Cultures

P.O. Box 507 Hayes, VA 23072 (804) 693-4046 (804)694-4704 fax
www.c-cultures.com
e-mail growfish@c-cultures.com

10L006-SF
rec'ved

pH: 7.3
Do: 25.0
temp: 23.5

SEACREST GROUP

Shipment Information

Species Leptocheirus plumulosus

Date 10/19/06

Age/Size retained between 600 and 250µ sieves

P.O. No. 1190

Quanitity 2720 +

Invoice No. 5559

+ 2L York River Sediment
— Homogenize before use

Temperature 24 °C Salinity 20‰ pH 7.97

Notes * Be sure to keep all debris in shipping jars until all animals are accounted for (no doubt you knew this!).

Thank you!

Biologist

* *Please inspect shipment and report any problem immediately* *

LC50- 165.98

The SeaCrest Group
Louisville, CO

Sediment Organism Reftox Benchsheet

Form #: 108
Effective: January 2006

Purpose: Reftox - Lepto p. Salt Used: Copper Sulfate Date Made: 102106
Dilution Series: 50% Template #: – Dilution Water: 20‰ Salt H2O
Name, age & source: Lepto p./Size Selected Ches Bay Test Start: 102106 - 1200 Test End: 102506 - 1215
Test Conditions: NON-RENEWAL

	0	24	48	72	96
(C)	10	10	10	10	10
0	10	10	10	10	10
DO	7.0	7.3	6.8	6.6	6.8
Temp	24.2	25.0	24.1	24.8	24.6
pH	8.1	8.2	8.2	8.2	8.2
Cond					
(1)	10	10	10	10	10
30.5ppb	10	10	10	10	10
DO	7.0	7.1	6.8	6.8	6.8
Temp	24.2	24.9	24.1	24.8	24.0
pH	8.1	8.2	8.2	8.2	8.2
Cond					
(2)	10	10	10	10	10
61ppb	10	10	10	10	9
DO	6.9	7.0	6.7	6.7	6.7
Temp	24.3	24.9	24.2	24.8	24.8
pH	8.1	8.2	8.2	8.2	8.2
Cond					
Initials	SP	SP			

	0	1	2	3	4
(3)	10	10	10	8	7
122ppb	10	10	9	8	5
DO	6.8	7.0	6.8	6.7	6.7
Temp	24.3	24.9	24.1	24.7	24.1
pH	8.2	8.2	8.2	8.2	8.2
Cond					
(4)	10	10	8	5	4
244ppb	10	8	7	4	4
DO	6.7	7.0	6.8	6.7	6.6
Temp	24.3	24.8	24.2	24.8	24.1
pH	8.2	8.2	8.2	8.2	8.3
Cond					
(5)	10	7	5	2	0
488ppb	10	6	3	0	0
DO	6.7	6.9	6.8	6.7	6.6
Temp	24.3	24.7	24.3	24.8	24.0
pH	8.2	8.2	8.2	8.3	8.3
Cond					
food	1mL	–	1mL	–	–

	Reftox1	Reftox2	Recon #1	Recon #2
Hardness				
Alkalinity				
Chlorine				
Ammonia				

1. Exposure Chamber
Total Capacity: 30 ml
Test Solution Surface Area: ____ cm^2
Test Solution Volume: 15 ml
Water Depth (constant): ____ cm
(cyclic): ____ to ____ cm

2. Feeding Schedule
Not fed: ____
Fed Daily: Day 0, 2 (1mL Tetramin)
Fed Irregularly: 0 & 48 hours
Food Used: ____

3. Aeration
Slow: ____
Med: ____
Fast: ____

4. Screened Animal Enclosers
Not Used: X
Used: ____ cm diameter

5. Condition/appearance of surviving organisms at end of test (i.e., alive but immobile; loss of orientation; erratic movement; etc,):

6. Comments:

```
THE SEACREST GROUP
                                                              Page __________

******************************* Version  2.5 ********************************

                 Results calculated using the Summary Method.

*****************************************************************************

              Sponsor                 :                    SEACREST
              Species                 :                LEPTOCHEIRUS
              Study Number            :                      REFTOX
              Dates of test           :    102106  to        102506
              Test Material           :                       CUSO4
              Concentration Units     :                         PPB
              Report run by           :                          CW
              Date of report          :                  01-15-2007

*****************************************************************************
*****************************************************************************

           Concentration      Number       Number       Percent
            (    PPB    )     Exposed      Dead         Dead
           -------------      -------      ------       ------
                488.0           20           20         100.0
                244.0           20           12          60.0
                122.0           20            8          40.0
                 61.0           20            1           5.0
                 30.5           20            0           0.0
              Control           20            0           0.0

*****************************************************************************

                                       95% Confidence Limits
Method               W          LC50      Lower          Upper         Slope
-----------------------------------------------------------------------------

Binomial                      172.53      61.00         488.00        --N/A--
Moving Average                159.19     129.27         201.77        --N/A--
Probit                        165.98     132.36         209.37          3.68
Logit                         171.63     130.94         237.27          5.09

-----------------------------------------------------------------------------

  Note --  In order to produce this summary report, no warning or diag-
           nostic messages were given (if any occurred).  An asterisk
           appearing next to the method indicates that there was a
           warning associated with the corresponding method.  You should
           run the full report for this method to determine the problem.
           This report is intended for informational purposes only.

****************************** End Of Report ******************************
```

APPENDIX 7 – SUMMARY DATA SHEETS RELFECTING RESULTS OF *L. PLUMULOSUS* TESTS

Date:12/18/2006
Species:*Leptocheirus p.*
Facility: SeaCrest Group
Test: 28 Day Chronic

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-103	a	19	4	15	3	1.1305	1.1393	8.8000	0.46
	b	18	2	16	2	1.1454	1.1579	12.5000	0.69
	c	9	2	7	0	1.1398	1.1463	6.5000	0.72
	d	15	4	11	0	1.1362	1.1459	9.7000	0.65
	e	19	5	14	7	1.1222	1.1295	7.3000	0.38

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-104	a	14	3	11	0	1.1564	1.1612	4.80	0.34
	b	14	6	8	0	1.1385	1.1445	6.00	0.43
	c	19	7	12	11	1.1413	1.1478	6.50	0.34
	d	18	5	13	13	1.1546	1.1623	7.70	0.43
	e	15	3	12	12	1.1559	1.1596	3.70	0.25

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-105	a	14	3	11	3	1.1401	1.1482	8.10	0.58
	b	16	7	9	11	1.1318	1.1413	9.50	0.59
	c	18	5	13	8	1.1251	1.1345	9.40	0.52
	d	18	7	11	16	1.1638	1.1699	6.10	0.34
	e	16	3	13	0	1.1709	1.1775	6.60	0.41

Date:12/18/2006
Species:*Leptocheirus p.*
Facility: SeaCrest Group
Test: 28 Day Chronic

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
FS-Area-1	a	8	4	4	0	1.1524	1.1550	2.6000	0.32
	b	6	2	4	0	1.1371	1.1388	1.7000	0.28
	c	9	2	7	5	1.1732	1.1758	2.6000	0.29
	d	9	6	3	0	1.1186	1.1221	3.5000	0.39
	e	10	2	8	0	1.1575	1.1608	3.3000	0.33

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
FS-Area-4	a	17	11	6	1	1.1156	1.1299	14.27	0.84
	b	14	10	4	0	1.1402	1.1489	8.70	0.62
	c	18	6	12	0	1.1680	1.1725	4.50	0.25
	d	17	3	14	0	1.1469	1.1594	12.50	0.74
	e	19	6	13	2	1.1656	1.1808	15.20	0.80

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
FS-Area-5	a	19	7	12	12	1.1531	1.1603	7.20	0.38
	b	16	4	12	17	1.1718	1.1794	7.60	0.48
	c	16	3	13	4	1.1294	1.1377	8.30	0.52
	d	18	3	15	18	1.1350	1.1422	7.20	0.40
	e	19	5	14	10	1.1467	1.1533	6.60	0.35

Date:12/18/2006
Species:*Leptocheirus p.*
Facility: SeaCrest Group
Test: 28 Day Chronic

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
FS-Area-6	a	16	2	14	0	1.1517	1.1556	3.9000	0.24
	b	18	6	12	1	1.1240	1.1304	6.4000	0.36
	c	12	2	10	0	1.1284	1.1324	4.0000	0.33
	d	18	5	13	0	1.1502	1.1577	7.5000	0.42
	e	14	5	9	6	1.1297	1.1355	5.8000	0.41

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-45	a	11	4	7	0	1.1616	1.1657	4.10	0.37
	b	16	8	8	0	1.1455	1.1507	5.20	0.33
	c	13	3	10	0	1.1557	1.1588	3.10	0.24
	d	10	4	6	0	1.1288	1.1322	3.40	0.34
	e	10	6	4	0	1.1423	1.1465	4.20	0.42

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-36	a	19	6	13	0	1.1893	1.1970	7.70	0.41
	b	18	4	14	30	1.1430	1.1503	7.30	0.41
	c	16	7	9	10	1.1397	1.1470	7.30	0.46
	d	17	8	9	0	1.1651	1.1732	8.10	0.48
	e	14	3	11	20	1.1340	1.1392	5.20	0.37

Date:12/118/2006									
Species:*Leptocheirus p.*									
Facility: SeaCrest Group									
Test: 28 Day Chronic									
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-15	a	16	6	10	7	1.1152	1.1262	11.0000	0.69
	b	15	4	11	14	1.1614	1.1717	10.3000	0.69
	c	14	7	7	32	1.1428	1.1482	5.4000	0.39
	d	15	5	10	15	1.1379	1.1485	10.6000	0.71
	e	19	8	11	6	1.1646	1.1763	11.7000	0.62
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-29	a	18	7	11	7	1.1433	1.1532	9.90	0.55
	b	16	6	10	0	1.1691	1.1724	3.30	0.21
	c	17	4	13	0	1.1425	1.1476	5.10	0.30
	d	17	5	12	4	1.1319	1.1411	9.20	0.54
	e	16	7	9	4	1.1281	1.1330	4.90	0.31
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-33	a	18	7	11	14	1.153	1.1676	14.60	0.81
	b	18	8	10	28	1.1553	1.1708	15.50	0.86
	c	11	4	7	54	1.1219	1.1297	7.80	0.71
	d	9	3	6	0	1.1337	1.1416	7.90	0.88
	e	14	5	9	0	1.1608	1.1681	7.30	0.52

Date:12/118/2006									
Species:*Leptocheirus p.*									
Facility: SeaCrest Group									
Test: 28 Day Chronic									
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-16	a	16	7	9	7	1.1377	1.1446	6.9000	0.43
	b	14	4	10	22	1.1441	1.1482	4.1000	0.29
	c	17	8	9	9	1.1615	1.1702	8.7000	0.51
	d	20	11	9	15	1.1344	1.1417	7.3000	0.36
	e	20	8	12	11	1.1689	1.1748	5.9000	0.30
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
FS-Area-3	a	16	5	11	17	1.1542	1.1633	9.10	0.57
	b	19	8	11	23	1.1326	1.1428	10.20	0.54
	c	18	12	6	28	1.1233	1.1294	6.10	0.34
	d	19	7	12	5	1.1385	1.1469	8.40	0.44
	e	15	3	12	4	1.1150	1.1189	3.90	0.26
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-5	a	13	4	9	3	1.1477	1.1554	7.70	0.59
	b	18	11	7	8	1.1265	1.1392	12.70	0.71
	c	20	13	7	12	1.1357	1.1526	16.90	0.85
	d	16	6	10	4	1.1418	1.1540	12.20	0.76
	e	20	10	10	25	1.1157	1.1287	13.00	0.65

Date:12/18/2006
Species:*Leptocheirus p.*
Facility: SeaCrest Group
Test: 28 Day Chronic

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
FS-Area-2	a	0	0	0	0	NA	NA	NA	NA
	b	0	0	0	0	NA	NA	NA	NA
	c	0	0	0	0	NA	NA	NA	NA
	d	0	0	0	0	NA	NA	NA	NA
	e	1	0	1	0	1.1593	1.1598	0.5000	0.50

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
M-AB	a	9	4	5	0	1.1137	1.1170	3.30	0.37
	b	18	3	15	3	1.1053	1.1134	8.10	0.45
	c	20	7	13	16	1.1119	1.1177	5.80	0.29
	d	18	6	12	0	1.1362	1.1410	4.80	0.27
	e	16	2	14	0	1.1209	1.1242	3.30	0.21

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
D-C	a	20	4	16	10	1.1166	1.1274	10.80	0.54
	b	19	10	9	21	1.1370	1.1473	10.30	0.54
	c	12	5	7	0	1.1420	1.1486	6.60	0.55
	d	18	7	11	7	1.1573	1.1675	10.20	0.57
	e	18	4	14	0	1.1468	1.1552	8.40	0.47

Date:12/18/2006
Species:*Leptocheirus p.*
Facility: SeaCrest Group
Test: 28 Day Chronic

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-7	a	16	5	11	5	1.1274	1.1370	9.6000	0.60
	b	20	9	11	9	1.1178	1.1292	11.4000	0.57
	c	19	4	15	12	1.1351	1.1445	9.4000	0.49
	d	16	2	14	6	1.1472	1.1570	9.8000	0.61
	e	20	4	16	17	1.1268	1.1369	10.1000	0.51

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
C-6	a	8	2	6	2	1.1442	1.1496	5.40	0.67
	b	15	8	7	0	1.1107	1.1169	6.20	0.41
	c	14	3	11	0	1.1171	1.1248	7.70	0.55
	d	18	5	13	12	1.1581	1.1709	12.80	0.71
	e	12	3	9	0	1.1434	1.1508	7.40	0.62

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
CR-C	a	19	3	16	15	1.1359	1.1433	7.40	0.39
	b	13	5	8	7	1.1826	1.1850	2.40	0.18
	c	18	2	16	13	1.1180	1.1223	4.30	0.24
	d	19	6	13	6	1.1640	1.1700	6.00	0.32
	e	19	8	11	6	1.1458	1.1550	9.20	0.48

Date:12/18/2006
Species:*Leptocheirus p.*
Facility: SeaCrest Group
Test: 28 Day Chronic

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
TC-C	a	8	3	5	0	1.1398	1.1420	2.2000	0.27
	b	17	6	11	0	1.1406	1.1493	8.7000	0.51
	c	16	2	14	0	1.1244	1.1294	5.0000	0.31
	d	14	2	12	0	1.1113	1.1178	6.5000	0.46
	e	17	7	10	5	1.1552	1.1631	7.9000	0.46

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
MG-K7	a	16	2	14	2	1.1352	1.1490	13.80	0.86
	b	12	4	8	1	1.1625	1.1716	9.10	0.76
	c	14	7	7	4	1.1592	1.1707	11.50	0.82
	d	14	3	11	3	1.1176	1.1300	12.40	0.89
	e	15	3	12	0	1.1162	1.1220	5.80	0.39

								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
MG-H7	a	11	4	7	1	1.1627	1.1666	3.90	0.35
	b	14	2	12	0	1.1489	1.1542	5.30	0.38
	c	15	2	13	0	1.1247	1.1326	7.90	0.53
	d	10	2	8	5	1.1727	1.1779	5.20	0.52
	e	16	2	14	11	1.1477	1.1559	8.20	0.51

Date:12/18/2006									
Species:*Leptocheirus p.*									
Facility: SeaCrest Group									
Test: 28 Day Chronic									
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Control 1	a	18	6	12	12	1.1720	1.1841	12.1000	0.67
	b	19	7	12	6	1.1156	1.1287	13.1000	0.69
	c	20	5	15	25	1.1359	1.1479	12.0000	0.60
	d	20	8	12	8	1.1294	1.1488	19.4000	0.97
	e	18	8	10	18	1.1562	1.1700	13.8000	0.77
								Dry Weight(mg)	
Treatment	**Rep**	**Surviving**	**Males**	**Females**	**Juvenile production**	**Pan Weight(g)**	**Pan + Larvae(g)**	**Total**	**Individual**
Pre-weight	NA	20	NA	NA	NA	1.1774	1.1802	2.80	0.14

A.2 AQUA SURVEY

Aqua Survey, Inc.

BIOASSAY REPORT

Chronic Bioassay Using the Amphipod *Leptocheirus plumulosus* for Sediments at the LCP Brunswick Site

Prepared for
CDR Environmental Specialists, Inc.
6001 N. Ocean Drive
Unit 1103
Hollywood, FL 33019-4618

January 19, 2007

ASI Job No. 26-349

469 Point Breeze Road
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Aqua Survey, Inc.

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BIOASSAY REPORT

Chronic Bioassay Using the Amphipod *Leptocheirus plumulosus*

Prepared for
CDR Environmental
6001 N. Ocean Drive
Unit 1103
Hollywood, FL 33019-4618

This report, as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc, 469 Point Breeze Road, Flemington, New Jersey, 08822.

Robert M. Fr 1-19-07
Robert M. Fristrom Date
Quality Assurance Officer

Michelle Thomas 1-19-07
Michelle Thomas Date
Laboratory Manager

Jon Doi 1-19-07
Jon Doi, Ph.D. Date
Executive Vice President

I. INTRODUCTION

Aqua Survey, Inc. conducted a chronic bioassay for CDR Environmental using the amphipod *Leptocheirus plumulosus* for sediments at the LCP/Brunswick site. A 28-day chronic bioassay was conducted from October 31, 2006 through November 28, 2006, with the objective of assessing three endpoints: survival, growth rate and reproduction.

II. SUMMARY OF TEST RESULTS

Table 1 summarizes the results of the bioassay by providing the cumulative survival, mean number of young per organism per sample, and the mean growth rate per organism per sample.

Table 1. Summary of Survival, Reproduction, and Growth Rate

Sample	Cumulative Survival	Mean Number of Young per Organism per Sample	Mean Growth Rate per Organism per Sample per Day
	n (%)	n	mg
Control	95	3.98	0.051
6A	92	3.75	0.060
7A	98	5.07	0.053
CA	94	2.24	0.040

III. MATERIALS AND METHODS

Chronic toxicity testing was performed in accordance with the USEPA document *Method for Assessing the Chronic Toxicity of Marine and Estuarine Sediment-associated Contaminants with the Amphipod Leptocheirus plumulosus.*

A. Sampling

Sediment samples were collected by CDR Environmental on October 18, 2006 and received at ASI on October 19, 2006. Upon arrival at ASI, all samples were assigned a unique sample number as listed in Table 2. Samples were received in good condition and were stored in the dark at 2-4° C prior to testing. The Chain of Custody and Sample Use Forms are located in Appendix A.

Table 2. Sample Identification

Sample	ASI Sample ID No.
Control	20061285
06291-C-6A	20061264
06291-C-7A	20061265
06291-CR-CA*	20061266

*Reference Sediment

B. Sample Preparation

Because indigenous organisms/predators were present, the test sediments were press-sieved through a 0.5 mm screen and then through a .25 mm screen. The control sediment was sieved through a 290 micron screen by the organism supplier, Aquatic Research Organisms.

Twenty four hours prior to test initiation, five 175 ml replicates of each sample and control sediment were set out in one liter glass beakers and approximately 725 ml of overlay water was added to each beaker. The following day the test was initiated when individual organisms were randomly selected and placed directly into each replicate until there was a total of 20 organisms in each exposure chamber.

C. Toxicity Testing

Whole sediment toxicity was assessed through a 28-day exposure with the amphipod *L. plumulosus*. Toxicity testing was conducted from October 31, 2006 to November 28, 2006.

The *L. plumulosus* used in testing were obtained from Aquatic Research Organisms, Hampton, NH. At test initiation, the organisms were neonates retained between a 0.25 mm and a 0.6 mm sieve. The *L. plumulosus* were fed 3 times weekly after water renewal. Per test chamber, the diet consisted of 20 mg of TetraMin® slurry on Days 0-13 and 40 mg on Days 14-28.

Sea water from the Manasquan inlet, Manasquan, NJ was used as the overlay water. This was conducted as a static renewal bioassay. Three times per week, 400 ml of water was siphoned and replaced in each test chamber. Water quality parameters including temperature, salinity, dissolved oxygen, and pH were monitored daily prior to water renewal. The test temperature was 25°C ± 3°C. The photoperiod was 16 hours light/8 hours dark, with illumination of 500 to 1000 lux.

IV. RESULTS AND DISCUSSION

The mean control organism survival was 95% (individual replicate survival of 90%, 95%, 100%), which meets the acceptance criteria of at least 80%, with no single replicate having less than 60% survival. It should be noted that 2 of the 5 control replicates, Chamber 17 (0% survival) and Chamber 18 (10% survival), were not used in the survival calculations, because these two replicates had unexplained and isolated toxicity that was not present in the other 3 control replicates nor any of test sediments. For this reason, the 2 control replicates with high mortality were deemed outliers and were not use in the control survival calculations.

The mean number of young per organism in the control was 3.98 (mean number of young per organism per replicate of 4.89, 3.79, and 3.25). Chamber 17 (3.50 mean young per organism) and Chamber 18 (0 mean young per organism) were considered outliers and were not used in the calculations.

The mean growth rate per control organism was 0.051 mg per day (mean growth rate per organism per replicate of 0.054, 0.046, and 0.053 mg per day). Chamber 17 (0.003 mg per day mean growth rate) and Chamber 18 (0 mg per day mean growth rate) were considered outliers and were not used in the calculations.

A standard reference toxicant (SRT) test was performed using cadmium chloride. The reference toxicant data were entered into a program based on currently accepted methods for calculating an LC_{50}. The results of this SRT test can be found in the quality control raw data section along with the control chart. The LC_{50} for the *L. plumulosus* fell within the 95 percent confidence limits of the control chart.

Survival, growth rate, and reproduction can be found in Tables 3 through 5. Biological and water quality raw data can be found in Appendix B. Quality control raw data can be found in Appendix C.

Table 3 **28-Day Live Counts**

28-Day Sediment Exposure Study **Initial Live Count 20**			**Species: *L. plumulosus*** **Job #: 26-349**	
Sample ID	**Code #**	**Chamber #**	**28-Day Live Count**	**% Survival**
Control 20061269	1.1	17*	2	
	1.2	15	18	
	1.3	5	19	
	1.4	12	20	
	1.5	18*	0	95
6A 20061264	2.1	14	20	
	2.2	6	17	
	2.3	3	19	
	2.4	8	16	
	2.5	2	20	92
7A 20061265	3.1	19	20	
	3.2	11	20	
	3.3	4	20	
	3.4	10	18	
	3.5	1	20	98
CA 20061266	4.1	9	18	
	4.2	7	19	
	4.3	16	18	
	4.4	13	19	
	4.5	20	20	94

* Chambers 17 and 18 were considered outliers, therefore were not included in the % survival calculation. (See Results and Discussion section for explanation.)

Table 4 **28-Day Summary of Reproduction**

28-Day Sediment Exposure Stury
Initial Live Count: 20
Species: *L. plumulosus*
Job #: 26-349

Sample	Code	Chamber	Total # Young Day 28	Live Count	Mean # Young per Surviving Adult	Mean
Control 20061269	1.1	17*	7	2	3.50	
	1.2	15	88	18	4.89	
	1.3	5	72	19	3.79	
	1.4	12	65	20	3.25	
	1.5	18*	1	0	—	3.98
6A 20061264	2.1	14	76	20	3.80	
	2.2	6	30	17	1.76	
	2.3	3	100	19	5.26	
	2.4	8	69	16	4.31	
	2.5	2	72	20	3.60	3.75
7A 20061265	3.1	19	16	20	0.80	
	3.2	11	140	20	7.00	
	3.3	4	125	20	6.25	
	3.4	10	119	18	6.61	
	3.5	1	94	20	4.70	5.07
CA 20061266	4.1	9	33	18	1.83	
	4.2	7	32	19	1.68	
	4.3	16	65	18	3.61	
	4.4	13	35	19	1.84	
	4.5	20	45	20	2.25	2.24

* Chambers 17 and 18 were considered outliers, therefore were not included in the mean calculation. (See Results and Discussion section for explanation.)

Table 5 **28-Day Summary of Growth Rate**

28-Day Sediment Exposure Study							**Species:** **Job #:**	***L plumulosus*** **26-349**	
Sample	**Code**	**Chamber**	**Empty Pan Wt.(mg)**	**Pan + Org. Dry Wt. (mg)**	**Dry Wt. of Org.**	**No. Org.**	**Wt. (mg) per Surviving Org.**	***Growth Rate (mg/Org./Day)**	**Mean Growth Rate**
Control 20061269	1.1	17*	1121.27	1121.63	0.36	2	0.180	0.003	
	1.2	15	1131.75	1160.87	29.12	18	1.618	0.054	
	1.3	5	1138.87	1165.28	26.41	19	1.390	0.046	
	1.4	12	1132.90	1164.66	31.76	20	1.588	0.053	
	1.5	18*	—	—	—	—	—	—	0.051
6A 20061264	2.1	14	1132.04	1163.07	31.03	20	1.552	0.052	
	2.2	6	1140.23	1172.94	32.71	17	1.924	0.065	
	2.3	3	1136.88	1171.59	34.71	19	1.827	0.061	
	2.4	8	1129.46	1153.23	23.77	16	1.486	0.049	
	2.5	2	1131.66	1173.95	42.29	20	2.115	0.072	0.060
7A 20061265	3.1	19	1134.34	1171.01	36.67	20	1.834	0.062	
	3.2	11	1138.50	1174.45	35.95	20	1.798	0.060	
	3.3	4	1123.12	1148.19	25.07	20	1.254	0.041	
	3.4	10	1145.63	1175.59	29.96	18	1.664	0.056	
	3.5	1	1133.38	1160.14	26.76	20	1.338	0.044	0.053
CA 20061266	4.1	9	1143.61	1160.62	17.01	18	0.945	0.030	
	4.2	7	1123.62	1146.11	22.49	19	1.184	0.038	
	4.3	16	1123.24	1147.91	24.67	18	1.371	0.045	
	4.4	13	1135.62	1160.17	24.55	19	1.292	0.042	
	4.5	20	1139.93	1167.65	27.72	20	1.386	0.046	0.040

*Growth Rate = mean adult dry weight - mean neonate dry weight (0.106mg)/28

** Chambers 17 and 18 were considered outliers, therefore were not included in the mean growth rate calculation.
(See Results and Discussion section for explanation.)

Appendix A

Chain of Custody
and
Sample Use Forms

Columbia Analytical Services INC.
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CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

8540 Baycenter Rd. • Jacksonville, FL 32256 • (904) 739-2277 • 800-695-7222 x06 • FAX (904) 739-2011

PAGE 1 OF 1

SR #

CAS Contact

Project Name: Brunswick LCP
Project Number:
Project Manager: Curt Rose
Email Address: curtrose@bellsouth.net
Company/Address: CNR Environmental Specialists
Phone #: 954-577-1165
FAX#:
Sampler's Signature:
Sampler's Printed Name:

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	28-d/Leptocheirus test	Toxicity Identification (TIE)		REMARKS/ ALTERNATE DESCRIPTION
PRESERVATIVE									
06291-C-6A		10/18/06		SD	1	1	2		
06291-C-7A		10/18/06		SD		1	2		
06291-CR-CA		10/18/06		SD		1			
				1-gal				5-gal	
				container				containers	

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

SPECIAL INSTRUCTIONS/COMMENTS

① For each of 3 sediments to be evaluated for 28-d amphipod tests → Mix thoroughly → Send subsamples to Columbia Labs for chemical analyses

② For each of 2 sediments to be evaluated in TIE Chemical
→ Combine the 2 5-gal containers + mix thoroughly
→ Conduct TIE and chemical analyses

See QAPP ☐

TURNAROUND REQUIREMENTS
______ RUSH (SURCHARGES APPLY)
______ STANDARD
REQUESTED FAX DATE: Time C
REQUESTED REPORT DATE: ______

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO#
BILL TO:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ______ CUSTODY SEALS: Y N

	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Curt Rose					
Printed Name	CNR Environmental					
Firm						
Date/Time	10/19/06 4PM					

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-01/12/06-07

AQUA SURVEY, INC.
SPECIAL STUDIES DEPARTMENT
SAMPLE USE FORM

Job #: 26-349 **Client:** CDR **ASI Sample #:** 20061264 **Sample ID:** 06291-C-6A

SEDIMENT CHARACTERIZATION

Odor: none

Color: brown

Consistency (sandy, silty, clayey): silty w/ organic debris

HOMOGENIZATION/ COMPOSITING/ AMENDING

Method Used: Drill mixer

Duration of Mixing: ~5 mins

If Composite, list all constituent ASI sample #'s:
(Also provide the amount of each sample used, of the number of cores)

Total Sample Volume: 1 gallon

Date/ Initials: 10/19/06 TD

ELUTRIATE PREPARATION

Water used: site dilution other: N/A

Water Volume Used: N/A

Sediment Volume Used: N/A

Mixing Duration: N/A

Date/ Initials: N/A

RECORD OF SAMPLE USE

DATE	AMOUNT USED	AMOUNT REMAINING	USED FOR	INITIALS
10/19/06	1L	3L	**Chemistry**	TD
10/ /06			**Testing**	
10/ /06			**Archive**	

AQUA SURVEY, INC.
SPECIAL STUDIES DEPARTMENT
SAMPLE USE FORM

Job #: 26-349 Client: CDR ASI Sample #: 2006 1265 Sample ID: 06291-C-7A

SEDIMENT CHARACTERIZATION

Odor: none

Color: brown

Consistency (sandy, silty, clayey): silty/organic matter

HOMOGENIZATION/ COMPOSITING/ AMENDING

Method Used: Drill mixer

Duration of Mixing: ~ 5 mins

If Composite, list all constituent ASI sample #'s:
(Also provide the amount of each sample used, of the number of cores)

Total Sample Volume: 1 gal

Date/ Initials: 10/19 /06 TD

ELUTRIATE PREPARATION

Water used: site dilution other: N/A

Water Volume Used: N/A

Sediment Volume Used: N/A

Mixing Duration: N/A

Date/ Initials: N/A

RECORD OF SAMPLE USE

DATE	AMOUNT USED	AMOUNT REMAINING	USED FOR	INITIALS
10/19/06	1L	3L	**Chemistry**	TD
10/ /06			**Testing**	
10/ /06			**Archive**	

AQUA SURVEY, INC.
SPECIAL STUDIES DEPARTMENT
SAMPLE USE FORM

Job #: 26-349 **Client:** CDR **ASI Sample #:** 20061266 **Sample ID:** 06291-CR-CA

SEDIMENT CHARACTERIZATION

Odor: none

Color: brown

Consistency (sandy, silty, clayey): silty very fine sand

HOMOGENIZATION/ COMPOSITING/ AMENDING

Method Used: Drill mixer

Duration of Mixing: ~5 mins

If Composite, list all constituent ASI sample #'s:
(Also provide the amount of each sample used, of the number of cores)

Total Sample Volume: 1 gallon

Date/ Initials: 10/19/06 TD

ELUTRIATE PREPARATION

Water used: site dilution other: N/A

Water Volume Used: N/A

Sediment Volume Used: N/A

Mixing Duration: N/A

Date/ Initials: N/A

RECORD OF SAMPLE USE

DATE	AMOUNT USED	AMOUNT REMAINING	USED FOR	INITIALS
10/19/06	1L	~3L	**Chemistry**	TD
10/ /06			**Testing**	
10/ /06			**Archive**	

AQUA SURVEY, INC.
SPECIAL STUDIES DEPARTMENT
SAMPLE USE FORM

Job #: 26-349 **Client:** CDR **ASI Sample #:** 20061269 **Sample ID:** Control

SEDIMENT CHARACTERIZATION

Odor: Slight · Moderate Color: Gray black

Consistency (sandy, silty, clayey): Silty Sandy

HOMOGENIZATION/ COMPOSITING/ AMENDING

Method Used: hand Duration of Mixing: ~ 5 mins

If Composite, list all constituent ASI sample #'s:
(Also provide the amount of each sample used, of the number of cores)

Total Sample Volume: ~1 gallon Date/ Initials: 10/27/06

ELUTRIATE PREPARATION

Water used: site dilution other:

Water Volume Used: Sediment Volume Used:

Mixing Duration: Time to Settle:

Centrifuge (if necessary)/ Time (mins)/ @ RPM:

Elutriate Prepared By (name/ date/ time):

RECORD OF SAMPLE USE

DATE	AMOUNT USED	AMOUNT REMAINING	USED FOR	INITIALS
10/27			holding · testing	

Appendix B

Leptocheirus plumulosus Biological and Water Quality Raw Data

Aqua Survey, Inc.
Special Studies Department
Live Count/ Reproduction

Job #: 26-349
Client: CDR

Organism: *L. plumulosus*
Test Start Date: 10/31/06

Day → Chamber ↓	**0**	**28**	
	Live Count	**Live Count**	**Reproduction**
1	20	20	94
2	20	20	72
3	20	19	100
4	20	20	125
5	20	19	72
6	20	17	30
7	20	19	32
8	20	16	69
9	20	18	33
10	20	18	119
11	20	20	140
12	20	20	65
13	20	19	35
14	20	20	76
15	20	18	88
16	20	18	105
17	20	2	7
18	20	0	1
19	20	20	16
20	20	20	45
Initials/ Date	JC 10/31/06	LH 11/28/06 →	

Aqua Survey, Inc.
Special Studies Department

Water Quality

Job #: 26-349 **Organism:** *L. plumulosus*

Client: CDR **Test Start Date:** 10/31/06

Porewater

		INITIAL (Day 0)				FINAL (Day 28)			
Sample	**ASI #**	**Temperature °C**	**Salinity ppt**	**pH**	**NH$_3$ mg/L**	**Temperature °C**	**Salinity ppt**	**pH**	**NH$_3$ mg/L**
Control	#20061269	25.0°C	14.0	7.4	39.9	25.0	20.4	7.4	1.68
CA	20061266	24.9°C	24.0	7.8	4.52	24.9	20.5	7.2	<0.50
6A	20061264	25.0°C	26.5	7.3	9.33	24.9	20.3	7.1	<0.50
7A	20061265	25.0°C	26.5	7.4	4.78	24.9	20.5	7.1	<0.50
Initials/ Date	MJO 8/31/06	MJO 8/31/06	JC 10/31/06	MJO 8/31/06	JC 10/31/06	JC 11/28/06	JC 11/28/06	JC 11/28/06	JC 11/28/06

Overlay

		INITIAL (Day 0)				FINAL (Day 28)			
Sample	**ASI #**	**Temperature °C**	**Salinity ppt**	**pH**	**NH$_3$ mg/L**	**Temperature °C**	**Salinity ppt**	**pH**	**NH$_3$ mg/L**
Control	20061269	24.9	19.0	7.9	4.64	24.60	20.6	7.8	<0.50
CA	20061266	25.1	20.1	8.0	<0.50	24.9	20.6	7.8	<0.50
6A	20061264	24.8	20.4	7.9	1.36	24.9	20.4	7.8	<0.50
7A	20061265	24.8	20.6	7.9	0.85	25.0	20.5	7.8	<0.50
Initials/ Date	MJO 8/31/06	MJO 8/31/06	JC 10/31/06	MJO 8/31/06	JC 10/31/06	JC 11/28/06	JC 11/28/06	JC 11/28/06	JC 11/28/06

Aqua Survey, Inc.
Special Studies Department
Feeding and Exchanges

Job #: 26-349
Client: CDR

Organism: *L. plumulosus*
Test Start Date: 10/31/06

To be performed Monday, Wednesday, and Friday ONLY

Day	Date	Exchanges Manasquan- 20±3ppt (400mL) (Time/ Initials)	Feeding Tetramin Slurry (1mL Days 0-13 - 20mg ~~1~~2mL Days 14-28) 40mg (Time/ Initials)	Notes aeration rat. / bath temp check
0	10/31/06	—	—	M
1	11/1/06	1530 JC	1545 JC	M
2	11/2/06	—	—	M
3	11/3/06	1720 PM	1730 PM	M
4	11/4/06	—	—	M
5	11/5/06	—	—	M
6	11/6/06	1700 JC	1710 JC	M
7	11/7/06	—	—	M
8	11/8/06	1340 JC	1400 JC	M
9	11/9/06	—	—	M
10	11/10/06	1545 [illegible]	1600 M	M
11	11/11/06	—	—	M
12	11/12/06	—	—	
13	11/13/06	1330 JC	1340 JC	JC
14	11/14/06	—	—	JC
15	11/15/06	1415 JC	1430 JC	JC
16	11/16/06	—	—	M
17	11/17/06	0945 JC	0950 JC	JC
18	11/18/06	—	—	JC
19	11/19/06	—	—	JC
20	11/20/06	1100 JC	1110 JC	JC
21	11/21/06	~~1000~~ —	—	JC
22	11/22/06	1000 JC	1015 JC	JC
23	11/23/06	—	—	JC
24	11/24/06	1050 JC	1110 JC	JC
25	11/25/06	—	—	JC
26	11/26/06	—	—	JC
27	11/27/06	1130 [illegible]	1135 [illegible]	[illegible]

Aqua Survey, Inc.
Solid Phase Readings
Bioaccumulation Study

Job #: 26-349 **Test Start Date:** 10/31/06 **Parameter:** Observations
Client: CDR **Organism:** *L. plumulosus*

Key: **D= Dead** **S= Surface/Swimming** **N= Nothing Unusual**

Day ⇒ Chamber ⇓	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5	N	N	N	N	N	N	N	N	N	N	N	N	N	N
6	N	N	N	N	N	N	N	N	N	N	N	N	N	N
7	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	N	N	N	N	N	N	N	N	N	N	N	N	N	N
10	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11	N	N	N	N	N	N	N	N	N	N	N	N	N	N
12	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	N	N	N	N	N	N	N	N	N	N	N	N	N	N
15	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	N	N	N	N	N	N	N	N	N	N	N	N	N	N
17	N	N	N	N	N	N	N	N	N	N	N	N	N	N
18	N	N	N	N	N	N	N	N	N	N	N	N	N	N
19	N	N	N	N	N	N	N	N	N	N	N	N	N	N
20	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Initials/ Date	JC 11/15/06	[illegible] 11/16/06	JC 11/17/06	AW 11/18	AW 11/19	JC 11/20/06	[illegible] 11/21/06	JC 11/22/06	JC 11/23/06	JC 11/24/06	JC 11/25/06	JC 11/26/06	[illegible] 11/27/06	JC 11/28/06

Aqua Survey, Inc.
Special Studies Department

Observations

Job #: 26-349 **Organism:** *L. plumulosus*

Client: CDR **Initial # of Organisms:** 20 **Test Start Date:** 10/31/06

Obeservations Key: D= Dead S=Surface/ Swimming N= Nothing Unusual

Day → Chamber ↓	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	N	N	N	N	N	N	N	N	N	N	N	✓	N	N	N
2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
6	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
10	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
12	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
15	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
17	N	N	N	N	N	N	N	N	1D	N	N	N	N	N	N
18	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
19	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
20	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Initials/ Date	JC 10/31/06	JC 11/1/06	H 11/2/06	H 11/3/06	H 11/4/06	H 11/5/06	JC 11/6/06	JC 11/7/06	JC 11/8/06	H 11/9/06	H 11/10/06	PM 11/11/06	PM 11/12/06	JC 11/13/06	JC 11/14/06

Aqua Survey, Inc.
Special Studies Department

Weight Data Form (Day 28)

Job #: 26-349	**Client:** CDR	**Test Dates:** 10/31-11/28/06
Organism: *L. plumulosus*	**Age of Organism:** Retained between 0.25-0.6 mm screen	**Initial #/ Rep:** 20
Weigh Date: 11/28/06 11/30/06	**Oven:** # 2 **Oven Temp (°C):** 70	**Drying Time (hr):** 24

Chamber #	Wt. Of Oven Dried Pan (mg)	Wt. Of Pan + Oven Dried Organisms (mg)	Dried Wt. Of Organisms (mg)	Number of Surviving Organisms	Mean Wt. Per Surviving Organisms (mg)
1	1133.38	1160.14		20	
2	1131.66	1173.95		20	
3	1136.88	1171.59		19	
4	1123.12	1148.19		20	
5	1138.87	1165.28		19	
6	1140.23	1172.94		17	
7	1123.62	1146.11		19	
8	1129.46	1153.23	①	16	①
9	1143.61	1160.62		18	
10	1145.63	1175.59		18	
11	1138.50	1174.45		20	
12	1132.90	1164.66		20	
13	1135.62	1160.17		19	
14	1132.04	1163.07		20	
15	1131.75	1160.87		18	
16	1123.24	1147.91		18	
17	1121.27	1121.63		2	
18	1136.44	—	—	0	—
19	1134.34	1171.01		20	
20	1139.93	1167.65		20	
Initials/ Date	LAH 11/28/06	LAH 11/30/06	N.A.	LAH 11/28/06	N.A.

① See table 5 in report.
RF 1/4/07

Ref A	1141.27	1141.17
B	1134.53	1134.42
C	1119.29	1119.22
	LAH 11/28/06	LAH 11/30/06

AQUA SURVEY, INC.

CULTURE ORGANISM DISTRIBUTION FORM

DATE: 10/31/06

TEST JOB #: 06-349 CLIENT: CDR

TEST LOCATION: IN-LAB [✓] FIELD [ ]

TEST SPECIES: L. plumulosus

TOTAL NUMBER ORGANSIMS TRANSFERRED: 900+

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS:

A. ORGANISMS

1. ASI CULTURE/ HOLDING UNIT: 11 10 gallon tank
2. RECEIVING LOG #: 06-088
3. CULTURE LOG #: 06-0108
4. AGE/ SIZE INFORMATION: Retained between a 0.25 : 0.6mm sieve

B. HOLDING [✓] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 22.8°C
2. SALINITY: 20.7ppt
3. WATER SOURCE: Manasquan

B. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT
   DATE: 10/31/06
   TIME: 1300
   BY:
2. LIVESTOCK RECEIVING
   DATE: 10/31/06
   TIME: 1300
   BY:
3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS:

REMARKS:

AQUA SURVEY, INC.
CULTURE DEPARTMENT

Organism Receiving Form

Receiving Log #: 26-088 Date: 10/27/06

Shipping Carrier: Fed Ex

Species: L. plumulosus Number Shipped: 900+

Livestock Source/ Shipper: ARO

ASI Order Ref. Date: ASI Order Ref. Initials:

Age/ Characteristics Retained between a 0.25-0.6mm sieve

Taxonomic Verification Log #: 26-088 Date: 10/27/06

Receiving Water Quality Parameters

D.O: 25.8 mg/L Temp.: 80C NH3/NO2: 0/0 pH: 7.5

[✓ Salinity] Hardness 17.2 ppt Alkalinity: 120

Water- [✓ Clear]/ Cloudy Container Size: (1) 1gallon Cubetainer

ICE: [✓ Y]/N Type of Packing: Styrofoam Box

Observation/ Condition of Livestock: appear good

Receiving Tech. Initials: Supervisors Initials:

AQUA SURVEY, INC.
CULTURE DEPARTMENT
GENERAL SPECIES STATUS LOG

Species: L. plumulosus
Receiving [✓] Culture [ ] Log #: 26-088
Test Job #: 26-349
Client: CDR
Dates: 10/27/06 - 10/31/06
Initial Stock @: 900+
Food Type: GORP Slurry

Date	Day Number	Temp/DO	NH_3/NO_2	pH	[✓ Sal]/ Hardness	Alkalinity	Mortality	Remarks/ Initials
10/27/06	1 1130	8.0°C/25.8	0/0	7.5	17.2	120	0	Started acclimation
10/27/06	1 1630	11.0°C/—	—	—	—	—	—	
10/28/06	2	14.8°c/8.1	0/0	8.0	18.6	116	0	Fed Gorp Slurry 75% H2O Exchange
10/29/06	3	18.4°c/7.3	0/0	8.1	20.81	120	0	
10/30/06	4	18.8°C/6.3	1.0/0	7.6	20.8	120	0	75% water Exchange Fed
10/31/06	5	22.8°C/6.4	0.50/0	7.7	20.7	112	0	To test

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Leptochirus plumulosus

Source: Lab reared ✓ Hatchery reared____ Field collected____

Hatch date 09/06 Receipt date____

Lot number 102606 LP Strain____

Brood Origination Chesapeake Bay VA

II. Water Quality

Temperature 23 °C Salinity 15-16 ppt DO Sat

pH 8.0 Hardness NA ppm

III. Culture Conditions

System: SW Static renewal

Diet: Flake Food ✓ Phytoplankton____ Trout Chow ✓

Brine Shrimp____ Rotifers____ Other____

Prophylactic Treatments:____

Comments: <600 ; >300 um

IV. Shipping Information

Client: Aqua Survey # of Organisms: 900+

Carrier: Fed Ex Date Shipped: 10/26/06

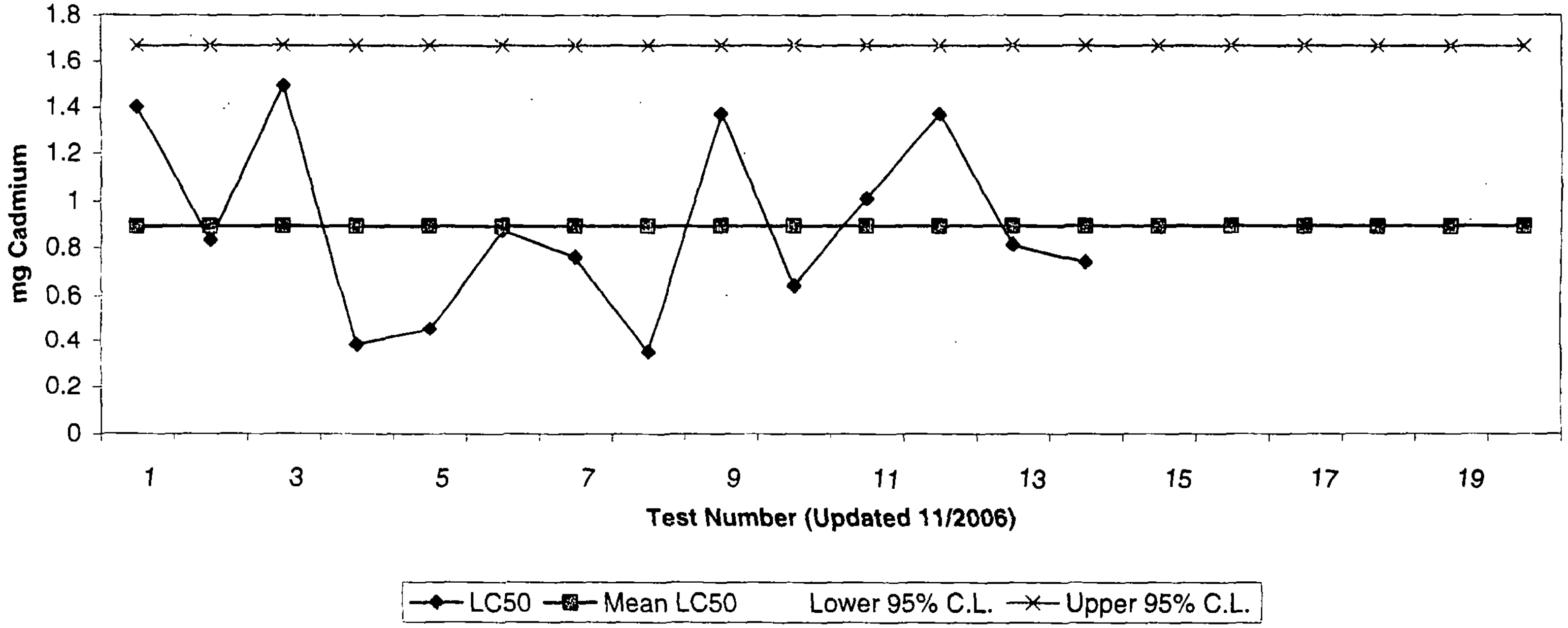
Biologist: Neil Savage

1 - 800 - 927 - 1650

Appendix C

Leptocheirus plumulosus Quality Control Raw Data

Control Chart LC50 Values, Acute SRT With L. plumulosus (ASI Organisms)



SRT

Prep sheet for Saltwater amphipod SRTs

Stock Solution

Add 250 milligrams of Cadmium chloride to 500 mL of Manasquan water.
This will give you a 250 mg Cadmium/L stock solution.

3 replicates per concentration
250 mL per replicate
10 organisms per replicate

Ampelisca abdita

Concentration (mg/L)	Stock (mL)	Total (mL)
0	0	750
0.24	0.72	750
0.48	1.44	750
0.86	2.58	750
1.5	4.5	750
2.8	8.4	750

Salinity 28 +/- 2 ppt
Temp. 20 +/- 2 C

Eohaustorius estuarius

Concentration (mg/L)	Stock (mL)	Total (mL)
0	0	750
2.5	7.5	750
4.5	13.5	750
8	24	750
14.4	43.2	750
26	78	750

Salinity 20 +/- 2 ppt
Temp. 15 +/- 2 C

Leptocheirus plumulosus

Concentration (mg/L)	Stock (mL)	Total (mL)
0	0	750
0.3	0.9	750
0.55	1.65	750
1	3	750
1.8	5.4	750
3.2	9.6	750

Salinity 20 +/- 2 ppt
Temp. 25 +/- 2 C

Rhepoxinius abronius

Concentration (mg/L)	Stock (mL)	Total (mL)
0	0	750
1.2	3.6	750
2.2	6.6	750
4	12	750
7.2	21.6	750
13	39	750

Salinity 28 +/- 2 ppt
Temp. 15 +/- 2 C

Acute Amphipod-96 Hr Survival

Start Date:	11/15/2006	Test ID:	26-349	Sample ID:	REF-Ref Toxicant
End Date:	11/29/2006	Lab ID:	ASI-Aqua Survey Inc.	Sample Type:	CDCL-Cadmium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	LP-Leptocheirus plumulosus
Comments:					

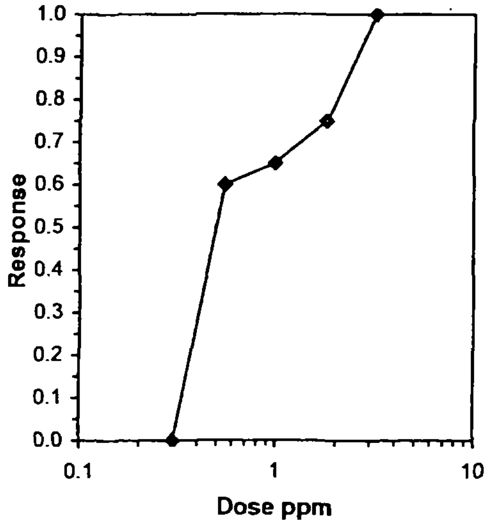
Conc-ppm	1	2
Control	1.0000	1.0000
0.3	1.0000	1.0000
0.55	0.4000	0.4000
1	0.2000	0.5000
1.8	0.3000	0.2000
3.2	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-ppm	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.3	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.55	0.4000	0.4000	0.6847	0.6847	0.6847	0.000	2	12	20
1	0.3500	0.3500	0.6245	0.4636	0.7854	36.430	2	13	20
1.8	0.2500	0.2500	0.5216	0.4636	0.5796	15.723	2	15	20
3.2	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	0.7355	0.5934	0.9116
5.0%	0.7137	0.5632	0.9044
10.0%	0.6901	0.5315	0.8961
20.0%	0.6342	0.4594	0.8755
Auto-0.0%	0.7355	0.5934	0.9116



Reviewed by:

Aqua Survey, Inc.
96-Hour Reference Toxicant Test

Client: CDR 26-349

Toxicant: Cadmium Chloride

Species: L. plumulosus

Test Volume: 250 ml

Start Date: 10/~~30~~ 31/06

Start Time: 1630

End Time: 1500

Water Bath: 2

Sample Concentration (mg/L)	Live Counts				
	0 hours	24 hours	48 hours	72 hours	96 hours
Control A	10	10	10	10	10
Control B	10	10	10	10	10
~~Control C~~					
0.3 A	10	10	10	10	10
B	10	10	10	10	10
0.55 A	10	10	10	9^1	4^5
B	10	10	10	10	4^6
1.0 A	10	10	10	2^8	2
B	10	10	10	6^4	5^1
1.8 A	10	10	10	5^5	3^2
B	10	10	10	4^6	2^2
3.2 A	10	10	10	0^{10}	—
B	10	9^1	9	0^9	—
Date/Initials	10/31/06	11/1/06	11/2/06	11/3/06 PM	11/4/06

AQUA SURVEY, INC.

CULTURE ORGANISM DISTRIBUTION FORM

DATE: 10/31/06

TEST JOB #: 26-349 CLIENT: CDR

TEST LOCATION: IN-LAB [✓] FIELD [ ]

TEST SPECIES: L. plumulosus

TOTAL NUMBER ORGANSIMS TRANSFERRED: 900+

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS: nf

A. ORGANISMS

1. ASI CULTURE/ HOLDING UNIT: 1) 10 gallon tank
2. RECEIVING LOG #: 26-088
3. CULTURE LOG #: 26-0108
4. AGE/ SIZE INFORMATION: Retained between a 0.25 : 0.6 mm seive

B. HOLDING [✓] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 22.8°C
2. SALINITY: 20.7 ppt
3. WATER SOURCE: Manasquan

B. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT
   DATE: 10/31/06
   TIME: 1300
   BY: nf
2. LIVESTOCK RECEIVING
   DATE: 10/31/06
   TIME: 1300
   BY: nf
3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS: nf

REMARKS:

AQUA SURVEY, INC.
CULTURE DEPARTMENT

Organism Receiving Form

Receiving Log #: 26-088 Date: 10/27/06

Shipping Carrier: Fed Ex

Species: L. plumulosus Number Shipped: 900+

Livestock Source/ Shipper: ARO

ASI Order Ref. Date: ASI Order Ref. Initials:

Age/ Characteristics Retained between 0.25-0.6mm sieve

Taxonomic Verification Log #: 26-088 Date: 10/27/06

Receiving Water Quality Parameters

D.O: 25.8 mg/l Temp.: 80°C NH_3/NO_2: 0/0 pH: 7.5

[✓ Salinity]/ Hardness 17.2 ppt Alkalinity: 120

Water- [✓ Clear]/ Cloudy Container Size: (1) 1 gallon Cubetainer

ICE: [✓ Y]/N Type of Packing: Styrofoam Box

Observation/ Condition of Livestock: appear good

Receiving Tech. Initials: Supervisors Initials:

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Leptochirus plumulosus

Source: Lab reared ✓ Hatchery reared ____ Field collected ____

Hatch date 09/06 Receipt date ____

Lot number 102606 LP Strain ____

Brood Origination Chesapeake Bay VA

II. Water Quality

Temperature 23 °C Salinity 15-16 ppt DO Sat

pH 8.0 Hardness NA ppm

III. Culture Conditions

System: SW Static renewal

Diet: Flake Food ✓ Phytoplankton ____ Trout Chow ✓

Brine Shrimp ____ Rotifers ____ Other ____

Prophylactic Treatments: ____

Comments: <600 ; >300 µm

IV. Shipping Information

Client: Aqua Survey # of Organisms: 900 +

Carrier: Fed Ex Date Shipped: 10/26/06

Biologist: Neil Savage

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

AQUA SURVEY, INC.
CULTURE DEPARTMENT
GENERAL SPECIES STATUS LOG

Species: L. plumulosus
Receiving [✓] Culture [ ] Log #: 26-088
Test Job #: 26-349 Client: CDR
Dates: 10/27/06 - 10/31/06
Initial Stock @: 900+
Food Type: Grp Slurry

Date	Day Number	Temp/DO	NH3/NO2	pH	[✓ Sal]/ Hardness	Alkalinity	Mortality	Remarks/ Initials
10/27/06	1 1130	8.0°C/25.8	0/0	7.5	17.2	120	0	Startd acclimation
10/27/06	1 1630	11.0°C/—	—	—	—	—	—	
10/28/06	2	14.8°C/8.1	0/0	8.0	18.6	116	0	Fd Grp Slurry 75% H2O Exchange
10/29/06	3	18.4°C/7.3	0/0	8.1	20.81	120	0	
10/30/06	4	~~2~~18.8°C/6.3	1.0/0	7.6	20.8	120	0	75% water Exchange Fd
10/31/06	5	22.8°C/6.4	0.50/0	7.7	20.7	112	0	To test

SRTLP-0.DAT

	DateTime M/D/Y	Temp C	SpCond uS/cm	Salinity ppt	DO Conc mg/L	pH
0	10/31/06 16:18:27	24.74	32008.0	19.95	6.84	7.80
1	10/31/06 16:19:54	25.01	32145.0	20.04	6.88	7.84
2	10/31/06 16:20:37	25.21	32041.0	19.96	6.61	7.85
3	10/31/06 16:21:04	25.24	32108.0	20.01	6.62	7.86
4	10/31/06 16:21:33	25.32	32148.0	20.04	6.51	7.86
5	10/31/06 16:22:05	25.35	32132.0	20.02	6.43	7.86

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 10/31/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L. plumulosus Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 23 – 27 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Dissolved Oxygen: ☐ >4.0 mg/L ☑ > 3.9 mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☑ 7 to 9

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials:

SRTLP24.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/01/06 09:34:09	25.15	32242.0	20.10	6.01	7.96
1	11/01/06 09:34:58	25.21	32437.0	20.24	6.21	7.96
2	11/01/06 09:35:17	25.24	32418.0	20.22	6.02	7.96
3	11/01/06 09:35:45	25.25	32433.0	20.23	5.98	7.96
4	11/01/06 09:36:29	25.22	32486.0	20.27	5.84	7.96
5	11/01/06 09:37:06	25.22	32496.0	20.28	5.84	7.95

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/1/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☐ OTHER: ________ Day of Study: 24h

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☐ > _____ mg/L

pH: ☑ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials

SRTLP-48.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/02/06 09:27:23	24.30	32375.0	20.21	6.39	7.95
1	11/02/06 09:28:26	24.82	32595.0	20.35	6.44	7.95
2	11/02/06 09:29:20	25.06	32512.0	20.29	6.37	7.96
3	11/02/06 09:29:59	25.22	32437.0	20.24	6.33	7.96
4	11/02/06 09:30:32	25.29	32570.0	20.33	6.32	7.97
5	11/02/06 09:31:05	25.25	32568.0	20.33	6.33	7.96

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/2/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L. plumulosus Day of Study: 48 hrs

OPERATIONAL RANGE: Check if OK

Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 23 – 27 °C	Meter Used:	
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 18 – 22 ppt	Blue	☐
Dissolved Oxygen:	☐ >4.0 mg/L	☑ >3.9 mg/L		Red	☐
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☑ 7 to 9	Green	☑

Actions taken:

See deviation summary sheet ☐

Initials:

SRTLP72.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/03/06 12:24:52	24.34	33493.0	20.98	6.71	7.97
1	11/03/06 12:25:43	24.57	33280.0	20.83	6.68	8.00
2	11/03/06 12:26:04	24.66	32982.0	20.62	6.71	8.01
3	11/03/06 12:26:38	24.66	32859.0	20.54	6.68	8.01
4	11/03/06 12:27:13	24.65	32995.0	20.63	6.68	8.00
5	11/03/06 12:27:37	24.68	32621.0	20.37	6.63	7.97

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp Day of Study: 72hrs

OPERATIONAL RANGE: Check if OK

				Meter Used:	
Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C	Blue	☐
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 18 – 22 ppt	Red	☐
Dissolved Oxygen:	☐ >4.0 mg/L	☑ > 3.6 mg/L		Green	☑
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☑ 7 to 9		

Actions taken:

See deviation summary sheet ☐

Tue Nov 07 14:39:22 2006

Page 1 of 1

Pages: 1

SRTLP96.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/04/06 11:59:01	25.10	33626.0	21.06	6.45	7.95
1	11/04/06 11:59:54	25.22	33305.0	20.83	6.64	7.94
2	11/04/06 12:00:13	25.34	33397.0	20.90	6.47	7.93
3	11/04/06 12:00:38	25.33	33239.0	20.79	6.35	7.92
4	11/04/06 12:01:09	25.21	33260.0	20.80	6.35	7.90
5	11/04/06 12:01:36	25.19	33524.0	20.99	6.33	7.89

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☒ OTHER: Acute Date: 11/4/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☒ OTHER: Lp Day of Study: 96hr

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☒ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☒ 18 – 22 ppt

Dissolved Oxygen: ☐ >4.0 mg/L ☒ >3.6 mg/L

pH: ☐ 7.3 to 8.3 ☒ ~~6~~7.0 to 9.0 ☐ ____ to ____

Blue ☐

Red ☐

Green ☒

Actions taken:

See deviation summary sheet ☐

Initials:

CDR Appendix

B. TOXICITY IDENTIFICATION EVALUATION
(AQUA SURVEY)

Aqua Survey, Inc.

Volume I

TOXICITY IDENTIFICATION EVALUATION REPORT

TIE Study using *Leptocheirus plumulosus* On Pore Waters from Sediments from the LCP Chemical Site in Brunswick, Georgia

Prepared for

CDR Environmental Specialists, Inc.
6001 N. Ocean Drive
Unit 1103
Hollywood, FL 33019-4618

Prepared by

Aqua Survey, Inc.
469 Point Breeze Road
Flemington, NJ 08822

February 16, 2007

ASI Job No. 26-349

469 Point Breeze Road
Flemington, NJ 08822

Phone: 908-788-8700
Fax 908-788-9165
mail@aquasurvey.com
www.aquasurvey.com

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Tables

Appendices

Volume II

Alpha Woods Hole Chemical Analysis of Sediment

Volume III

Alpha Woods Hole Chemical Analysis of Pore Water

Signature Page

TIE Study using *Leptocheirus plumulosus* On Pore Waters from Sediments from the LCP Chemical Site in Brunswick, Georgia

Prepared for

CDR Environmental Specialists, Inc.
6001 N. Ocean Drive
Unit 1103
Hollywood, FL 33019-4618

This report, as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc, 469 Point Breeze Road, Flemington, New Jersey, 08822.

Robert M Fristrom 2/16/07

Robert M. Fristrom Date
Quality Assurance Officer

Michelle Thomas 2/16/07

Michelle Thomas Date
Laboratory Manager

Jon Doi 2-16-07

Jon Doi, Ph.D. Date
Executive Vice President

I. EXECUTIVE SUMMARY

A toxicity identification evaluation (TIE) study was conducted on pore waters produced from sediments from the LCP Chemical Site in Brunswick, Georgia.

The results of the 10-day *Leptocheirus plumulosus* acute test on the two sediment samples from the LCP site, C-6 and C-7, showed no statistical difference in survival or reburial rates when compared to the control sediment. All endpoints fell within 86.0% to 93.0% for all sediments (tests and control) tested.

Pore waters produced from the two LCP sediment samples in the TIE study were evaluated with *L. plumulosus* in toxicity tests that ran from 4 to 10 days. The results from Day 4 showed there was no difference in toxicological response between the two LCP pore water samples compared to the control water. This was true for both the 25% and 100% pore water concentrations. Up to Day 7, there was still little difference in toxicological response between the two LCP pore waters and the control water. On Day 8 there appears to be a slight difference in toxicological response between the two LCP 100% pore waters and the control water. By Day 9 there was significant mortality in the control water.

The TIE treatments on the two LCP pore water samples yielded little useful information, because the untreated pore water samples were basically non-toxic. The TIE treatments are designed to remove toxicity from the untreated water, but if the untreated water is basically non-toxic, then there is nothing to remove. This turned out to be a fortunate occurrence, because the first TIE treatment in a series of five treatments (thiosulfate followed by EDTA, filtering, passage through C-18, and treatment with ulva / pH manipulations) had considerable control mortality. All subsequent treatments showed the same high control mortality, because manipulations were carried out in a serial fashion.

The conclusion of this TIE study is that neither the two LCP sediment samples nor the pore waters produced from these sediments showed acute toxicity to the amphipod, *Leptocheirus plumulosus*.

Chemical analysis of both the LCP sediment samples and subsequently-produced pore waters were conducted. Evaluation of the analytical results is beyond the scope of our work and is left up to the client.

II. PROLOGUE

During the fall of 2006 an ecological investigation was planned for the estuary at the LCP Chemical Site in Brunswick, Georgia. This investigation was designed to serve as a continuation of the annual monitoring program that has been conducted at the LCP Site since 2002 and, additionally, to resolve specific issues that have been raised during previous monitoring investigations and/or by various parties regarding environmental conditions in the estuary.

The major unresolved issue in previous monitoring investigations is the cause of toxicity of surface sediment to organisms (amphipods and grass shrimp) tested for toxicity in the laboratory (e.g. CDR Environmental Specialists and MWH Americas, 2006). None of LCP Chemical Site's chemicals of potential concern (COPC) – mercury, Aroclor 1268, lead, and PAHs – have been statistically associated with observed toxicity. However, various chemical and biological sources of variation may confound identification of such relationships. Conversely, statistical evaluations of the results of "field" toxicity tests with indigenous grass shrimp have unambiguously indicated the absence of COPC-related (or other) toxicity.

The parties whose environmental concerns are being addressed in this document are the Natural Resource Damage Assessment (NRDA) Trustees for the LCP Site, Region 4 of the U. S. Environmental Protection Agency (EPA), and Stakeholders involved with the site.

III. INTRODUCTION

Aqua Survey, Inc. (ASI) conducted a Toxicity Identification Evaluation (TIE) study on pore waters from sediments from the LCP chemical site in Brunswick, Georgia using the amphipod, *Leptocheirus plumulosus*.

The TIE was employed in several ways to address the causes of toxicity in the LCP sediment samples. First, the bulk sediment samples was evaluated for the usual chemical constituents (grain size, TOC, and COPC [total mercury, Aroclor 1268, lead, and total PAHs]), 21 secondary metals and also for SEM/AVS.

L. plumulosus were then exposed in the laboratory under static conditions to sediments from two stations – Site Stations C-6 and C-7 in the Eastern Creek from the LCP chemical site in Brunswick, Georgia and a control sediment for a period of ten days. Measurement endpoints are survival and, secondarily, reburial of surviving amphipods.

L. plumulosus acute bioassay tests with pore waters from the two test sediments and control sediment were conducted from 4 to 10 days. The measurement endpoint is survival.

Eight treatments (manipulations) of each sample of pore water (including baseline tests) were conducted with amphipods as illustrated in **Figure 1**. Each pore-water treatment (and a negative control) was conducted, after appropriate salinity adjustments, under static conditions from 4 to 10 days. Both 100% and 25% pore water concentrations were tested. The measurement endpoint is survival.

The following chemical/physical measurements were taken on a daily basis for each pore-water treatment: temperature, salinity, dissolved oxygen and pH. In addition, each batch of pore water (baseline and treated batches) was analyzed for COPC (total

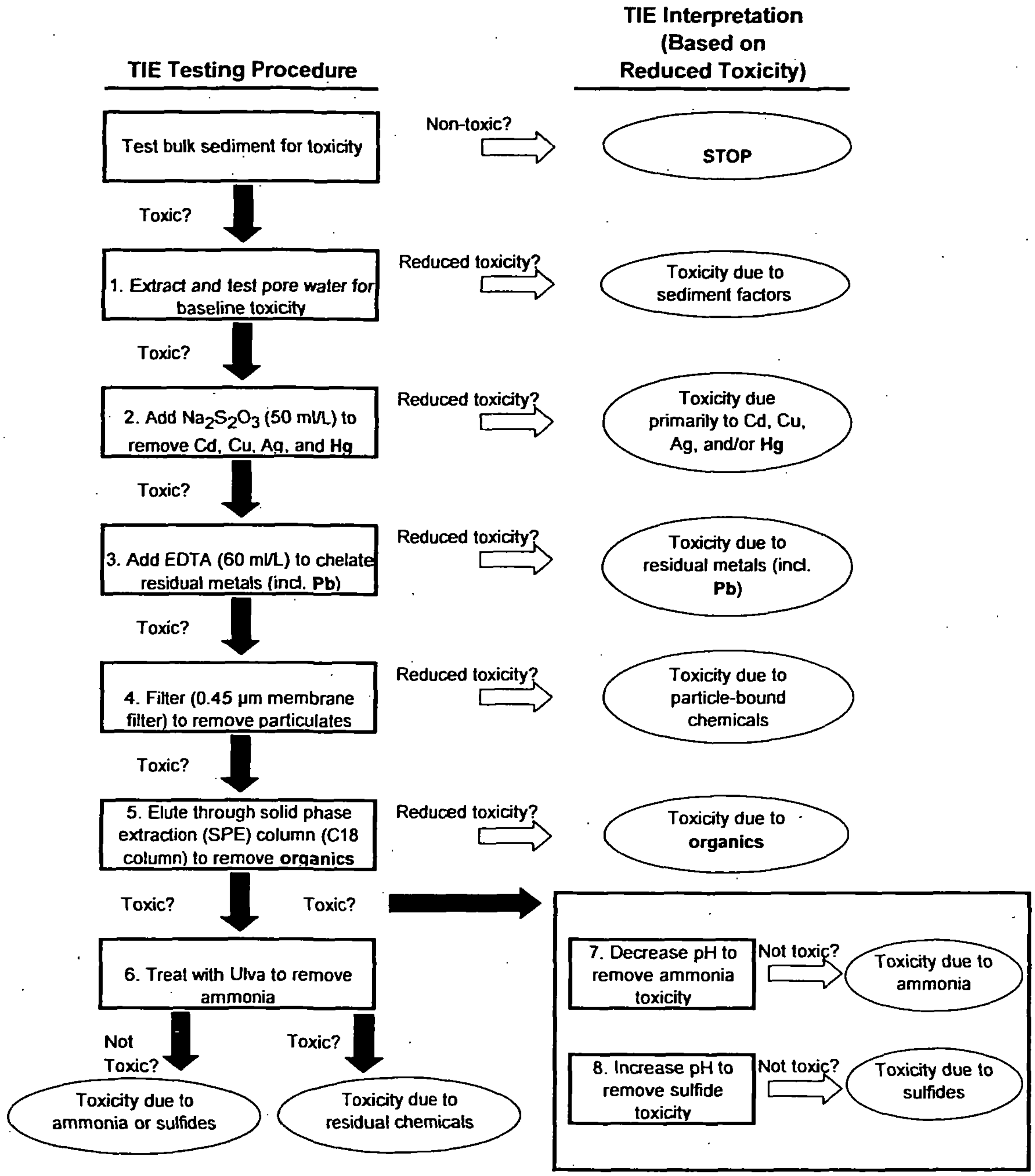

Figure 1 Toxicity Identification Evaluation (TIE) for sediment of estuary at LCP Site (adopted from Science Applications International, 2003). Refer to text for additional discussion regarding these and other procedures as applied to marine sediment.

mercury, Aroclor 1268, lead, and total PAHs), 21 secondary metals, total ammonia, total sulfides, total organic carbon (TOC) and dissolved organic carbon (DOC).

The TIE is interpreted by comparing concentrations of chemicals in baseline batches of pore water to established water quality criteria to assist in identifying bioavailable toxic agents (agents not sequestered by variable site-specific sediment characteristics such as TOC and/or AVS). In addition, the TIE differentiates among toxicity caused by metals, nonpolar organic chemicals, and ammonia-type groups; and, together with the above-referenced SEM/AVS measurements, addresses differential toxicity of mercury and lead.

IV. SOURCE OF SEDIMENT AND DILUTION WATER

A. Sediment Samples

Two sediment samples from the LCP chemical site were collected by CDR Environmental Specialists personnel on October 18, 2006. The samples were shipped overnight following chain of custody procedures. The samples were received at ASI in good condition. The chains of custody can be found in Appendix A.

B. Dilution Water

The dilution water used both for acclimation and testing, was from the Manasquan Inlet in New Jersey. Sample Receiving Forms and chemical analysis raw data is found in Appendix B.

V. TEST METHODS

A. Methods

The test method used for the marine sediment 10-day acute bioassay study was the *Method for Assessing Toxicity of Sediment Associated Contaminants with Estuarine and Marine Amphipods*, EPA 600/R-94-025, June 2004. Each sediment test consisted of five replicates. In each replicate, 20 amphipods were exposed to 2 cm of sediment and 800 ml of control water in a 1-liter glass beaker. The endpoints were survival and reburial rate.

The test method used for the pore water TIE study was the methodology described in Region 9; SOP 1003, as supplemented by procedures identified by Adams et al. (Adams, W. J., W. J. Berry, G. A. Burton Jr., K. Ho, D. MacDonald, R. Scroggins, and P. V. Winger. 2001. Summary of a SETAC technical workshop – pore water toxicity testing: biological, chemical, and ecological considerations with a review of methods and applications, and recommendations for future areas of research. Edited by R. S. Carr and M. Nipper. SETAC Publication. 24 pp.) and

SAIC (Science Applications International. 2003. Guide for planning and conducting sediment pore water toxicity identification evaluations to determine causes of acute toxicity at Navy aquatic sites. User's Guide UG-2052-ENV. March 2003. Naval Facilities Engineering Service Center. Port Hueneme, CA. 6 sections). The *Marine Toxicity Identification Evaluation (TIE) Phase I Guidance Document*, fifth edition, September 1996, EPA/600/R-96-054 was also used as reference. Eight treatments (manipulations) of each sample of pore water (including baseline tests) were conducted with amphipods as illustrated in **Figure 1.** Each pore-water treatment (and a negative control) was conducted, after appropriate salinity adjustments, under static conditions from 4 to 10 days; and each treatment consisted of two concentrations of pore water (100 and 25% pore water), with three replicates per concentration. Each replicate consisted of 10 amphipods placed in a 9 ounce polyethylene container containing 100 ml of test material. Measurement endpoint was survival. A positive control test was conducted with cadmium chloride.

B. Sample Preparation

Upon arrival at the laboratory, the LCP Chemical Site sediment samples were logged in and unique ASI numbers were assigned. The pore waters were separated from the sediments by centrifuging and were also assigned unique ASI numbers.

Table 1 provides sample identification numbers.

Table 1. Sample Identification

Sample Name	ASI #	Sample Type
C7-A	20061298	sediment
C6-A	20061299	sediment
C6-A pore water	20061301	pore water
C7-A pore water	20061300	pore water

C. Test Parameters

The Solid Phase Acute 10 day test was started on November 3, 2006 and terminated on November 13, 2006. The TIE tests were started on November 3, 2006 and terminated on November 13, 2006. All tests were conducted with a photoperiod of 16 hours light and 8 hours dark.

For the Solid Phase Acute 10 Day test, the chambers were 1-L glass beakers. Overlay water was Manasquan inlet water. There were 20 organisms per chamber and 5 replicates per sediment and control.

All water quality parameters (temperature, salinity, dissolved oxygen and pH) were monitored daily. The temperature and salinity recorded for the tests are listed in Table 2. Complete water quality readings can be found in Appendix C.

Table 2. Summary of Solid Phase Acute 10 Day Test Temperature and Salinity Readings

Sample	Temperature °C	Salinity ppt
Control mean	24.3	24.8
Control range	24.2-24.5	24.4-25.3
C-6 mean	24.4	23.6
C-6 range	24.0-24.8	10.6-25.4
C-7 mean	24.4	24.5
C-7 range	24.0-24.9	24.1-25.0

For the TIE tests, the test chambers were made of polyethylene terephthalate (PETE). The chamber size was 9 oz. and the test solution volume was 100 ml per chamber. There were 10 organisms per chamber and 3 replicates per treatment. The tests were each run with a dilution water control and test concentrations of 25 and 100 percent.

Water quality parameters (temperature, salinity, dissolved oxygen and pH) were monitored at 0 hours for all manipulations. The temperature and salinity recorded for the tests are listed in Table 3.

Table 3. TIE Pore Water Tests Temperature and Salinity Readings

Sample	Temperature °C	Salinity ppt
Control mean	24.3	24.8
Control range	24.2-24.5	24.4-25.3
C-6 25% mean	24.4	25.1
C-6 25% range	24.0-24.8	24.5-25.4
C-6 100% mean	24.4	24.4
C-6 100% range	24.1-25.2	24.2-25.2
C-7 25% mean	24.3	25.0
C-7 25% range	24.0-24.7	24.6-25.3
C-7 100% mean	24.4	24.5
C-7 100% range	24.0-24.9	24.1-25.0

VI. TEST ORGANISMS

A. *Leptocheirus plumulosus*

The *Leptocheirus plumulosus* used in testing were obtained from Aquatic Research Organisms, Hampton, NH. The taxonomic key use for species identification was *Shallow Water Gammaridean Amphipoda of New England*, Bousfield, 1970. The organisms were acclimated for 48 hours at a mean temperature of 20.8 °C (range 14.6 °C to 25.0 °C). The mean salinity was 21.0 ppt (range 18.5 ppt to 24.5 ppt).

VII. TEST PROCEDURES

A. Solid Phase 10-day Acute *L plumulosus* Bioassay Test

The solid phase 10-day acute *Leptocheirus plumulosus* bioassay test was run according to the test method described in Section V.

B. Pore Water TIE *L. plumulosus* Bioassay Tests

The pore water TIE *Leptocheirus plumulosus* bioassay test was run according to the test method described in Section V. It is important to note that unlike the US EPA TIE guidance manual, this study followed the EPA, Region 9; SOP 1003 methodology in which TIE manipulations (shown in Figure 1) were run in consecutive fashion, i.e., each TIE manipulation in order was run on the same sample as the previous manipulation. In the US EPA TIE guidance manual, each TIE manipulation is run as a separate test.

VIII. QUALITY ASSURANCE

Standard Reference Toxicant Tests

A standard reference toxicant (SRT) test was conducted for each test/species according to the EPA method, *Marine Toxicity Identification Evaluation (TIE) Phase I Guidance Document*, fifth edition, September 1996, EPA/600/R-96-054.

The reference toxicant used was cadmium chloride (CdCl) supplied by Sigma-Aldrich, and the dilution water used was Manasquan water. The SRT test was initiated on November 3, 2006 and terminated on November 7, 2006.

The results are listed in Table 4.

Table 4. Acute SRT Test Results

Species	LC_{50}	Lower Control Limit	Upper Control Limit
L. plumulosus (Cd mg/L)	0.98	0.16	1.6

IX. RESULTS

Summary of Results

The 10-day acute *Leptocheirus plumulosus* test results for the two LCP sediment samples are summarized in Table 5. An ANOVA statistical analysis was run comparing the sediments to a control for both survival and reburial. There was no statistical difference for either endpoint. The raw data associated with these toxicity tests can be found in Appendix C.

The 4-10 day acute *Leptocheirus plumulosus* test results for the pore waters generated from the two LCP sediments in the TIE study are summarized in Tables 6 - 14. The raw data associated with these pore water TIE toxicity tests can be found in Appendix D.

The bulk sediment chemical results for the two sediment samples from the LCP site are summarized in Table 15. Grain size distribution results for the two sediment samples from the LCP site are summarized in Table 16. The complete analytical data package can be found in Volume II.

The pore water chemical results from the two LCP sediment samples are summarized in Tables 17. The complete analytical data package can be found in Volume III.

Solid Phase 10-day Acute *L. plumulosus* Toxicity Results

Table 5. Results of 10-day Acute *L. plumulosus* Test on LCP Sediments

Sediment Identification	Average Percent Survival	Average Percent Reburial
Control	91 %	91 %
6A	93 %	92 %
7A	88 %	86 %

Pore Water TIE *L. plumulosus* Toxicity Results

The following tables show the results from the TIE Study following the schematic in Figure 1. Note that the "No Treatment" toxicity data was reported from Days 4-10, the "Thiosulfate Treatment" from Days 2-10 and the remaining TIE treatments from Days 1-4.

Pore Water 4-10 day Acute *L. plumulosus* Bioassay Results – No Treatment

Table 6. Results of TIE Study on Pore Waters from LCP Sediments – No Treatment

Sediment ID	**Average Percent Survival**						
	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Control	96.7	93.3	93.3	93.3	93.3	53.3	23.3
C-6; 25% pore water	100	86.7	86.7	86.7	76.7	70.0	63.3
C-6; 100% pore water	96.7	93.3	93.3	93.3	86.7	83.3	80.0
C-7; 25% pore water	100	100	100	100	86.7	73.3	53.3
C-7; 100% pore water	93.3	80.0	80.0	80.0	73.3	70.0	60.0

Pore Water 2-10 day Acute *L. plumulosus* Bioassay Results – Thiosulfate Treatment

Table 7. Results of TIE Study on Pore Waters from LCP Sediments – After Thiosulfate

Sediment ID	**Average Percent Survival**								
	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Control	93.3	73.3	60.0	46.73	10.0	0.00	0.00	0.00	0.00
C-6; 25% pore water	93.3	86.7	86.7	86.7	83.3	80.0	80.0	73.3	53.3
C-6; 100% pore water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-7; 25% pore water	90.0	66.7	66.7	63.3	63.3	63.3	60.0	53.3	43.3
C-7; 100% pore water	86.7	16.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Pore Water 1-4 day Acute *L. plumulosus* Bioassay Results – EDTA Treatment

Table 8. Results of TIE Study on Pore Waters from LCP Sediments – After EDTA

Sediment ID	Average Percent Survival			
	Day 1	Day 2	Day 3	Day 4
Control	100	100	60.0	10.0
C-6; 25% pore water	100	63.3	13.3	0.00
C-6; 100% pore water	100	3.33	0.00	0.00
C-7; 25% pore water	100	73.3	13.3	0.00
C-7; 100% pore water	100	80.0	10.0	0.00

Pore Water 1-4 day Acute *L. plumulosus* Bioassay Results – Filtering Treatment

Table 9. Results of TIE Study on Pore Waters from LCP Sediments – After Filtering

Sediment ID	Average Percent Survival			
	Day 1	Day 2	Day 3	Day 4
Control	100	96.7	46.7	0.00
C-6; 25% pore water	100	93.3	50.0	0.00
C-6; 100% pore water	100	76.7	0.00	0.00
C-7; 25% pore water	100	93.3	73.3	50.0
C-7; 100% pore water	100	93.3	53.3	0.00

Pore Water 1-4 day Acute *L. plumulosus* Bioassay Results – C-18 Treatment

Table 10. Results of TIE Study on Pore Waters from LCP Sediments – After C-18

Sediment ID	Average Percent Survival			
	Day 1	Day 2	Day 3	Day 4
Control	100	96.7	53.3	10.0
C-6; 25% pore water	100	100	46.7	3.33
C-6; 100% pore water	100	90.0	6.67	0.00
C-7; 25% pore water	100	100	43.3	33.3
C-7; 100% pore water	100	93.3	43.3	6.67

Pore Water 1-4 day Acute L. plumulosus Bioassay Results – pH Treatments

Table 11. Results of TIE Study on Pore Waters from LCP Sediments – After pH 7

Sediment ID	Average Percent Survival			
	Day 1	Day 2	Day 3	Day 4
Control	100	100	63.3	6.67
C-6; 25% pore water	100	100	63.3	3.33
C-6; 100% pore water	100	93.3	0.00	0.00
C-7; 25% pore water	100	96.7	56.7	36.7
C-7; 100% pore water	100	100	53.3	23.3

Table 12. Results of TIE Study on Pore Waters from LCP Sediments – After pH 9

Sediment ID	Average Percent Survival			
	Day 1	Day 2	Day 3	Day 4
Control	100	100	56.7	0.00
C-6; 25% pore water	100	96.7	36.7	3.33
C-6; 100% pore water	100	100	6.67	0.00
C-7; 25% pore water	100	66.7	36.7	36.7
C-7; 100% pore water	100	50.0	0.00	0.00

Pore Water 1-4 day Acute *L. plumulosus* Bioassay Results – Ulva Treatment

Table 13. Results of TIE Study on Pore Waters from LCP Sediments – After Ulva

Sediment ID	Average Percent Survival			
	Day 1	Day 2	Day 3	Day 4
Control	100	63.3	20.0	3.33
C-6; 25% pore water	100	73.3	33.3	10.0
C-6; 100% pore water	100	53.3	26.7	0.00
C-7; 25% pore water	100	76.7	40.0	13.3
C-7; 100% pore water	100	56.7	26.7	0.00

Summary of Chemical and Physical Analysis Results of Test Sediments

Table 15 on page 18 shows the chemical analysis results for the two LCP sediment samples, C-6 and C-7. Table 16 on page 20 shows the grain size distribution for the two LCP sediment samples, C-6 and C-7.

Summary of Chemical Analysis Results of Pore Waters from Test Sediments

Tables 17 on pages 21-23 show the chemical analysis results for the pore waters from the two LCP sediment samples C-6 and C-7 before and taken through the TIE process.

The dilution factors associated with organic chemical analysis on the pore waters is shown in Table 14. There is a "Sample Size Dilution" factor, because less than 1000 ml of pore water was available to the analytical laboratory and a "Dilution from Interference" factor, because there was a sulfur interference in the PCB Aroclor analyses, which cause the analytical laboratory to dilute the samples by a factor of 5.

Table 14. Dilution Factors Associated with Organic Chemical Analysis Results

Sample	Analyte Class	Sample Size Dilution	Dilution from Interference	Total Dilution
C7-A pore water	PAHs	2.2	1	2.2
C7-A after C-18	PAHs	37	1	37
C6-A pore water	PAHs	1.1	1	1.1
C6-A after TIE manipulations	PAHs	1.4	1	1.4
C7-A pore water	PCB Aroclors	2.2	1	2.2
C7-A after C-18	PCB Aroclors	27	5	185
C6-A pore water	PCB Aroclors	1.1	1	1.1
C6-A after TIE manipulations	PCB Aroclors	1.43	5	7.1

X. DISCUSSION

The results of the 10-day *Leptocheirus plumulosus* acute test on the two sediment samples from the LCP site, C-6 and C-7, showed no statistical difference in survival or reburial rates when compared to our control sediment. All endpoints fell within 86.0% to 93.0% for all sediments (tests and control) tested.

Pore waters produced from the two LCP sediment samples in the TIE study were evaluated with *L. plumulosus* in toxicity tests that ran from 4 to 10 days. The results from

Day 4 showed there was no difference in toxicological response between the two LCP pore water samples, C-6 and C-7, compared to the control water. This was true for both the 25% and 100% pore water concentrations. Up to Day 7, there was still little difference in toxicological response between the two LCP pore waters and the control water. On Day 8 there appears to be a slight difference in toxicological response between the two LCP 100% pore waters and the control water. By Day 9 there was significant mortality in the control water.

The TIE treatments, adding thiosulfate, adding EDTA, filtering through a 0.45 μm filter, passing through a C-18 column, adjusting the pH to values of 7 and 9, and adding ulva to the effluent, carried out sequentially on the two LCP pore water samples yielded little useful information, because the untreated pore water samples, C-6 and C-7, were basically non-toxic. The TIE treatments are designed to remove toxicity from the untreated water, but if the untreated water is non-toxic, then there is nothing to remove. This turned out to be fortunate, because the first TIE treatment in a series of five treatments (thiosulfate) had considerable control mortality. All subsequent treatments showed the same high control mortality, because manipulations were carried out in a sequential fashion. It is believed that the high control mortality in the thiosulfate manipulation occurred, because although the volume of thiosulfate to be added to the pore water samples was stated in the SAIC document, the concentration of the thiosulfate was not. The concentration used in the TIE manipulation came from the US EPA Marine TIE Guidance Manual. However, the volume added in EPA guidance manual was much lower than stated in the SAIC document. For this reason, we believe that the volume of thiosulfate added in this TIE manipulation step at the concentration used was too high and caused the excess control mortality. Once the pore water was toxic due to high thiosulfate concentration, it remained toxic for the rest of the manipulations done sequentially. That is why the TIE manipulations in Tables 8-13 were shown only to Day 4, because by then, the controls were mostly deceased.

Chemical analysis of both the LCP sediment samples and subsequently-produced pore waters before and after TIE manipulations were conducted. Evaluation of the analytical results is beyond the scope of our work and is left up to the client.

XI. CONCLUSIONS

The results of the 10-day *Leptocheirus plumulosus* acute test on the two sediment samples from the LCP site, C-6 and C-7, showed no statistical difference in survival or reburial rates when compared to the control sediment.

The pore waters generated from the two sediment samples from the LCP site, C-6 and C-7, showed no acute toxicity through Day 7.

Chemical analysis of both the LCP sediment samples and subsequently-produced pore waters were conducted. Evaluation of the analytical results is beyond the scope of our work and is left up to the client.

Table 15 Semivolatile Analysis of Bulk Sediment

ASI Job #26-349	Sediment (Units:ug/kg)		Sediment (Units:ug/kg)	
ASI ID #	20061298		20061299	
Laboratory ID #	0611050-01		0611050-02	
Sample ID #	C7-A	Q	C6-A	Q
Naphthalene	12	ND	12	ND
2-Methylnaphthalene	12	ND	12	ND
1-Methylnaphthalene	12	ND	12	ND
Biphenyl	12	ND	12	ND
2,6-Dimethylnaphthalene	33		43	
Acenaphthylene	24		15	
Acenaphthene	12	ND	12	ND
Fluorene	12	ND	12	ND
2,3,5-Trimethylnaphthalene	12	ND	12	ND
Phenanthrene	29		26	
Anthracene	67		56	
1-Methylphenanthrene	12	ND	12	ND
Fluoranthene	170		150	
Pyrene	160		310	
Benz[a]anthracene	96		120	
Chrysene	100		150	
Benzo[b]fluoranthene	120		180	
Benzo[k]fluoranthene	230		380	
Benzo[e]pyrene	130		70	
Benzo[a]pyrene	94		180	
Perylene	55		50	
Indeno[1,2,3-cd]pyrene	64		120	
Dibenz[a,h]anthracene	21		72	
Benzo[g,h,i]perylene	71		190	

PCB/Aroclor Analysis of Bulk Sediment

ASI Job #26-349	Sediment (Units:ug/kg)		Sediment (Units:ug/kg)	
ASI ID #	20061298		20061299	
Laboratory ID #	0611050-01		0611050-02	
Sample ID #	C7-A	Q	C6-A	Q
Aroclor 1016	120	ND	120	ND
Aroclor 1221	120	ND	120	ND
Aroclor 1232	120	ND	120	ND
Aroclor 1242	120	ND	120	ND
Aroclor 1248	120	ND	120	ND
Aroclor 1254	120	ND	120	ND
Aroclor 1260	120	ND	120	ND
Aroclor 1262	120	ND	120	ND
Aroclor 1268	13,000		28,000	
Total Arochlor(SUM)	13,960		28,960	

Table 15 continued **Metal Analysis of Bulk Sediment**

ASI Job #26-349	Sediment (Units:mg/kg)		Sediment (Units:mg/kg)		Sediment (Units:mg/kg)	
ASI ID #	**20061298**		**20061298 dup**		**20061299**	
Laboratory ID #	**0611050-01**		**0611050-01 dup**		**0611050-02**	
Sample ID #	**C7-A**	**Q**	**C7-A dup**	**Q**	**C6-A**	**Q**
Aluminum	17,000		19,000		16,000	
Antimony	0.11	ND	0.11	ND	0.1	ND
Arsenic	14		13		12	
Barium	25		25		21	
Beryllium	1.5		1.6		1.5	
Cadmium	0.23		0.20		0.2	
Calcium	7,600		8,000		4,600	
Chromium	53		55		46	
Cobalt	7.3		7.4		6	
Copper	13		13		12	
Iron	26,000		27,000		22,000	
Lead	22		21		24	
Magnesium	8,000		8,200		6,900	
Manganese	470		470		310	
Mercury	3.7				13	
Nickel	12		13		11	
Potassium	3800		4,000		3400	
Selenium	2.5		2.5		2.2	
Silver	0.20		0.20		0.19	
Sodium	24,000		24,000		23,000	
Thallium	0.23		0.18		0.28	
Vanadium	57		59		47	
Zinc	83		81		68	

AVS and SEM Analysis of Bulk Sediment

ASI Job #26-349	Sediment (Units:umol/g)		Sediment (Units:umol/g)		Sediment (Units:umol/g)	
ASI ID #	**20061298**		**20061298 dup**		**20061299**	
Laboratory ID #	**0611050-01**		**0611050-01dup**		**0611050-02**	
Sample ID #	**C7-A**	**Q**	**C7-A**	**Q**	**C6-A**	**Q**
SEM/AVS	0.020				0.014	
Sulfide	45		44		51	
Copper	0.073		0.045		0.030	
Cadmium	0.0016		0.0013		0.0015	
Nickel	0.084		0.050		0.041	
Lead	0.063		0.062		0.060	
Zinc	0.66		0.65		0.58	

TOC Analysis of Bulk Sediment

ASI Job #26-349	Sediment (Units: %)		Sediment (Units: %)	
ASI ID #	**20061298**		**20061299**	
Laboratory ID #	**0611050-01**		**0611050-02**	
Sample ID #	**C7-A**	**Q**	**C6-A**	**Q**
Total Organic Carbon (Run 1)	3.6		3.9	
Total Organic Carbon (Run 2)	3.8		3.9	

Table 16 **Grain Size Distribution**

ASI Job #26-349	% Gravel		% Sand			% Fines	
ASI ID # , Laboratory ID #, Sample #	Coarse	Medium	Coarse	Medium	Fine	Silt	Clay
20061298, 0611050-01, C7-A	0.0	0.0	4.7	9.2	5.1	55.7	25.1
20061299, 0611050-02, C6-A	0.0	0.0	8.0	7.4	12.8	49.4	21.7

Table 17 Semivolatile Analysis of Pore Water by Selective Ion Monitoring (SVOC-SIM)

ASI Job #26-349	Pore Water (Units: ng/L)				Pore Water (Units: ng/L)			
ASI ID #	20061300				20061301			
Laboratory ID #	0611051-01		0611051-02		0611051-03		0611051-04	
Sample ID #	C7-A	Q	C-7A *	Q	C6-A	Q	C6-A *	Q
Naphthalene	22	ND	370	ND	11	ND	14	ND
2-Methylnaphthalene	22	ND	370	ND	11	ND	14	ND
1-Methylnaphthalene	22	ND	370	ND	11	ND	14	ND
Biphenyl	22	ND	370	ND	11	ND	14	ND
2,6-Dimethylnaphthalene	22	ND	370	ND	11	ND	14	ND
Acenaphthylene	22	ND	370	ND	11	ND	14	ND
Acenaphthene	22	ND	370	ND	11	ND	14	ND
Fluorene	22	ND	370	ND	11	ND	14	ND
2,3,5-Trimethylnaphthalene	22	ND	370	ND	11	ND	14	ND
Phenanthrene	22	ND	370	ND	11	ND	14	ND
Anthracene	22	ND	370	ND	11	ND	14	ND
1-Methylphenanthrene	22	ND	370	ND	11	ND	14	ND
Fluoranthene	22	ND	370	ND	18		14	ND
Pyrene	22	ND	370	ND	11	ND	14	ND
Benz[a]anthracene	22	ND	370	ND	22		14	ND
Chrysene	22	ND	370	ND	28		14	ND
Benzo[b]fluoranthene	22	ND	370	ND	16		14	ND
Benzo[k]fluoranthene	22	ND	370	ND	11	ND	14	ND
Benzo[e]pyrene	22	ND	370	ND	38		14	ND
Benzo[a]pyrene	22	ND	370	ND	23		14	ND
Perylene	22	ND	370	ND	11	ND	14	ND
Indeno[1,2,3-cd]pyrene	22	ND	370	ND	11		14	ND
Dibenz[a,h]anthracene	22	ND	370	ND	11	ND	14	ND
Benzo[g,h,i]perylene	22	ND	370	ND	19		14	ND

PCB/Aroclor Analysis of Pore Water

ASI Job #26-349	Pore Water (Units: ug/L)				Pore Water (Units: ug/L)			
ASI ID #	20061300				20061301			
Laboratory ID #	0611051-01		0611051-02		0611051-03		0611051-04	
Sample ID #	C7-A	Q	C-7A *	Q	C6-A	Q	C6-A *	Q
Aroclor 1016	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1221	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1232	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1242	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1248	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1254	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1260	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1262	0.044	ND	3.7	ND	0.022	ND	0.14	ND
Aroclor 1268	0.650		3.7	ND	1.0		0.14	ND
Total Arochlor(SUM)	1.002		33.3	ND	1.18		1.26	ND

* After manipulations

Table 17 continued **Total Metal Analysis of Pore Water**

ASI Job #26-349	Pore Water (Units: ug/L)		Pore Water (Units: ug/L)	
ASI ID #	**20061300**		**20061301**	
Laboratory ID #	**0611051-01**		**0611051-03**	
Sample ID #	**C-7A**	**Q**	**C6-A**	**Q**
Aluminum	1,500		900	
Antimony	4.9		2.5	ND
Arsenic	14		19	
Barium	54		43	
Beryllium	1.0	ND	1.0	ND
Cadmium	1.0	ND	1.0	ND
Calcium	370,000		340,000	
Chromium	3.2		2.6	
Cobalt	1.0	ND	1.0	ND
Copper	2.2		2.0	ND
Iron	11,000		19,000	
Lead	1.3		1.0	ND
Magnesium	1,200,000		1,000,000	
Manganese	13000		9100	
Mercury	0.20	ND	0.20	ND
Nickel	3.7		3.5	
Potassium	330,000		280,000	
Selenium	0.56	ND	0.56	ND
Silver	0.50	ND	0.50	ND
Sodium	8,500,000		9,100,000	
Thallium	0.5	ND	0.50	ND
Vanadium	20	ND	20	ND
Zinc	20	ND	20	ND

Dissolved Metal Analysis of Pore Water

ASI Job #26-349	Pore Water (Units: ug/L)		Pore Water (Units: ug/L)	
ASI ID #	**20061300**		**20061301**	
Laboratory ID #	**0611051-01**		**0611051-03**	
		Q		**Q**
Aluminum	250	ND	250	ND
Antimony	2.8		2.5	ND
Arsenic	4.1		4	
Barium	70		31	
Beryllium	1.0	ND	1	ND
Cadmium	1.0	ND	1	ND
Calcium	340,000		330,000	
Chromium	1.0	ND	1	ND
Cobalt	1.0	ND	1	ND
Copper	4.0		4.2	
Iron	100	ND	100	ND
Lead	1.0	ND	1	ND
Magnesium	1,000,000		1,000,000	
Manganese	12,000		9,000	
Mercury	0.20	ND	0.2	ND
Nickel	2.0	ND	2	ND
Potassium	300,000		270,000	
Selenium	0.56	ND	0.56	ND
Silver	0.50	ND	0.5	ND
Sodium	8,300,000		8,200,000	
Thallium	0.50	ND	0.5	ND
Vanadium	20	ND	20	ND
Zinc	90		20	ND

Table 17 continued **Inorganic Analysis of Pore Water**

ASI Job #26-349	Pore Water				Pore Water			
ASI ID #	20061300				20061301			
Laboratory ID #	0611051-01		0611051-02		0611051-03		0611051-04	
Sample ID #	C7-A	Q	C7-A *	Q	C6-A	Q	C6-A *	Q
Eh	51 (mV)		▨	▨	49 (mV)		▨	▨
pH	7.5 (S.U.)		▨	▨	7.4 (S.U.)		▨	▨
Salinity	25 (%)		▨	▨	24 (%)		▨	▨
Sulfide	0.83 (mg/L)	ND	▨	▨	0.45 (mg/L)	ND	0.80 (mg/L)	ND
Solids, total	▨	▨	28,200 (mg/L)		▨	▨	27,100 (mg/L)	

TOC Analysis of Pore Water

ASI Job #26-349	Pore Water (Units: mg/L)				Pore Water (Units: mg/L)			
ASI ID #	20061300				20061301			
Laboratory ID #	L0616131-01				L0616131-02		L0616131-03	
Sample ID #	C7-A	Q	C7-A *	Q	C6-A	Q	C6-A *	Q
Total Organic Carbon	14		▨	▨	20		500	
Dissolved Organic Carbon	14		▨	▨	20		510	

ASI Job #26-349	Pore Water (Units: mg/L)					
ASI ID #	20061300					
Laboratory ID #	L0616202-01		L0616202-02		L0616202-03	
Sample ID #	C7-A	Q	C6-A		C6-A *	Q
Nitrogen, Ammonia	3.30		5.98		4.98	

* After manipulations

APPENDIX A

Chains of Custody

Columbia Analytical Services inc.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

8540 Baycenter Rd. • Jacksonville, FL 32256 • (904) 739-2277 • 800-695-7222 x06 • FAX (904) 739-2011

PAGE 1 OF 1

SR #

CAS Contact

Project Name: Brunswick LCP	Project Number
Project Manager: Curt Rose	Email Address: curtrose@bellsouth.net
Company/Address: CAR Environmental Specialists	
Phone #: 954-927-1165	FAX#
Sampler's Signature	Sampler's Printed Name

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	(1) [illegible] / Leachate	(2) Toxicity Identification (TIE)													REMARKS/ ALTERNATE DESCRIPTION
06291-C-6A		10/18/06		SD	1	1	2													
06291-C-7A		10/18/06		SD		1	2													
06291-CR-CA		10/18/06		SD		1														

1-gal container

5-gal containers

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ______

SPECIAL INSTRUCTIONS/COMMENTS

① For each of 3 sediments to be evaluated in 2 appropriate tests → Mix thoroughly → Send subsample to Columbia Labs for chemical analyses

② For each of 2 sediments to be evaluated in TIE → Combine the 2 5-gal containers + mix thoroughly → Conduct TIE and chemical analyses

See QAPP ☐

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ STANDARD

REQUESTED FAX DATE: Line 2

REQUESTED REPORT DATE ________

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

____ V. Specialized Forms / Custom Report

Edata ____ Yes ____ No

INVOICE INFORMATION

PO#

BILL TO:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ________ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Curt Rose	Signature	Signature	Signature	Signature	Signature
Printed Name: CAR Environmental	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm	Firm	Firm	Firm	Firm
Date/Time: 10/18/06, 4 PM	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-01/12/06-07

ALPHA
WOODS HOLE LABS

VESTBORO, MA
'EL: 508-898-9220
'AX: 508-898-9193

RAYNHAM,MA
TEL: 508-822-9300
FAX: 508-822-3288

CHAIN OF CUSTODY

PAGE ______ OF ______

Date Rec'd in Lab:

ALPHA Job #:

lient Information

lient: Aqua Survey
ddress: 469 Pt. Breeze Rd
Flemington NJ 08822
hone: ~~[illegible]~~ 908 788 8700
ax: 908 7889165
mail: Doi@aquasurvey.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: CDR - TIF
Project Location: Honeywell, LCP
Project #: 26-349
Project Manager: Jon Doi
ALPHA Quote #:

Turn-Around Time

☐ Standard ☐ RUSH *(only confirmed if pre-approved!)*
Date Due: **Time:**

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program *Criteria*

MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☐ No Are MCP Analytical Methods Required?
☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: Grain Size	TOC / PCB PAH	Hg										Sample Specific Comments	TOTAL # BOTTLES
	C-7A Sediment 20061298	11/3/6		Sed		Y	Y	Y										2 Jars + 1 bag	
	C-6A Sediment 20061299	11/6/6		Sed.		Y	X	X										2 jars + 1 bag	

PLEASE ANSWER QUESTIONS ABOVE!

Container Type	
Preservative	

IS YOUR PROJECT
MA MCP or CT RCP?

Relinquished By:	Date/Time	Received By:	Date/Time
A. Hamlyn AST	11/6/6		

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

RM NO: 01-01 (rev. 10-OCT-05)

ALPHA
WOODS HOLE LABS

CHAIN OF CUSTODY

PAGE ____ OF ____

WESTBORO, MA
TEL: 508-898-9220
FAX: 508-898-9193

RAYNHAM, MA
TEL: 508-822-9300
FAX: 508-822-3288

Date Rec'd in Lab:

ALPHA Job #:

Client Information

Client: AquaSurvey Inc.
Address: 469 Pt. Breeze Rd
Flemington NJ 08822
Phone: 908 788 8700
Fax: 908 788 9165
Email: Doi @ aquasurvey.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: CDR - TIE
Project Location: Honeywell - LCP
Project #: 26-349
Project Manager: Jon Doi
ALPHA Quote #:

Turn-Around Time

☐ Standard ☐ RUSH *(only confirmed if pre-approved!)*

Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program
Criteria

MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☐ No Are MCP Analytical Methods Required?
☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

SAMPLE HANDLING

Filtration
☐ Done
☐ Not needed
☐ Lab to do

Preservation
☐ Lab to do

(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS Aroclor / PAH	TOC / DOC	Total metals / metals Dissolved	Sal. pH TS eh	Tot. ammon	Total Sulfides		Aroclor / PAH	Total Solids	Tot. ammonia	Tot. sulfides		Sample Specific Comments	TOTAL # BOTTLES
	C6-A Pore water 20061301	11/6/6		W	AH	1 X	2 X	2 X	1 X	1 X	1 X		X	X	X	X			
								baseline						after TIE					
															Manipulations				
	C6-A Porewater	11/3/6				X												Hold for Jon Doi	
																		approval	

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP *or* CT RCP?

Container Type	
Preservative	

Relinquished By:	Date/Time	Received By:	Date/Time
ASI	11/6/6 170		

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

FORM NO: 01-01 (rev. 10-OCT-05)

CHAIN OF CUSTODY

PAGE ____ OF ____

ALPHA
WOODS HOLE LABS

WESTBORO, MA
TEL: 508-898-9220
FAX: 508-898-9193

RAYNHAM, MA
TEL: 508-822-9300
FAX: 508-822-3288

Date Rec'd In Lab:

ALPHA Job #:

Client Information

Client: AquaSurvey Inc.
Address: 469 Pt. Breeze Rd
Flemington NJ 08822
Phone: 908 788 8700
Fax: 908 788 9165
Email: Doi@aquasurvey.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: CDR - TIE
Project Location: Honeywell LCP
Project #: 26-349
Project Manager: Jon Doi
ALPHA Quote #:

Turn-Around Time

☐ Standard ☐ RUSH *(only confirmed if pre-approved!)*

Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	*Criteria*

MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☐ No Are MCP Analytical Methods Required?
☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: Aroclor baseline / PAH	TOC/DOC baseline	Total metals / dissolved metals baseline	Sal. pH TS eh (baseline)	Tot. ammonia	Tot. sulfides	Total solids after filtration step		Aroclor/PAH after C-18 (limited vol.)				Sample Specific Comments	TOTAL # BOTTLES
	C7-A Pore Water 20061300	11/3/6		W	AH	X^1	X^2	X^2	X^1	X^1	X	X'		X'					
						baseline													

PLEASE ANSWER QUESTIONS ABOVE!

Container Type												
Preservative												

IS YOUR PROJECT
MA MCP *or* CT RCP?

Relinquished By:	Date/Time	Received By:	Date/Time
S. Hornberger ASI	11/6/6 1700		

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

FORM NO: 01-01 (rev. 10-OCT-05)

APPENDIX B

Manasquan Inlet Water Chemical Analysis and Receiving Forms

MAN1027.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	10/27/06 16:56:43	14.23	46006.0	29.85	8.51	7.85

Page ____ of ____

ASI, INC.
SAMPLE RECEIVING FORM

Client: Various
Job #: Various
Shipped via: Quality Carriers
# of Shipping Containers: 1
Type of Shipping Container: stainless tanker
Custody Seal: Present Absent Broken
Condition of Shipping Containers: Acceptable Unacceptable

	ASI #	Sample ID	Type of Container	Number of Containers	Condition of Samples †	Temp °C	Ice +	Type of Sample*
1.	20061279	Manasquan H_2O	tanker	1	A	17.2	—	W
2.								
3.								
4.								
5.								

NOTES: (Discrepancies between Sample Label and COC Record)

	Opened/ Received By:	Date/ Time:
1.		10/27/06 1700
2.		
3.		
4.		
5.		

*
S= Soil
SD= Sediment
SL= Sludge
W= Water
E= Effluent

†
A= Acceptable
U= Unusable or Contaminated

\+
I= Ice
B= Blue Ice
D= Dry Ice
N= None

MAN1116.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/16/06 09:15:26	14.97	37390.0	23.74	7.45	7.77

Page ____ of ____

ASI, INC.
SAMPLE RECEIVING FORM

Client: Various
Job #: Various

Shipped via: Quality Carriers
# of Shipping Containers: 1

Type of Shipping Container: Stainless tanker
Custody Seal: Present Absent Broken
Condition of Shipping Containers: Acceptable ✓ Unacceptable

	ASI #	Sample ID	Type of Container	Number of Containers	Condition of Samples †	Temp °C	Ice +	Type of Sample*
1.	20061365	manasquan H2O	tanker	1	A	14.9	—	W
2.								
3.								
4.								
5.								

NOTES: (Discrepancies between Sample Label and COC Record)

Opened/ Received By:	Date/ Time:
1.	0915 11/16/06
2.	
3.	
4.	
5.	

*
S= Soil
SD= Sediment
SL= Sludge
W= Water
E= Effluent

†
A= Acceptable
U= Unusable or Contaminated

\+
I= Ice
B= Blue Ice
D= Dry Ice
N= None

2006 1365

QUALITY CARRIERS, INC. 3802 CORPOREX PARK DRIVE, SUITE 200 TAMPA, FL 33619 | **SCAC-QLYC**

DRIVER 1: [illegible] DRIVER NO.: [illegible]

DRIVER 2: [illegible] DRIVER NO.: [illegible]

DRIVER 3: DRIVER NO.:

TRAILER/CHASSIS NUMBER: 7316 CONTAINER NUMBER:

ORDER NUMBER

7 7 2 3 3 4 8 7

SHIPPER NAME/CITY/STATE:
ATLANTIC OCEAN
MANASQUAN INLET
PT PLEASANT NJ

CONSIGNEE NAME/CITY/STATE:
AQUA SURVEY
499 [illegible]
FLEMINGTON NJ

TRACTOR NUMBER
LOAD [illegible]
UNLOAD [illegible]
LINEHAUL [illegible]
RELAY 1 ________
RELAY 2 ________
RELAY 3 ________

C	H/M	COMMODITY AND HAZARDOUS MATERIAL DESCRIPTION (MUST AGREE WITH DESCRIPTION ON SHIPPING ORDER)	QUANTITY	TARE	GROSS	NET	TEMP
		SEAWATER	500 GAL				
		[illegible]					

IN CASE OF: LEAK, SPILL, FIRE OR OTHER EMERGENCY, CALL TOLL FREE
QUALITY CARRIERS 24 HOUR EMERGENCY RESPONSE HOT LINE 800-759-8265

COMPLETE AS REQUIRED: INTRANSIT HEAT ○ TRAILER STEAMING ○ TRAILER CLEANING ○ DEAD HEAD MILES ________

CANCELLED SHIPMENT ○ REJECTED SHIPMENT ○ RECONSIGNED SHIPMENT ○ TOLLS $ 3.70 US ● CAN ○

LOADING INFORMATION (MILITARY TIME):
APPOINTMENT: DT 11/14 TIME 1300
ARRIVAL TIME: DT 11/14 TIME 1245
START TIME: DT 11/14 TIME 1300
FINISH TIME: DT 11/14 TIME 1345
DEPART TIME: DT 11/14 TIME 1400

LATE PICKUP REASON: N/A
SHIPPER ○ DISPATCH ○ EQUIPMENT ○
DRIVER ○ WEATHER/ROAD CONDITIONS ○
PUMP ● COMPRESSOR ○ BLOWER ○
VACUUM ○ NOZZLE ○ SPOTTED TRL ○
RAIL TRANSFER ○ SCALE $ _____ US ○ CAN ○
HOSE 2" 40 FT 3" ______ FT 4" ______ FT

UNLOADING INFORMATION (MILITARY TIME):
APPOINTMENT: DT 11/16 TIME ________
ARRIVAL TIME: DT 11/16 TIME 0725
START TIME: DT 11/16 TIME 0730
FINISH TIME: DT 11/16 TIME 0825
DEPART TIME: DT 11/16 TIME 0830

LATE DELIVERY REASON: N/A
SHIPPER ○ DISPATCH ○ EQUIPMENT ○
DRIVER ○ WEATHER/ROAD CONDITIONS ○
PUMP ○ COMPRESSOR ● BLOWER ○
VACUUM ○ NOZZLE ○ SPOTTED TRL ○
RAIL TRANSFER ○ SCALE $ _____ US ○ CAN ○
HOSE 2" ______ FT 3" ______ FT 4" ______ FT

SHIPPER BILL OF LADING NUMBER
[illegible] 27247

I HAVE CHECKED THE DOCUMENTS FOR THIS SHIPMENT AND VERIFY THAT THERE IS ADEQUATE STORAGE ROOM TO RECEIVE THIS SHIPMENT AND CONNECTION HAS BEEN MADE TO THE PROPER STORAGE FACILITY

CONSIGNEE'S SIGNATURE:
X

CONSIGNEE YOU ARE RESPONSIBLE FOR UNLOADING ALL CONTENTS ASSIGNED TO YOU BY SHIPPER.

○ ALL PRODUCT WAS RECEIVED IN GOOD ORDER
○ NO RETAIN - ALL PRODUCT WAS REMOVED FROM THE TRAILER
○ LESS THAN 5 GALLONS RETAIN AND NO PRODUCT IS VISABLE ON TRAILER WALLS
○ MORE THAN 5 GALLONS RETAIN REMAIN IN THE TRAILER APPROX ______ GAL REMAIN
○ TRAILER WAS NOT INSPECTED POSSIBLE RETAIN

REASON FOR LOADING DELAY:
[illegible]

REASON FOR UNLOADING DELAY:
[illegible]

SHIPPER'S SIGNATURE:
X

CONSIGNEE'S SIGNATURE:
X

acknowledge that the current rate for the specific load referenced in this delivery receipt may be higher or lower than the compensation percentage indicated in my contractor agreement. I have been advised of and understand the rate for this specific movement and indicate my acceptance by my initials below. Further, I understand that this document becomes an addendum to my independent contractor agreement.

B-3

Pennsylvania Location:
1605 Benjamin Franklin Highway
Douglassville, PA 19518
Phone: (610) 327-8196
Fax: (610) 327-6864

NJ DEP Cert #PA925
NY LAB ID NO.: 11828
PA DEP Cert #06-409

Blue Marsh
LABORATORIES • INC
Professional testing for the critical decision

New Jersey Location:
261 U.S. Hwy. 130
Bordentown, NJ 08505
Phone: (609) 298-5255
Fax: (609) 298-4225

NJ DEP Cert #03018

- CERTIFICATE OF ANALYSIS -

LAB #: 47212-1

Client: Aqua Survey, Inc.
469 Point Breeze Road
Flemington, NJ 08822

Attn: Bob Fristrom

Project: Manasquan Water

Received: 12/22/2005

Sample Type: Surface Water
Sample ID: Manasquan Inlet Sea Water
Collected By: Client
Collected: 12/22/05 9:15
Source:

Print Date: April 12, 2006
Report Date: February 15, 2006 (Rev 0)

Abstract Test	Result	Qls	Units	LOQ	LOD	Method	Init	Analysis Date
Mercury 245.1-aq								
Mercury	see attached		ng/L	0.1000	0.200000	245.1	Env Labs-D	12/15/05 12:51
Metals WW-aq								
Cadmium	< 0.020		ug/L	0.020	4.00000	200.8	KJP-DV	1/4/06 11:16
Chromium	0.400		ug/L	0.020	7.00000	200.8	KJP-DV	1/4/06 11:16
Copper	0.160		ug/L	0.020	3.00000	200.8	KJP-DV	1/4/06 11:16
Lead	< 0.020		ug/L	0.020	4.00000	200.8	KJP-DV	1/4/06 11:16
Nickel	0.440		ug/L	0.020	5.00000	200.8	KJP-DV	1/4/06 11:16
Silver	< 0.020		ug/L	0.020	39.0000	200.8	KJP-DV	1/4/06 11:16
Zinc	1.480		ug/L	0.020	6.00000	200.8	KJP-DV	1/4/06 11:16
Pest-608-aq								
4,4-DDD	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
4,4-DDE	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
4,4-DDT	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
a-BHC	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
a-Chlordane	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
Aldrin	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
b-BHC	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
d-BHC	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
Dieldrin	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
Endosulfan I	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
Endosulfan II	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
Endosulfan sulfate	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
Endrin	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
Endrin aldehyde	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
Endrin ketone	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47
g-BHC (Lindane)	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
g-Chlordane	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
Heptachlor	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47
Heptachlor epoxide	< 0.0008		ug/L	0.0008	0.0008	608	JLO-DV	1/6/06 18:47

Pennsylvania Location:
1605 Benjamin Franklin Highway
Douglassville, PA 19518
Phone: (610) 327-8196
Fax: (610) 327-6864

NJ DEP Cert #PA925
NY LAB ID NO.: 11828
PA DEP Cert #06-409

Blue Marsh

LABORATORIES • INC

Professional testing for the critical decision

New Jersey Location:
261 U.S. Hwy. 130
Bordentown, NJ 08505
Phone: (609) 298-5255
Fax: (609) 298-4225

NJ DEP Cert #03018

- CERTIFICATE OF ANALYSIS -

LAB #: 47212-1

Client: Aqua Survey, Inc.
469 Point Breeze Road
Flemington, NJ 08822

Attn: Bob Fristrom

Project: Manasquan Water

Received: 12/22/2005

Sample Type: Surface Water
Sample ID: Manasquan Inlet Sea Water
Collected By: Client
Collected: 12/22/05 9:15
Source:

Print Date: April 12, 2006
Report Date: February 15, 2006 (Rev 0)

Abstract Test	Result	Qls	Units	LOQ	LOD	Method	Init	Analysis Date
trans-Nanochlor								
trans-Nanochlor	< 0.0016		ug/L	0.0016	0.0016	608	JLO-DV	1/6/06 18:47

Reviewed and Approved by;

Debbie Wanner
Laboratory Manager
2/13/2006

< - indicates the result was non-detect or a result below the laboratories reporting detection limit
E - indicates an estimated value outside of the calibration range of the analysis
J - indicates that the analyte was detected, but below the limit of quantitation
B - indicates that the analyte was found in the method blank at a concentration equal to or greater than the reporting limit
T - indicates that the sample was analyzed out of hold
I - indicates that there was matrix interference and matrix spike and/or matrix spike duplicate failed acceptance criteria
Q - indicates that the sample was analyzed without all quality control being in compliance
H - exceeds applicable regulatory limit
S - indicates surrogate recovery outside method acceptance criteria

DV - in the 'Init' column indicates that the sample was analyzed at our Douglassville, PA facility
BT - in the 'Init' column indicates that the sample was analyzed at our Bordentown, NJ facility
SB - in the 'Init' column indicates that the sample was analyzed at a sub-contracted laboratory

Results reported with the units "ug/kg" and "mg/kg" are calculated on a dry weight basis

LOD is the "Level of Detection", also known as the MDL
LOQ is the "Level of Quantitation", also known as the PQL

Manasquan Inlet #

Pace Analytical™

Pace Analytical Services, Inc.
1700 Elm Street • Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1668A Polychlorobiphenyl Sample Analysis Results

Client - Blue Marsh Laboratories, Inc.

Page 1 of 7

Client's Sample ID	2610-01		
Lab Sample ID	106567001		
Filename	M50207B_6		
Injected By	CVS		
Total Amount Extracted	977 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	01/11/2005
ICAL Date	02/07/2005	Received	01/21/2005
CCal Filename(s)	M50207B_1	Extracted	01/30/2005
Method Blank ID		Analyzed	02/07/2005 22:43

PCB Isomer	IUPAC	RT	Ratio	ng's Added	ng's Found	% Recovery	
Internal Standards							
13C-2-MoCB	1	—	—	2.0	ND	—	
13C-4-MoCB	3	—	—	2.0	ND	—	
13C-2,2'-DiCB	4	—	—	2.0	ND	—	
13C-4,4'-DiCB	15	—	—	2.0	ND	—	
13C-2,2',6-TrCB	19	—	—	2.0	ND	—	
13C-3,4,4'-TrCB	37	—	—	2.0	ND	—	
13C-2,2',6,6'-TeCB	54	—	—	2.0	ND	—	
13C-3,4,4',5-TeCB	81	33.261	0.74	2.0	0.102	5	P
13C-3,3',4,4'-TeCB	77	33.907	0.81	2.0	0.153	8	P
13C-2,2',4,6,6'-PeCB	104	24.302	1.69	2.0	0.0221	1	P
13C-2,3,3',4,4'-PeCB	105	37.655	1.53	2.0	0.123	6	P
13C-2,3,4,4',5-PeCB	114	36.951	1.50	2.0	0.121	6	P
13C-2,3',4,4',5-PeCB	118	36.402	1.61	2.0	0.124	6	P
13C-2,3',4,4',5'-PeCB	123	36.058	1.29	2.0	0.112	6	IP
13C-3,3',4,4',5-PeCB	126	40.951	1.56	2.0	0.144	7	P
13C-2,2',4,4',6,6'-HxCB	155	30.745	1.15	2.0	0.0917	5	P
13C-HxCB (156/157)	156/157	44.119	1.28	4.0	0.301	8	P
13C-2,3',4,4',5,5'-HxCB	167	42.912	1.22	2.0	0.150	7	P
13C-3,3',4,4',5,5'-HxCB	169	47.519	1.43	2.0	0.143	7	P
13C-2,2',3,4',5,6,6'-HpCB	188	36.934	1.03	2.0	0.128	6	P
13C-2,3,3',4,4',5,5'-HpCB	189	50.140	1.00	2.0	0.220	11	P
13C-2,2',3,3',5,5',6,6'-OcCB	202	42.623	0.87	2.0	0.216	11	P
13C-2,3,3',4,4',5,5',6-OcCB	205	52.808	0.85	2.0	0.159	8	P
13C-2,2',3,3',4,4',5,5',6-NoCB	206	54.607	0.80	2.0	0.186	9	P
13C-2,2',3,3',4,5,5',6,6'-NoCB	208	49.606	0.71	2.0	0.190	9	P
13C—DeCB	209	56.248	0.74	2.0	0.220	11	P
Cleanup Standards							
13C-2,4,4'-TrCB	28	21.055	0.90	2.0	0.150	8	P
13C-2,3,3',5,5'-PeCB	111	33.958	1.58	2.0	1.68	84	
13C-2,2',3,3',5,5',6-HpCB	178	40.195	1.09	2.0	1.84	92	
Recovery Standards							
13C-2,5-DiCB	9	12.281	1.48	2.0	NA	NA	
13C-2,2',5,5'-TeCB	52	23.248	0.80	2.0	NA	NA	
13C-2,2',4,5,5'-PeCB	101	31.000	1.59	2.0	NA	NA	
13C-2,2',3,4,4',5'-HxCB	138	39.715	1.25	2.0	NA	NA	
13C-2,2',3,3',4,4',5,5'-OcCB	194	52.314	0.90	2.0	NA	NA	

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Method 1668A Polychlorobiphenyl
Sample Analysis Results

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Client Sample ID 2610-01
Lab Sample ID 106567001
Filename M50207B_6

IUPAC	Co-elutions	RT	Ratio	Concentration ng/L	EMPC ng/L	EML ng/L
1		—	—	ND	—	0.512
2		—	—	ND	—	0.512
3		—	—	ND	—	0.512
4		—	—	ND	—	0.512
5		—	—	ND	—	0.512
6		—	—	ND	—	0.512
7		—	—	ND	—	0.512
8		—	—	ND	—	0.512
9		—	—	ND	—	0.512
10		—	—	ND	—	0.512
11		—	—	ND	—	0.614
12	12/13	—	—	ND	—	0.512
13	12/13	—	—	ND	—	0.512
14		—	—	ND	—	0.512
15		—	—	ND	—	0.512
16		—	—	ND	—	0.512
17		—	—	ND	—	0.512
18	18/30	—	—	ND	—	0.512
19		—	—	ND	—	0.512
20	20/28	—	—	ND	—	0.614
21	21/33	—	—	ND	—	0.512
22		—	—	ND	—	0.512
23		—	—	ND	—	0.512
24		—	—	ND	—	0.512
25		—	—	ND	—	0.512
26	26/29	—	—	ND	—	0.512
27		—	—	ND	—	0.512
28	20/28	—	—	ND	—	0.614
29	26/29	—	—	ND	—	0.512
30	18/30	—	—	ND	—	0.512
31		—	—	ND	—	0.512
32		—	—	ND	—	0.512
33	21/33	—	—	ND	—	0.512
34		—	—	ND	—	0.512
35		—	—	ND	—	0.512
36		—	—	ND	—	0.512
37		—	—	ND	—	0.512
38		—	—	ND	—	0.512
39		—	—	ND	—	0.512
40	40/41/71	—	—	ND	—	0.512
41	40/41/71	—	—	ND	—	0.512
42		—	—	ND	—	0.512

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Lab Sample ID	106567001
Filename	M50207B_6

IUPAC	Co-elutions	RT	Ratio	Concentration ng/L	EMPC ng/L	EML ng/L
43		—	—	ND	—	0.512
44	44/47/65	—	—	ND	—	0.614
45	45/51	—	—	ND	—	0.512
46		—	—	ND	—	0.512
47	44/47/65	—	—	ND	—	0.614
48		—	—	ND	—	0.512
49	49/69	—	—	ND	—	0.512
50	50/53	—	—	ND	—	0.512
51	45/51	—	—	ND	—	0.512
52		—	—	ND	—	0.512
53	50/53	—	—	ND	—	0.512
54		—	—	ND	—	0.512
55		—	—	ND	—	0.512
56		—	—	ND	—	0.512
57		—	—	ND	—	0.512
58		—	—	ND	—	0.512
59	59/62/75	—	—	ND	—	0.512
60		—	—	ND	—	0.512
61	61/70/74/76	—	—	ND	—	0.512
62	59/62/75	—	—	ND	—	0.512
63		—	—	ND	—	0.512
64		—	—	ND	—	0.512
65	44/47/65	—	—	ND	—	0.614
66		—	—	ND	—	0.512
67		—	—	ND	—	0.512
68		—	—	ND	—	0.512
69	49/69	—	—	ND	—	0.512
70	61/70/74/76	—	—	ND	—	0.512
71	40/41/71	—	—	ND	—	0.512
72		—	—	ND	—	0.512
73		—	—	ND	—	0.512
74	61/70/74/76	—	—	ND	—	0.512
75	59/62/75	—	—	ND	—	0.512
76	61/70/74/76	—	—	ND	—	0.512
77		—	—	ND	—	0.512
78		—	—	ND	—	0.512
79		—	—	ND	—	0.512
80		—	—	ND	—	0.512
81		—	—	ND	—	0.512
82		—	—	ND	—	0.512
83		—	—	ND	—	0.512
84		—	—	ND	—	0.512

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Client Sample ID	2610-01
Lab Sample ID	106567001
Filename	M50207B_6

IUPAC	Co-elutions	RT	Ratio	Concentration ng/L	EMPC ng/L	EML ng/L
85	85/116/117	—	—	ND	—	0.614
86	86/87/97/108/119/125	—	—	ND	—	1.02
87	86/87/97/108/119/125	—	—	ND	—	1.02
88	88/91	—	—	ND	—	0.512
89		—	—	ND	—	0.512
90	90/101/113	31.034	1.05	0.512 I	—	0.512
91	88/91	—	—	ND	—	0.512
92		—	—	ND	—	0.512
93	93/98/100/102	—	—	ND	—	0.768
94		—	—	ND	—	0.512
95		—	—	ND	—	0.512
96		—	—	ND	—	0.512
97	86/87/97/108/119/125	—	—	ND	—	1.02
98	93/98/100/102	—	—	ND	—	0.768
99		—	—	ND	—	0.512
100	93/98/100/102	—	—	ND	—	0.768
101	90/101/113	31.034	1.05	(0.512) I	—	0.512
102	93/98/100/102	—	—	ND	—	0.768
103		—	—	ND	—	0.512
104		—	—	ND	—	0.512
105		—	—	ND	—	0.512
106		—	—	ND	—	0.512
107	107/124	—	—	ND	—	0.512
108	86/87/97/108/119/125	—	—	ND	—	1.02
109		—	—	ND	—	0.512
110	110/115	—	—	ND	—	0.512
111		—	—	ND	—	0.512
112		—	—	ND	—	0.512
113	90/101/113	31.034	1.05	(0.512) I	—	0.512
114		—	—	ND	—	0.512
115	110/115	—	—	ND	—	0.512
116	85/116/117	—	—	ND	—	0.614
117	85/116/117	—	—	ND	—	0.614
118		—	—	ND	—	0.512
119	86/87/97/108/119/125	—	—	ND	—	1.02
120		—	—	ND	—	0.512
121		—	—	ND	—	0.512
122		—	—	ND	—	0.512
123		—	—	ND	—	0.512
124	107/124	—	—	ND	—	0.512
125	86/87/97/108/119/125	—	—	ND	—	1.02
126		—	—	ND	—	0.512

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Lab Sample ID 106567001
Filename M50207B_6

IUPAC	Co-elutions	RT	Ratio	Concentration ng/L	EMPC ng/L	EML ng/L
127		—	—	ND	—	0.512
128	128/166	—	—	ND	—	1.02
129	129/138/163	—	—	ND	—	0.512
130		—	—	ND	—	0.512
131		—	—	ND	—	0.512
132		—	—	ND	—	0.512
133		—	—	ND	—	0.512
134	134/143	—	—	ND	—	0.512
135	135/151	—	—	ND	—	0.522
136		—	—	ND	—	0.512
137		—	—	ND	—	0.512
138	129/138/163	—	—	ND	—	0.512
139	139/140	—	—	ND	—	0.512
140	139/140	—	—	ND	—	0.512
141		—	—	ND	—	0.512
142		—	—	ND	—	0.512
143	134/143	—	—	ND	—	0.512
144		—	—	ND	—	0.512
145		—	—	ND	—	0.512
146		—	—	ND	—	0.512
147	147/149	—	—	ND	—	0.512
148		—	—	ND	—	0.512
149	147/149	—	—	ND	—	0.512
150		—	—	ND	—	0.512
151	135/151	—	—	ND	—	0.522
152		—	—	ND	—	0.512
153	153/168	—	—	ND	—	0.614
154		—	—	ND	—	0.512
155		—	—	ND	—	0.512
156	156/157	—	—	ND	—	0.512
157	156/157	—	—	ND	—	0.512
158		—	—	ND	—	0.512
159		—	—	ND	—	0.512
160		—	—	ND	—	0.512
161		—	—	ND	—	0.512
162		—	—	ND	—	0.512
163	129/138/163	—	—	ND	—	0.512
164		—	—	ND	—	0.512
165		—	—	ND	—	0.512
166	128/166	—	—	ND	—	1.02
167		—	—	ND	—	0.512
168	153/168	—	—	ND	—	0.614

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Lab Sample ID	106567001
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IUPAC	Co-elutions	RT	Ratio	Concentration ng/L	EMPC ng/L	EML ng/L
169		—	—	ND	—	0.512
170		—	—	ND	—	0.512
171	171/173	—	—	ND	—	0.512
172		—	—	ND	—	0.512
173	171/173	—	—	ND	—	0.512
174		—	—	ND	—	0.512
175		—	—	ND	—	0.512
176		—	—	ND	—	0.512
177		—	—	ND	—	0.512
178		—	—	ND	—	0.512
179		—	—	ND	—	0.512
180	180/193	—	—	ND	—	0.512
181		—	—	ND	—	0.512
182		—	—	ND	—	0.512
183	183/185	—	—	ND	—	0.512
184		—	—	ND	—	0.512
185	183/185	—	—	ND	—	0.512
186		—	—	ND	—	0.512
187		—	—	ND	—	0.512
188		—	—	ND	—	0.512
189		—	—	ND	—	0.512
190		—	—	ND	—	0.512
191		—	—	ND	—	0.512
192		—	—	ND	—	0.512
193	180/193	—	—	ND	—	0.512
194		—	—	ND	—	0.512
195		—	—	ND	—	0.512
196		—	—	ND	—	0.717
197	197/200	—	—	ND	—	2.56
198	198/199	—	—	ND	—	0.512
199	198/199	—	—	ND	—	0.512
200	197/200	—	—	ND	—	2.56
201		—	—	ND	—	0.512
202		—	—	ND	—	0.512
203		—	—	ND	—	0.512
204		—	—	ND	—	0.512
205		—	—	ND	—	0.512
206		—	—	ND	—	0.512
207		—	—	ND	—	0.512
208		—	—	ND	—	0.512
209		—	—	ND	—	0.512

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Congener Group	Concentration ng/L
Total Monochloro Biphenyls	ND
Total Dichloro Biphenyls	ND
Total Trichloro Biphenyls	ND
Total Tetrachloro Biphenyls	ND
Total Pentachloro Biphenyls	0.512
Total Hexachloro Biphenyls	ND
Total Heptachloro Biphenyls	ND
Total Octachloro Biphenyls	ND
Total Nonachloro Biphenyls	ND
Decachloro Biphenyls	ND
Total PCBs	0.512

ND = Not Detected

Report No.....106567

REPORT OF LABORATORY ANALYSIS

APPENDIX C

L. plumulosus Acute Raw Data Sheets

26-349 CDR 10 Day L. plumulosus- STATIC

Chamber	Sample	Code
6	Control	1.1
2		1.2
9		1.3
8		1.4
5		1.5
13	6A	2.1
14		2.2
7		2.3
11		2.4
4		2.5
3	7A	3.1
1		3.2
10		3.3
12		3.4
15		3.5

* Reburial *

Test: AA-Acute Amphipod	Test ID: 26-349
Species: LP-Leptocheirus plumulosus	Protocol: EPAM 01 EPA Marine
Sample ID: sediment	Sample Type: SED sediment
Start Date: 11/3/2006 End Date: 11/13/2006	Lab ID: ASI-Aqua Survey Inc.

Pos	ID	Rep	Group	Start	24 hrs	48 hrs	72 hrs	96 hrs	10 days	Notes
	1	1	Control	20					18	
	2	2	Control	20					18	
	3	3	Control	20					18	
	4	4	Control	20					19	
	5	5	Control	20					18	
	6	1	C6-A	20					20	
	7	2	C6-A	20					16	
	8	3	C6-A	20					19	
	9	4	C6-A	20					20	
	10	5	C6-A	20					17	
	11	1	C7-A	20					15	
	12	2	C7-A	20					16	
	13	3	C7-A	20					20	
	14	4	C7-A	20					17	
	15	5	C7-A	20					18	

Comments:

Reviewed by:

* Reburial *

Acute Amphipod-10 day

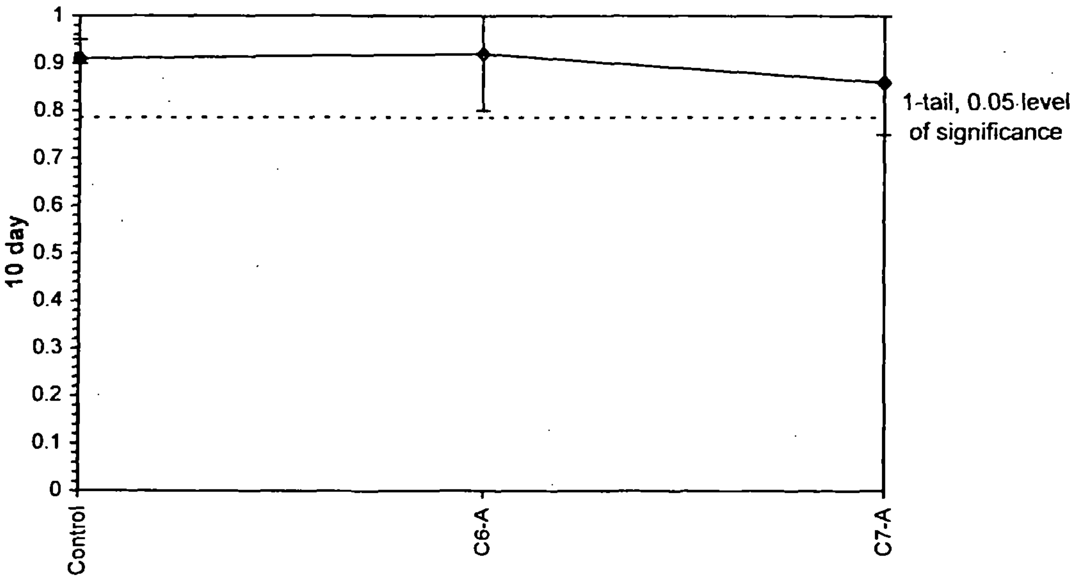
Start Date:	11/3/2006	Test ID:	26-349	Sample ID:	sediment
End Date:	11/13/2006	Lab ID:	ASI-Aqua Survey Inc.	Sample Type:	SED sediment
Sample Date:		Protocol:	EPAM 01 EPA Marine	Test Species:	LP-Leptocheirus plumulosus
Comments:					

Conc-%	1	2	3	4	5
Control	0.9000	0.9000	0.9000	0.9500	0.9000
C6-A	1.0000	0.8000	0.9500	1.0000	0.8500
C7-A	0.7500	0.8000	1.0000	0.8500	0.9000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9100	1.0000	1.2683	1.2490	1.3453	3.393	5			
C6-A	0.9200	1.0110	1.3086	1.1071	1.4588	12.404	5	-0.477	2.110	0.1785
C7-A	0.8600	0.9451	1.2070	1.0472	1.4588	13.217	5	0.724	2.110	0.1785

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96707		0.835		0.32498	-0.1168
Bartlett's Test indicates equal variances (p = 0.06)	5.49747		9.21034			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test indicates no significant differences	0.12528	0.13748	0.01308	0.01788	0.50162	2, 12
Treatments vs Control						

Dose-Response Plot



Reviewed by:

C-3

Aqua Survey, Inc.
Solid Phase Readings

Job #: 26-349
Client: CDR

Test Start Date: 11/3/06
STATIC

Parameter: Live Count/ Observations
Organism: *L. plumulosus*

Key: D= Dead S= Surface/Swimming N= Nothing Unusual

Day ⇒ Chamber ⇓	0	1	2	3	4	5	6	7	8	9	Day 10 Final Count	Reburial ~~Day 11~~ ~~Final~~ Count	~~Day 12~~ ~~Final Count~~
1	N/20	N	N	N	N	N	N	N	N	N	16	16	N/A
2	N/20	N	N	N	N	N	N	N	N	N	18	18	↓
3	N/20	N	N	N	N	N	N	N	N	N	16	15	
4	N/20	N	N	N	N	N	N	N	N	N	17	17	
5	N/20	N	N	N	N	N	N	N	N	N	18	18	
6	N/20	N	N	N	N	N	N	N	N	N	18	18	
7	N/20	N	N	N	N	N	N	N	N	N	19	19	
8	N/20	N	N	N	N	N	N	N	N	N	19	19	
9	N/20	N	N	N	N	N	N	N	N	N	18	18	
10	N/20	N	N	N	N	N	N	N	N	N	20	20	
11	N/20	N	N	N	N	N	N	N	N	N	20	20	
12	N/20	N	N	N	N	N	N	N	N	N	18	17	
13	N/20	N	N	N	N	N	N	N	N	N	20	20	
14	N/20	N	N	N	N	N	N	N	N	N	17	16	
15	N/20	N	N	N	N	N	N	N	N	N	18	18	
Initials/ Date	M 11/3/06	M 11/4/06	M 11/5/06	JC 11/6/06	JC 11/7/06	JC 11/8/06	M 11/9/06	M 11/10/06	PM 11/11/06	FM 11/12/06	M 11/13/06	M 11/13/06	↓

Aqua Survey, Inc.
Solid Phase Readings

Job #: 26-349
Client: CDR
Test Start Date: 11/3/06
STATIC
Parameter: Ammonia-N
Organism: *L. plumulosus*

Day ⇒ Chamber ⇓	0	1	2	3	4	5	6	7	8	9	10
1	0.50	0.79	0.99	1.22	1.58	1.60	1.74	1.05	0.647	<0.50	<0.50
2	4.68	9.95	13.0	16.0	14.8	17.6	19.6	18.0	12.5	11.1	6.46
3	0.59	0.88	1.14	1.49	1.72	1.90	1.79	1.63	1.30	0.71	0.98
4	0.73	1.36	1.73	2.05	2.23	2.24	2.11	1.88	1.31	0.69	0.69
5	5.43										21.1
6	5.49										14.1
7	0.95	1.71	2.21	2.92	3.10	3.20	3.20	~~3.19~~ ①	1.94	0.72	0.56
8	5.24										14.6
9	5.22										12.9
10	0.56	0.78	0.94	1.19	1.35	1.36	1.06	0.98	0.58	<0.50	<0.50
11	0.86	1.71	2.21	2.84	3.17	3.30	3.30	3.19	2.28	0.83	1.32
12	0.55	0.77	0.99	1.32	1.55	1.59	1.42	1.38	1.04	0.64	0.58
13	0.75	1.46	1.88	2.42	3.04	3.22	3.22	2.90	2.26	0.849	1.56
14	0.81	1.41	1.87	2.01	2.16	2.13	2.10	1.68	0.969	<0.50	<0.50
15	0.54	0.78	0.94	1.21	1.33	1.37	1.42	0.84	<0.50	<0.50	<0.50
Initials/ Date	PM 11/3/06	11/4/06	11/5/06	JC 11/6/06	JC 11/7/06	JC 11/8/06	PM 11/9/06	11/10/06	PM 11/11/06	PM 11/12/06	11/13/06

①2.60
11/14/06

Aqua Survey, Inc.
Solid Phase Readings

Job #: 26-349 **Test Start Date:** 11/3/06 **Parameter:** Overlay/ Porewater
Client: CDR **Static** **Organism:** *L. plumulosus*

Sample Con	Day 0	Day 10
OVERLAY	N/A	
Temperature (°C)		24.4
Salinity (ppt)		21.0
D.O. (mg/L)		6.9
pH		7.8
NH_3 (mg/L)		13.8
POREWATER		
Temperature (°C)		—
Salinity (ppt)		—
D.O. (mg/L)		—
pH		—
NH_3 (mg/L)	↓	27.6
Initials/ Date	J 11/3/06	LH 11/13/06

Sample 6A	Day 0	Day 10
OVERLAY		
Temperature (°C)	24.2	24.4
Salinity (ppt)	21.0	21.0
D.O. (mg/L)	6.6	6.7
pH	7.8	7.8
NH_3 (mg/L)	0.86	0.92
POREWATER		
Temperature (°C)	—	—
Salinity (ppt)	—	—
D.O. (mg/L)	—	—
pH	—	—
NH_3 (mg/L)	5.16	1.44
Initials/ Date	J 11/3/06	LH 11/13/06

Sample 7A	Day 0	Day 10
OVERLAY		
Temperature (°C)	24.3	24.4
Salinity (ppt)	21.0	20.8
D.O. (mg/L)	6.6	6.5
pH	7.8	7.8
NH_3 (mg/L)	<0.50	0.60
POREWATER		
Temperature (°C)	—	—
Salinity (ppt)	—	—
D.O. (mg/L)	—	—
pH	—	—
NH_3 (mg/L)	3.81	2.57
Initials/ Date	J 11/3/06	LH 11/13/06

Sample	Day 0	Day 10
OVERLAY		
Temperature (°C)		
Salinity (ppt)		
D.O. (mg/L)		
pH		
NH_3 (mg/L)		
POREWATER		
Temperature (°C)		
Salinity (ppt)		
D.O. (mg/L)		
pH		
NH_3 (mg/L)		
Initials/ Date		

349LPS0.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/03/06 12:00:44	24.48	33285.0	20.83	6.90	7.91
1	11/03/06 12:02:32	24.48	30911.0	19.20	4.82	7.47
2	11/03/06 12:03:51	24.41	33232.0	20.80	6.55	7.76
3	11/03/06 12:04:27	24.40	33397.0	20.91	6.73	7.82
4	11/03/06 12:05:08	24.43	30734.0	19.08	6.54	7.77
5	11/03/06 12:05:45	24.44	30788.0	19.12	6.68	7.91
6	11/03/06 12:06:44	24.46	33609.0	21.06	6.65	7.91
7	11/03/06 12:07:24	24.36	30817.0	19.14	6.55	7.83
8	11/03/06 12:07:55	24.51	30832.0	19.15	6.64	7.86
9	11/03/06 12:08:18	24.41	33338.0	20.87	6.66	7.87
10	11/03/06 12:08:49	24.47	33525.0	21.00	6.64	7.81
11	11/03/06 12:09:25	24.45	33335.0	20.87	6.71	7.86
12	11/03/06 12:10:17	24.33	33182.0	20.77	6.49	7.75
13	11/03/06 12:10:46	24.47	33445.0	20.94	6.42	7.73
14	11/03/06 12:11:34	24.49	33171.0	20.76	6.52	7.74

Project #: 26349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: 10day Static Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L.plumulosus Day of Study: 0

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ ~~22~~ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Dissolved Oxygen: ☐ >4.0 mg/L ☑ > 3.6 mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☑ 7 to 9

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials:

349LPS1.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/04/06 11:45:33	24.43	35042.0	22.05	6.73	7.94
1	11/04/06 11:47:36	24.93	31226.0	19.41	6.75	8.20
2	11/04/06 11:48:24	24.80	34719.0	21.82	6.65	8.05
3	11/04/06 11:49:36	24.74	34849.0	21.91	6.67	8.03
4	11/04/06 11:50:50	24.77	31000.0	19.26	6.49	8.03
5	11/04/06 11:51:34	24.77	31227.0	19.41	6.71	8.19
6	11/04/06 11:52:25	24.84	35313.0	22.23	6.60	8.08
7	11/04/06 11:53:24	24.81	31194.0	19.39	6.69	8.14
8	11/04/06 11:54:02	24.80	31217.0	19.41	6.60	8.11
9	11/04/06 11:54:44	24.71	34888.0	21.94	6.58	8.02
10	11/04/06 11:55:24	24.78	35259.0	22.20	6.58	8.03
11	11/04/06 11:56:05	24.65	34940.0	21.98	6.49	7.93
12	11/04/06 11:56:37	24.66	34963.0	21.99	6.43	7.88
13	11/04/06 11:57:11	24.54	34911.0	21.96	6.43	7.88
14	11/04/06 11:57:42	24.59	34768.0	21.86	6.47	7.88

Project #: 26.349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ________ Date: 11/4/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L. plumulosus Day of Study: 1

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Dissolved Oxygen: ☐ >4.0 mg/L ☑ > 3.6 mg/L

pH: ☐ 7.3 to 8.3 ☑ 6.0 to 9.0 ☐ _____ to _____

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials: ______

349LPS2.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/05/06 09:58:40	25.26	35352.0	22.25	6.82	8.01
1	11/05/06 09:59:47	25.38	31091.0	19.31	6.86	8.18
2	11/05/06 10:00:21	25.27	34990.0	22.00	6.68	8.00
3	11/05/06 10:01:08	25.26	35205.0	22.15	6.68	8.00
4	11/05/06 10:01:44	25.26	30646.0	19.01	6.72	8.12
5	11/05/06 10:02:14	25.18	30776.0	19.10	6.81	8.22
6	11/05/06 10:03:06	25.10	35650.0	22.46	6.65	8.03
7	11/05/06 10:03:38	25.18	30906.0	19.19	6.76	8.16
8	11/05/06 10:04:29	25.19	30817.0	19.13	6.72	8.18
9	11/05/06 10:05:03	25.07	35085.0	22.07	6.68	8.07
10	11/05/06 10:05:33	25.10	35626.0	22.45	6.69	8.05
11	11/05/06 10:06:02	24.99	34977.0	22.00	6.43	7.91
12	11/05/06 10:06:34	24.96	35039.0	22.04	6.49	7.90
13	11/05/06 10:07:10	24.88	35011.0	22.02	6.52	7.91
14	11/05/06 10:07:33	24.85	34911.0	21.95	6.57	7.91

Project #: 26-349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ________ Date: 11/5/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L plumulosus Day of Study: 2

OPERATIONAL RANGE: Check if OK

Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C		
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☐ 18 – 22 ppt*		
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >_____ mg/L			
pH:	☐ 7.3 to 8.3	☑ ~~6~~7.0 to 9.0	☐ _____ to _____		

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:
*Salinity slightly high due to sediment

See deviation summary sheet ☐

Initials: ______

349LPS3.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/06/06 10:23:38	24.26	35871.0	22.63	6.67	8.03
1	11/06/06 10:25:14	24.70	31229.0	19.42	6.66	8.20
2	11/06/06 10:26:54	24.83	35228.0	22.17	6.61	7.99
3	11/06/06 10:27:41	24.96	35418.0	22.30	6.68	8.03
4	11/06/06 10:28:43	24.92	30346.0	18.81	6.76	8.15
5	11/06/06 10:29:11	25.02	30735.0	19.07	6.87	8.28
6	11/06/06 10:30:02	24.88	35944.0	22.67	6.87	8.18
7	11/06/06 10:30:21	24.96	30897.0	19.19	6.97	8.24
8	11/06/06 10:31:21	24.87	30868.0	19.17	6.94	8.30
9	11/06/06 10:32:16	24.79	35534.0	22.39	6.84	8.05
10	11/06/06 10:33:07	24.80	36076.0	22.77	6.82	8.09
11	11/06/06 10:33:34	24.77	35195.0	22.15	6.69	8.00
12	11/06/06 10:34:28	24.69	35377.0	22.28	6.39	7.90
13	11/06/06 10:35:04	24.71	35255.0	22.20	6.77	7.99
14	11/06/06 10:35:46	24.60	35208.0	22.16	6.81	7.94

Project #: 26 349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ____ Date: 11/6/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp. Day of Study: 3

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 - 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☐ 18 - 22 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >____ mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☑ 7 to 9

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials: _____

349LPS4.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/07/06 11:18:50	24.65	36977.0	23.40	6.42	7.95
1	11/07/06 11:20:15	25.31	31606.0	19.66	6.33	8.22
2	11/07/06 11:21:14	25.26	35618.0	22.44	6.24	7.95
3	11/07/06 11:21:46	25.28	35844.0	22.60	6.33	8.04
4	11/07/06 11:22:35	25.29	30322.0	18.79	5.94	7.97
5	11/07/06 11:23:06	25.28	30786.0	19.10	6.24	8.24
6	11/07/06 11:23:52	25.27	36301.0	22.91	6.39	8.12
7	11/07/06 11:24:23	25.24	30842.0	19.14	6.56	8.22
8	11/07/06 11:24:57	25.30	30983.0	19.24	6.56	8.27
9	11/07/06 11:25:32	25.25	35896.0	22.63	6.38	8.01
10	11/07/06 11:26:14	25.19	36518.0	23.07	6.39	8.06
11	11/07/06 11:26:53	25.19	35329.0	22.24	6.24	7.88
12	11/07/06 11:27:48	25.13	35675.0	22.48	5.39	7.84
13	11/07/06 11:28:27	25.11	35496.0	22.36	5.98	7.97
14	11/07/06 11:29:11	25.05	35489.0	22.35	6.35	7.88

Project #: 26 349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ______ Date: 11/7/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☐ OTHER: Lp Day of Study: 4

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☐ 18 – 22 ppt

Red ☐

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >_____ mg/L

Green ☑

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☑ 7 to 9

Actions taken:

See deviation summary sheet ☐

Initials:

349LPS5.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/08/06 10:09:41	25.52	37128.0	23.49	6.56	8.12
1	11/08/06 10:10:44	25.71	31686.0	19.71	6.59	8.36
2	11/08/06 10:11:31	25.55	35754.0	22.53	6.38	8.04
3	11/08/06 10:12:01	25.55	36049.0	22.73	6.47	8.17
4	11/08/06 10:12:52	25.60	30376.0	18.82	6.54	8.27
5	11/08/06 10:13:13	25.57	30903.0	19.18	6.58	8.37
6	11/08/06 10:14:08	25.58	36969.0	23.38	6.46	8.25
7	11/08/06 10:14:31	25.60	30984.0	19.23	6.67	8.32
8	11/08/06 10:15:07	25.57	30991.0	19.24	6.73	8.34
9	11/08/06 10:15:43	25.51	35989.0	22.69	6.55	8.15
10	11/08/06 10:16:27	25.41	36912.0	23.34	6.25	8.13
11	11/08/06 10:17:08	25.41	35546.0	22.38	6.09	7.95
12	11/08/06 10:17:51	25.45	35811.0	22.57	6.37	8.05
13	11/08/06 10:18:27	25.36	35540.0	22.38	6.37	8.12
14	11/08/06 10:19:16	25.37	35614.0	22.43	6.41	7.99

Project #: 26-349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ________ Date: 11/8/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp Day of Study: 5

OPERATIONAL RANGE: Check if OK

					Meter Used:	
Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C		Blue	☐
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 18 – 22 ppt		Red	☐
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >____ mg/L			Green	☑
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☑ 7 to 9			

Actions taken:

See deviation summary sheet ☐

Pages: 1 of 1

349LPS6.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/09/06 08:35:01	25.41	37283.0	23.60	6.69	8.15
1	11/09/06 08:36:03	25.70	31841.0	19.82	6.71	8.42
2	11/09/06 08:36:59	25.55	35850.0	22.59	6.60	8.10
3	11/09/06 08:38:03	25.53	36037.0	22.72	6.63	8.20
4	11/09/06 08:39:15	25.62	30356.0	18.80	6.70	8.31
5	11/09/06 08:39:53	25.61	30875.0	19.16	6.76	8.41
6	11/09/06 08:40:36	25.64	37057.0	23.44	6.73	8.30
7	11/09/06 08:41:17	25.62	30866.0	19.15	6.87	8.36
8	11/09/06 08:42:09	25.73	31066.0	19.29	6.79	8.37
9	11/09/06 08:42:50	25.57	36268.0	22.89	6.66	8.14
10	11/09/06 08:43:34	25.52	37143.0	23.50	6.65	8.25
11	11/09/06 08:44:10	25.50	35642.0	22.45	6.28	7.97
12	11/09/06 08:44:49	25.53	35888.0	22.62	6.53	8.09
13	11/09/06 08:45:10	25.41	35630.0	22.44	6.54	8.13
14	11/09/06 08:45:59	25.38	35686.0	22.48	6.58	8.03

Project #: 26-349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ________ Date: 11/9/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: LP Day of Study: 6

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 - 26 °C	Blue	☐
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☐ 18 – 22 ppt	Red	☐
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >_____ mg/L		Green	☑
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☑ 7 to 9		

Actions taken:

See deviation summary sheet ☐

349LPS7.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/10/06 10:55:32	24.61	37437.0	23.72	6.10	8.04
1	11/10/06 10:56:52	25.20	31817.0	19.81	6.23	8.44
2	11/10/06 10:57:36	25.12	35754.0	22.54	6.08	8.16
3	11/10/06 10:58:00	25.16	36193.0	22.84	6.11	8.21
4	11/10/06 10:58:44	25.24	30453.0	18.88	6.19	8.33
5	11/10/06 10:59:17	25.20	30912.0	19.19	6.26	8.42
6	11/10/06 11:00:03	25.27	36884.0	23.32	6.03	8.32
7	11/10/06 11:00:39	25.22	30991.0	19.24	6.22	8.36
8	11/10/06 11:01:27	25.31	31056.0	19.29	6.20	8.40
9	11/10/06 11:02:01	25.14	36029.0	22.73	6.05	8.20
10	11/10/06 11:02:36	25.09	37024.0	23.42	5.97	8.25
11	11/10/06 11:03:09	25.04	35677.0	22.48	5.49	8.03
12	11/10/06 11:04:12	25.01	35959.0	22.68	5.85	8.16
13	11/10/06 11:04:31	24.91	35692.0	22.50	5.91	8.22
14	11/10/06 11:05:07	24.93	35593.0	22.43	5.92	8.07

Project #: 26349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ________ Date: 11/10/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER L. plumulosus Day of Study: 7

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12–14 °C ☐ 18–22 °C ☑ 24 – 26 °C

Salinity: ☐ 26–30 ppt ☐ 28–32 ppt ☐ 18 – 22 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >_____ mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Pages: 1 of 1

349LPS8.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/11/06 09:55:45	24.88	36852.0	23.31	7.10	8.21
1	11/11/06 09:59:04	25.50	32086.0	19.99	6.83	8.53
2	11/11/06 10:00:04	25.23	35825.0	22.58	6.76	8.23
3	11/11/06 10:00:32	25.38	36311.0	22.92	6.64	8.28
4	11/11/06 10:02:22	25.44	30437.0	18.86	6.77	8.38
5	11/11/06 10:03:07	25.44	31089.0	19.31	6.86	8.46
6	11/11/06 10:04:47	25.48	37122.0	23.48	6.41	8.38
7	11/11/06 10:05:14	25.52	31138.0	19.34	6.84	8.41
8	11/11/06 10:05:43	25.62	31370.0	19.50	6.94	8.43
9	11/11/06 10:06:41	25.43	36479.0	23.04	6.78	8.24
10	11/11/06 10:07:52	25.38	37186.0	23.53	4.78	8.34
11	11/11/06 10:08:50	25.35	35638.0	22.45	6.09	8.16
12	11/11/06 10:09:36	25.34	35946.0	22.67	6.51	8.25
13	11/11/06 10:10:48	25.26	35675.0	22.48	6.77	8.34
14	11/11/06 10:11:47	25.28	35724.0	22.51	6.69	8.13

Project #: 26-349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: Std. 2 Date: 11/11/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L. plumulosus Day of Study: 8

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 15 – 22 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☑ > 3.6 mg/L

pH: ☐ 7.3 to 8.3 ☑ 6.0 to 9.0 ☐ ____ to ____

Meter Used:

Blue ☐

Red ☐

Green ☐

Actions taken:

See deviation summary sheet ☐

Sat Nov 11 10:42:02 2006

Page 1 of 1

349LPS9.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/12/06 09:16:49	25.34	37207.0	23.55	7.10	8.12
1	11/12/06 09:19:50	25.69	32435.0	20.23	6.63	8.46
2	11/12/06 09:21:03	25.53	35905.0	22.63	6.73	8.23
3	11/12/06 09:22:01	25.70	35613.0	22.57	6.70	8.29
4	11/12/06 09:23:12	25.70	30622.0	18.98	6.75	8.34
5	11/12/06 09:23:44	25.64	31183.0	19.37	6.85	8.41
6	11/12/06 09:24:46	25.70	37464.0	23.72	6.66	8.37
7	11/12/06 09:25:16	25.74	31430.0	19.54	6.86	8.39
8	11/12/06 09:26:06	25.79	31382.0	19.50	6.81	8.41
9	11/12/06 09:27:44	25.61	36704.0	23.19	6.63	8.20
10	11/12/06 09:28:13	25.56	37457.0	23.72	6.66	8.32
11	11/12/06 09:28:55	25.58	35781.0	22.55	6.59	8.20
12	11/12/06 09:29:25	25.52	35964.0	22.67	6.65	8.30
13	11/12/06 09:30:01	25.44	35753.0	22.53	6.78	8.42
14	11/12/06 09:30:45	25.43	35894.0	22.63	6.68	8.24

Project #: 06-347 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: ~~[illegible]~~ static Date: 11/12/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L. plumulosus Day of Study: 9

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Red ☐

Dissolved Oxygen: ☐ >4.0 mg/L ☑ > 3.6 mg/L

Green ☑

pH: ☐ 7.3 to 8.3 ☑ 6.0 to 9.0 ☐ ____ to ____

Actions taken:

~~Sun Nov 12 10:05:43 2006~~ ~~Page 1 of 1~~

See deviation summary sheet ☐

Initials:

349LPS10.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/13/06 09:00:06	24.79	37823.0	23.99	6.29	8.24
1	11/13/06 09:01:13	25.38	32682.0	20.40	6.21	8.45
2	11/13/06 09:02:11	25.29	35943.0	22.66	6.29	8.15
3	11/13/06 09:02:54	25.45	36339.0	22.94	6.32	8.32
4	11/13/06 09:03:49	25.47	30511.0	18.91	6.48	8.36
5	11/13/06 09:04:19	25.44	31301.0	19.45	6.58	8.43
6	11/13/06 09:05:27	25.37	37600.0	23.82	6.37	8.40
7	11/13/06 09:06:03	25.50	31184.0	19.37	6.53	8.39
8	11/13/06 09:06:45	25.52	31459.0	19.56	6.53	8.38
9	11/13/06 09:07:27	25.39	36848.0	23.29	6.46	8.21
10	11/13/06 09:08:15	25.36	37692.0	23.89	6.50	8.40
11	11/13/06 09:08:56	25.33	35677.0	22.48	6.39	8.17
12	11/13/06 09:09:49	25.22	35901.0	22.64	6.46	8.42
13	11/13/06 09:10:11	25.19	35743.0	22.53	6.58	8.55
14	11/13/06 09:11:21	25.12	35768.0	22.55	6.47	8.25

Project #: 26-349 Test type: ☐ Bioaccumulation ☑ Solid Phase ☐ SPP ☐ OTHER: static Date: 11/13/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L. plumulosus Day of Study: 10

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Red ☐

Dissolved Oxygen: ☐ >4.0 mg/L ☑ > 3.6 mg/L

Green ☑

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☑ 7.0 to 9.0

Actions taken:

~~Mon Nov 13 13:13:51 2006~~ ~~Page 1 of 1~~

See deviation summary sheet ☐ Initials: JL

AQUA SURVEY, INC.
CULTURE DEPARTMENT

Organism Receiving Form

Receiving Log #: 26-089 Date: 11/1/06

Shipping Carrier: Fed Ex

Species: L. plumulosus Number Shipped: 2300+

Livestock Source/ Shipper: ARO

ASI Order Ref. Date: 10/31/06 ASI Order Ref. Initials:

Age/ Characteristics 2-4mm

Taxonomic Verification Log #: 26-089 Date: 11/1/06

Receiving Water Quality Parameters

D.O: 10.1mg/L Temp.: 14.6°C NH_3/NO_2: 0/0 pH: 6.9

[✓ Salinity]/ Hardness 18.5ppt Alkalinity: 140

Water- [✓ Clear/ Cloudy] Container Size: (3)-1gallon cubitainers

ICE: [✓ Y]/N Type of Packing: Styrofoam Box

Observation/ Condition of Livestock: 1 gallon Sid provided for holding Organisms appear good!

Receiving Tech. Initials: Supervisors Initials:

AQUA SURVEY, INC.
CULTURE DEPARTMENT
GENERAL SPECIES STATUS LOG

Species: L. plumulosus
Receiving [✓] Culture [ ] Log #: 26-089
Test Job #: 26-349 Client: CDR
Dates: 11/1/06 - 11/4/06
Initial Stock @: 2300+
Food Type: gorp Slurry

Date	Day Number	Temp/DO	NH3/NO2	pH	[✓ Sal]/Hardness	Alkalinity	Mortality	Remarks/ Initials
11/1/06	1 1150	14.6°C/40.1mg/l	0/0	6.9	18.5ppt	140	0	Started acclimation nf
11/1/06	1 1600	18.0°C/ —	—	—	—	—	—	nf
11/2/06	2 0930	19.9°C/6.8	0/0	7.8	18.6ppt	120	0	Continued acclim. Fed gorp slurry nf
11/3/06	3 0850	22.9°C/7.1	0/0	7.8	20.0ppt	120	0	continued acc. nf
11/3/06	3 1500	25.0°C/7.3	0/0	7.9	23.2ppt	120	0	To test nf TIE/SET Fed gorp Slurry nf
11/4/06	4	24.1°C/7.2	0/0	7.8	24.5ppt	120	0	TIE-ulva To test nf

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Lepto chierus plumulasos

Source: Lab reared X Hatchery reared ____ Field collected ____

Hatch date 10/06 Receipt date ____

Lot number 1023~~0~~06LP Strain ____

Brood Origination Chesapeake Bay VA

II. Water Quality

Temperature 21 °C Salinity 20 ppt DO SAT

pH 8.0 Hardness – ppm

III. Culture Conditions

System: SW STATIC renewal

Diet: Flake Food ✓ Phytoplankton ____ Trout Chow ✓

Brine Shrimp ____ Rotifers ____ Other "GORP"

Prophylactic Treatments: ____

Comments: SEDIMENT 4L

2-4 mm

IV. Shipping Information

Client: AQUA SURVEY # of Organisms: 2300+

Carrier: FED EX Date Shipped: 10/31/06

Biologist: ____

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

AQUA SURVEY, INC.
Taxonomic Verification Form

TAXONOMIC VERIFICATION LOG #: 26-089 **DATE:** 11/1/06

SPECIES: *L. plumulosus* **RECEIVING #/ CULTURE LOT #:** 26- 089

LIVESTOCK SOURCE: ARO

JOB #: 26-349/SRT **CLIENT:** CDR

TAXONOMIC KEYS/ SOURCES USED: *Shallow Water Gammaridean Amphipoda of New England*

Bousfield, 1970

DISTIGUISHING CHARACTERISTICS:

- Uropod 3 biramous; abdominal side plates overlapping distally
- Head, anterior lobe round or truncate; antenna 2 peducle stout, usually exceeding that of antenna 1; gnathopods dissimilar in males.
- Coxal plates 1-4, moderately deep, setose below; urosome with clusters of dorsal setae and or spines; paraeopods 5-7, bases broadly expanded
- Coxa 1 broad, vertical; coax 5, anterior lobe margins subparallel; uropod 3, rami with few posterior spines and long apical spines

AQUA SURVEY INVESTIGATOR (S):

SUPERVISORS INITIALS:

```
----------------------------------------------------------------------
Series: Temperature (*C)
----------------------------------------------------------------------
Logger Info                     Information specific to the logger
  Model                         HOBO Water Temp Pro [H20-001]
  Serial Number                 810765
  Memory Size (Bytes)           32768
  Deployment                    37
Series Info                     Information about the data in the series
  Points Used                   268
  First Point                   11/03/06 13:23:13.0
  Last Point                    11/14/06 16:23:13.0
  Duration                      11 Days 03:00:00.0
Stats                           Calculated from the series
  Wrap Count                    0
  Max Value                     26.50
  Min Value                     21.91
  Avg Value                     24.95
Launch Parameters
  Load Time                     11/03/2006 18:23:11 GMT   11/03/2006 13:23:11 Local
  Launch Time                   11/03/2006 18:23:13 GMT   11/03/2006 13:23:13 Local
  Logging Time                  11/03/2006 18:23:13 GMT   11/03/2006 13:23:13 Local
  Sampling Interval             3600
  Wrap                          0 = (FALSE/OFF/OPEN/TYPE 0)
  Stealth Enable                0 = (FALSE/OFF/OPEN/TYPE 0)
  End of Data                   0x320_00
  Wrap Count                    0
  Description String            26-349 Lp static bath 6
  Time Zone                     GMT-300 Minutes TZ set on Launch
```

```
Date,Time,Temperature (*C)
11/03/06,13:23:13.0,23.809
11/03/06,14:23:13.0,24.581
11/03/06,15:23:13.0,24.653
11/03/06,16:23:13.0,24.726
11/03/06,17:23:13.0,24.363
11/03/06,18:23:13.0,24.219
11/03/06,19:23:13.0,24.436
11/03/06,20:23:13.0,24.508
11/03/06,21:23:13.0,24.653
11/03/06,22:23:13.0,24.677
11/03/06,23:23:13.0,24.605
11/04/06,00:23:13.0,24.557
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11/04/06,03:23:13.0,24.219
11/04/06,04:23:13.0,24.146
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11/04/06,07:23:13.0,24.05
11/04/06,08:23:13.0,24.146
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11/04/06,16:23:13.0,24.508
11/04/06,17:23:13.0,24.557
11/04/06,18:23:13.0,24.557
11/04/06,19:23:13.0,24.532
11/04/06,20:23:13.0,24.508
11/04/06,21:23:13.0,24.412
11/04/06,22:23:13.0,24.315
11/04/06,23:23:13.0,24.219
11/05/06,00:23:13.0,24.171
11/05/06,01:23:13.0,24.122
11/05/06,02:23:13.0,24.146
11/05/06,03:23:13.0,24.122
11/05/06,04:23:13.0,24.122
11/05/06,05:23:13.0,24.074
11/05/06,06:23:13.0,24.122
11/05/06,07:23:13.0,24.122
11/05/06,08:23:13.0,24.291
11/05/06,09:23:13.0,24.46
11/05/06,10:23:13.0,24.629
11/05/06,11:23:13.0,24.895
11/05/06,12:23:13.0,24.968
11/05/06,13:23:13.0,25.065
11/05/06,14:23:13.0,25.113
11/05/06,15:23:13.0,25.113
11/05/06,16:23:13.0,25.065
11/05/06,17:23:13.0,25.016
11/05/06,18:23:13.0,24.968
11/05/06,19:23:13.0,24.919
11/05/06,20:23:13.0,24.847
11/05/06,21:23:13.0,24.798
11/05/06,22:23:13.0,24.702
11/05/06,23:23:13.0,24.677
11/06/06,00:23:13.0,24.677
11/06/06,01:23:13.0,24.653
11/06/06,02:23:13.0,24.581
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11/06/06,03:23:13.0,24.581
11/06/06,04:23:13.0,24.557
11/06/06,05:23:13.0,24.532
11/06/06,06:23:13.0,24.581
11/06/06,07:23:13.0,24.653
11/06/06,08:23:13.0,24.677
11/06/06,09:23:13.0,24.726
11/06/06,10:23:13.0,24.823
11/06/06,11:23:13.0,24.823
11/06/06,12:23:13.0,24.919
11/06/06,13:23:13.0,24.968
11/06/06,14:23:13.0,25.016
11/06/06,15:23:13.0,25.016
11/06/06,16:23:13.0,25.016
11/06/06,17:23:13.0,25.016
11/06/06,18:23:13.0,25.089
11/06/06,19:23:13.0,25.04
11/06/06,20:23:13.0,25.016
11/06/06,21:23:13.0,24.992
11/06/06,22:23:13.0,24.944
11/06/06,23:23:13.0,24.968
11/07/06,00:23:13.0,24.968
11/07/06,01:23:13.0,24.968
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11/07/06,08:23:13.0,24.992
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11/08/06,08:23:13.0,25.355
11/08/06,09:23:13.0,25.428
11/08/06,10:23:13.0,25.404
11/08/06,11:23:13.0,25.428
11/08/06,12:23:13.0,25.404
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11/08/06,14:23:13.0,25.428
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11/09/06,21:23:13.0,23.4
11/09/06,22:23:13.0,23.184
11/09/06,23:23:13.0,23.04
11/10/06,00:23:13.0,22.944
11/10/06,01:23:13.0,22.848
11/10/06,02:23:13.0,22.776
11/10/06,03:23:13.0,22.753
11/10/06,04:23:13.0,22.705
11/10/06,05:23:13.0,22.633
11/10/06,06:23:13.0,22.633
11/10/06,07:23:13.0,22.633
11/10/06,08:23:13.0,22.896
11/10/06,09:23:13.0,24.267
11/10/06,10:23:13.0,24.823
11/10/06,11:23:13.0,25.162
11/10/06,12:23:13.0,25.307
11/10/06,13:23:13.0,25.38
11/10/06,14:23:13.0,25.38
11/10/06,15:23:13.0,25.404
11/10/06,16:23:13.0,25.331
11/10/06,17:23:13.0,25.234
11/10/06,18:23:13.0,25.331
11/10/06,19:23:13.0,25.38
11/10/06,20:23:13.0,25.501
11/10/06,21:23:13.0,25.38
11/10/06,22:23:13.0,25.404
11/10/06,23:23:13.0,25.38
11/11/06,00:23:13.0,25.355
11/11/06,01:23:13.0,25.307
11/11/06,02:23:13.0,25.283
11/11/06,03:23:13.0,25.307
11/11/06,04:23:13.0,25.283
11/11/06,05:23:13.0,25.307
11/11/06,06:23:13.0,25.307
11/11/06,07:23:13.0,25.355
11/11/06,08:23:13.0,25.38
```

```
11/11/06,09:23:13.0,25.404
11/11/06,10:23:13.0,25.404
11/11/06,11:23:13.0,25.453
11/11/06,12:23:13.0,25.477
11/11/06,13:23:13.0,25.501
11/11/06,14:23:13.0,25.501
11/11/06,15:23:13.0,25.55
11/11/06,16:23:13.0,25.598
11/11/06,17:23:13.0,25.574
11/11/06,18:23:13.0,25.525
11/11/06,19:23:13.0,25.55
11/11/06,20:23:13.0,25.55
11/11/06,21:23:13.0,25.525
11/11/06,22:23:13.0,25.525
11/11/06,23:23:13.0,25.574
11/12/06,00:23:13.0,25.55
11/12/06,01:23:13.0,25.525
11/12/06,02:23:13.0,25.525
11/12/06,03:23:13.0,25.574
11/12/06,04:23:13.0,25.55
11/12/06,05:23:13.0,25.598
11/12/06,06:23:13.0,25.623
11/12/06,07:23:13.0,25.647
11/12/06,08:23:13.0,25.647
11/12/06,09:23:13.0,25.671
11/12/06,10:23:13.0,25.647
11/12/06,11:23:13.0,25.598
11/12/06,12:23:13.0,25.598
11/12/06,13:23:13.0,25.574
11/12/06,14:23:13.0,25.598
11/12/06,15:23:13.0,25.598
11/12/06,16:23:13.0,25.55
11/12/06,17:23:13.0,25.55
11/12/06,18:23:13.0,25.55
11/12/06,19:23:13.0,25.55
11/12/06,20:23:13.0,25.501
11/12/06,21:23:13.0,25.453
11/12/06,22:23:13.0,25.453
11/12/06,23:23:13.0,25.477
11/13/06,00:23:13.0,25.525
11/13/06,01:23:13.0,25.501
11/13/06,02:23:13.0,25.525
11/13/06,03:23:13.0,25.501
11/13/06,04:23:13.0,25.501
11/13/06,05:23:13.0,25.501
11/13/06,06:23:13.0,25.623
11/13/06,07:23:13.0,25.598
11/13/06,08:23:13.0,25.598
11/13/06,09:23:13.0,25.598
11/13/06,10:23:13.0,25.574
11/13/06,11:23:13.0,26.256
11/13/06,12:23:13.0,26.5
11/13/06,13:23:13.0,26.475
11/13/06,14:23:13.0,26.134
11/13/06,15:23:13.0,25.939
11/13/06,16:23:13.0,25.647
11/13/06,17:23:13.0,25.501
11/13/06,18:23:13.0,25.38
11/13/06,19:23:13.0,25.331
11/13/06,20:23:13.0,25.355
11/13/06,21:23:13.0,25.428
11/13/06,22:23:13.0,25.404
11/13/06,23:23:13.0,25.283
```

```
11/14/06,00:23:13.0,25.331
11/14/06,01:23:13.0,25.355
11/14/06,02:23:13.0,25.38
11/14/06,03:23:13.0,25.38
11/14/06,04:23:13.0,25.404
11/14/06,05:23:13.0,25.355
11/14/06,06:23:13.0,25.428
11/14/06,07:23:13.0,25.38
11/14/06,08:23:13.0,25.404
11/14/06,09:23:13.0,25.477
11/14/06,10:23:13.0,24.412
11/14/06,11:23:13.0,23.328
11/14/06,12:23:13.0,22.585
11/14/06,13:23:13.0,22.034
11/14/06,14:23:13.0,21.963
11/14/06,15:23:13.0,21.915
11/14/06,16:23:13.0,22.154
```

APPENDIX D

L. plumulosus TIE Raw Data Sheets

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: Baseline	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; 2130	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

onc % Effluent		Daily Counts										
		0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120	(6) 144	(7) 168	(8) 192	(9) 216	(10) 240	
on	A	10	10	10	10	9^{1}	8^{1}	8	8	8	7^{1}	3^{4}	
	B	10	10	10	10	10	10	10	10	10	6^{4}	3^{3}	
	C	10	10	10	10	10	10	10	10	10	3^{7}	1^{2}	
C.6 25%	A	10	10	10	10	10	8^{2}	8	8	8	8	8	
	B	10	10	10	10	10	10	10	10	8^{2}	8	7^{1}	
	C	10	10	10	10	10	8^{2}	8	8	7^{1}	5^{2}	4^{1}	
.6 100%	A	10	10	10	10	10	10	10	10	10	10	9^{1}	
	B	10	10	10	10	9^{1}	9	9	9	7^{2}	6^{1}	6	
	C	10	10	10	10	10	9^{1}	9	9	9	9	9	
.7 25%	A	10	10	10	10	10	10	10	10	9^{1}	8^{1}	5^{3}	
	B	10	10	10	10	10	10	10	10	9^{1}	8^{1}	6^{2}	
	C	10	10	10	10	10	10	10	10	8^{2}	6^{2}	5 6^{1}	
C.7 100%	A	10	10	10	10	8^{2}	7^{1}	7	7	7	7	6^{1}	
	B	10	10	10	10	10	8^{2}	8	8	6^{2}	5^{1}	4^{1}	
	C	10	10	10	10	10	9^{1}	9	9	9	9	8^{1}	
nitials/ Date		11/3/06	11/4/06	11/5/06	11/6/06	11/7/06	11/8/06	11/9/06	11/10/06	11/11/06	Pmin 11/12/06	11/13/06	

349B0.DAT

	DateTime M/D/Y	Temp C	SpCond uS/cm	Salinity ppt	DO Conc mg/L	pH
0 Con	11/03/06 15:29:40	24.16	39686.0	25.32	6.65	8.03
1 Cb 25%	11/03/06 15:30:29	24.09	39531.0	25.21	6.61	7.97
2 Cb 100%	11/03/06 15:31:16	24.11	39439.0	25.14	6.55	7.86
3 C-7 25%	11/03/06 15:33:22	24.01	39417.0	25.13	6.56	7.80
4 C-7 100%	11/03/06 15:37:05	24.91	39187.0	24.95	6.28	7.39

Project #: 26-349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp. Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 23 – 27 ppt

Red ☐

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >____ mg/L

Green ☑

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ ____ to ____

Actions taken:

See deviation summary sheet ☐

Initials: ____

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: Thio	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; 2145	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts 0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120	(6) 144	(7) 168	(8) 192	(9) 216	(10) 240	
Con	A	10	10	10	7^{3} ①	5^{2}	3^{2}	0^{3}	–	–	–	–	
	B	10	10	9^{1}	9	8^{1}	7^{1}	3^{4}	0^{3}	–	–	–	
	C	10	10	9^{1}	6^{3} ①	5^{1}	4^{1}	0^{4}	–	–	–	–	
-6 25%	A	10	10	9^{1}	9	9	9	8^{1}	8	8	8	7^{1}	
	B	10	10	9^{1}	8^{1}	8	8	8	7^{1}	7	5^{2}	3^{2}	
	C	10	10	10	9^{1}	9	9	9	9	9	9	6^{3}	
C-6 100%	A	10	0^{10}	–	–	–	–	–	–	–	–	–	
	B	10	1^{9}	0^{1}	–	–	–	–	–	–	–	–	
	C	10	1^{9}	0^{1}	–	–	–	–	–	–	–	–	
-7 25%	A	10	10	9^{1}	9	9	9	9	9	9	7^{2}	6^{1}	
	B	10	10	9^{1}	6^{3}	6	6	6	6	5^{1}	5	4^{1}	
	C	10	10	9^{1}	5^{4} ②	5	4^{1}	4	4	4	4	3^{1}	
-7 100%	A	10	10	9^{1}	0^{9}	–	–	–	–	–	–	–	
	B	10	10	9^{1}	3^{6}	0^{3}	–	–	–	–	–	–	
	C	10	10	8^{2}	2^{6}	0^{2}	–	–	–	–	–	–	
Initials/ Date		J 11/3/06	J 11/4/06	J 11/5/06	J 11/6/06	J 11/7/06	J 11/8/06	J 11/9/06	J 11/10/06	J 11/11/06	J 11/12/06	J 11/13/06	

① No dead bodies present; may have degraded or eaten J 11/6/06

② Only 1 dead body present J 11/6/06

349T0.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 Con	11/03/06 16:11:00	24.21	39296.0	25.04	6.71	8.04
1 C6 25%	11/03/06 16:11:42	24.25	39474.0	25.16	6.66	7.96
2 100%	11/03/06 16:12:44	24.16	39260.0	25.01	6.34	7.79
3 C7 25%	11/03/06 16:15:14	24.01	39293.0	25.04	6.61	7.86
4 100%	11/03/06 16:16:40	24.06	38979.0	24.82	6.51	7.51

Project #: 26-349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE-Thio Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L.p. Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 23 – 27 ppt

Red ☐

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >_____ mg/L

Green ☑

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Actions taken:

See deviation summary sheet ☐

Initials:

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: EDTA	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; ~~2200~~ 2150	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts										
	0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120						
Con A	10	10	10	6^{4}	0^{6}	—						
B	10	10	10	6^{4}	1^{5}	0^{1}						
C	10	10	10	6^{4}	2^{4}	0^{2}						
-6 25% A	10	10	7^{3}	1^{6}	0^{1}	—						
B	10	10	6^{4}	2^{4}	0^{2}	—						
C	10	10	6^{4}	1^{5}	0^{1}	—						
C-6 100% A	10	10	0^{10}	—	—	—						
B	10	10	0^{10}	—	—	—						
C	10	10	1^{9}	0^{1}	—	—						
-7 25% A	10	10	7^{3}	2^{5}	0^{2}	—						
B	10	10	8^{2}	1^{7}	0^{1}	—						
C	10	10	7^{3}	1^{6}	0^{1}	—						
-7 100% A	10	10	6^{4}	2^{4}	0^{2}	—						
B	10	10	10	0^{10}	—	—						
C	10	10	8^{2}	1^{7}	0^{1}	—						
Initials/ Date	11/3/06	11/4/06	11/5/06	11/6/06	11/7/06	11/8/06						

349E0.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/03/06 16:21:12	24.30	38541.0	24.50	6.74	3.94
1	11/03/06 16:24:15	24.32	39227.0	24.99	6.83	6.28
2	11/03/06 16:25:48	24.28	38075.0	24.18	6.63	4.47
3	11/03/06 16:28:22	24.28	39102.0	24.90	6.91	5.95
4	11/03/06 16:29:41	24.22	37918.0	24.07	6.68	4.26

pH adjustments:

Con 49 drops NaOH => pH 8.2 ; adjusted w/ ~5 drops HCL -> pH 7.9

C-6 25% - No adjustments
100% - 26 drops NaOH => pH 7.8

C-7 25% - 3 drops NaOH => pH 8.0
100% - 33 drops NaOH -> pH 7.6
11/3/06

*

Project #: ________ Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☐ OTHER: __________ Date: __________

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☐ OTHER: ________ Day of Study: _____

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☐ _____ – _____ °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☐ _____ – _____ ppt

Red ☐

Dissolved Oxygen: ☐ >4.0 mg/L ☐ >_____ mg/L

Green ☐

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Actions taken:

____

____

Standardization summary sheet ☐

Initials: ________

349E20.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 con	11/03/06 21:10:26	24.32	38638.0	24.57	6.32	7.85
1 C-6 25%	11/03/06 21:16:30	24.04	39677.0	25.31	6.31	7.24
2 100%	11/03/06 21:17:12	24.13	38828.0	24.71	6.29	7.77
3 C-7 25%	11/03/06 21:18:32	24.11	39601.0	25.26	6.30	7.98
4 100%	11/03/06 21:19:22	24.10	38553.0	24.52	6.37	7.60

Project #: 26-349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE-EDTA Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp. Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☐

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 23 – 27 ppt

Red ☐

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >_____ mg/L

Green ☑

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐_____ to _____

Actions taken:

Sat Nov 04 10:57:15 2006

See deviation summary sheet ☐

Page 1 of 1

Initials:

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: 0 45	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; ~~2230~~ 2200hr	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts											
		0	24	48	72	96	120	144					
on	A	10	10	10	4^{6}	0^{4}	—	—					
	B	10	10	10	5^{5}	0^{5}	—	—					
	C	10	10	9^{1}	5^{67}	0^{5}	—	—					
C-6 25%	A	10	10	10	5^{5}	0^{5}	—	—					
	B	10	10	10	5^{5}	0^{5}	—	—					
	C	10	10	8^{2}	5^{3}	0^{5}	—	—					
6 100%	A	10	10	7^{3}	0^{7}	—	—	—					
	B	10	10	10	0^{10}	—	—	—					
	C	10	10	6^{4}	0^{6}	—	—	—					
7 25%	A	10	10	9^{1}	7^{2}	5^{2}	1^{4}	0^{1}					
	B	10	10	9^{1}	8^{1}	4^{4}	2^{2}	0^{2}					
	C	10	10	10	7^{3}	6^{1}	2^{4}	0^{2}					
C7 10%	A	10	10	10	3^{7}	0^{3}	—	—					
	B	10	10	10	8^{2}	0^{8}	—	—					
	C	10	10	8^{2}	5^{3}	0^{5}	—	—					
nitials/ Date		11/3/06	11/4/06	11/5/06	11/6/06	11/7/06	11/8/06	11/9/06					

349450.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/03/06 16:37:40	24.51	38547.0	24.50	6.56	3.93
1	11/03/06 16:39:27	24.47	39206.0	24.97	6.95	6.01
2	11/03/06 16:40:32	24.35	38229.0	24.28	6.45	4.41
3	11/03/06 16:42:50	24.22	38951.0	24.80	6.86	5.76
4	11/03/06 16:44:48	24.30	38044.0	24.15	6.07	4.23

pH adjustments:

Con - 55 drops NaOH → pH 8.2, adjusted w/~5drops HCL → pH 7.7

C-6 25% - 3 drops NaOH → pH 8.0
100% - 19 drops NaOH → pH 7.8

C-7 25% - 2 drops NaOH → pH 7.6
100% - 29.5 drops NaOH → pH 7.4

11/3/06

Project #: ________ Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☐ OTHER: __________ Date: __________

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☐ OTHER: ________ Day of Study: _____

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 –14 °C ☐ 18 –22 °C ☐ _____ – _____ °C

Salinity: ☐ 26 –30 ppt ☐ 28 –32 ppt ☐ _____ – _____ ppt

Dissolved Oxygen: ☐ >4.0 mg/L ☐ >_____ mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Blue ☐
Red ☐
Green ☐

Actions taken:

See deviation summary sheet ☐

Initials: ______

4520.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 Con	11/03/06 21:25:07	24.24	39014.0	24.84	6.25	7.73
1 C-6 25%	11/03/06 21:28:17	24.37	39821.0	25.41	6.24	7.84
2 C-6 100%	11/03/06 21:29:24	24.33	38892.0	24.75	6.15	7.90
3 C-7 25%	11/03/06 21:30:29	24.31	39724.0	25.34	6.13	7.72
4 C-7 100%	11/03/06 21:31:12	24.34	38380.0	24.39	6.17	7.79

Project #: 26-349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE- 0.45 Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp. Day of Study: 0

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 23 – 27 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >____ mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ ____ to ____

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials: mj

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: C-18	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; 2245	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts 0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120	(6) 144					
Con	A	10	10	10	8^2	0^8	—	—					
	B	10	10	10	4^6	2^2	0^2	—					
	C	10	10	9^1	4^5	1^3	0^1	—					
26 25%	A	10	10	10	6^4	0^6	—	—					
	B	10	10	10	5^5	0^5	—	—					
	C	10	10	10	3^7	~~0^5~~ 1^2	0^1	—					
26 100%	A	10	10	9^1	2^7	0^2	—	—					
	B	10	10	9^1	0^9	—	—	—					
	C	10	10	9^1	0^9	—	—	—					
27 25%	A	10	10	10	5^5	5	1^4	0^1					
	B	10	10	10	3^7	2^1	0^2	—					
	C	10	10	10	5^5	3^2	0^3	—					
27 100%	A	10	10	10	2^8	0^2	—	—					
	B	10	10	9^1	4^5	0^4	—	—					
	C	10	10	9^1	7^2	2^5	0^2	—					
Initials/ Date		J 11/3/06	J 11/4/06	J 11/5/06	J 11/6/06	J 11/7/06	J 11/8/06	J 11/9/06					

349C180.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 Con	11/03/06 22:01:16	24.33	38755.0	24.65	6.34	7.82
1 C6 25%	11/03/06 22:02:49	24.19	39454.0	25.15	6.33	7.92
2 C-6 100%	11/03/06 22:03:26	24.25	38693.0	24.61	6.28	7.68
3 C-7 25%	11/03/06 22:05:12	24.11	39238.0	25.00	6.37	8.00
4 C-7 100%	11/03/06 22:06:10	24.23	38146.0	24.23	6.37	7.70

pH adjustments: made prior to mix out

Con. initial pH = 3.9, added 50 drops NaOH → pH 8.2, readjusted w/ HCL → pH

C-6 - initial pH = 4.4, added 21.5 drops NaOH → pH 7.7

C-7 - initial pH = 4.2; added 21 drops NaOH → pH 7.7

11/3/06

Project #: 26349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE-C18 Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp. Day of Study: 0

OPERATIONAL RANGE: Check if OK

Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C	Meter Used:	
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 23 – 27 ppt	Blue	☐
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >_____ mg/L		Red	☐
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☐ _____ to _____	Green	☑

Actions taken:

See deviation summary sheet ☐

Initials:

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: pH 7	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; 2330	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts													
		0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120								
Con	A	10	10	10	5^5	1^4	0^1								
	B	10	10	10	10	1^9	0^1								
	C	10	10	10	4^6	0^4	–								
C6 25%	A	10	10	10	7^3	0^7	–								
	B	10	10	10	4^6	0^4	–								
	C	10	10	10	8^2	1^7	0^1								
C6 100%	A	10	10	8^2	0^8	–	–								
	B	10	10	10	0^{10}	–	–								
	C	10	10	10	0^{10}	–	–								
C7 25%	A	10	10	10	6^3	4^2	0^4								
	B	10	10	9^1	5^4	4^1	0^4								
	C	10	10	10	6^4	3^3	0^3								
C7 100%	A	10	10	10	4^6	1^3	0^1								
	B	10	10	10	6^4	4^2	0^4								
	C	10	10	10	6^4	2^4	0^2								
Initials/ Date		11/3/06	11/4/06	11/5/06	11/6/06	11/7/06	11/8/06								

349PH70.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 Con	11/03/06 22:56:54	24.49	38660.0	24.58	6.62	7.31
① ~~1~~	~~11/03/06 22:57:19~~	~~24.55~~	~~18009.0~~	~~10.64~~	~~7.08~~	~~7.30~~
2 C.6 25%	11/03/06 22:58:29	25.22	39359.0	25.06	6.42	7.77
3 C.6 100%	11/03/06 22:59:55	24.26	38688.0	24.61	6.66	7.08
4 C.7 25%	11/03/06 23:01:11	24.84	39057.0	24.86	6.23	7.84
5 C.7 100%	11/03/06 23:03:18	24.46	38413.0	24.41	6.56	7.32

① Biorugard; re read Chamber 11/3/06

Project #: 26349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE pH 7 Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp Day of Study: 0

OPERATIONAL RANGE: Check if OK

Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C		
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 23 – 27 ppt		
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >____ mg/L			
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☐ ____ to ____		

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials:

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: pH 9	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: 11/3/06; 2350	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts										
		0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120	(6) 144				
Con	A	10	10	10	6^4	0^6	—	—				
	B	10	10	10	5^5	0^5	—	—				
	C	10	10	10	6^4	0^6	—	—				
-6 25%	A	10	10	9^1	3^6	1^2	0^1	—				
	B	10	10	10	1^9	0^1	—	—				
	C	10	10	10	7^3	0^7	—	—				
C-6 100%	A	10	10	10	1^9	0^1	—	—				
	B	10	10	10	0^{10}	—	—	—				
	C	10	10	10	1^9	0^1	—	—				
-7 25%	A	10	10	8^2	4^4	4	1^3	0^1				
	B	10	10	8^2	6^2	6	0^6	—				
	C	10	10	4^6	1^3	1	0^1	—				
7 100%	A	10	10	4^6	0^4	—	—	—				
	B	10	10	7^3	0^7	—	—	—				
	C	10	10	4^6	0^4	—	—	—				
Initials/ Date		11/3/06	11/4/06	11/5/06	11/6/06	11/7/06	11/8/06	11/9/06				

349PH90.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 Con	11/03/06 23:05:34	24.19	38372.0	24.39	6.42	8.91
1 C-6 25%	11/03/06 23:06:58	24.79	39359.0	25.07	6.17	8.24
2 C-6 100%	11/03/06 23:07:42	24.12	38548.0	24.51	6.53	8.92
3 C-7 25%	11/03/06 23:08:47	24.58	39336.0	25.06	6.16	8.20
4 C-7 100%	11/03/06 23:09:42	24.03	38415.0	24.42	6.54	8.82

Project #: 06-349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: ~~Lp~~ TIE - ph 9 Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp Day of Study: 0

OPERATIONAL RANGE: Check if OK

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 23 – 27 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >_____ mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Meter Used:

Blue ☐

Red ☐

Green ☑

Actions taken:

See deviation summary sheet ☐

Initials:

Aqua Survey, Inc.

TIE DATA SHEET

Test Description: Ulva	Species: L. plumulosus
	Age: 2-4mm
Test Start Date & Time: ~~11/3/06;~~ 11/4/06; 1040	Animal Source: ARO
Client: CDR Job #: 26-349	Test Volume: 100mL Test Temp: 25±1°C
Sample Information or ID:	Dilution Water: Manasquan

Conc % Effluent		Daily Counts											
		0	(1) 24	(2) 48	(3) 72	(4) 96	(5) 120						
Con	A	10	10	8^{2}	4^{4}	0^{4}	—						
	B	10	10	6^{4}	1^{5}	0^{1}	—						
	C	10	10	5^{5}	1^{4}	1	0^{1}						
-6 25%	A	10	10	8^{2}	5^{3}	1^{4}	0^{1}						
	B	10	10	7^{3}	3^{4}	0^{3}	—						
	C	10	10	7^{3}	2^{5}	2	0^{2}						
-6 100%	A	10	10	6^{4}	4^{2}	0^{4}	—						
	B	10	10	4^{6}	2^{2}	0^{2}	—						
	C	10	10	6^{4}	2^{4}	0^{2}	—						
7 25%	A	10	10	7^{3}	4^{3}	2^{2}	0^{2}						
	B	10	10	8^{2}	4^{4}	0^{4}	—						
	C	10	10	8^{2}	4^{4}	2^{2}	0^{2}						
-7 100%	A	10	10	6^{4}	2^{4}	0^{2}	—						
	B	10	10	8^{2}	5^{3}	0^{5}	—						
	C	10	10	3^{7}	1^{2}	0^{1}	—						
Initials/ Date		11/4/06	11/5/06	11/6/06	11/7/06	11/8/06	11/9/06						

349U0.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0 Con	11/04/06 16:26:52	24.20	39452.0	25.15	5.35	7.33
1 C-6 25%	11/04/06 16:28:05	24.74	39163.0	24.94	6.33	7.79
2 ~~C-7~~ C-6 100%	11/04/06 16:29:18	24.80	39541.0	25.20	5.74	7.34
3 C-7 25%	11/04/06 16:30:40	24.71	39089.0	24.88	6.15	7.79
4 C-7 100%	11/04/06 16:32:15	24.84	38935.0	24.77	6.28	7.52

pH adjustments: adjustments made prior to mix out.

Con - initial pH = 3.9; added 83 drops NaOH → pH 7.3

C-6 - initial pH = 4.4; added 20 drops NaOH → pH 7.3

C-7 - initial pH = 4.4; added 20 drops NaOH → pH 7.5

11/4/06

Project #: 26-349 Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: TIE - Ulva Date: 11/4/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: L.p Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 - 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 25 - 27 ppt

Dissolved Oxygen: ☑ >4.0 mg/L ☐ >_____ mg/L

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____

Blue ☐

Red ☐

Green ☑

Actions taken:

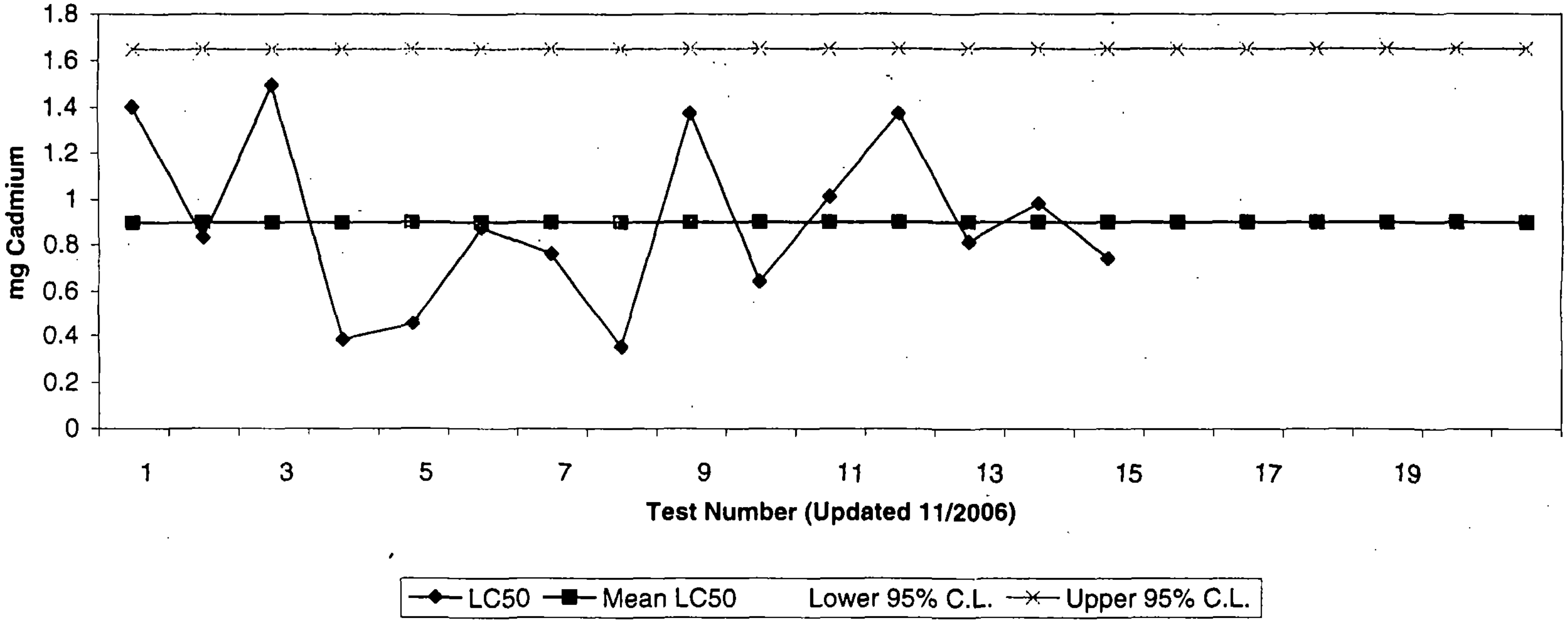
Sun Nov 05 10:15:37 2006

Page 1 of 1

See deviation summary sheet ☐

Initials:

Control Chart LC50 Values, Acute SRT With L. plumulosus



Test: AC-Acute Fish Test
Species: LP-Leptocheirus plumulosus
Sample ID: REF-Ref Toxicant
Start Date: 11/3/2006 End Date: 11/7/2006

Test ID: 26-349
Protocol: EPAA 91-EPA Acute
Sample Type: CDCL-Cadmium chloride
Lab ID: ASI-Aqua Survey Inc.

Pos	ID	Rep	Group	Start	24 hrs	48 hrs	72 hrs	96 hrs	Notes
	1	1	Control	10	10	10	10	10	
	2	2	Control	10	10	10	10	10	
	3	1	0.3	10	10	10	10	9	
	4	2	0.3	10	10	10	10	10	
	5	1	0.55	10	10	10	10	4	
	6	2	0.55	10	10	10	10	5	
	7	1	1.0	10	10	10	10	6	
	8	2	1.0	10	10	10	10	6	
	9	1	1.8	10	10	10	9	5	
	10	2	1.8	10	10	10	9	3	
	11	1	3.2	10	10	7	4	2	
	12	2	3.2	10	10	5	4	1	

Comments:

Reviewed by:

Acute Fish Test-96 Hr Survival

Start Date:	11/3/2006	Test ID:	26-349	Sample ID:	REF-Ref Toxicant
End Date:	11/7/2006	Lab ID:	ASI-Aqua Survey Inc.	Sample Type:	CDCL-Cadmium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	LP-Leptocheirus plumulosus
Comments:					

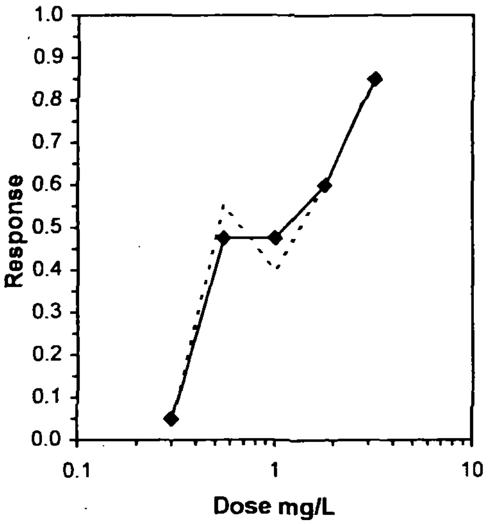
Conc-mg/L	*1*	*2*
Control	1.0000	1.0000
0.3	0.9000	1.0000
0.55	0.4000	0.5000
1	0.6000	0.6000
1.8	0.5000	0.3000
3.2	0.2000	0.1000

			Transform: Arcsin Square Root					Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.3	0.9500	0.9500	1.3305	1.2490	1.4120	8.661	2	1	20
0.55	0.4500	0.4500	0.7351	0.6847	0.7854	9.685	2	11	20
1	0.6000	0.6000	0.8861	0.8861	0.8861	0.000	2	8	20
1.8	0.4000	0.4000	0.6825	0.5796	0.7854	21.317	2	12	20
3.2	0.1500	0.1500	0.3927	0.3218	0.4636	25.550	2	17	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%	0.9704	0.6685	1.4088
Auto-15.0%	0.9802	0.7049	1.3629



Reviewed by:

SRT

Prep sheet for Saltwater amphipod SRTs

Stock Solution

Add 250 milligrams of Cadmium chloride to 500 mL of Manasquan water.
This will give you a 250 mg Cadmium/L stock solution.

3 replicates per concentration
250 mL per replicate
10 organisms per replicate

Ampelisca abdita

Concentration (mg/L)	Stock (mL)	Total (mL)		
0	0	750		
0.24	0.72	750	Salinity	28 +/- 2 ppt
0.48	1.44	750	Temp.	20 +/- 2 C
0.86	2.58	750		
1.5	4.5	750		
2.8	8.4	750		

Eohaustorius estuarius

Concentration (mg/L)	Stock (mL)	Total (mL)		
0	0	750		
2.5	7.5	750	Salinity	20 +/- 2 ppt
4.5	13.5	750	Temp.	15 +/- 2 C
8	24	750		
14.4	43.2	750		
26	78	750		

Leptocheirus plumulosus

Concentration (mg/L)	Stock (mL)	Total (mL)		
0	0	750		
0.3	0.9	750	Salinity	20 +/- 2 ppt
0.55	1.65	750	Temp.	25 +/- 2 C
1	3	750		
1.8	5.4	750		
3.2	9.6	750		

Rhepoxinius abronius

Concentration (mg/L)	Stock (mL)	Total (mL)		
0	0	750		
1.2	3.6	750	Salinity	28 +/- 2 ppt
2.2	6.6	750	Temp.	15 +/- 2 C
4	12	750		
7.2	21.6	750		
13	39	750		

Aqua Survey, Inc.
96-Hour Reference Toxicant Test

Client: 26-349
Start Date: 11/3/06
Toxicant: Cadmium Chloride
Start Time: 2200
Species: L.plumulosus
End Time: 1700
Test Volume: 750mL
Water Bath: 1

Sample Concentration (mg/L)	Live Counts				
	0 hours	24 hours	48 hours	72 hours	96 hours
Control A	10	10	10	10	10
Control B	10	10	10	10	10
~~Control C~~	—	—	—	—	—
0.3 A	10	10	10	10	9
B	10	10	10	10	10
.55 A	10	10	10	10	4^{6}
B	10	10	10	10	5^{5}
1.0 A	10	10	10	10	6^{4}
B	10	10	10	10	6^{4}
1.8 A	10	10	10	9^{1}	5^{4}
B	10	10	10	9^{1}	3^{6}
3.2 A	10	10	7^{3}	4^{3}	2^{2}
B	10	10	5^{5}	4^{1}	1^{3}
Date/Initials	11/3/06	11/4/06	11/5/06	11/6/06	11/7/06

AQUA SURVEY, INC.

CULTURE ORGANISM DISTRIBUTION FORM

DATE: 11/3/06

TEST JOB #: 26-349 ISRT CLIENT: CDR

TEST LOCATION: IN-LAB [✓] FIELD [ ]

TEST SPECIES: L. plumulosus

TOTAL NUMBER ORGANSIMS TRANSFERRED: 2300+

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS:

A. ORGANISMS

1. ASI CULTURE/ HOLDING UNIT: (1) ~~76 L~~ 10 gallon tank
2. RECEIVING LOG #: 26-089
3. CULTURE LOG #: 26-0109
4. AGE/ SIZE INFORMATION: 2-4 mm

B. HOLDING [✓] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 25.0°C
2. SALINITY: 23.2ppt
3. WATER SOURCE: Manasquan

B. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT
   DATE: 11/3/06
   TIME: 1500
   BY:
2. LIVESTOCK RECEIVING
   DATE: 11/3/06
   TIME: 1500
   BY:
3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS:

REMARKS:

AQUA SURVEY, INC.
CULTURE DEPARTMENT
GENERAL SPECIES STATUS LOG

Species: L. plumulosus
Receiving [✓] Culture [ ] Log #: 26-089
Test Job #: 26-349 Client: CDR
Dates: 11/1/06 - 11/4/06
Initial Stock @: 2300+
Food Type: gorp Slurry

Date	Day Number	Temp/DO	NH$_3$/NO$_2$	pH	[✓ Sal]/Hardness	Alkalinity	Mortality	Remarks/ Initials
11/1/06	1 1150	14.6°C/40.1mg/L	0/0	6.9	18.5ppt	140	0	Started acclimation rf
11/1/06	1 1600	18.0°C/ —	—	—	—	—	—	rf
11/2/06	2 0930	19.9°C/6.8	0/0	7.8	18.6ppt	120	0	Continued acclim. Fed gorp slurry rf
11/3/06	3 0850	22.9°C/7.1	0/0	7.8	20.0ppt	120	0	continued acc. rf
11/3/06	3 1500	25.0°C/7.3	0/0	7.9	23.2ppt	120	0	To test rf TIE/SRT Fed gorp Slurry rf
11/4/06	4	24.1°C/7.2	0/0	7.8	24.5ppt	120	0	TIE.ulva To test rf

AQUA SURVEY, INC.
CULTURE DEPARTMENT

Organism Receiving Form

Receiving Log #: 26-089

Date: 11/1/06

Shipping Carrier: Fed Ex

Species: L. plumulosus

Number Shipped: 2300+

Livestock Source/ Shipper: ARO

ASI Order Ref. Date: 10/31/06

ASI Order Ref. Initials:

Age/ Characteristics 2-4mm

Taxonomic Verification Log #: 26-089

Date: 11/1/06

Receiving Water Quality Parameters

D.O: 40.1 mg/L

Temp.: 14.6°C

NH_3/NO_2: 0/0

pH: 6.9

[✓ Salinity/] Hardness 18.5ppt

Alkalinity: 140

Water- [✓ Clear/ Cloudy]

Container Size: (3) - 1 gallon cubetainers

ICE: [✓ Y]/N

Type of Packing: Styrofoam Box

Observation/ Condition of Livestock: 1 gallon Sed provided for holding
Organisms appear good!

Receiving Tech. Initials:

Supervisors Initials:

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: LeptoChierus plumulasos

Source: Lab reared X Hatchery reared______ Field collected______

Hatch date 10/06 Receipt date______

Lot number 103006LP Strain______

Brood Origination Chesapeake BAy VA

II. Water Quality

Temperature 21 °C Salinity 20 ppt DO Sat

pH 8.0 Hardness — ppm

III. Culture Conditions

System: SW STATIC renewal

Diet: Flake Food ✓ Phytoplankton______ Trout Chow ✓

Brine Shrimp______ Rotifers______ Other "GORP"

Prophylactic Treatments:______

Comments: SEDIMENT 4L

2-4 mm

IV. Shipping Information

Client: AQUAS URVEY # of Organisms: 2300+

Carrier: FED EX Date Shipped: 10/31/06

Biologist:______

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

SRT2LP0.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/03/06 21:48:45	24.63	32955.0	20.60	6.33	7.93
1	11/03/06 21:49:24	24.50	32854.0	20.54	6.39	7.92
2	11/03/06 21:50:16	24.48	32904.0	20.57	6.50	7.91
3	11/03/06 21:50:37	24.44	32842.0	20.53	6.42	7.90
4	11/03/06 21:50:59	24.44	32850.0	20.53	6.38	7.90
5	11/03/06 21:51:18	24.41	32844.0	20.53	6.38	7.89

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/3/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☐ OTHER: Lp. Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☑ 24 – 26 °C

Blue ☑

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☑ 18 – 22 ppt

Red ☐

Dissolved Oxygen: ☐ >4.0 mg/L ☑ >3.6 mg/L

Green ☐

pH: ☐ 7.3 to 8.3 ☐ 6.0 to 9.0 ☑ 7 to 9

Actions taken:

See deviation summary sheet ☐

Initials:

SRT2LP24.DAT

	DateTime M/D/Y	Temp C	SpCond uS/cm	Salinity ppt	DO Conc mg/L	pH
0	11/04/06 12:03:42	25.23	33594.0	21.03	6.17	7.97
1	11/04/06 12:04:24	25.35	33546.0	21.00	6.25	7.97
2	11/04/06 12:04:45	25.35	33592.0	21.03	6.32	7.97
3	11/04/06 12:05:15	25.34	33578.0	21.02	6.34	7.97
4	11/04/06 12:05:47	25.32	33562.0	21.01	6.38	7.96
5	11/04/06 12:06:06	25.21	33489.0	20.96	6.42	7.96

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/4/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp. Day of Study: 24hrs

OPERATIONAL RANGE: Check if OK

Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 - 26 °C	Blue	☐
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 18 - 22 ppt	Red	☐
Dissolved Oxygen:	☐ >4.0 mg/L	☑ > 3.6 mg/L		Green	☑
pH:	☐ 7.3 to 8.3	☑ 6.0 to 9.0	☐ ____ to ____		

Meter Used:

Actions taken:

See deviation summary sheet ☐

Initials:

SRT2L48.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/05/06 10:08:51	25.01	33576.0	21.03	6.64	7.97
1	11/05/06 10:09:48	25.17	33414.0	20.91	6.53	7.99
2	11/05/06 10:10:10	25.24	33478.0	20.95	6.53	7.99
3	11/05/06 10:10:26	25.26	33467.0	20.95	6.53	7.99
4	11/05/06 10:10:40	25.25	33445.0	20.93	6.52	7.99
5	11/05/06 10:10:53	25.22	33399.0	20.90	6.54	7.99

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☒ OTHER: Acute Date: 11/5/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☒ OTHER: Lp Day of Study: 48hrs

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 12 – 14 °C ☐ 18 – 22 °C ☒ 24 – 26 °C

Salinity: ☐ 26 – 30 ppt ☐ 28 – 32 ppt ☒ 18 – 22 ppt

Dissolved Oxygen: ☐ >4.0 mg/L ☒ >3.0 mg/L

pH: ☐ 7.3 to 8.3 ☒ ~~6~~7.0 to 9.0 ☐ ____ to ____

Blue ☐

Red ☐

Green ☒

Actions taken:

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See deviation summary sheet ☐

Initials:

SRT2LP72.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/06/06 16:59:16	24.46	33669.0	21.10	9.06	7.71
1	11/06/06 17:00:13	25.09	33347.0	20.87	8.60	7.81
2	11/06/06 17:00:37	25.29	33411.0	20.91	8.47	7.85
3	11/06/06 17:00:57	25.38	33408.0	20.90	8.22	7.87
4	11/06/06 17:01:20	25.40	33405.0	20.90	7.96	7.88
5	11/06/06 17:01:41	25.41	33397.0	20.89	7.74	7.89

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/6/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp Day of Study: 72hrs

OPERATIONAL RANGE: Check if OK

				Meter Used:	
Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C	Blue	☐
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 18 – 22 ppt	Red	☐
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >_____ mg/L		Green	☑
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☑ 7 to 9		

Actions taken:

See deviation summary sheet ☐

Initials

SRT2LP96.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	11/07/06 11:31:45	25.06	34171.0	21.44	6.13	7.93
1	11/07/06 11:32:46	25.35	33805.0	21.18	5.68	7.94
2	11/07/06 11:33:21	25.39	33721.0	21.12	5.83	7.94
3	11/07/06 11:33:45	25.41	33664.0	21.08	5.88	7.94
4	11/07/06 11:34:09	25.43	33785.0	21.16	5.84	7.93
5	11/07/06 11:34:33	25.34	34012.0	21.32	5.91	7.92

Project #: SRT Test type: ☐ Bioaccumulation ☐ Solid Phase ☐ SPP ☑ OTHER: Acute Date: 11/7/06

Species: ☐ *A. abdita* ☐ *M. bahia* ☐ *M. beryllina* ☐ *M. nasuta* ☐ *N. virens* ☑ OTHER: Lp Day of Study: 96hrs

OPERATIONAL RANGE: Check if OK

				Meter Used:	
Temperature:	☐ 12 – 14 °C	☐ 18 – 22 °C	☑ 24 – 26 °C	Blue	☐
Salinity:	☐ 26 – 30 ppt	☐ 28 – 32 ppt	☑ 18 – 22 ppt	Red	☐
Dissolved Oxygen:	☑ >4.0 mg/L	☐ >_____ mg/L		Green	☑
pH:	☐ 7.3 to 8.3	☐ 6.0 to 9.0	☑ 7 to 9		

Actions taken:

Standard Deviation Summary Sheet ☐ Initials:

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```
-----------------------------------------------------------------------
Series: Temperature (*C)
-----------------------------------------------------------------------
Logger Info                    Information specific to the logger
  Model                        HOBO Water Temp Pro [H20-001]
  Serial Number                810765
  Memory Size (Bytes)          32768
  Deployment                   37
Series Info                    Information about the data in the series
  Points Used                  268
  First Point                  11/03/06 13:23:13.0
  Last Point                   11/14/06 16:23:13.0
  Duration                     11 Days 03:00:00.0
Stats                          Calculated from the series
  Wrap Count                   0
  Max Value                    26.50
  Min Value                    21.91
  Avg Value                    24.95
Launch Parameters
  Load Time                    11/03/2006 18:23:11 GMT   11/03/2006 13:23:11 Local
  Launch Time                  11/03/2006 18:23:13 GMT   11/03/2006 13:23:13 Local
  Logging Time                 11/03/2006 18:23:13 GMT   11/03/2006 13:23:13 Local
  Sampling Interval            3600
  Wrap                         0 = (FALSE/OFF/OPEN/TYPE 0)
  Stealth Enable               0 = (FALSE/OFF/OPEN/TYPE 0)
  End of Data                  0x320_00
  Wrap Count                   0
  Description String           26-349 Lp static bath 6
  Time Zone                    GMT-300 Minutes TZ set on Launch
```

```
Date,Time,Temperature (*C)
11/03/06,13:23:13.0,23.809
11/03/06,14:23:13.0,24.581
11/03/06,15:23:13.0,24.653
11/03/06,16:23:13.0,24.726
11/03/06,17:23:13.0,24.363
11/03/06,18:23:13.0,24.219
11/03/06,19:23:13.0,24.436
11/03/06,20:23:13.0,24.508
11/03/06,21:23:13.0,24.653
11/03/06,22:23:13.0,24.677
11/03/06,23:23:13.0,24.605
11/04/06,00:23:13.0,24.557
11/04/06,01:23:13.0,24.412
11/04/06,02:23:13.0,24.315
11/04/06,03:23:13.0,24.219
11/04/06,04:23:13.0,24.146
11/04/06,05:23:13.0,24.074
11/04/06,06:23:13.0,24.026
11/04/06,07:23:13.0,24.05
11/04/06,08:23:13.0,24.146
11/04/06,09:23:13.0,24.146
11/04/06,10:23:13.0,24.219
11/04/06,11:23:13.0,24.074
11/04/06,12:23:13.0,24.195
11/04/06,13:23:13.0,24.291
11/04/06,14:23:13.0,24.339
11/04/06,15:23:13.0,24.46
11/04/06,16:23:13.0,24.508
11/04/06,17:23:13.0,24.557
11/04/06,18:23:13.0,24.557
11/04/06,19:23:13.0,24.532
11/04/06,20:23:13.0,24.508
11/04/06,21:23:13.0,24.412
11/04/06,22:23:13.0,24.315
11/04/06,23:23:13.0,24.219
11/05/06,00:23:13.0,24.171
11/05/06,01:23:13.0,24.122
11/05/06,02:23:13.0,24.146
11/05/06,03:23:13.0,24.122
11/05/06,04:23:13.0,24.122
11/05/06,05:23:13.0,24.074
11/05/06,06:23:13.0,24.122
11/05/06,07:23:13.0,24.122
11/05/06,08:23:13.0,24.291
11/05/06,09:23:13.0,24.46
11/05/06,10:23:13.0,24.629
11/05/06,11:23:13.0,24.895
11/05/06,12:23:13.0,24.968
11/05/06,13:23:13.0,25.065
11/05/06,14:23:13.0,25.113
11/05/06,15:23:13.0,25.113
11/05/06,16:23:13.0,25.065
11/05/06,17:23:13.0,25.016
11/05/06,18:23:13.0,24.968
11/05/06,19:23:13.0,24.919
11/05/06,20:23:13.0,24.847
11/05/06,21:23:13.0,24.798
11/05/06,22:23:13.0,24.702
11/05/06,23:23:13.0,24.677
11/06/06,00:23:13.0,24.677
11/06/06,01:23:13.0,24.653
11/06/06,02:23:13.0,24.581
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11/06/06,03:23:13.0,24.581
11/06/06,04:23:13.0,24.557
11/06/06,05:23:13.0,24.532
11/06/06,06:23:13.0,24.581
11/06/06,07:23:13.0,24.653
11/06/06,08:23:13.0,24.677
11/06/06,09:23:13.0,24.726
11/06/06,10:23:13.0,24.823
11/06/06,11:23:13.0,24.823
11/06/06,12:23:13.0,24.919
11/06/06,13:23:13.0,24.968
11/06/06,14:23:13.0,25.016
11/06/06,15:23:13.0,25.016
11/06/06,16:23:13.0,25.016
11/06/06,17:23:13.0,25.016
11/06/06,18:23:13.0,25.089
11/06/06,19:23:13.0,25.04
11/06/06,20:23:13.0,25.016
11/06/06,21:23:13.0,24.992
11/06/06,22:23:13.0,24.944
11/06/06,23:23:13.0,24.968
11/07/06,00:23:13.0,24.968
11/07/06,01:23:13.0,24.968
11/07/06,02:23:13.0,24.944
11/07/06,03:23:13.0,24.919
11/07/06,04:23:13.0,24.919
11/07/06,05:23:13.0,24.919
11/07/06,06:23:13.0,24.944
11/07/06,07:23:13.0,24.992
11/07/06,08:23:13.0,24.992
11/07/06,09:23:13.0,24.919
11/07/06,10:23:13.0,25.089
11/07/06,11:23:13.0,25.21
11/07/06,12:23:13.0,25.234
11/07/06,13:23:13.0,25.258
11/07/06,14:23:13.0,25.258
11/07/06,15:23:13.0,25.283
11/07/06,16:23:13.0,25.307
11/07/06,17:23:13.0,25.331
11/07/06,18:23:13.0,25.331
11/07/06,19:23:13.0,25.331
11/07/06,20:23:13.0,25.331
11/07/06,21:23:13.0,25.307
11/07/06,22:23:13.0,25.331
11/07/06,23:23:13.0,25.283
11/08/06,00:23:13.0,25.258
11/08/06,01:23:13.0,25.258
11/08/06,02:23:13.0,25.258
11/08/06,03:23:13.0,25.307
11/08/06,04:23:13.0,25.355
11/08/06,05:23:13.0,25.307
11/08/06,06:23:13.0,25.331
11/08/06,07:23:13.0,25.38
11/08/06,08:23:13.0,25.355
11/08/06,09:23:13.0,25.428
11/08/06,10:23:13.0,25.404
11/08/06,11:23:13.0,25.428
11/08/06,12:23:13.0,25.404
11/08/06,13:23:13.0,25.428
11/08/06,14:23:13.0,25.428
11/08/06,15:23:13.0,25.404
11/08/06,16:23:13.0,25.404
11/08/06,17:23:13.0,25.428
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11/08/06,18:23:13.0,25.428
11/08/06,19:23:13.0,25.428
11/08/06,20:23:13.0,25.404
11/08/06,21:23:13.0,25.38
11/08/06,22:23:13.0,25.404
11/08/06,23:23:13.0,25.404
11/09/06,00:23:13.0,25.404
11/09/06,01:23:13.0,25.428
11/09/06,02:23:13.0,25.38
11/09/06,03:23:13.0,25.38
11/09/06,04:23:13.0,25.355
11/09/06,05:23:13.0,25.404
11/09/06,06:23:13.0,25.428
11/09/06,07:23:13.0,25.477
11/09/06,08:23:13.0,25.477
11/09/06,09:23:13.0,25.428
11/09/06,10:23:13.0,25.453
11/09/06,11:23:13.0,25.428
11/09/06,12:23:13.0,25.428
11/09/06,13:23:13.0,25.428
11/09/06,14:23:13.0,25.453
11/09/06,15:23:13.0,25.477
11/09/06,16:23:13.0,25.477
11/09/06,17:23:13.0,25.453
11/09/06,18:23:13.0,24.823
11/09/06,19:23:13.0,24.195
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11/09/06,21:23:13.0,23.4
11/09/06,22:23:13.0,23.184
11/09/06,23:23:13.0,23.04
11/10/06,00:23:13.0,22.944
11/10/06,01:23:13.0,22.848
11/10/06,02:23:13.0,22.776
11/10/06,03:23:13.0,22.753
11/10/06,04:23:13.0,22.705
11/10/06,05:23:13.0,22.633
11/10/06,06:23:13.0,22.633
11/10/06,07:23:13.0,22.633
11/10/06,08:23:13.0,22.896
11/10/06,09:23:13.0,24.267
11/10/06,10:23:13.0,24.823
11/10/06,11:23:13.0,25.162
11/10/06,12:23:13.0,25.307
11/10/06,13:23:13.0,25.38
11/10/06,14:23:13.0,25.38
11/10/06,15:23:13.0,25.404
11/10/06,16:23:13.0,25.331
11/10/06,17:23:13.0,25.234
11/10/06,18:23:13.0,25.331
11/10/06,19:23:13.0,25.38
11/10/06,20:23:13.0,25.501
11/10/06,21:23:13.0,25.38
11/10/06,22:23:13.0,25.404
11/10/06,23:23:13.0,25.38
11/11/06,00:23:13.0,25.355
11/11/06,01:23:13.0,25.307
11/11/06,02:23:13.0,25.283
11/11/06,03:23:13.0,25.307
11/11/06,04:23:13.0,25.283
11/11/06,05:23:13.0,25.307
11/11/06,06:23:13.0,25.307
11/11/06,07:23:13.0,25.355
11/11/06,08:23:13.0,25.38
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11/11/06,09:23:13.0,25.404
11/11/06,10:23:13.0,25.404
11/11/06,11:23:13.0,25.453
11/11/06,12:23:13.0,25.477
11/11/06,13:23:13.0,25.501
11/11/06,14:23:13.0,25.501
11/11/06,15:23:13.0,25.55
11/11/06,16:23:13.0,25.598
11/11/06,17:23:13.0,25.574
11/11/06,18:23:13.0,25.525
11/11/06,19:23:13.0,25.55
11/11/06,20:23:13.0,25.55
11/11/06,21:23:13.0,25.525
11/11/06,22:23:13.0,25.525
11/11/06,23:23:13.0,25.574
11/12/06,00:23:13.0,25.55
11/12/06,01:23:13.0,25.525
11/12/06,02:23:13.0,25.525
11/12/06,03:23:13.0,25.574
11/12/06,04:23:13.0,25.55
11/12/06,05:23:13.0,25.598
11/12/06,06:23:13.0,25.623
11/12/06,07:23:13.0,25.647
11/12/06,08:23:13.0,25.647
11/12/06,09:23:13.0,25.671
11/12/06,10:23:13.0,25.647
11/12/06,11:23:13.0,25.598
11/12/06,12:23:13.0,25.598
11/12/06,13:23:13.0,25.574
11/12/06,14:23:13.0,25.598
11/12/06,15:23:13.0,25.598
11/12/06,16:23:13.0,25.55
11/12/06,17:23:13.0,25.55
11/12/06,18:23:13.0,25.55
11/12/06,19:23:13.0,25.55
11/12/06,20:23:13.0,25.501
11/12/06,21:23:13.0,25.453
11/12/06,22:23:13.0,25.453
11/12/06,23:23:13.0,25.477
11/13/06,00:23:13.0,25.525
11/13/06,01:23:13.0,25.501
11/13/06,02:23:13.0,25.525
11/13/06,03:23:13.0,25.501
11/13/06,04:23:13.0,25.501
11/13/06,05:23:13.0,25.501
11/13/06,06:23:13.0,25.623
11/13/06,07:23:13.0,25.598
11/13/06,08:23:13.0,25.598
11/13/06,09:23:13.0,25.598
11/13/06,10:23:13.0,25.574
11/13/06,11:23:13.0,26.256
11/13/06,12:23:13.0,26.5
11/13/06,13:23:13.0,26.475
11/13/06,14:23:13.0,26.134
11/13/06,15:23:13.0,25.939
11/13/06,16:23:13.0,25.647
11/13/06,17:23:13.0,25.501
11/13/06,18:23:13.0,25.38
11/13/06,19:23:13.0,25.331
11/13/06,20:23:13.0,25.355
11/13/06,21:23:13.0,25.428
11/13/06,22:23:13.0,25.404
11/13/06,23:23:13.0,25.283
```

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11/14/06,00:23:13.0,25.331
11/14/06,01:23:13.0,25.355
11/14/06,02:23:13.0,25.38
11/14/06,03:23:13.0,25.38
11/14/06,04:23:13.0,25.404
11/14/06,05:23:13.0,25.355
11/14/06,06:23:13.0,25.428
11/14/06,07:23:13.0,25.38
11/14/06,08:23:13.0,25.404
11/14/06,09:23:13.0,25.477
11/14/06,10:23:13.0,24.412
11/14/06,11:23:13.0,23.328
11/14/06,12:23:13.0,22.585
11/14/06,13:23:13.0,22.034
11/14/06,14:23:13.0,21.963
11/14/06,15:23:13.0,21.915
11/14/06,16:23:13.0,22.154
```

CDR Appendix

C. APPARENT EFFECTS THRESHOLDS
(SEACREST GROUP)

Appendix C.__ Chemical data employed to generate apparent effects thresholds (AETs) for sediment at LCP Site[a]

Sampling location (From headwaters to mouth)	Chemical concentration (mg/kg, dry wt)								
	Total Mercury	Aroclor 1268	Lead	Total PAHs	Cadmium	Copper	Nickel	Silver	Zinc
				MAIN CANAL					
MC50	0.37	1.5	3.9	0.229	0.032	1.29	1.26	0.016	8
MC49	0.40	1.5	4.4	0.429	0.037	1.58	1.31	0.016	9
MC48	0.20	1.0	5.8	0.104	0.036	1.76	1.85	0.015	9.9
MC47	29	54	42	0.714	0.233	28.2	20.2	0.291	106
MC46	35	280	42	0.955	0.296	20	20.2	0.22	88.5
MC45	29	140	29	0.744	0.182	15.9	12.9	0.206	71.4
MC44	6.2	55	41	0.454	0.244	18.8	21	0.188	76.9
MC43	1.2	8.1	68	16.683	0.137	11.2	12.7	0.079	58
MC42	13	18	31	0.396	0.2	20.1	15.8	0.323	93
MC41	22	9.2	32	0.420	0.201	19.4	16	0.256	95
MC40	8.9	19	33	0.371	0.21	14.3	14.1	0.246	84.8
MC39	5.3	37	31	0.517	0.219	13.1	13.1	0.199	79.6
MC38	4.3	21	29	0.435	0.184	12.7	14.5	0.169	84.3
MC37	5.3	76	31	0.769	0.228	13.9	15.3	0.16	79.3
MC36	6.7	150	40	0.849	0.28	16.2	17.7	0.134	36.3
MC35	8.3	11	30	0.457	0.199	18.8	16.7	0.245	56.3
MC34	8.0	10	30	0.405	0.193	14.8	17.1	0.218	81.3
MC33	11	12	31	0.541	0.197	18.5	15.1	0.275	79
MC32	5.8	16	34	0.657	0.202	13.6	14	0.172	90
MC31	5.6	23	29	0.633	0.218	14.6	14.6	0.233	87
MC30	40	32	24	0.394	0.168	10.1	10.2	0.125	91.4
MC29	1.5	4.8	12	0.184	0.095	5.63	6.57	0.064	77.1
MC28	12	20	28	0.630	0.193	14	13.2	0.297	74.5
MC27	9.4	34	35	0.642	0.248	17.3	17.8	0.354	66.8
MC26	7.6	68	33	0.858	0.222	13.8	15.5	0.202	71.6
MC25	6.3	18	41	0.729	0.218	13.9	14.4	0.178	80.5
MC24	22	570	34	3.764	0.255	14.8	10.7	0.229	67.6
MC23	4.7	28	28	0.501	0.206	12.4	13.6	0.179	75.3
MC22	10	110	32	0.658	0.246	14.3	15.9	0.188	75.3
MC21	3.0	18	24	0.589	0.203	11.3	11.9	0.127	71.1
MC20	18	360	38	2.238	0.266	16.4	12.5	0.215	76.4
MC19	24	33	29	0.569	0.237	20.7	13.5	0.309	78.9
MC18	4.6	30	14	0.719	0.107	5.45	5.32	0.071	31.8
MC17	8.4	14	14	0.391	0.099	5.82	7.09	0.066	35.1
MC16	3.0	19	13	0.433	0.078	5.06	6.12	0.065	32.4
MC15	3.1	26	25	0.599	0.211	10.4	12.3	0.133	59.1
MC14	9.0	39	27	0.363	0.251	12.4	11.6	0.238	70.3
MC13	13	32	41	0.648	0.156	11.6	10.8	0.183	57.4
MC12	3.6	13	29	0.525	0.246	14.6	16.4	0.274	77
MC11	28	15	30	0.612	0.224	19.1	15.7	0.277	78.3
MC10	1.3	4.1	21	0.389	0.198	12.1	13.3	0.142	85.5
MC9	2.6	11	22	0.516	0.179	10.9	12.1	0.147	75
MC8	3.0	11	23	0.859	0.2	12	12.8	0.15	78.7
MC7	3.6	21	24	0.761	0.207	11.7	12.4	0.143	80.8
MC6	0.77	1.8	25	0.343	0.21	12.8	15.1	0.146	97.1
MC5	2.1	8.3	23	0.479	0.212	12	12.2	0.141	77.2
MC4	2.8	20	22	1.010	0.168	9.29	8.64	0.105	59.2
MC3	1.7	8.2	42	0.490	0.181	10.7	11.9	0.118	73.5
MC2	2.6	15	25	0.682	0.175	10.5	10.6	0.122	67.1
MC1	3.4	20	27	0.761	0.189	10.6	10.4	0.131	71.2
Mean:	**9.21**	**50.95**	**28.4**	**0.982**	**0.192**	**13.01**	**12.72**	**0.176**	**69.74**

Appendix C.__ Continued

Sampling location	Chemical concentration (mg/kg, dry wt)								
(From headwaters to mouth)	Total Mercury	Aroclor 1268	Lead	Total PAHs	Cadmium	Copper	Nickel	Silver	Zinc
				EASTERN CREEK					
EC50	2.5	1.7	5.7	0.126	0.054	2.38	2.85	0.027	14.5
EC49	5.6	2.9	240	38.458	0.16	17.3	14.8	0.095	79.5
EC48	28	26	100	1.100	0.304	18.9	17.6	0.184	75.5
EC47	4.5	4.0	25	0.728	0.17	10	11.1	0.12	51.4
EC13	11	3.7	34	0.318	0.178	11.5	10.6	0.125	51.2
EC46	0.26	0.27	16	0.060	0.114	6.01	11.5	0.066	47.1
EC12	0.044	0.0074	14	0.0065	0.141	5.64	10.2	0.046	33
EC45	0.28	0.15	13	0.037	0.103	4.71	8.6	0.054	38.7
EC11	1.5	1.9	16	0.986	0.121	5.52	8.25	0.053	30.8
EC44	13	43	27	0.351	0.183	11.6	8.74	0.262	64.6
EC10	26	120	40	0.588	0.255	16.3	13.4	0.257	81.3
EC43	2.4	9.5	9.1	0.240	0.074	3.28	3.14	0.052	22.5
EC9	13	26	43	0.626	0.182	15	16.6	0.233	90.1
EC8	61	59	39	0.648	0.22	25.3	17	0.387	96.3
EC42	11	28	27	2.534	0.164	9.92	10.4	0.137	56.1
EC7	76	150	33	0.575	0.196	20.1	14.3	0.338	86.5
EC41	17	38	27	0.608	0.187	13.8	9.35	0.299	71.7
EC6	110	420	45	1.243	0.285	19.9	18	0.463	98.7
EC5	42	380	48	3.735	0.28	21.8	16.1	0.412	92.8
EC40	140	24	37	0.538	0.239	17	13.9	0.364	71.3
EC4	6.5	19	25	0.616	0.198	11.9	11.5	0.152	79.2
EC3	19	17	28	0.473	0.183	13.1	13.5	0.193	90.5
EC39	6.8	28	27	0.359	0.184	12.2	12.2	0.158	67
EC2	74	16	23	0.566	0.143	9.66	10.3	0.164	58.6
EC38	6.2	15	21	0.474	0.136	9.16	10.1	0.1	50.5
EC37	110	44	38	0.715	0.221	16.8	14.4	0.413	73.3
EC36	4.3	39	23	0.809	0.151	9.02	10.2	0.143	56
EC35	20	30	34	0.420	0.243	17	13.3	0.357	89.9
EC1	21	90	49	0.997	0.263	19	17.7	0.154	61.1
EC34	50	11	52	0.750	0.177	13.6	11.7	0.202	63
EC33	14	120	36	0.636	0.253	15.6	14.8	0.306	85
EC32	30	330	32	0.883	0.226	14.9	13.9	0.198	72
EC31	8.7	36	26	0.638	0.177	9.84	8.97	0.141	57.8
EC30	5.1	11	30	0.483	0.176	13.3	14.9	0.14	70.9
EC29	4.1	13	25	0.546	0.188	11.3	13.8	0.106	63.9
EC28	5.3	12	27	0.305	0.162	12.1	14	0.143	62.1
EC27	3.5	14	11	0.420	0.059	3.94	4.48	0.047	22.5
EC26	17	110	36	0.878	0.244	18.1	14.3	0.224	65.8
EC25	11	44	15	0.343	0.094	5.27	5.34	0.063	24.3
EC24	2.6	15	13	0.568	0.079	4.3	4.66	0.038	20.5
EC23	13	130	36	0.910	0.265	16	15.6	0.184	64.1
EC22	4.5	17	57	5.560	0.175	12.9	12.6	0.131	60.5
EC21	3.0	16	26	0.507	0.219	12.6	14.3	0.127	83.3
EC20	6.4	11	31	0.434	0.221	14.2	14.8	0.156	75.3
EC19	4.7	110	28	1.527	0.191	11.8	11.8	0.151	53.3
EC18	4.6	20	18	1.335	0.08	4.95	5.19	0.064	26.4
EC17	0.79	15	8.7	0.380	0.052	2.69	2.5	0.03	15.1
EC16	0.77	12	28	0.774	0.163	9.41	11.1	0.092	44.9
EC15	5.0	12	34	0.670	0.184	14.9	14.2	0.185	76.7
EC14	5.6	17	31	0.555	0.238	15.9	14.4	0.225	88.9
Mean:	**20.65**	**54.24**	**34.1**	**1.561**	**0.179**	**12.23**	**11.74**	**0.175**	**61.52**

Appendix C.__ Continued

Sampling location	Chemical concentration (mg/kg, dry wt)								
(From headwaters to mouth)	Total Mercury	Aroclor 1268	Lead	Total PAHs	Cadmium	Copper	Nickel	Silver	Zinc
				WESTERN CREEK COMPLEX					
WC1	1.2	0.62	26	6.197	0.209	15.4	13.7	0.144	77.3
WC2	1.3	0.63	24	1.509	0.208	14.4	14.8	0.155	76
WC3	1.4	0.78	27	11.376	0.248	16	15.8	0.158	78.8
WC4	4.8	4.1	33	0.896	0.295	14.7	13.5	0.147	70.9
WC50	16	11	34	1.324	0.32	17.7	14.1	0.239	85.7
WC5	3.8	15	38	0.659	0.336	17.3	14.8	0.178	78.5
WC49	0.20	1.0	35	1.103	0.213	13.7	11.2	0.137	69.2
WC48	5.5	4.3	36	7.813	0.302	15	12.5	0.151	70.3
WC47	0.88	0.023	35	0.449	0.169	15.4	15.6	0.135	77.9
WC46	0.089	0.0079	52	0.878	0.148	15.2	16.1	0.118	72.4
WC45	7.8	2.2	34	0.428	0.255	18.8	18.4	0.287	88.7
WC44	0.35	0.16	39	0.525	0.157	15	16.1	0.119	79
WC43	,15	13	35	0.629	0.251	17.8	15.6	0.26	78.9
WC42	3.8	5.5	36	0.230	0.376	18.2	18.5	0.192	93.8
WC41	12	4.2	33	0.354	0.245	16.5	15.4	0.21	81
WC40	0.50	2.5	45	0.400	0.277	19.1	21.9	0.13	70.7
WC39	1.7	2.5	42	0.151	0.288	19.9	25.6	0.174	79.5
WC38	13	0.33	37	0.414	0.236	18.4	22.1	0.171	65.9
WC37	5.2	0.35	38	0.428	0.201	18.7	21.8	0.158	69.3
WC36	2.3	2.4	37	0.242	0.261	17.5	23.2	0.175	83.2
WC35	13	4.9	32	0.586	0.259	16.6	17.8	0.192	68.8
WC34	12	0.76	40	0.413	0.294	18.8	17.9	0.179	61.2
WC33	1.8	1.7	27	0.162	0.208	15.6	18.4	0.182	88.3
WC32	1.1	1.0	25	0.183	0.17	15.4	18.2	0.146	77.9
WC31	2.6	2.4	34	0.253	0.3	17.8	19.6	0.22	72.1
WC30	4.0	4.3	24	0.242	0.196	12.2	12.5	0.195	77.6
WC29	1.5	2.0	28	0.138	0.213	15.3	16.6	0.17	79.7
WC28	2.1	3.5	29	0.289	0.252	14.5	15.7	0.223	79.7
WC27	1.6	2.1	30	0.207	0.201	15.2	17.2	0.172	83.8
WC26	2.0	1.7	29	0.515	0.2	13.4	15.2	0.191	71
WC25	1.8	3.1	26	0.318	0.22	13.1	13.4	0.192	74.7
WC24	3.3	4.5	27	0.404	0.264	13.7	12.7	0.272	70.9
WC23	2.0	3.8	32	0.424	0.266	14.4	16.2	0.17	75.6
WC22	1.9	6.9	31	0.400	0.251	13.5	15.1	0.141	69.1
WC21	1.7	4.8	47	0.340	0.359	18.4	19.9	0.16	63.4
WC20	1.5	2.4	30	0.268	0.242	13.1	14	0.181	67
WC19	1.5	1.8	27	0.287	0.255	13.2	13.3	0.28	73.1
WC18	1.1	2.1	30	0.294	0.239	15.5	18.4	0.158	77.1
WC17	6.7	25	52	0.314	0.363	22.4	25.1	0.142	74.2
WC16	2.8	20	40	0.396	0.279	16.6	19.9	0.17	76.4
WC15	1.8	2.5	36	0.317	0.262	16.8	20.3	0.294	87.9
WC14	1.5	5.2	25	0.310	0.153	11.8	14	0.176	59
WC13	0.92	2.2	31	0.246	0.238	15.2	18.9	0.155	79.6
WC12	1.6	2.4	28	0.360	0.229	13.9	16.5	0.295	77.3
WC11	0.52	0.75	25	0.276	0.209	13.1	16	0.155	84.6
WC10	1.2	1.4	24	0.272	0.211	11.9	13.3	0.141	72.1
WC9	1.3	1.7	26	0.318	0.223	12.9	15.1	0.164	85.3
WC8	1.0	7.0	34	0.360	0.362	14.5	15.2	0.142	80.5
WC6	2.1	1.9	27	0.323	0.229	13.9	16.4	0.237	81.6
WC7	0.95	1.8	27	0.365	0.195	13.7	16.3	0.157	82.1
Mean:	**3.51**	**3.92**	**32.7**	**0.912**	**0.247**	**15.62**	**16.80**	**0.182**	**76.37**

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[a] These three sampling areas at the LCP Site – Main Canal, Eastern Creek, and Western Creek Complex – were selected to generate chemical data (to be associated with toxicological data) for the AET evaluations because it was anticipated that they would generate a range of data suitable for derivation of AETs. It was anticipated that the lowest concentrations of chemicals of potential concern (COPC) would occur in the Western Creek Complex.

APPENDIX D

DEVELOPMENT OF SEDIMENT EFFECT CONCENTRATIONS

(On CD Only)

Appendix D

The amphipod toxicity test results and associated sediment COPC concentrations were used to develop several sediment effect concentrations (SECs) for prediction of toxicity to the amphipod (Files: **Amphipod Tox Analysis_02212011.xls** and **Grass Shrimp Tox Analysis_02212011.xls**). The SECs consist of the following:

- Effects Range-Low (ER-L): 10th percentile of the sediment concentration distribution for the effects data (Long and Morgan, 1990).
- Effects Range-Median (ER-M): Median of the sediment concentration distribution for the effects data (Long and Morgan, 1990).
- Threshold Effect Level (TEL): The geometric mean of the 15th percentile of the concentration distribution for the no-effects data (MacDonald et al., 1996).
- Probable Effects Level (PEL): Geometric mean of the ER-M and the 85th percentile of the concentration distribution for the no-effects data (MacDonald et al., 1996).
- Apparent Effects Threshold (AET): The sediment concentration above which a particular adverse biological effect (e.g., survival rate, embryo development rate) is always toxic relative to appropriate reference conditions (WSDE, 1997).

The effects data set for each COPC is defined as those stations at which the biological effect is observed (statistically different from controls) (Files: ***Amphipod Controls.xls*** and ***Grass Shrimp Controls***.xls) and the associated COPC concentration is greater than or equal to twice the mean concentration of the no-effect stations. It is desirable for both the effects and no-effects distributions to include at least 20 data entries (MacDonald et al., 1996).

All of the amphipod and grass shrimp toxicity test endpoint results (e.g., survival, reproductive response, growth) were paired with the COPC concentrations in the test sediment samples (Files: **Amphipod Tox and Sediment data.xls** and **Grass Shrimp Tox and Sediment data**.xls). The data were sorted by those samples that were considered toxic (significantly differently from the mean controls at p=0.05 and represented in red color). The effects data sets were then generated (the “Y” represents those samples greater than twice the mean and the “b” represents concentrations below it). Then the SECs were calculated per their definitions above.

To assess the accuracy with which the various sets of SECs predict the presence or absence of toxic effects to amphipods, the following performance criteria were also calculated:

- False Positives (Type I Error): The percentage of stations predicted to have effects (based on exceedance of a SEC) that actually had no observed effects.
- False Negatives (Type II Error): The percentage of stations predicted to have no effects (based on exceedance of a SEC) that actually had observed effects.
- Overall Accuracy: The percentage of all samples that were correctly predicted to have effects or not to have effects based on the SEC.

The error results are shown on the worksheets and in the Tab entitled “Summary”

APPENDIX D - Amphipod Toxicity Response and Sediment Concentrations

Location	Year	Domain	Reproductive Response	Average Survival Rate	Survivor's Average Weight	Aroclor-1268	Lead	Mercury	Total Organic Carbon (TOC)*	Total PAHs	A-1268 OC Norm	PAHs OC Norm
MG-B7(C)	2000	Domain 1	NA	31	NA	15.000	28	6.6	32000	0.562	4.6875	0.1757
MG-D9(C)	2000	Domain 1	NA	39	NA	1.400	28	2.28	33700	0.234	0.415	0.0694
MG-H7(C)	2000	Domain 1	NA	15	NA	17.000	50	4.16	40700	0.204	4.177	0.0501
MG-K7(C)	2000	Domain 1	NA	0	NA	0.330	47	3.1	34700	11.726	0.095	3.3793
MG-N2(C)	2000	North South Tributary Domain	NA	49	NA	0.630	29	12.3	62000	0.564	0.102	0.0910
TC-C	2000	Crescent River Reference	NA	29	NA	0.045	12	0.052	23200	0.810	0.019	0.3491
C-15	2002	Western Creek Complex	0.47	77	0.70	2.800	32	1.3	43000	0.060	0.651	0.0140
C-45	2002	East of domain 4	0.29	71	0.60	1.900	18	0.24	44000	0.140	0.432	0.0317
C-5	2002	LCP Ditch Domain	0.07	54	0.42	19.000	21	11	44000	1.110	4.318	0.2522
C-6	2002	North South Tributary Domain	0	48	0.51	19.000	20	48	27000	4.363	7.037	1.6159
C-7	2002	North South Tributary Domain Removal	0	56	0.43	430.000	36	14	55000	0.454	78.182	0.0825
CR-C	2002	Crescent River Reference	0.1	53	0.47	0.190	12	0.025	34000	0.060	0.056	0.0177
D-C	2002	West of domain 4	0	63	0.61	1.200	18	0.55	50000	0.087	0.240	0.0174
MG-H7(C)	2002	Domain 1	0.01	80	0.46	64.000	29	62	52000	1.060	12.308	0.2039
MG-K7(C)	2002	Domain 1	0	68	0.46	92.000	27	46	38000	0.828	24.211	0.2179
TC-C	2002	North St Simons Sound Domain	0.025	80	0.63	0.025	14	0.038	26000	0.060	0.010	0.0232
C-15	2003	Western Creek Complex	0.024	61	0.170	0.790	28	2.8	35000	0.446	0.226	0.1274
C-45	2003	East of domain 4	0.088	50	0.102	0.700	17	0.62	30000	0.180	0.233	0.0600
C-5	2003	LCP Ditch Domain	0.148	37	0.110	24.000	24	10	32000	2.553	7.500	0.7978
C-6	2003	North South Tributary Domain	0.21	35	0.080	19.000	47	80	37000	0.811	5.135	0.2192
C-7	2003	North South Tributary Domain Removal	0	1	0.020	3.700	43	4.1	31000	11.782	1.194	3.8006
CR-C	2003	Crescent River Reference	0.048	76	0.370	0.100	7.5	0.01	11000	0.084	0.091	0.0760
D-C	2003	West of domain 4	0.052	62	0.168	0.870	22	0.56	32000	0.243	0.272	0.0759
MG-H7(C)	2003	Domain 1	0.19	30	0.094	2.200	21	6.8	30000	0.222	0.733	0.0740
MG-K7(C)	2003	Domain 1	0.034	54	0.150	24.000	26	22	33000	5.042	7.273	1.5279
TC-C	2003	North St Simons Sound Domain	0.078	69	0.350	0.100	9.4	0.044	13000	0.061	0.077	0.0471
C-33	2004	Domain 3	1.94	42	0.350	0.031	8.9	0.044	4800	0.441	0.064	0.9188
CR-C	2004	Crescent River Reference	5.31	40	0.178	0.060	2.2	0.01	1700	0.090	0.353	0.5294
M-AB	2004	Domain 1 Removal	0.079	15	0.302	2.100	15	2.5	17000	7.290	1.235	4.2882
TC-C	2004	North St Simons Sound Domain	3.23	42	0.362	0.032	8	0.026	18000	0.468	0.018	0.2600
C-101	2004	Domain 3	1.59	25	0.308	0.970	20	0.53	35000	1.067	0.277	0.3049
C-105	2004	Domain 5	0	0	0	0.260	12	0.2	30000	0.632	0.087	0.2107
C-5	2004	LCP Ditch Domain	0.469	63	0.400	12.000	28	2.1	40000	2.350	3.000	0.5875
MG-H7(C)	2004	Domain 1	0.550	24	0.500	12.000	34	0.82	40000	4.945	3.000	1.2363
MG-K7(C)	2004	Domain 1	0.211	15	0.286	10.000	46	3	33000	1.684	3.030	0.5103
A-C	2004	East of domain 4	0.205	33	0.406	1.300	16	0.79	43000	0.477	0.302	0.1109
C-100	2004	Domain 3	1.605	76	0.294	3.600	23	3.3	47000	1.820	0.766	0.3872
C-102	2004	West of domain 4	2.873	17	0.398	0.720	15	0.73	47000	0.612	0.153	0.1302
C-104	2004	Domain 5	3.006	66	0.316	0.670	23	0.51	46000	0.788	0.146	0.1713
C-15	2004	Western Creek Complex	1.45	3	0.250	2.800	28	1.2	42000	1.360	0.667	0.3238
C-45	2004	East of domain 4	0.12	23	0.264	0.960	13	0.3	43000	0.625	0.223	0.1452
C-7	2004	North South Tributary Domain Removal	0	15	0.452	20.000	29	18	47000	3.550	4.255	0.7553
D-C	2004	West of domain 4	0.741	58	0.234	0.880	27	0.68	43000	1.044	0.205	0.2428
C-103	2004	Domain 5	0.148	72	0.230	0.180	3.9	0.16	85000	0.630	0.021	0.0741
C-6	2004	North South Tributary Domain	2.848	37	0.384	41.000	27	11	52000	11.510	7.885	2.2135
CR-C	2005	Crescent River Reference	0.85	36	0.282	0.012	12.4	0.0952	29000	0.136	0.004	0.0469
TC-C	2005	North St Simons Sound Domain	0.77	34	0.272	0.015	16.6	0.0921	28800	0.112	0.005	0.0387
C-5	2005	LCP Ditch Domain	0.6	62	0.39	4.200	25.8	1.1	37200	1.067	1.129	0.2868
C-36	2005	North Purvis Creek Domain	0.26	65	0.408	3.700	29.1	1.92	40000	1.189	0.925	0.2973
C-29	2005	North Purvis Creek Domain	0	0	0	2.200	25.4	1.05	48700	0.826	0.452	0.1696
C-16	2005	South Purvis Creek Domain	0	7	0.45	3.600	5.85	0.572	6870	0.274	5.240	0.3988
C-6	2005	North South Tributary Domain	0.95	42	0.39	69.000	42.1	86.6	45800	1.484	15.066	0.3240
C-7	2005	North South Tributary Domain Removal	0	0	0	82.000	52	80.4	56800	6.072	14.437	1.0689
C-15	2005	Western Creek Complex	0	0	0	6.800	25.3	2.11	44800	1.015	1.518	0.2266
MG-K7(M)	2005	Domain 1	0.39	45	0.532	16.000	29.5	5.68	34400	0.876	4.651	0.2547
MG-H7(M)	2005	Domain 1	0.67	29	0.512	36.000	28.8	4.31	50400	1.296	7.143	0.2571
C-33	2005	Domain 3	0.23	32	0.29	0.013	419	0.243	43300	0.649	0.003	0.1499
D-C	2005	West of domain 4	0	3	0.14	3.900	35.5	1.87	56800	0.794	0.687	0.1398
C-45	2005	East of domain 4	0	12	0.34	0.610	20.3	0.245	33300	0.725	0.183	0.2177
C-103	2005	Domain 5	0	14	0.26	0.560	24.2	1.99	54400	0.492	0.103	0.0903
C-104	2005	Domain 5	0	4	0.25	0.044	25.7	1.9	36800	1.647	0.012	0.4476
C-105	2005	Domain 5	0.38	36	0.302	0.390	22.9	0.0396	64900	0.565	0.060	0.0871
C-200	2005	Domain 3	0	23	0.326	8.200	154	4.43	40900	1.365	2.005	0.3337
C-201	2005	South Turtle River Domain	0	0	0	0.940	16.3	1.01	25800	1.166	0.364	0.4519
C-202	2005	North Turtle River Domain	0	19	0.528	0.210	17.2	0.218	27200	0.442	0.077	0.1623
C-203	2005	South Turtle River Domain	0	16	0.438	0.820	60.1	0.88	48200	0.980	0.170	0.2032
FS-AREA1	2005	Domain 3	0	2	0.1	1.300	32	0.686	34800	0.490	0.374	0.1407
FS-AREA2	2005		0	0	0	2.300	387	2.17	58600	5.097	0.392	0.8698
FS-AREA3	2005	Domain 3	0	0	0	0.520	1190	0.76	38500	52.800	0.135	13.7142
FS-AREA4	2005	LCP Ditch Domain	0.32	26	0.208	7.000	15.4	1.16	28000	0.561	2.500	0.2004
FS-AREA5	2005	LCP Ditch Domain	0	6	0.55	12.000	27.2	3.32	33900	1.394	3.540	0.4112
FS-AREA6	2005	Domain 2	0.54	39	0.334	5.800	27.6	8.79	76900	0.608	0.754	0.0791
C-103	2006	Domain 5	0.082	80	0.58	0.190	26.80	0.372	54800	0.273	0.035	0.0498
C-104	2006	Domain 5	0.292	80	0.358	0.210	17.30	0.276	34700	0.228	0.061	0.0657
C-105	2006	Domain 5	0.358	82	0.488	0.340	18.10	0.395	23600	0.149	0.144	0.0630
C-15	2006	Western Creek Complex	0.86	79	0.62	1.000	25.80	0.456	42200	0.434	0.237	0.1028
C-16	2006	South Purvis Creek Domain	0.656	87	0.378	1.200	6.55	0.186	9600	2.560	1.250	2.6664
C-29	2006	North Purvis Creek Domain	0.142	84	0.382	0.980	25.70	0.673	52300	0.515	0.187	0.0985
C-33	2006	Domain 3	1.18	70	0.756	0.059	27.80	0.097	16300	0.975	0.036	0.5982
C-36	2006	North Purvis Creek Domain	0.508	84	0.426	1.400	28.90	1.090	46600	0.563	0.300	0.1208
C-45	2006	East of domain 4	0	60	0.34	0.790	26.40	0.566	49200	0.558	0.161	0.1134
C-5	2006	LCP Ditch Domain	0.61	87	0.712	31.000	40.90	7.030	47200	2.154	6.568	0.4563
C-6	2006	North South Tributary Domain	0.126	67	0.592	25.000	31.90	8.750	65600	0.372	3.811	0.0568
C-7	2006	North South Tributary Domain Removal	0.356	91	0.556	13.000	27.90	3.270	57500	0.473	2.261	0.0822
CR-C	2006	Crescent River Reference	0.364	88	0.322	0.001	4.29	0.013	6700	0.015	0.002	0.0225
D-C	2006	West of domain 4	0.36	87	0.534	0.640	23.30	1.220	52100	0.289	0.123	0.0554
FS-AREA1	2006	Domain 3	0.072	41	0.322	0.920	44.20	1.070	24300	0.224	0.379	0.0921
FS-AREA2	2006		0	1	0.1	0.850	275.00	1.070	76900	2.454	0.111	0.3191
FS-AREA3	2006	Domain 3	0.906	87	0.43	2.000	177.00	3.570	77100	0.951	0.259	0.1234
FS-AREA4	2006	LCP Ditch Domain	0.032	85	0.65	5.800	14.90	1.340	25300	0.292	2.292	0.1153
FS-AREA5	2006	LCP Ditch Domain	0.464	88	0.426	11.000	29.70	4.540	43500	1.755	2.529	0.4034
FS-AREA6	2006	Domain 2	0.074	78	0.352	3.100	28.60	2.030	59500	0.240	0.521	0.0403
M-AB	2006	Domain 1 Removal	0.144	81	0.318	0.069	2.53	0.056	4100	0.044	0.168	0.1067
MG-H7(M)	2006	Domain 1	0.154	66	0.458	4.100	27.20	1.820	58100	0.286	0.706	0.0492
MG-K7(M)	2006	Domain 1	0.112	74	0.744	4.600	30.00	2.360	44200	0.247	1.041	0.0560
TC-C	2006	North St Simons Sound Domain	0.05	72	0.402	0.026	17.40	0.074	30000	0.042	0.009	0.0138

APPENDIX D - Amphipod Toxicity Response and Sediment Concentrations

Location	Year	Domain	Reproductive Response	Average Survival Rate	Survivor's Average Weight	Aroclor-1268	Lead	Mercury	Total Organic Carbon (TOC)*	Total PAHs	A-1268 OC Norm	PAHs OC Norm
SDEC-AET-1	2006	Eastern Creek	0	55	0.310	90.00	48.60	20.60	NA	0.994		
SDEC-AET-10	2006	Eastern Creek	0	0	0	120.00	39.90	25.60	NA	0.585		
SDEC-AET-11	2006	Eastern Creek	0	20	0.250	1.90	16.50	1.46	NA	0.986		
SDEC-AET-12	2006	Eastern Creek	0	70	0.330	0.01	13.90	0.04	NA	0.006		
SDEC-AET-13	2006	Eastern Creek	0.269	75	0.410	3.70	33.60	11.30	NA	0.315		
SDEC-AET-14	2006	Eastern Creek	0	80	0.440	17.00	30.70	5.59	NA	0.553		
SDEC-AET-15	2006	Eastern Creek	0	70	0.450	12.00	33.90	5.02	NA	0.668		
SDEC-AET-16	2006	Eastern Creek	0	0	0	12.00	27.80	0.77	NA	0.773		
SDEC-AET-17	2006	Eastern Creek	0	50	0.320	15.00	8.72	0.79	NA	0.379		
SDEC-AET-18	2006	Eastern Creek	0	75	0.340	20.00	17.70	4.64	NA	1.333		
SDEC-AET-19	2006	Eastern Creek	0	75	0.350	110.00	27.70	4.68	NA	1.525		
SDEC-AET-2	2006	Eastern Creek	0	50	0.290	16.00	23.30	74.00	NA	0.563		
SDEC-AET-20	2006	Eastern Creek	0.389	80	0.200	11.00	30.80	6.39	NA	0.433		
SDEC-AET-21	2006	Eastern Creek	0	25	0.500	16.00	25.80	3.05	NA	0.506		
SDEC-AET-22	2006	Eastern Creek	0	30	0.180	17.00	56.70	4.48	NA	5.551		
SDEC-AET-23	2006	Eastern Creek	0	55	0.610	130.00	36.20	13.00	NA	0.908		
SDEC-AET-24	2006	Eastern Creek	0.35	85	0.440	15.00	13.30	2.55	NA	0.566		
SDEC-AET-25	2006	Eastern Creek	1.38	80	0.290	44.00	14.60	10.70	NA	0.342		
SDEC-AET-26	2006	Eastern Creek	0	85	0.370	110.00	35.70	17.30	NA	0.876		
SDEC-AET-27	2006	Eastern Creek	0	85	0.410	14.00	11.00	3.50	NA	0.419		
SDEC-AET-28	2006	Eastern Creek	0	0	0	12.00	27.00	5.30	NA	0.304		
SDEC-AET-29	2006	Eastern Creek	0	0	0	13.00	25.40	4.06	NA	0.545		
SDEC-AET-3	2006	Eastern Creek	2.58	100	0.460	17.00	27.90	19.00	NA	0.471		
SDEC-AET-30	2006	Eastern Creek	0	50	0.450	11.00	29.50	5.10	NA	0.483		
SDEC-AET-31	2006	Eastern Creek	0.125	75	0.350	36.00	25.60	8.72	NA	0.635		
SDEC-AET-32	2006	Eastern Creek	0.727	85	0.350	330.00	31.90	30.10	NA	0.881		
SDEC-AET-33	2006	Eastern Creek	0	55	0.640	120.00	36.20	13.60	NA	0.634		
SDEC-AET-34	2006	Eastern Creek	0.0769	70	0.330	11.00	51.80	50.20	NA	0.746		
SDEC-AET-35	2006	Eastern Creek	0	80	0.560	30.00	33.80	19.50	NA	0.458		
SDEC-AET-36	2006	Eastern Creek	0.45	60	0.370	39.00	23.30	4.33	NA	0.808		
SDEC-AET-37	2006	Eastern Creek	0	80	0.590	44.00	38.30	105.00	NA	0.710		
SDEC-AET-38	2006	Eastern Creek	0	40	0.400	15.00	20.60	6.23	NA	0.473		
SDEC-AET-39	2006	Eastern Creek	0	75	0.610	28.00	26.70	6.81	NA	0.358		
SDEC-AET-4	2006	Eastern Creek	2.06	90	0.550	19.00	25.40	6.53	NA	0.614		
SDEC-AET-40	2006	Eastern Creek	0	50	0.690	240.00	37.30	145.00	NA	0.535		
SDEC-AET-41	2006	Eastern Creek	0	20	0.480	38.00	27.10	17.30	NA	0.607		
SDEC-AET-42	2006	Eastern Creek	1.88	90	0.530	28.00	26.90	11.20	NA	2.533		
SDEC-AET-43	2006	Eastern Creek	0	10	0.350	9.50	9.13	2.44	NA	0.239		
SDEC-AET-44	2006	Eastern Creek	1	100	0.480	43.00	26.90	12.60	NA	0.350		
SDEC-AET-45	2006	Eastern Creek	0	35	0.690	0.15	12.60	0.28	NA	0.037		
SDEC-AET-46	2006	Eastern Creek	1.56	90	0.430	0.27	15.90	0.26	NA	0.060		
SDEC-AET-47	2006	Eastern Creek	0	10	0.150	4.00	25.10	4.49	NA	0.727		
SDEC-AET-48	2006	Eastern Creek	0	10	0.200	26.00	99.80	27.60	NA	1.097		
SDEC-AET-49	2006	Eastern Creek	0	0	0	2.90	238.00	5.62	NA	38.448		
SDEC-AET-5	2006	Eastern Creek	0	65	0.710	380.00	48.20	41.60	NA	3.729		
SDEC-AET-50	2006	Eastern Creek	0.2308	80	0.330	1.70	5.74	2.53	NA	0.126		
SDEC-AET-6	2006	Eastern Creek	0	60	0.470	420.00	44.80	109.00	NA	1.238		
SDEC-AET-7	2006	Eastern Creek	0	0	0	150.00	32.60	75.70	NA	0.572		
SDEC-AET-8	2006	Eastern Creek	0	75	0.300	59.00	38.80	61.40	NA	0.646		
SDEC-AET-9	2006	Eastern Creek	0	65	0.190	26.00	42.90	12.70	NA	0.623		
SDMC-AET-1	2006	Main Canal	0.269	85	0.390	20.00	26.60	3.41	NA	0.758		
SDMC-AET-10	2006	Main Canal	0.167	75	0.340	4.10	21.30	1.29	NA	0.388		
SDMC-AET-11	2006	Main Canal	0	80	0.310	15.00	30.50	28.20	NA	0.610		
SDMC-AET-12	2006	Main Canal	0	65	0.680	13.00	29.10	3.60	NA	0.524		
SDMC-AET-13	2006	Main Canal	0	80	0.340	32.00	40.90	12.60	NA	0.647		
SDMC-AET-14	2006	Main Canal	0	15	0.300	39.00	27.20	8.97	NA	0.362		
SDMC-AET-15	2006	Main Canal	0	75	0.410	26.00	24.80	3.14	NA	0.597		
SDMC-AET-16	2006	Main Canal	0.9	85	0.560	19.00	12.80	3.01	NA	0.431		
SDMC-AET-17	2006	Main Canal	0.375	55	0.550	14.00	13.70	8.39	NA	0.391		
SDMC-AET-18	2006	Main Canal	0	60	0.480	30.00	14.00	4.63	NA	0.719		
SDMC-AET-19	2006	Main Canal	0	50	0.390	33.00	29.40	23.80	NA	0.568		
SDMC-AET-2	2006	Main Canal	0	80	0.440	15.00	25.10	2.57	NA	0.680		
SDMC-AET-20	2006	Main Canal	0	55	0.270	360.00	37.90	17.80	NA	2.233		
SDMC-AET-21	2006	Main Canal	0.375	80	0.510	18.00	24.50	2.99	NA	0.588		
SDMC-AET-22	2006	Main Canal	0.611	80	0.240	110.00	32.30	10.20	NA	0.656		
SDMC-AET-23	2006	Main Canal	0	35	0.490	28.00	28.00	4.66	NA	0.500		
SDMC-AET-24	2006	Main Canal	0	15	0.270	570.00	34.10	22.10	NA	3.760		
SDMC-AET-25	2006	Main Canal	0	65	0.370	18.00	41.20	6.32	NA	0.726		
SDMC-AET-26	2006	Main Canal	0	55	0.390	68.00	32.80	7.57	NA	0.854		
SDMC-AET-27	2006	Main Canal	0.167	75	0.570	34.00	34.60	9.45	NA	0.640		
SDMC-AET-28	2006	Main Canal	0.654	95	0.440	20.00	27.50	12.40	NA	0.628		
SDMC-AET-29	2006	Main Canal	0	50	0.330	4.80	12.50	1.47	NA	0.184		
SDMC-AET-3	2006	Main Canal	0	65	0.390	8.20	42.30	1.74	NA	0.489		
SDMC-AET-30	2006	Main Canal	0	70	0.440	32.00	24.30	39.60	NA	0.393		
SDMC-AET-31	2006	Main Canal	0	55	0.430	23.00	28.70	5.57	NA	0.631		
SDMC-AET-32	2006	Main Canal	0.6	75	0.330	16.00	34.30	5.79	NA	0.655		
SDMC-AET-33	2006	Main Canal	0	45	0.190	12.00	31.30	11.40	NA	0.539		
SDMC-AET-34	2006	Main Canal	0	5	0.200	10.00	29.70	7.95	NA	0.404		
SDMC-AET-35	2006	Main Canal	1.625	85	0.450	11.00	30.40	8.28	NA	0.456		
SDMC-AET-36	2006	Main Canal	0	25	0.660	150.00	39.90	6.74	NA	0.844		
SDMC-AET-37	2006	Main Canal	0	65	0.310	76.00	30.90	5.30	NA	0.766		
SDMC-AET-38	2006	Main Canal	0.15	70	0.380	21.00	28.60	4.26	NA	0.433		
SDMC-AET-39	2006	Main Canal	0.688	75	0.330	37.00	30.90	5.34	NA	0.515		
SDMC-AET-4	2006	Main Canal	0	65	0.250	20.00	21.90	2.78	NA	1.008		
SDMC-AET-40	2006	Main Canal	0	5	0.300	19.00	32.80	8.94	NA	0.370		
SDMC-AET-41	2006	Main Canal	0	35	0.510	9.20	31.50	21.70	NA	0.419		
SDMC-AET-42	2006	Main Canal	0	60	0.340	18.00	30.90	13.40	NA	0.395		
SDMC-AET-43	2006	Main Canal	0	5	0.300	8.10	67.90	1.24	NA	16.679		
SDMC-AET-44	2006	Main Canal	0	15	0.530	55.00	40.50	6.17	NA	0.452		
SDMC-AET-45	2006	Main Canal	0	50	0.400	140.00	28.80	29.20	NA	0.741		
SDMC-AET-46	2006	Main Canal	0	55	0.570	280.00	41.50	35.10	NA	0.952		
SDMC-AET-47	2006	Main Canal	0	0	0	54.00	41.90	29.00	NA	0.712		
SDMC-AET-48	2006	Main Canal	0	0	0	1.00	5.75	0.20	NA	0.158		
SDMC-AET-49	2006	Main Canal	0.25	75	0.430	1.50	4.36	0.40	NA	0.356		
SDMC-AET-5	2006	Main Canal	0	15	0.330	8.30	22.90	2.14	NA	0.478		
SDMC-AET-50	2006	Main Canal	0.909	100	0.530	1.50	3.90	0.37	NA	0.229		
SDMC-AET-6	2006	Main Canal	0	35	0.440	1.80	25.20	0.77	NA	0.342		
SDMC-AET-7	2006	Main Canal	0	35	0.330	21.00	23.80	3.61	NA	0.759		
SDMC-AET-8	2006	Main Canal	0.8	80	0.430	11.00	22.50	3.00	NA	0.858		
SDMC-AET-9	2006	Main Canal	1.04	100	0.580	11.00	21.90	2.64	NA	0.530		

APPENDIX D - Amphipod Toxicity Response and Sediment Concentrations

Location	Year	Domain	Reproductive Response	Average Survival Rate	Survivor's Average Weight	Aroclor-1268	Lead	Mercury	Total Organic Carbon (TOC)*	Total PAHs	A-1268 OC Norm	PAHs OC Norm
SDWC-AET-1	2006	Western Creek Complex	0.833	100	0.400	0.62	26.50	1.23	NA	6.192		
SDWC-AET-10	2006	Western Creek Complex	3.64	90	0.570	1.40	24.30	1.22	NA	0.271		
SDWC-AET-11	2006	Western Creek Complex	0.938	100	0.680	0.75	25.30	0.52	NA	0.275		
SDWC-AET-12	2006	Western Creek Complex	0.5	70	0.450	2.40	27.70	1.59	NA	0.358		
SDWC-AET-13	2006	Western Creek Complex	0	85	0.490	2.20	31.20	0.92	NA	0.245		
SDWC-AET-14	2006	Western Creek Complex	1.733	90	0.440	5.20	25.30	1.50	NA	0.308		
SDWC-AET-15	2006	Western Creek Complex	0.2	80	0.410	2.50	35.60	1.85	NA	0.317		
SDWC-AET-16	2006	Western Creek Complex	0	75	0.310	20.00	40.30	2.76	NA	0.394		
SDWC-AET-17	2006	Western Creek Complex	0	65	0.410	25.00	51.60	6.72	NA	0.312		
SDWC-AET-18	2006	Western Creek Complex	1.682	100	0.730	2.10	29.60	1.14	NA	0.293		
SDWC-AET-19	2006	Western Creek Complex	0.083	80	0.430	1.80	27.10	1.49	NA	0.286		
SDWC-AET-2	2006	Western Creek Complex	0.556	65	0.750	0.63	24.50	1.33	NA	1.508		
SDWC-AET-20	2006	Western Creek Complex	1.111	85	0.460	2.40	29.90	1.53	NA	0.267		
SDWC-AET-21	2006	Western Creek Complex	0.571	80	0.390	4.80	47.00	1.71	NA	0.338		
SDWC-AET-22	2006	Western Creek Complex	1.571	95	0.510	6.90	31.00	1.89	NA	0.397		
SDWC-AET-23	2006	Western Creek Complex	0.792	100	0.650	3.80	32.40	1.99	NA	0.421		
SDWC-AET-24	2006	Western Creek Complex	2.833	100	0.430	4.50	27.20	3.28	NA	0.402		
SDWC-AET-25	2006	Western Creek Complex	0.643	90	0.570	3.10	26.40	1.78	NA	0.317		
SDWC-AET-26	2006	Western Creek Complex	2.25	75	0.800	1.70	29.30	2.01	NA	0.511		
SDWC-AET-27	2006	Western Creek Complex	0	75	0.550	2.10	29.50	1.61	NA	0.206		
SDWC-AET-28	2006	Western Creek Complex	0.708	95	0.350	3.50	28.90	2.08	NA	0.288		
SDWC-AET-29	2006	Western Creek Complex	0.5	85	0.310	2.00	27.80	1.48	NA	0.137		
SDWC-AET-3	2006	Western Creek Complex	0.818	85	0.380	0.78	26.70	1.39	NA	11.367		
SDWC-AET-30	2006	Western Creek Complex	0	0	0	4.30	23.70	3.99	NA	0.240		
SDWC-AET-31	2006	Western Creek Complex	0.778	100	0.480	2.40	34.10	2.64	NA	0.251		
SDWC-AET-32	2006	Western Creek Complex	1.91	100	0.490	1.00	24.80	1.12	NA	0.182		
SDWC-AET-33	2006	Western Creek Complex	0	30	0.350	1.70	27.30	1.75	NA	0.161		
SDWC-AET-34	2006	Western Creek Complex	0	25	0.280	0.76	39.70	12.20	NA	0.409		
SDWC-AET-35	2006	Western Creek Complex	0.5	85	0.410	4.90	32.50	12.70	NA	0.580		
SDWC-AET-36	2006	Western Creek Complex	0.917	80	0.490	2.40	37.20	2.27	NA	0.241		
SDWC-AET-37	2006	Western Creek Complex	0	75	0.420	0.35	38.40	5.24	NA	0.425		
SDWC-AET-38	2006	Western Creek Complex	0	90	0.410	0.33	36.60	13.20	NA	0.410		
SDWC-AET-39	2006	Western Creek Complex	0	30	0.130	2.50	41.50	1.67	NA	0.150		
SDWC-AET-4	2006	Western Creek Complex	2.27	100	0.600	4.10	33.30	4.84	NA	0.894		
SDWC-AET-40	2006	Western Creek Complex	0	50	0.300	2.50	45.30	0.50	NA	0.398		
SDWC-AET-41	2006	Western Creek Complex	1.42	90	0.620	4.20	33.00	12.20	NA	0.351		
SDWC-AET-42	2006	Western Creek Complex	0	10	0.150	5.50	36.10	3.77	NA	0.229		
SDWC-AET-43	2006	Western Creek Complex	2.17	85	0.350	13.00	34.50	14.70	NA	0.623		
SDWC-AET-44	2006	Western Creek Complex	0	55	0.350	0.16	39.40	0.35	NA	0.524		
SDWC-AET-45	2006	Western Creek Complex	0	40	0.460	2.20	33.60	7.83	NA	0.426		
SDWC-AET-46	2006	Western Creek Complex	0	45	0.360	0.01	51.80	0.09	NA	0.876		
SDWC-AET-47	2006	Western Creek Complex	0	5	0.200	0.02	35.00	0.88	NA	0.445		
SDWC-AET-48	2006	Western Creek Complex	0	85	0.560	4.30	35.70	5.49	NA	7.799		
SDWC-AET-49	2006	Western Creek Complex	0.962	85	0.440	1.00	34.60	0.20	NA	1.098		
SDWC-AET-5	2006	Western Creek Complex	0	50	0.510	15.00	38.40	3.81	NA	0.656		
SDWC-AET-50	2006	Western Creek Complex	1.625	95	0.390	11.00	33.80	16.30	NA	1.319		
SDWC-AET-6	2006	Western Creek Complex	0	80	0.240	1.90	27.00	2.10	NA	0.322		
SDWC-AET-7	2006	Western Creek Complex	0	55	0.330	1.80	27.10	0.95	NA	0.365		
SDWC-AET-8	2006	Western Creek Complex	0	5	0.200	7.00	34.20	1.02	NA	0.358		
SDWC-AET-9	2006	Western Creek Complex	0	60	0.290	1.70	25.90	1.29	NA	0.317		
			240	240	240							

Key:

Toxic	Significantly less than mean controls (p=0.05)
Nontoxic	Not significant from mean controls
🟨	Test not within acceptability limits

APPENDIX D - Grass Shrimp Toxicity Response and Sediment Concentrations

Red formatting in these columns is hard-wired in. Will not change when data moves from one row to another upon sorting.

Location	Matrix	Year	Domain	DNA strand damage	Embryo Development Rate	Embryo Hatching Rate	Ovary Maturation Rate	Survival Rate	Aroclor-1268	Lead	Mercury	Total Organic Carbon (TOC)*	Total PAHs	PAHs OC norm	Aroclor-1268 OC norm
C-16	Grass Shrimp	2000	South Purvis Creek Domain	NA	44	76	61	72	0.600	3.70	0.279	24500	0.107	0.0435	0.2449
C-33	Grass Shrimp	2000	Domain 3	NA	36	39	76	84	0.015	17.00	0.079	16600	0.086	0.0516	0.0090
C-5	Grass Shrimp	2000	LCP Ditch Domain	NA	11	0	20	80	3.700	36.00	11.5	40100	0.270	0.0673	0.9227
C-7	Grass Shrimp	2000	North South Tributary Domain Removal	NA	11	0	32	77	23.000	38.00	30.5	49100	0.229	0.0466	4.6843
CR-C(S)	Grass Shrimp	2000	Crescent River Reference	NA	73	96	73	92	0.022	2.00	0.014	17100	0.080	0.0468	0.0129
MG-B7(C)	Grass Shrimp	2000	Domain 1	NA	48	92	57	93	15.000	28.00	6.60	32000	0.562	0.1757	4.6875
MG-D9(C)	Grass Shrimp	2000	Domain 1	NA	55	88	63	83	1.400	28.00	2.28	33700	0.234	0.0694	0.4154
MG-H7(C)	Grass Shrimp	2000	Domain 1	NA	0	0	48	89	17.000	50.00	4.16	40700	0.204	0.0501	4.1769
MG-K7(C)	Grass Shrimp	2000	Domain 1	NA	0	0	60	76	0.330	47.00	3.10	34700	11.726	3.3793	0.0951
MG-N2(C)	Grass Shrimp	2000	North South Tributary Domain	NA	45	85	64	76	0.630	29.00	12.30	62000	0.564	0.0910	0.1016
TC-C(S)	Grass Shrimp	2000	North St Simons Sound Domain	NA	44	84	52	88	0.045	12.00	0.052	23200	0.810	0.3491	0.0192
C-15	Grass Shrimp	2002	Western Creek Complex	2.1	74	89	93	87	2.80	32.0	1.30	43000	0.060	0.0140	0.6512
C-45	Grass Shrimp	2002	East of domain 4	2.3	25	84	39	40	1.90	18.0	0.24	44000	0.140	0.0317	0.4318
C-5	Grass Shrimp	2002	LCP Ditch Domain	4.3	21	61	40	57	19.00	21.0	11.0	44000	1.110	0.2522	4.3182
C-6	Grass Shrimp	2002	North South Tributary Domain	3.6	16	50	32	15	19.00	20.0	48.0	27000	4.363	1.6159	7.0370
C-7	Grass Shrimp	2002	North South Tributary Domain Removal	3.9	18	77	38	23	430.00	36.0	14.0	55000	0.454	0.0825	78.1818
CR-C	Grass Shrimp	2002	Crescent River Reference	2.2	53	88	73	73	0.19	12.0	0.03	34000	0.060	0.0177	0.0559
D-C	Grass Shrimp	2002	West of domain 4	2.3	28	88	57	67	1.20	18.0	0.55	50000	0.087	0.0174	0.2400
MG-H7(C)	Grass Shrimp	2002	Domain 1	3.8	8	65	36	20	64.00	29.0	62.00	52000	1.060	0.2039	12.3077
MG-K7(C)	Grass Shrimp	2002	Domain 1	NA	0	0	0	48	92.00	27.0	46.00	38000	0.828	0.2179	24.2105
TC-C	Grass Shrimp	2002	North St Simons Sound Domain	2.1	77	90	85	87	0.03	14.0	0.04	26000	0.060	0.0232	0.0096
C-15	Grass Shrimp	2003	Western Creek Complex	1.9	21	87	73	58	0.790	28.0	2.80	35000	0.446	0.1274	0.2257
C-45	Grass Shrimp	2003	East of domain 4	1.7	45	88	78	85	0.700	17.0	0.62	30000	0.180	0.0600	0.2333
C-5	Grass Shrimp	2003	LCP Ditch Domain	2.7	28	88	72	85	24.000	24.0	10.00	32000	2.553	0.7978	7.5000
C-6	Grass Shrimp	2003	North South Tributary Domain	2.2	32	88	78	72	19.000	47.0	80.00	37000	0.811	0.2192	5.1351
C-7	Grass Shrimp	2003	North South Tributary Domain Removal	1.9	30	93	78	77	3.700	43.0	4.10	31000	11.782	3.8006	1.1935
CR-C	Grass Shrimp	2003	Crescent River Reference	1.7	29	97	73	87	0.100	7.5	0.01	11000	0.084	0.0760	0.0909
D-C	Grass Shrimp	2003	West of domain 4	1.8	29	87	74	83	0.870	22.0	0.56	32000	0.243	0.0759	0.2719
MG-H7(C)	Grass Shrimp	2003	Domain 1	3.6	9	35	33	27	2.200	21.0	6.80	30000	0.222	0.0740	0.7333
MG-K7(C)	Grass Shrimp	2003	Domain 1	2.2	15	87	71	83	24.000	26.0	22.00	33000	5.042	1.5279	7.2727
TC-C	Grass Shrimp	2003	North St Simons Sound Domain	2.4	50	82	83	83	0.100	9.4	0.04	13000	0.061	0.0471	0.0769
C-33	Grass Shrimp	2004	Domain 3	2.6	9	67	78	42	0.0305	8.9	0.044	4800	0.441	0.9188	0.0635
CR-C	Grass Shrimp	2004	Crescent River Reference	2	38	93	80	87	0.0600	2.2	0.010	1700	0.090	0.5294	0.3529
M-AB	Grass Shrimp	2004	Domain 1 Removal	1.9	34	85	78	83	2.1000	15.0	2.500	17000	7.290	4.2882	1.2353
TC-C	Grass Shrimp	2004	North St Simons Sound Domain	2.5	39	73	72	82	0.0320	8.0	0.026	18000	0.468	0.2600	0.0178
C-101	Grass Shrimp	2004	Domain 3	3	10	63	76	13	0.9700	20.0	0.530	35000	1.067	0.3049	0.2771
C-105	Grass Shrimp	2004	Domain 5	2.8	11	65	55	63	0.2600	12.0	0.200	30000	0.632	0.2107	0.0867
C-5	Grass Shrimp	2004	LCP Ditch Domain	2.2	29	83	54	67	12.0000	28.0	2.100	40000	2.350	0.5875	3.0000
MG-H7(C)	Grass Shrimp	2004	Domain 1	2.2	38	82	76	78	12.0000	34.0	0.820	40000	4.945	1.2363	3.0000
MG-K7(C)	Grass Shrimp	2004	Domain 1	2.3	17	70	70	67	10.0000	46.0	3.000	33000	1.684	0.5103	3.0303
A-C	Grass Shrimp	2004	East of domain 4	1.9	26	92	62	52	1.3000	16.0	0.790	43000	0.477	0.1109	0.3023
C-100	Grass Shrimp	2004	Domain 3	2.3	25	83	78	73	3.6000	23.0	3.300	47000	1.820	0.3872	0.7660
C-102	Grass Shrimp	2004	West of domain 4	2.3	28	87	56	32	0.7200	15.0	0.730	47000	0.612	0.1302	0.1532
C-104	Grass Shrimp	2004	Domain 5	2.3	49	85	61	30	0.6700	23.0	0.510	46000	0.788	0.1713	0.1457
C-15	Grass Shrimp	2004	Western Creek Complex	2.1	44	88	59	65	2.8000	28.0	1.200	42000	1.360	0.3238	0.6667
C-45	Grass Shrimp	2004	East of domain 4	2	29	92	54	47	0.9600	13.0	0.300	43000	0.625	0.1452	0.2233
C-7	Grass Shrimp	2004	North South Tributary Domain Removal	3.5	3	45	58	27	20.0000	29.0	18.000	47000	3.550	0.7553	4.2553
D-C	Grass Shrimp	2004	West of domain 4	2.7	21	72	75	60	0.8800	27.0	0.680	43000	1.044	0.2428	0.2047
C-103	Grass Shrimp	2004	Domain 5	2.2	29	87	77	28	0.1800	3.9	0.160	85000	0.630	0.0741	0.0212
C-6	Grass Shrimp	2004	North South Tributary Domain	2.4	33	82	72	40	41.0000	27.0	11.000	52000	11.510	2.2135	7.8846
CR-C	Grass Shrimp	2005	Crescent River Reference	1.8	56.3	86.7	75.7	76.7	0.012	12.4	0.0952	29000	0.136	0.0469	0.0041
TC-C	Grass Shrimp	2005	North St Simons Sound Domain	2.23	30.7	90	77.3	83.3	0.015	16.6	0.0921	28800	0.112	0.0387	0.0052
C-5	Grass Shrimp	2005	LCP Ditch Domain	2.2	29.3	80	66	65	4.200	25.8	1.1000	37200	1.067	0.2868	1.1290
C-36	Grass Shrimp	2005	North Purvis Creek Domain	1.9	38.7	80	79	73.3	3.700	29.1	1.9200	40000	1.189	0.2973	0.9250
C-29	Grass Shrimp	2005	North Purvis Creek Domain	1.9	22	85	63.7	71.7	2.200	25.4	1.0500	48700	0.826	0.1696	0.4517
C-16	Grass Shrimp	2005	South Purvis Creek Domain	2.1	28.3	85	66.7	71.7	3.600	5.8	0.5720	6870	0.274	0.3988	5.2402
C-6	Grass Shrimp	2005	North South Tributary Domain	1.63	37	83.3	69.3	73.3	69.000	42.1	86.6000	45800	1.484	0.3240	15.0655
C-7	Grass Shrimp	2005	North South Tributary Domain Removal	3.67	8.7	46.7	50.3	36.7	82.000	52.0	80.4000	56800	6.072	1.0689	14.4366
C-15	Grass Shrimp	2005	Western Creek Complex	2.07	27	85	75.7	76.7	6.800	25.3	2.1100	44800	1.015	0.2266	1.5179
MG-K7(M)	Grass Shrimp	2005	Domain 1	2	31.7	76.7	83.3	81.7	16.000	29.5	5.6800	34400	0.876	0.2547	4.6512
MG-H7(M)	Grass Shrimp	2005	Domain 1	1.87	31.7	88.3	79.7	73.3	36.000	28.8	4.3100	50400	1.296	0.2571	7.1429
C-33	Grass Shrimp	2005	Domain 3	1.7	52.3	90	83.7	83.3	0.013	419.0	0.2430	43300	0.649	0.1499	0.0030
D-C	Grass Shrimp	2005	West of domain 4	2	18	85	63.7	56.7	3.900	35.5	1.8700	56800	0.794	0.1398	0.6866
C-45	Grass Shrimp	2005	East of domain 4	4.43	12	23.3	21.3	25	0.610	20.3	0.2450	33300	0.725	0.2177	0.1832
C-103	Grass Shrimp	2005	Domain 5	1.97	34.7	90	60.3	78.3	0.560	24.2	1.9900	54400	0.492	0.0903	0.1029
C-104	Grass Shrimp	2005	Domain 5	1.7	27.7	86.7	66	71.7	0.044	25.7	1.9000	36800	1.647	0.4476	0.0120
C-105	Grass Shrimp	2005	Domain 5	2.07	28.3	81.7	68	83.3	0.390	22.9	0.0396	64900	0.565	0.0871	0.0601
C-200	Grass Shrimp	2005	Domain 3	1.8	46.7	86.7	72.3	81.7	8.200	154.0	4.4300	40900	1.365	0.3337	2.0049
C-201	Grass Shrimp	2005	South Turtle River Domain	2.13	28.7	88.3	68	83.3	0.940	16.3	1.0100	25800	1.166	0.4519	0.3643
C-202	Grass Shrimp	2005	North Turtle River Domain	1.67	47.3	83.3	70.7	80	0.210	17.2	0.2180	27200	0.442	0.1623	0.0772
C-203	Grass Shrimp	2005	South Turtle River Domain	1.9	24.7	86.7	63.7	76.7	0.820	60.1	0.8800	48200	0.980	0.2032	0.1701
FS-AREA1	Grass Shrimp	2005	Domain 3	2.23	29	86.7	76.3	83.3	1.300	32.0	0.6860	34800	0.490	0.1407	0.3736
FS-AREA2	Grass Shrimp	2005		1.87	56.3	81.7	75.3	78.3	2.300	387.0	2.1700	58600	5.097	0.8698	0.3925
FS-AREA3	Grass Shrimp	2005	Domain 3	1.9	3.7	8.3	70.3	76.7	0.520	1190.0	0.7600	38500	52.800	13.7142	0.1351
FS-AREA4	Grass Shrimp	2005	LCP Ditch Domain	2.07	37.7	85	68.7	81.7	7.000	15.4	1.1600	28000	0.561	0.2004	2.5000
FS-AREA5	Grass Shrimp	2005	LCP Ditch Domain	1.7	34	81.7	77.3	76.7	12.000	27.2	3.3200	33900	1.394	0.4112	3.5398
FS-AREA6	Grass Shrimp	2005	Domain 2	1.87	22.3	81.7	66.7	71.7	5.800	27.6	8.7900	76900	0.608	0.0791	0.7542

* Total Organic Carbon (TOC) was not measured in 2000. Therefore, it was estimated from the average of TOC measured at the same stations in monitoring years 2002-2006.

Key:	
Toxic	Significantly less than mean controls (p=0.05)
Nontoxic	Not significant from mean controls

APPENDIX D - Amphipod Controls

2000 Amphipod Toxicity Data Controls

Sample	Replicate	No. Survivors out of 20 to start	Mean Weight per Survivor	Survival, %		
Control	1	15	0.62	75	Average Control Survival =	71.0
	2	12	0.41	60	Standard Deviation =	12.4
	3	12	0.69	60	N =	5
	4	14	0.64	70		
	5	18	0.36	90		

Not within Test acceptability crit
Needs to be ≥ 80% mean surviva

2002 Amphipod Toxicity Data Controls

Control	Rep	Surviving	Sexed males	Juvenile Production	Avg Weight	Reproductive Response	Survival Rate
	a	21	6	2	0.66	0.067	105
	b	16	7	30	0.94	1.667	80
	c	19	9	50	0.97	2.500	95
	d	16	5	20	0.82	0.909	80
	e	15	12	4	0.57	0.667	75

Control		Survival Rate	Survivor's Average Weight	Reproductive Response
	Mean	87	0.792	1.16
	Variance	157.5	0.030	0.889
	N	5	5	5
	Std Dev	12.55	0.17	0.94

APPENDIX D - Amphipod Controls

2003 Amphipod Toxicity Data Controls

Treatment	Rep	Number Surviving	Survivor's Avg Weight	Survival Rate	Reproductive Response
Control 1	a	20	0.31	100	0.04
	b	16	0.36	80	0.15
	c	15	0.33	75	0.00
	d	20	0.27	100	0.04
	e	15	0.29	75	0.06

Control		Survival Rate	Survivor's Average Weight	Reproductive Response
	Mean	86	0.312	0.058
	Variance	167.5	0.00122	0.003
	N	5	5	5
	Std Dev	12.9	0.0349	0.0559

Not within Test acceptability criteria
Needs to have response in all control replicates

Note: One of the controls was unable to yield a non-zero reproductive response in 2003.
The reproductive response in controls failed to meet minimum test acceptability requirements.

2004 Amphipod Toxicity Data Controls

Control 1	Rep	No. Surviving	No. Females	Juveniles Produced	Reproductive Response	Survivor's Average Weight	Survival Rate
	a	18	3	25	4.17	0.28	90
	b	20	10	25	1.25	0.29	100
	c	20	10	50	2.50	0.3	100
	d	16	11	20	0.91	0.11	80
	e	18	6	25	2.08	0.64	90
Control 2	a	18	10	100	5.00	0.32	90
	b	19	11	25	1.14	0.28	95
	c	17	7	20	1.43	0.14	85
	d	17	10	20	1.00	0.23	85
	e	15	4	100	12.50	0.15	75
Mean		17.8			3.20	0.274	89
Variance		1.86			12.63	0.02	65.56
N		10			10	10	10
Std Dev		1.62			3.55	0.15	8.10

APPENDIX D - Amphipod Controls

2005 Amphipod Toxicity Data Controls

Treatment	Rep	Number Surviving	Survivor's Avg Weight	Survival Rate	Reproductive Response
Control 1	a	14	0.44	70	1.33
	b	16	0.31	80	1.57
	c	17	0.36	85	1.30
	d	16	0.35	80	3.62
	e	19	0.34	95	3.25

Control		Survival		Average Percent Survival in Controls	Reproductive Response	Survivor's Average Weight
	Mean	16.4		82	2.21	0.360
	Variance	3.3		82.5	1.27	0.00235
	N	5		5	5	5
	Std Dev	1.82		9.08	1.13	0.048

2006 AVS Amphipod Toxicity Data Controls

Control	Rep	No. Surviving	No. Females	Juveniles Produced	Reproductive Response	Survivor's Average Weight	Survival Rate
	a	18	12	12	0.5	0.67	90
	b	19	12	6	0.25	0.69	95
	c	20	15	25	0.833	0.6	100
	d	20	12	8	0.333	0.97	100
	e	18	10	18	0.9	0.77	90
Mean		19			0.563	0.74	95
N		5			5	5	5
Std Dev		1.0			0.29	0.14	5.0
Variance		1.0			0.085	0.0202	25.0

APPENDIX D - Amphipod Controls

2006 AET Toxicity Data

Control	Rep	No. Surviving	No. Females	Juveniles Produced	Reproductive Response	Survivor's Average Weight	Survival Rate
1	a	20	13	25	0.962	0.32	100
	b	20	8	33	2.063	0.51	100
	c	20	11	70	3.182	0.33	100
	d	19	11	47	2.136	0.52	95
	e	20	11	12	0.545	0.6	100
2	a	18	13	88	3.385	0.41	90
	b	20	17	30	0.882	0.46	100
	c	20	12	17	0.708	0.4	100
	d	18	11	33	1.500	0.55	90
	e	20	9	54	3.000	0.34	100
Mean					1.84	0.444	97.5
Variance					1.2	0.0098	18.1
N					10	10	10
Std Dev					1.1	0.0990	4.2

Note that the 2006 AET data were based on a single replicate at each location, except for controls which results in considerable uncertainty in the 2006 AET data because there was only one replicate.

APPENDIX D - Grass Shrimp Controls

Data for the Reference Sediment Station on the Skidaway River

Year 2000

Replicate	DNA strand damage	Embryo Development Rate	Embryo Hatching Rate	Ovary Maturation Rate	Survival Rate, %
1	NA	80	96	76	96
2	NA	52	96	84	92
3	NA	76	88	60	92
Mean		69.3	93.3	73.3	93.3
Std Dev		15.1	4.62	12.2	2.3
N		3	3	3	3

Year 2002

Replicate	DNA strand damage	Embryo Development Rate	Embryo Hatching Rate	Ovary Maturation Rate	Survival Rate, %
1	1.3	83	94	83	90
2	2.4	57	85	100	80
3	2.9	43	96	71	90
Mean	2.2	61.0	91.7	84.7	86.7
Std Dev	0.8	20.3	5.9	14.6	5.8
N	3	3	3	3	3

Year 2003

Replicate	DNA strand damage	Embryo Development Rate	Embryo Hatching Rate	Ovary Maturation Rate	Survival Rate, %
1	0.9	38	95	79	80
2	1.7	42	100	92	90
3	1.3	40	85	70	75
Mean	1.3	40.0	93.3	80.3	81.7
Std Dev	0.4	2.0	7.6	11.1	7.6
N	3	3	3	3	3

Year 2004

Replicate	DNA strand damage	Embryo Development Rate	Embryo Hatching Rate	Ovary Maturation Rate	Survival Rate, %
1	1.7	29	90	64	90
2	2.3	45	80	72	80
3	2.4	33	90	78	90
Mean	2.1	35.7	86.7	71.3	86.7
Std Dev	0.4	8.3	5.8	7.0	5.8
N	3	3	3	3	3

Year 2005

Replicate	DNA strand damage	Embryo Development Rate	Embryo Hatching Rate	Ovary Maturation Rate	Survival Rate, %
1	1.9	55	95	82	85
2	2.3	57	90	79	90
3	1.5	50	90	83	70
Mean	1.9	54.0	91.7	81.3	81.7
Std Dev	0.4	3.6	2.9	2.1	10.4
N	3	3	3	3	3

Sediment Effect Concentrations Summary - Amphipod

Mercury

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	11.8	21.9	4.9	15.5	19	230
Number of Type 1 Errors	4	0	10	2	0	
Number of Type 2 Errors	156	174	123	167	171	
Number predicted correctly	70	56	97	61	59	
Overall Reliability (%)	30%	24%	42%	27%	26%	30%

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	11.3	21.7	4.2	15.4	62	240
Number of Type 1 Errors	7	1	12	3	0	
Number of Type 2 Errors	150	167	104	161	184	
Number predicted correctly	83	72	124	76	56	
Overall Accuracy (%)	35%	30%	52%	32%	23%	34%

Survivors Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	21.6	38.1	8.1	21.9	145	240
Number of Type 1 Errors	10	6	31	9	0	
Number of Type 2 Errors	93	100	77	93	109	
Number predicted correctly	137	134	132	138	131	
Overall Accuracy (%)	57%	56%	55%	58%	55%	56%

Aroclor 1268

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	19	35	6.5	24.7	44	230
Number of Type 1 Errors	4	2	11	4	0	
Number of Type 2 Errors	116	142	75	129	149	-
Number predicted correctly	110	86	144	97	81	
Overall Reliability (%)	48%	37%	63%	42%	35%	45%

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	16.0	32	6.2	20.3	64	240
Number of Type 1 Errors	7	2	12	4	0	
Number of Type 2 Errors	120	153	86	139	169	
Number predicted correctly	113	85	142	97	71	
Overall Accuracy (%)	47%	35%	59%	40%	30%	42%

Survivors Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	61.0	110	19.4	61	420	240
Number of Type 1 Errors	11	8	36	11	0	
Number of Type 2 Errors	96	101	82	96	107	
Number predicted correctly	133	131	122	133	133	
Overall Accuracy (%)	55%	55%	51%	55%	55%	54%

OC-normalized Aroclor 1268

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.0	4.9	1.0	3.3	7.9	80
Number of Type 1 Errors	2	2	4	2	0	
Number of Type 2 Errors	50	56	40	51	59	
Number predicted correctly	28	22	36	27	21	
Overall Reliability (%)	35%	28%	45%	34%	26%	34%

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.0	5.2	0.9	3.5	12.3	90
Number of Type 1 Errors	2	2	6	2	0	
Number of Type 2 Errors	50	57	41	51	63	
Number predicted correctly	38	31	43	37	27	
Overall Accuracy (%)	42%	34%	48%	41%	30%	39%

Survivors Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	5.0	7.5	1.9	5.6	15.1	90
Number of Type 1 Errors	5	2	15	4	0	
Number of Type 2 Errors	39	42	36	40	45	
Number predicted correctly	46	46	39	46	45	
Overall Accuracy (%)	51%	51%	43%	51%	50%	49%

Total Polycyclic Aromatic Hydrocarbons

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.1	5.6	1.4	3.1	12	230
Number of Type 1 Errors	1	1	6	1	0	
Number of Type 2 Errors	182	188	174	182	194	
Number predicted correctly	47	41	50	47	36	
Overall Reliability (%)	20%	18%	22%	20%	16%	19%

Average Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.5	4.4	0.8	2.1	6	240
Number of Type 1 Errors	6	1	10	4	0	
Number of Type 2 Errors	168	179	127	171	184	
Number predicted correctly	66	60	103	65	56	
Overall Accuracy (%)	28%	25%	43%	27%	23%	29%

Survivor's Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	2.5	5.1	1.2	2.5	12	240
Number of Type 1 Errors	9	5	22	8	0	
Number of Type 2 Errors	97	102	91	97	105	
Number predicted correctly	134	133	127	135	135	
Overall Accuracy (%)	56%	55%	53%	56%	56%	55%

OC-normalized PAHs

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	2.2	4.3	0.9	1.9	2.7	80
Number of Type 1 Errors	2	0	2	2	0	
Number of Type 2 Errors	62	62	59	62	62	
Number predicted correctly	16	18	19	16	18	
Overall Reliability (%)	7%	8%	8%	7%	8%	8%

Average Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	0.6	1.0	0.2	0.6	2.7	90
Number of Type 1 Errors	1	1	4	1	0	
Number of Type 2 Errors	53	59	34	53	64	
Number predicted correctly	36	30	52	36	26	
Overall Accuracy (%)	15%	13%	22%	15%	11%	15%

Survivor's Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.0	1.6	0.5	1.0	4.3	90
Number of Type 1 Errors	3	2	8	3	0	
Number of Type 2 Errors	41	44	38	41	46	
Number predicted correctly	46	44	44	46	44	
Overall Accuracy (%)	19%	18%	18%	19%	18%	19%

Lead

Reproductive Response

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	66.3	238	44.8	88.7	177	230
Number of Type 1 Errors	1	0	1	1	0	
Number of Type 2 Errors	189	192	177	190	192	
Number predicted correctly	40	38	52	39	38	
Overall Reliability (%)	17%	17%	23%	17%	17%	18%

Average Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	59.8	196	40.8	88.4	177	240
Number of Type 1 Errors	1	0	2	1	0	
Number of Type 2 Errors	183	187	161	185	187	
Number predicted correctly	56	53	77	54	53	
Overall Accuracy (%)	23%	22%	32%	23%	22%	24%

Survivor's Average Weight

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	87.0	238	52.0	94	419.0	240
Number of Type 1 Errors	2	1	3	2	0	
Number of Type 2 Errors	103	105	101	103	108	
Number predicted correctly	135	134	136	135	132	
Overall Accuracy (%)	56%	56%	57%	56%	55%	56%

APPENDIX H - Amphipod Tox - Mercury

Reproductive Response	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
5.31	b	0.01		2x mean NOEC	9.1	0	-	-	-	-	-
3.23	b	0.026		Median NOEC	1.9	0	-	-	-	-	-
2.87	b	0.73				0	-	-	-	-	-
3.01	b	0.51		ER-L	11.8	0	-	-	-	-	-
2.85	b	11	Y	ER-M	21.9	0	-	-	T1	-	-
0.86	b	0.456		15th Percentile E	12.6	0	-	-	-	-	-
0.656	b	0.186		TEL	4.9	0	-	-	-	-	-
1.18	b	0.097		85th Percentile NE	11.0	0	-	-	-	-	-
0.508	b	1.09		PEL	15.5	0	-	-	-	-	-
0.61	b	7.03		AET	19	0	-	-	T1	-	-
0.906	b	3.57				0	-	-	-	-	-
0.464	b	4.54			53	0	-	-	-	-	-
2.58	b	19	Y	Effects Data N	46	0	T1	-	T1	T1	-
2.06	b	6.53				0	-	-	T1	-	-
1.88	b	11.2	Y	**Effects Data Set**		0	-	-	T1	-	-
1.56	b	0.257		48		0	-	-	-	-	-
1.625	b	8.28		14		0	-	-	T1	-	-
3.64	b	1.22		62		0	-	-	-	-	-
1.733	b	1.5		46		0	-	-	-	-	-
1.682	b	1.14		18		0	-	-	-	-	-
1.571	b	1.89		86.6		0	-	-	-	-	-
2.833	b	3.28		80.4		0	-	-	-	-	-
2.25	b	2.01		20.6		0	-	-	-	-	-
1.91	b	1.12		25.6		0	-	-	-	-	-
2.27	b	4.84		11.3		0	-	-	-	-	-
2.17	b	14.7	Y	74		0	T1	-	T1	-	-
1.625	b	16.3	Y	13		0	T1	-	T1	T1	-
1.94	b	0.044		10.7		0	-	-	-	-	-
1.59	b	0.53		17.3		0	-	-	-	-	-
1.61	b	3.3		30.1		0	-	-	-	-	-
1.45	b	1.2		13.6		0	-	-	-	-	-
1.38	b	10.7	Y	50.2		0	-	-	T1	-	-
1.42	b	12.2	Y	19.5		0	T1	-	T1	-	-
0.47	🟥	1.3		105		1	T2	T2	T2	T2	T2
0.29	🟥	0.24		145		1	T2	T2	T2	T2	T2
0.07	🟥	11	Y	17.3		1	T2	T2	-	T2	T2
0	🟥	48	Y	12.6		1	-	-	-	-	-
0	🟥	14	Y	27.6		1	-	T2	-	T2	T2
0.1	🟥	0.025		41.6		1	T2	T2	T2	T2	T2
0	🟥	0.55		109		1	T2	T2	T2	T2	T2
0.01	🟥	62	Y	75.7		1	-	-	-	-	-
0	🟥	46	Y	61.4		1	-	-	-	-	-
0.025	🟥	0.038		12.7		1	T2	T2	T2	T2	T2
0.079	🟥	2.5		28.2		1	T2	T2	T2	T2	T2
0	🟥	0.2		12.6		1	T2	T2	T2	T2	T2
0.47	🟥	2.1		23.8		1	T2	T2	T2	T2	T2
0.55	🟥	0.82		17.8		1	T2	T2	T2	T2	T2
0.21	🟥	3		10.2		1	T2	T2	T2	T2	T2
0.21	🟥	0.79		22.1		1	T2	T2	T2	T2	T2
0.12	🟥	0.3		9.45		1	T2	T2	T2	T2	T2
0	🟥	18	Y	12.4		1	-	T2	-	-	T2
0.74	🟥	0.68		39.6		1	T2	T2	T2	T2	T2
0.15	🟥	0.16		11.4		1	T2	T2	T2	T2	T2
0.85	🟥	0.0952		21.7		1	T2	T2	T2	T2	T2
0.77	🟥	0.0921		13.4		1	T2	T2	T2	T2	T2
0.6	🟥	1.1		29.2		1	T2	T2	T2	T2	T2
0.26	🟥	1.92		35.1		1	T2	T2	T2	T2	T2
0	🟥	1.05		29		1	T2	T2	T2	T2	T2
0	🟥	0.572		12.2		1	T2	T2	T2	T2	T2
0.95	🟥	86.6	Y	12.7		1	-	-	-	-	-
0	🟥	80.4	Y	13.2		1	-	-	-	-	-
0	🟥	2.11				1	T2	T2	T2	T2	T2
0.39	🟥	5.68				1	T2	T2	-	T2	T2
0.67	🟥	4.31				1	T2	T2	T2	T2	T2
0.23	🟥	0.243				1	T2	T2	T2	T2	T2
0	🟥	1.87				1	T2	T2	T2	T2	T2
0	🟥	0.245				1	T2	T2	T2	T2	T2
0	🟥	1.99				1	T2	T2	T2	T2	T2
0	🟥	1.9				1	T2	T2	T2	T2	T2
0.38	🟥	0.0396				1	T2	T2	T2	T2	T2
0	🟥	4.43				1	T2	T2	T2	T2	T2
0	🟥	1.01				1	T2	T2	T2	T2	T2
0	🟥	0.218				1	T2	T2	T2	T2	T2
0	🟥	0.88				1	T2	T2	T2	T2	T2
0	🟥	0.686				1	T2	T2	T2	T2	T2
0	🟥	2.17				1	T2	T2	T2	T2	T2
0	🟥	0.76				1	T2	T2	T2	T2	T2
0.32	🟥	1.16				1	T2	T2	T2	T2	T2
0	🟥	3.32				1	T2	T2	T2	T2	T2
0.54	🟥	8.79				1	T2	T2	-	T2	T2
0.082	🟥	0.372				1	T2	T2	T2	T2	T2
0.292	🟥	0.276				1	T2	T2	T2	T2	T2
0.358	🟥	0.395				1	T2	T2	T2	T2	T2
0.142	🟥	0.673				1	T2	T2	T2	T2	T2
0	🟥	0.566				1	T2	T2	T2	T2	T2
0.126	🟥	8.75				1	T2	T2	-	T2	T2
0.356	🟥	3.27				1	T2	T2	T2	T2	T2
0.364	🟥	0.0129				1	T2	T2	T2	T2	T2
0.36	🟥	1.22				1	T2	T2	T2	T2	T2
0.072	🟥	1.07				1	T2	T2	T2	T2	T2
0	🟥	1.07				1	T2	T2	T2	T2	T2
0.032	🟥	1.34				1	T2	T2	T2	T2	T2
0.074	🟥	2.03				1	T2	T2	T2	T2	T2
0.144	🟥	0.0561				1	T2	T2	T2	T2	T2
0.154	🟥	1.82				1	T2	T2	T2	T2	T2
0.112	🟥	2.36				1	T2	T2	T2	T2	T2
0.05	🟥	0.0742				1	T2	T2	T2	T2	T2
0	🟥	20.6	Y			1	-	T2	-	-	-
0	🟥	25.6	Y			1	-	-	-	-	-
0	🟥	1.46				1	T2	T2	T2	T2	T2
0	🟥	0.0437				1	T2	T2	T2	T2	T2
0.269	🟥	11.3	Y			1	T2	T2	-	T2	T2
0	🟥	5.59				1	T2	T2	-	T2	T2
0	🟥	5.02				1	T2	T2	-	T2	T2
0	🟥	0.767				1	T2	T2	T2	T2	T2
0	🟥	0.794				1	T2	T2	T2	T2	T2
0	🟥	4.64				1	T2	T2	T2	T2	T2
0	🟥	4.68				1	T2	T2	T2	T2	T2
0	🟥	74	Y			1	-	-	-	-	-
0.389	🟥	6.39				1	T2	T2	-	T2	T2
0	🟥	3.05				1	T2	T2	T2	T2	T2
0	🟥	4.48				1	T2	T2	T2	T2	T2
0	🟥	13	Y			1	-	T2	-	T2	T2
0.35	🟥	2.55				1	T2	T2	T2	T2	T2
0	🟥	17.3	Y			1	-	T2	-	-	T2
0	🟥	3.5				1	T2	T2	T2	T2	T2
0	🟥	5.3				1	T2	T2	-	T2	T2
0	🟥	4.06				1	T2	T2	T2	T2	T2
0	🟥	5.1				1	T2	T2	-	T2	T2
0.125	🟥	8.72				1	T2	T2	-	T2	T2
0.727	🟥	30.1	Y			1	-	-	-	-	-
0	🟥	13.6	Y			1	-	T2	-	T2	T2
0.0769	🟥	50.2	Y			1	-	-	-	-	-
0	🟥	19.5	Y			1	-	T2	-	-	-
0.45	🟥	4.33				1	T2	T2	T2	T2	T2
0	🟥	105	Y			1	-	-	-	-	-
0	🟥	6.23				1	T2	T2	-	T2	T2

Average Survival Rate	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
87	b	0.186		2x mean NOEC	9.4	0	-	-	-	-	-
87	b	7.03		Median NOEC	1.4	0	-	-	T1	-	-
91	b	3.27				0	-	-	-	-	-
88	b	0.0129		ER-L	11.3	0	-	-	-	-	-
87	b	1.22		ER-M	21.7	0	-	-	-	-	-
87	b	3.57		15th Percentile E	12.2	0	-	-	-	-	-
88	b	4.54		TEL	4.2	0	-	-	T1	-	-
100	b	19	Y	85th Percentile NE	11.0	0	T1	-	T1	T1	-
90	b	6.53		PEL	15.4	0	-	-	T1	-	-
90	b	11.2	Y	AET	62	0	-	-	T1	-	-
100	b	12.6	Y			0	T1	-	T1	-	-
90	b	0.257			56	0	-	-	-	-	-
95	b	12.4	Y	Effects Data N	47	0	T1	-	T1	-	-
100	b	0.367				0	-	-	-	-	-
100	b	2.64		**Effects Data Set**		0	-	-	-	-	-
100	b	1.23		11		0	-	-	-	-	-
90	b	1.22		48		0	-	-	-	-	-
100	b	0.518		14		0	-	-	-	-	-
90	b	1.5		46		0	-	-	-	-	-
100	b	1.14		10		0	-	-	-	-	-
95	b	1.89		80		0	-	-	-	-	-
100	b	1.99		22		0	-	-	-	-	-
100	b	3.28		18.0		0	-	-	-	-	-
90	b	1.78		11.0		0	-	-	-	-	-
95	b	2.08		86.6		0	-	-	-	-	-
100	b	2.64		80.4		0	-	-	-	-	-
100	b	1.12		20.6		0	-	-	-	-	-
90	b	13.2	Y	25.6		0	T1	-	T1	-	-
100	b	4.84		11.3		0	-	-	T1	-	-
90	b	12.2	Y	74.0		0	T1	-	T1	-	-
95	b	16.3	Y	13.0		0	T1	-	T1	T1	-
77	b	1.3		10.7		0	-	-	-	-	-
71	b	0.24		17.3		0	-	-	-	-	-
80	b	0.038		30.1		0	-	-	-	-	-
76	b	0.01		13.6		0	-	-	-	-	-
69	b	0.044		50.2		0	-	-	-	-	-
76	b	3.3		19.5		0	-	-	-	-	-
72	b	0.16		105		0	-	-	-	-	-
80	b	62	Y	145		0	T1	T1	T1	T1	-
80	b	0.372		17.3		0	-	-	-	-	-
80	b	0.276		27.6		0	-	-	-	-	-
82	b	0.395		41.6		0	-	-	-	-	-
79	b	0.456		109		0	-	-	-	-	-
84	b	0.673		75.7		0	-	-	-	-	-
84	b	1.09		61.4		0	-	-	-	-	-
85	b	1.340		12.7		0	-	-	-	-	-
78	b	2.03		28.2		0	-	-	-	-	-
81	b	0.0561		12.6		0	-	-	-	-	-
54	🟥	11	Y	23.8		1	T2	T2	-	T2	T2
48	🟥	48	Y	17.8		1	-	-	-	-	T2
56	🟥	14	Y	10.2		1	-	T2	-	T2	T2
53	🟥	0.025		22.1		1	T2	T2	T2	T2	T2
63	🟥	0.55		39.6		1	T2	T2	T2	T2	T2
68	🟥	46	Y	11.4		1	-	-	-	-	T2
61	🟥	2.8		21.7		1	T2	T2	T2	T2	T2
50	🟥	0.62		13.4		1	T2	T2	T2	T2	T2
37	🟥	10	Y	29.2		1	T2	T2	-	T2	T2
35	🟥	80	Y	35.1		1	-	-	-	-	-
1	🟥	4.1		29.0		1	T2	T2	T2	T2	T2
62	🟥	0.56		12.2		1	T2	T2	T2	T2	T2
30	🟥	6.8		12.7		1	T2	T2	-	T2	T2
54	🟥	22	Y	14.7		1	-	-	-	-	T2
42	🟥	0.044		9.5		1	T2	T2	T2	T2	T2
40	🟥	0.01				1	T2	T2	T2	T2	T2
15	🟥	2.5				1	T2	T2	T2	T2	T2
42	🟥	0.026				1	T2	T2	T2	T2	T2
25	🟥	0.53				1	T2	T2	T2	T2	T2
0	🟥	0.2				1	T2	T2	T2	T2	T2
63	🟥	2.1				1	T2	T2	T2	T2	T2
24	🟥	0.82				1	T2	T2	T2	T2	T2
15	🟥	3				1	T2	T2	T2	T2	T2
33	🟥	0.79				1	T2	T2	T2	T2	T2
17	🟥	0.73				1	T2	T2	T2	T2	T2
66	🟥	0.51				1	T2	T2	T2	T2	T2
3	🟥	1.2				1	T2	T2	T2	T2	T2
23	🟥	0.3				1	T2	T2	T2	T2	T2
15	🟥	18	Y			1	-	T2	-	-	T2
58	🟥	0.68				1	T2	T2	T2	T2	T2
37	🟥	11	Y			1	T2	T2	-	T2	T2
36	🟥	0.0952				1	T2	T2	T2	T2	T2
34	🟥	0.0921				1	T2	T2	T2	T2	T2
62	🟥	1.1				1	T2	T2	T2	T2	T2
65	🟥	1.92				1	T2	T2	T2	T2	T2
0	🟥	1.05				1	T2	T2	T2	T2	T2
7	🟥	0.572				1	T2	T2	T2	T2	T2
42	🟥	86.6	Y			1	-	-	-	-	-
0	🟥	80.4	Y			1	-	-	-	-	-
0	🟥	2.11				1	T2	T2	T2	T2	T2
45	🟥	5.68				1	T2	T2	-	T2	T2
29	🟥	4.31				1	T2	T2	-	T2	T2
32	🟥	0.243				1	T2	T2	T2	T2	T2
3	🟥	1.87				1	T2	T2	T2	T2	T2
12	🟥	0.245				1	T2	T2	T2	T2	T2
14	🟥	1.99				1	T2	T2	T2	T2	T2
4	🟥	1.9				1	T2	T2	T2	T2	T2
36	🟥	0.0396				1	T2	T2	T2	T2	T2
23	🟥	4.43				1	T2	T2	-	T2	T2
0	🟥	1.01				1	T2	T2	T2	T2	T2
19	🟥	0.218				1	T2	T2	T2	T2	T2
16	🟥	0.88				1	T2	T2	T2	T2	T2
2	🟥	0.686				1	T2	T2	T2	T2	T2
0	🟥	2.17				1	T2	T2	T2	T2	T2
0	🟥	0.76				1	T2	T2	T2	T2	T2
26	🟥	1.16				1	T2	T2	T2	T2	T2
6	🟥	3.32				1	T2	T2	T2	T2	T2
39	🟥	8.79				1	T2	T2	-	T2	T2
70	🟥	0.0972				1	T2	T2	T2	T2	T2
60	🟥	0.566				1	T2	T2	T2	T2	T2
67	🟥	8.75				1	T2	T2	-	T2	T2
41	🟥	1.07				1	T2	T2	T2	T2	T2
1	🟥	1.07				1	T2	T2	T2	T2	T2
66	🟥	1.82				1	T2	T2	T2	T2	T2
74	🟥	2.36				1	T2	T2	T2	T2	T2
72	🟥	0.0742				1	T2	T2	T2	T2	T2
55	🟥	20.6	Y			1	-	T2	-	-	T2
0	🟥	25.6	Y			1	-	-	-	-	T2
20	🟥	1.46				1	T2	T2	T2	T2	T2
70	🟥	0.0437				1	T2	T2	T2	T2	T2
75	🟥	11.3	Y			1	-	T2	-	T2	T2
80	🟥	5.59				1	T2	T2	-	T2	T2
70	🟥	5.02				1	T2	T2	-	T2	T2
0	🟥	0.767				1	T2	T2	T2	T2	T2
50	🟥	0.794				1	T2	T2	T2	T2	T2
75	🟥	4.64				1	T2	T2	-	T2	T2
75	🟥	4.68				1	T2	T2	-	T2	T2
50	🟥	74	Y			1	-	-	-	-	-
80	🟥	6.39				1	T2	T2	-	T2	T2

APPENDIX H - Amphipod Tox - Mercury

Reproductive Response	b	Mercury		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0	🟥	6.81		1	T2	T2	-	T2	T2
0	🟥	145	Y	1	-	-	-	-	-
0	🟥	17.3	Y	1	-	T2	-	-	T2
0	🟥	2.44		1	T2	T2	T2	T2	T2
1.0	🟥	12.6	Y	1	-	T2	-	T2	T2
0	🟥	0.277		1	T2	T2	T2	T2	T2
0	🟥	4.49		1	T2	T2	T2	T2	T2
0	🟥	27.6	Y	1	-	-	-	-	-
0	🟥	5.62		1	T2	T2	-	T2	T2
0	🟥	41.6	Y	1	-	-	-	-	-
0.2308	🟥	2.53		1	T2	T2	T2	T2	T2
0	🟥	109	Y	1	-	-	-	-	-
0	🟥	75.7	Y	1	-	-	-	-	-
0	🟥	61.4	Y	1	-	-	-	-	-
0	🟥	12.7	Y	1	-	T2	-	T2	T2
0.269	🟥	3.41		1	T2	T2	T2	T2	T2
0.167	🟥	1.29		1	T2	T2	T2	T2	T2
0	🟥	28.2	Y	1	-	-	-	-	-
0	🟥	3.6		1	T2	T2	T2	T2	T2
0	🟥	12.6	Y	1	-	T2	-	T2	T2
0	🟥	8.97		1	T2	T2	-	T2	T2
0	🟥	3.14		1	T2	T2	T2	T2	T2
0.9	🟥	3.01		1	T2	T2	T2	T2	T2
0.375	🟥	8.39		1	T2	T2	-	T2	T2
0	🟥	4.63		1	T2	T2	T2	T2	T2
0	🟥	23.8	Y	1	-	-	-	-	-
0	🟥	2.57		1	T2	T2	T2	T2	T2
0	🟥	17.8	Y	1	-	T2	-	-	T2
0.375	🟥	2.99		1	T2	T2	T2	T2	T2
0.611	🟥	10.2	Y	1	T2	T2	-	T2	T2
0	🟥	4.66		1	T2	T2	T2	T2	T2
0	🟥	22.1	Y	1	-	-	-	-	-
0	🟥	6.32		1	T2	T2	-	T2	T2
0	🟥	7.57		1	T2	T2	-	T2	T2
0.167	🟥	9.45	Y	1	T2	T2	-	T2	T2
0.654	🟥	12.4	Y	1	-	T2	-	T2	T2
0	🟥	1.47		1	T2	T2	T2	T2	T2
0	🟥	1.74		1	T2	T2	T2	T2	T2
0	🟥	39.6	Y	1	-	-	-	-	-
0	🟥	5.57		1	T2	T2	-	T2	T2
0.6	🟥	5.79		1	T2	T2	-	T2	T2
0	🟥	11.4	Y	1	T2	T2	-	T2	T2
0	🟥	7.95		1	T2	T2	-	T2	T2
0	🟥	6.74		1	T2	T2	-	T2	T2
0	🟥	5.3		1	T2	T2	-	T2	T2
0.15	🟥	4.26		1	T2	T2	T2	T2	T2
0.688	🟥	5.34		1	T2	T2	-	T2	T2
0	🟥	2.78		1	T2	T2	T2	T2	T2
0	🟥	8.94		1	T2	T2	-	T2	T2
0	🟥	21.7	Y	1	-	T2	-	-	-
0	🟥	13.4	Y	1	-	T2	-	T2	T2
0	🟥	1.24		1	T2	T2	T2	T2	T2
0	🟥	6.17		1	T2	T2	-	T2	T2
0	🟥	29.2	Y	1	-	-	-	-	-
0	🟥	35.1	Y	1	-	-	-	-	-
0	🟥	29	Y	1	-	-	-	-	-
0	🟥	0.196		1	T2	T2	T2	T2	T2
0.25	🟥	0.397		1	T2	T2	T2	T2	T2
0	🟥	2.14		1	T2	T2	T2	T2	T2
0.909	🟥	0.367		1	T2	T2	T2	T2	T2
0	🟥	0.772		1	T2	T2	T2	T2	T2
0	🟥	3.61		1	T2	T2	T2	T2	T2
0.8	🟥	3		1	T2	T2	T2	T2	T2
1.04	🟥	2.64		1	T2	T2	T2	T2	T2
0.833	🟥	1.23		1	T2	T2	T2	T2	T2
0.938	🟥	0.518		1	T2	T2	T2	T2	T2
0.5	🟥	1.59		1	T2	T2	T2	T2	T2
0	🟥	0.921		1	T2	T2	T2	T2	T2
0.2	🟥	1.85		1	T2	T2	T2	T2	T2
0	🟥	2.76		1	T2	T2	T2	T2	T2
0	🟥	6.72		1	T2	T2	-	T2	T2
0.083	🟥	1.49		1	T2	T2	T2	T2	T2
0.556	🟥	1.33		1	T2	T2	T2	T2	T2
1.111	🟥	1.53		1	T2	T2	T2	T2	T2
0.571	🟥	1.71		1	T2	T2	T2	T2	T2
0.792	🟥	1.99		1	T2	T2	T2	T2	T2
0.643	🟥	1.78		1	T2	T2	T2	T2	T2
0	🟥	1.61		1	T2	T2	T2	T2	T2
0.708	🟥	2.08		1	T2	T2	T2	T2	T2
0.5	🟥	1.48		1	T2	T2	T2	T2	T2
0.818	🟥	1.39		1	T2	T2	T2	T2	T2
0	🟥	3.99		1	T2	T2	T2	T2	T2
0.778	🟥	2.64		1	T2	T2	T2	T2	T2
0	🟥	1.75		1	T2	T2	T2	T2	T2
0	🟥	12.2	Y	1	-	T2	-	T2	T2
0.5	🟥	12.7	Y	1	-	T2	-	T2	T2
0.917	🟥	2.27		1	T2	T2	T2	T2	T2
0	🟥	5.24		1	T2	T2	-	T2	T2
0	🟥	13.2	Y	1	-	T2	-	T2	T2
0	🟥	1.67		1	T2	T2	T2	T2	T2
0	🟥	0.501		1	T2	T2	T2	T2	T2
0	🟥	3.77		1	T2	T2	T2	T2	T2
0	🟥	0.35		1	T2	T2	T2	T2	T2
0	🟥	7.83		1	T2	T2	-	T2	T2
0	🟥	0.089		1	T2	T2	T2	T2	T2
0	🟥	0.882		1	T2	T2	T2	T2	T2
0	🟥	5.49		1	T2	T2	-	T2	T2
0.962	🟥	0.203		1	T2	T2	T2	T2	T2
0	🟥	3.81		1	T2	T2	T2	T2	T2
0	🟥	2.1		1	T2	T2	T2	T2	T2
0	🟥	0.954		1	T2	T2	T2	T2	T2
0	🟥	1.02		1	T2	T2	T2	T2	T2
0	🟥	1.29		1	T2	T2	T2	T2	T2
				197	4	0	10	2	0
				230	156	174	123	167	171
					160	174	133	169	171

Average Survival Rate	b	Mercury		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
25	🟥	3.05		1	T2	T2	T2	T2	T2
30	🟥	4.48		1	T2	T2	-	T2	T2
55	🟥	13	Y	1	-	T2	-	T2	T2
85	🟥	2.55		1	T2	T2	T2	T2	T2
80	🟥	10.7	Y	1	T2	T2	-	T2	T2
85	🟥	17.3	Y	1	-	T2	-	-	T2
85	🟥	3.5		1	T2	T2	T2	T2	T2
0	🟥	5.3		1	T2	T2	-	T2	T2
0	🟥	4.06		1	T2	T2	T2	T2	T2
50	🟥	5.1		1	T2	T2	-	T2	T2
75	🟥	8.72		1	T2	T2	-	T2	T2
85	🟥	30.1	Y	1	-	-	-	-	T2
55	🟥	13.6	Y	1	-	T2	-	T2	T2
70	🟥	50.2	Y	1	-	-	-	-	T2
80	🟥	19.5	Y	1	-	T2	-	-	T2
60	🟥	4.33		1	T2	T2	-	T2	T2
80	🟥	105	Y	1	-	-	-	-	-
40	🟥	6.23		1	T2	T2	-	T2	T2
75	🟥	6.81		1	T2	T2	-	T2	T2
50	🟥	145	Y	1	-	-	-	-	-
20	🟥	17.3	Y	1	-	T2	-	-	T2
10	🟥	2.44		1	T2	T2	T2	T2	T2
35	🟥	0.277		1	T2	T2	T2	T2	T2
10	🟥	4.49		1	T2	T2	-	T2	T2
10	🟥	27.6	Y	1	-	-	-	-	T2
0	🟥	5.62		1	T2	T2	-	T2	T2
65	🟥	41.6	Y	1	-	-	-	-	T2
80	🟥	2.53		1	T2	T2	T2	T2	T2
60	🟥	109	Y	1	-	-	-	-	-
0	🟥	75.7	Y	1	-	-	-	-	-
75	🟥	61.4	Y	1	-	-	-	-	T2
65	🟥	12.7	Y	1	-	T2	-	T2	T2
85	🟥	3.41		1	T2	T2	T2	T2	T2
75	🟥	1.29		1	T2	T2	T2	T2	T2
80	🟥	28.2	Y	1	-	-	-	-	T2
65	🟥	3.6		1	T2	T2	T2	T2	T2
80	🟥	12.6	Y	1	-	T2	-	T2	T2
15	🟥	8.97		1	T2	T2	-	T2	T2
75	🟥	3.14		1	T2	T2	T2	T2	T2
85	🟥	3.01		1	T2	T2	T2	T2	T2
55	🟥	8.39		1	T2	T2	-	T2	T2
60	🟥	4.63		1	T2	T2	-	T2	T2
50	🟥	23.8	Y	1	-	-	-	-	T2
80	🟥	2.57		1	T2	T2	T2	T2	T2
55	🟥	17.8	Y	1	-	T2	-	-	T2
80	🟥	2.99		1	T2	T2	T2	T2	T2
80	🟥	10.2	Y	1	T2	T2	-	T2	T2
35	🟥	4.66		1	T2	T2	-	T2	T2
15	🟥	22.1	Y	1	-	-	-	-	T2
65	🟥	6.32		1	T2	T2	-	T2	T2
55	🟥	7.57		1	T2	T2	-	T2	T2
75	🟥	9.45	Y	1	T2	T2	-	T2	T2
50	🟥	1.47		1	T2	T2	T2	T2	T2
65	🟥	1.74		1	T2	T2	T2	T2	T2
70	🟥	39.6	Y	1	-	-	-	-	T2
55	🟥	5.57		1	T2	T2	-	T2	T2
75	🟥	5.79		1	T2	T2	-	T2	T2
45	🟥	11.4	Y	1	-	T2	-	T2	T2
5	🟥	7.95		1	T2	T2	-	T2	T2
85	🟥	8.28		1	T2	T2	-	T2	T2
25	🟥	6.74		1	T2	T2	-	T2	T2
65	🟥	5.3		1	T2	T2	-	T2	T2
70	🟥	4.26		1	T2	T2	-	T2	T2
75	🟥	5.34		1	T2	T2	-	T2	T2
65	🟥	2.78		1	T2	T2	T2	T2	T2
5	🟥	8.94		1	T2	T2	-	T2	T2
35	🟥	21.7	Y	1	-	-	-	-	T2
60	🟥	13.4	Y	1	-	T2	-	T2	T2
5	🟥	1.24		1	T2	T2	T2	T2	T2
15	🟥	6.17		1	T2	T2	-	T2	T2
50	🟥	29.2	Y	1	-	-	-	-	T2
55	🟥	35.1	Y	1	-	-	-	-	T2
0	🟥	29	Y	1	-	-	-	-	T2
0	🟥	0.196		1	T2	T2	T2	T2	T2
75	🟥	0.397		1	T2	T2	T2	T2	T2
15	🟥	2.14		1	T2	T2	T2	T2	T2
35	🟥	0.772		1	T2	T2	T2	T2	T2
35	🟥	3.61		1	T2	T2	T2	T2	T2
80	🟥	3		1	T2	T2	T2	T2	T2
70	🟥	1.59		1	T2	T2	T2	T2	T2
85	🟥	0.921		1	T2	T2	T2	T2	T2
80	🟥	1.85		1	T2	T2	T2	T2	T2
75	🟥	2.76		1	T2	T2	T2	T2	T2
65	🟥	6.72		1	T2	T2	-	T2	T2
80	🟥	1.49		1	T2	T2	T2	T2	T2
65	🟥	1.33		1	T2	T2	T2	T2	T2
85	🟥	1.53		1	T2	T2	T2	T2	T2
80	🟥	1.71		1	T2	T2	T2	T2	T2
75	🟥	2.01		1	T2	T2	T2	T2	T2
75	🟥	1.61		1	T2	T2	T2	T2	T2
85	🟥	1.48		1	T2	T2	T2	T2	T2
85	🟥	1.39		1	T2	T2	T2	T2	T2
0	🟥	3.99		1	T2	T2	T2	T2	T2
30	🟥	1.75		1	T2	T2	T2	T2	T2
25	🟥	12.2	Y	1	-	T2	-	T2	T2
85	🟥	12.7	Y	1	-	T2	-	T2	T2
80	🟥	2.27		1	T2	T2	T2	T2	T2
75	🟥	5.24		1	T2	T2	-	T2	T2
30	🟥	1.67		1	T2	T2	T2	T2	T2
50	🟥	0.501		1	T2	T2	T2	T2	T2
10	🟥	3.77		1	T2	T2	T2	T2	T2
85	🟥	14.7	Y	1	-	T2	-	T2	T2
55	🟥	0.35		1	T2	T2	T2	T2	T2
40	🟥	7.83		1	T2	T2	-	T2	T2
45	🟥	0.089		1	T2	T2	T2	T2	T2
5	🟥	0.882		1	T2	T2	T2	T2	T2
85	🟥	5.49		1	T2	T2	-	T2	T2
85	🟥	0.203		1	T2	T2	T2	T2	T2
50	🟥	3.81		1	T2	T2	T2	T2	T2
80	🟥	2.1		1	T2	T2	T2	T2	T2
55	🟥	0.954		1	T2	T2	T2	T2	T2
5	🟥	1.02		1	T2	T2	T2	T2	T2
60	🟥	1.29		1	T2	T2	T2	T2	T2
				192	7	1	12	3	0
				240	150	167	104	161	184
					157	168	116	164	184

APPENDIX H - Amphipod Tox - Mercury

Survivor's Average Weight	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.37	b	0.01		2x mean NOEC	17.7	0	-	-	-	-	-
0.35	b	0.04		Median NOEC	3.0	0	-	-	-	-	-
0.350	b	0.04				0	-	-	-	-	-
0.302	b	2.5		ER-L	21.6	0	-	-	-	-	-
0.362	b	0.026		ER-M	38.1	0	-	-	-	-	-
0.308	b	0.53		15th Percentile E	22.1	0	-	-	-	-	-
0.400	b	2.1		TEL	8.1	0	-	-	-	-	-
0.500	b	0.82		85th Percentile NE	12.7	0	-	-	-	-	-
0.286	b	3		PEL	22	0	-	-	-	-	-
0.406	b	0.79		AET	145	0	-	-	-	-	-
0.294	b	3.3				0	-	-	-	-	-
0.398	b	0.73			31	0	-	-	-	-	-
0.316	b	0.51		Effects Data N	18	0	-	-	-	-	-
0.250	b	1.2				0	-	-	-	-	-
0.264	b	0.3		**Effects Data Set**		0	-	-	-	-	-
0.452	b	18	Y	48		0	-	-	T1	-	-
0.384	b	11		62		0	-	-	T1	-	-
0.39	b	1.1		46		0	-	-	-	-	-
0.408	b	1.92		80		0	-	-	-	-	-
0.45	b	0.572		22		0	-	-	-	-	-
0.39	b	86.6	Y	80.4		0	T1	T1	T1	T1	-
0.532	b	5.68		75.7		0	-	-	-	-	-
0.512	b	4.31		74		0	-	-	-	-	-
0.528	b	0.218		61.4		0	-	-	-	-	-
0.438	b	0.88		50.2		0	-	-	-	-	-
0.55	b	3.32		30.1		0	-	-	-	-	-
0.756	b	0.0972		29.0		0	-	-	-	-	-
0.712	b	7.03		28.2		0	-	-	-	-	-
0.744	b	2.36		27.6		0	-	-	-	-	-
0.440	b	5.59		25.6		0	-	-	-	-	-
0.450	b	5.02		22.1		0	-	-	-	-	-
0.500	b	3.05		20.6		0	-	-	-	-	-
0.610	b	13		17.8		0	-	-	T1	-	-
0.440	b	2.55				0	-	-	-	-	-
0.460	b	19	Y			0	-	-	T1	-	-
0.450	b	5.1				0	-	-	-	-	-
0.640	b	13.6				0	-	-	T1	-	-
0.560	b	19.5	Y			0	-	-	T1	-	-
0.590	b	105	Y			0	T1	T1	T1	T1	-
0.610	b	6.81				0	-	-	-	-	-
0.550	b	6.53				0	-	-	-	-	-
0.690	b	145	Y			0	T1	T1	T1	T1	-
0.480	b	17.3				0	-	-	T1	-	-
0.530	b	11.2				0	-	-	T1	-	-
0.480	b	12.6				0	-	-	T1	-	-
0.690	b	0.277				0	-	-	-	-	-
0.430	b	0.257				0	-	-	-	-	-
0.710	b	41.6	Y			0	T1	T1	T1	T1	-
0.470	b	109	Y			0	T1	T1	T1	T1	-
0.680	b	3.6				0	-	-	-	-	-
0.560	b	3.01				0	-	-	-	-	-
0.550	b	8.39				0	-	-	T1	-	-
0.480	b	4.63				0	-	-	-	-	-
0.440	b	2.57				0	-	-	-	-	-
0.510	b	2.99				0	-	-	-	-	-
0.490	b	4.66				0	-	-	-	-	-
0.570	b	9.45				0	-	-	T1	-	-
0.440	b	12.4				0	-	-	T1	-	-
0.440	b	39.6	Y			0	T1	T1	T1	T1	-
0.430	b	5.57				0	-	-	-	-	-
0.450	b	8.28				0	-	-	T1	-	-
0.660	b	6.74				0	-	-	-	-	-
0.510	b	21.7	Y			0	T1	-	T1	-	-
0.530	b	6.17				0	-	-	-	-	-
0.570	b	35.1	Y			0	T1	-	T1	T1	-
0.530	b	0.367				0	-	-	-	-	-
0.440	b	0.772				0	-	-	-	-	-
0.430	b	3				0	-	-	-	-	-
0.580	b	2.64				0	-	-	-	-	-
0.570	b	1.22				0	-	-	-	-	-
0.680	b	0.518				0	-	-	-	-	-
0.450	b	1.59				0	-	-	-	-	-
0.490	b	0.921				0	-	-	-	-	-
0.440	b	1.5				0	-	-	-	-	-
0.730	b	1.14				0	-	-	-	-	-
0.430	b	1.49				0	-	-	-	-	-
0.750	b	1.33				0	-	-	-	-	-
0.460	b	1.53				0	-	-	-	-	-
0.510	b	1.89				0	-	-	-	-	-
0.650	b	1.99				0	-	-	-	-	-
0.430	b	3.28				0	-	-	-	-	-
0.570	b	1.78				0	-	-	-	-	-
0.800	b	2.01				0	-	-	-	-	-
0.550	b	1.61				0	-	-	-	-	-
0.480	b	2.64				0	-	-	-	-	-
0.490	b	1.12				0	-	-	-	-	-
0.490	b	2.27				0	-	-	-	-	-
0.420	b	5.24				0	-	-	-	-	-
0.600	b	4.84				0	-	-	-	-	-
0.620	b	12.2				0	-	-	T1	-	-
0.460	b	7.83				0	-	-	-	-	-
0.560	b	5.49				0	-	-	-	-	-
0.440	b	0.203				0	-	-	-	-	-
0.510	b	3.81				0	-	-	-	-	-
0.70	b	1.3				0	-	-	-	-	-
0.234	b	0.68				0	-	-	-	-	-
0.230	b	0.16				0	-	-	-	-	-
0.58	b	0.372				0	-	-	-	-	-
0.62	b	0.456				0	-	-	-	-	-
0.592	b	8.75				0	-	-	T1	-	-
0.556	b	3.27				0	-	-	-	-	-
0.65	b	1.34				0	-	-	-	-	-
0.410	b	11.3				0	-	-	T1	-	-
0.370	b	17.3				0	-	-	T1	-	-
0.410	b	3.5				0	-	-	-	-	-
0.370	b	4.33				0	-	-	-	-	-
0.400	b	6.23				0	-	-	-	-	-
0.390	b	3.41				0	-	-	-	-	-
0.410	b	3.14				0	-	-	-	-	-
0.390	b	23.8	Y			0	T1	-	T1	T1	-
0.370	b	6.32				0	-	-	-	-	-
0.390	b	7.57				0	-	-	-	-	-
0.390	b	1.74				0	-	-	-	-	-
0.380	b	4.26				0	-	-	-	-	-
0.430	b	0.397				0	-	-	-	-	-
0.410	b	1.85				0	-	-	-	-	-
0.410	b	6.72				0	-	-	-	-	-
0.390	b	1.71				0	-	-	-	-	-
0.380	b	1.39				0	-	-	-	-	-
0.410	b	12.7				0	-	-	T1	-	-
0.410	b	13.2				0	-	-	T1	-	-
0.360	b	0.089				0	-	-	-	-	-
0.390	b	16.3				0	-	-	T1	-	-
0.400	b	29.2	Y			0	T1	-	T1	T1	-
0.400	b	1.230				0	-	-	-	-	-
0.282	b	0.0952				0	-	-	-	-	-
0.29	b	0.243				0	-	-	-	-	-

APPENDIX H - Amphipod Tox - Mercury

Survivor's Average Weight	b	Mercury		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.34	b	0.245		0	-	-	-	-	-
0.302	b	0.0396		0	-	-	-	-	-
0.326	b	4.43		0	-	-	-	-	-
0.334	b	8.79		0	-	-	T1	-	-
0.60	🟥	0.24		1	T2	T2	T2	T2	T2
0.42	🟥	11		1	T2	T2	-	T2	T2
0.51	🟥	48	Y	1	-	-	-	-	T2
0.43	🟥	14		1	T2	T2	-	T2	T2
0.47	🟥	0.025		1	T2	T2	T2	T2	T2
0.61	🟥	0.55		1	T2	T2	T2	T2	T2
0.46	🟥	62	Y	1	-	-	-	-	T2
0.46	🟥	46	Y	1	-	-	-	-	T2
0.63	🟥	0.038		1	T2	T2	T2	T2	T2
0.17	🟥	2.8		1	T2	T2	T2	T2	T2
0.10	🟥	0.62		1	T2	T2	T2	T2	T2
0.11	🟥	10		1	T2	T2	-	T2	T2
0.08	🟥	80	Y	1	-	-	-	-	T2
0.02	🟥	4.1		1	T2	T2	T2	T2	T2
0.17	🟥	0.56		1	T2	T2	T2	T2	T2
0.09	🟥	6.8		1	T2	T2	T2	T2	T2
0.15	🟥	22	Y	1	-	T2	-	-	T2
0.178	🟥	0.01		1	T2	T2	T2	T2	T2
0	🟥	0.2		1	T2	T2	T2	T2	T2
0.272	🟥	0.0921		1	T2	T2	T2	T2	T2
0	🟥	1.05		1	T2	T2	T2	T2	T2
0	🟥	80.4	Y	1	-	-	-	-	T2
0	🟥	2.11		1	T2	T2	T2	T2	T2
0.14	🟥	1.87		1	T2	T2	T2	T2	T2
0.26	🟥	1.99		1	T2	T2	T2	T2	T2
0.25	🟥	1.9		1	T2	T2	T2	T2	T2
0	🟥	1.01		1	T2	T2	T2	T2	T2
0.1	🟥	0.686		1	T2	T2	T2	T2	T2
0	🟥	2.17		1	T2	T2	T2	T2	T2
0	🟥	0.76		1	T2	T2	T2	T2	T2
0.208	🟥	1.16		1	T2	T2	T2	T2	T2
0.358	🟥	0.276		1	T2	T2	T2	T2	T2
0.488	🟥	0.395		1	T2	T2	T2	T2	T2
0.378	🟥	0.186		1	T2	T2	T2	T2	T2
0.382	🟥	0.673		1	T2	T2	T2	T2	T2
0.426	🟥	1.09		1	T2	T2	T2	T2	T2
0.34	🟥	0.566		1	T2	T2	T2	T2	T2
0.322	🟥	0.0129		1	T2	T2	T2	T2	T2
0.534	🟥	1.22		1	T2	T2	T2	T2	T2
0.322	🟥	1.07		1	T2	T2	T2	T2	T2
0.1	🟥	1.07		1	T2	T2	T2	T2	T2
0.43	🟥	3.57		1	T2	T2	T2	T2	T2
0.426	🟥	4.54		1	T2	T2	T2	T2	T2
0.352	🟥	2.03		1	T2	T2	T2	T2	T2
0.318	🟥	0.0561		1	T2	T2	T2	T2	T2
0.458	🟥	1.82		1	T2	T2	T2	T2	T2
0.402	🟥	0.0742		1	T2	T2	T2	T2	T2
0.310	🟥	20.6	Y	1	T2	T2	-	T2	T2
0	🟥	25.6	Y	1	-	T2	-	-	T2
0.250	🟥	1.46		1	T2	T2	T2	T2	T2
0.330	🟥	0.0437		1	T2	T2	T2	T2	T2
0	🟥	0.767		1	T2	T2	T2	T2	T2
0.320	🟥	0.794		1	T2	T2	T2	T2	T2
0.340	🟥	4.64		1	T2	T2	T2	T2	T2
0.350	🟥	4.68		1	T2	T2	T2	T2	T2
0.290	🟥	74	Y	1	-	-	-	-	T2
0.200	🟥	6.39		1	T2	T2	T2	T2	T2
0.180	🟥	4.48		1	T2	T2	T2	T2	T2
0.290	🟥	10.7		1	T2	T2	-	T2	T2
0	🟥	5.3		1	T2	T2	T2	T2	T2
0	🟥	4.06		1	T2	T2	T2	T2	T2
0.350	🟥	8.72		1	T2	T2	-	T2	T2
0.350	🟥	30.1	Y	1	-	T2	-	-	T2
0.330	🟥	50.2	Y	1	-	-	-	-	T2
0.350	🟥	2.44		1	T2	T2	T2	T2	T2
0.150	🟥	4.49		1	T2	T2	T2	T2	T2
0.200	🟥	27.6	Y	1	-	T2	-	-	T2
0	🟥	5.62		1	T2	T2	T2	T2	T2
0.330	🟥	2.53		1	T2	T2	T2	T2	T2
0	🟥	75.7	Y	1	-	-	-	-	T2
0.300	🟥	61.4	Y	1	-	-	-	-	T2
0.190	🟥	12.7		1	T2	T2	-	T2	T2
0.340	🟥	1.29		1	T2	T2	T2	T2	T2
0.310	🟥	28.2	Y	1	-	T2	-	-	T2
0.340	🟥	12.6		1	T2	T2	-	T2	T2
0.300	🟥	8.97		1	T2	T2	-	T2	T2
0.270	🟥	17.8	Y	1	T2	T2	-	T2	T2
0.240	🟥	10.2		1	T2	T2	-	T2	T2
0.270	🟥	22.1	Y	1	-	T2	-	-	T2
0.330	🟥	1.47		1	T2	T2	T2	T2	T2
0.330	🟥	5.79		1	T2	T2	T2	T2	T2
0.190	🟥	11.4		1	T2	T2	-	T2	T2
0.200	🟥	7.95		1	T2	T2	T2	T2	T2
0.310	🟥	5.3		1	T2	T2	T2	T2	T2
0.330	🟥	5.34		1	T2	T2	T2	T2	T2
0.250	🟥	2.78		1	T2	T2	T2	T2	T2
0.300	🟥	8.94		1	T2	T2	-	T2	T2
0.340	🟥	13.4		1	T2	T2	-	T2	T2
0.300	🟥	1.24		1	T2	T2	T2	T2	T2
0	🟥	29	Y	1	-	T2	-	-	T2
0	🟥	0.196		1	T2	T2	T2	T2	T2
0.330	🟥	2.14		1	T2	T2	T2	T2	T2
0.330	🟥	3.61		1	T2	T2	T2	T2	T2
0.310	🟥	2.76		1	T2	T2	T2	T2	T2
0.350	🟥	2.08		1	T2	T2	T2	T2	T2
0.310	🟥	1.48		1	T2	T2	T2	T2	T2
0.000	🟥	3.99		1	T2	T2	T2	T2	T2
0.350	🟥	1.75		1	T2	T2	T2	T2	T2
0.280	🟥	12.2		1	T2	T2	-	T2	T2
0.130	🟥	1.67		1	T2	T2	T2	T2	T2
0.300	🟥	0.501		1	T2	T2	T2	T2	T2
0.150	🟥	3.77		1	T2	T2	T2	T2	T2
0.350	🟥	14.7		1	T2	T2	-	T2	T2
0.350	🟥	0.35		1	T2	T2	T2	T2	T2
0.200	🟥	0.882		1	T2	T2	T2	T2	T2
0.240	🟥	2.1		1	T2	T2	T2	T2	T2
0.330	🟥	0.954		1	T2	T2	T2	T2	T2
0.200	🟥	1.02		1	T2	T2	T2	T2	T2
0.290	🟥	1.29		1	T2	T2	T2	T2	T2
				109	10	6	31	9	0
				240	93	100	77	93	109
					103	106	108	102	109

APPENDIX H - Amphipod Tox - Aroclor 1268

Reproductive Response	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
5.31	b	0.06		2x mean NOEC	16.4	0	-	-	-	-	-
3.23	b	0.032		Median NOEC	2.1	0	-	-	-	-	-
2.87	b	0.72				0	-	-	-	-	-
3.01	b	0.67		ER-L	19	0	-	-	-	-	-
2.85	b	41	Y	ER-M	35	0	T1	T1	T1	T1	-
0.86	b	1		15th Percentile E	20	0	-	-	-	-	-
0.656	b	1.2		TEL	6.5	0	-	-	-	-	-
1.18	b	0.059		85th Percentile NE	17	0	-	-	-	-	-
0.508	b	1.4		PEL	25	0	-	-	-	-	-
0.61	b	31	Y	AET	44	0	T1	-	T1	T1	-
0.906	b	2				0	-	-	-	-	-
0.464	b	11			72	0	-	-	T1	-	-
2.58	b	17	Y	Effects Data N	66	0	-	-	T1	-	-
2.06	b	19	Y			0	-	-	T1	-	-
1.88	b	28	Y	**Effects Data Set**		0	T1	-	T1	T1	-
1.56	b	0.27		19		0	-	-	-	-	-
1.625	b	11		19		0	-	-	T1	-	-
3.64	b	1.4		430		0	-	-	-	-	-
1.733	b	5.2		64		0	-	-	-	-	-
1.682	b	2.1		92		0	-	-	-	-	-
1.571	b	6.9		20		0	-	-	T1	-	-
2.833	b	4.5		69		0	-	-	-	-	-
2.25	b	1.7		82		0	-	-	-	-	-
1.91	b	1		36		0	-	-	-	-	-
2.27	b	4.1		25		0	-	-	-	-	-
2.17	b	13		90		0	-	-	T1	-	-
1.625	b	11		120		0	-	-	T1	-	-
1.94	b	0.0305		17		0	-	-	-	-	-
1.59	b	0.97		20		0	-	-	-	-	-
1.61	b	3.6		110		0	-	-	-	-	-
1.45	b	2.8		17		0	-	-	-	-	-
1.38	b	44	Y	30		0	T1	T1	T1	T1	-
1.42	b	2.1		110		0	-	-	-	-	-
0.47	🟥	2.8		36		1	T2	T2	T2	T2	T2
0.29	🟥	1.9		330		1	T2	T2	T2	T2	T2
0.07	🟥	19	Y	120		1	-	T2	-	T2	T2
0	🟥	19	Y	30		1	-	T2	-	T2	T2
0	🟥	430	Y	39		1	-	-	-	-	-
0.1	🟥	0.19		44		1	T2	T2	T2	T2	T2
0	🟥	1.2		28		1	T2	T2	T2	T2	T2
0.01	🟥	64	Y	240		1	-	-	-	-	-
0	🟥	92	Y	38		1	-	-	-	-	-
0.025	🟥	0.025		43		1	T2	T2	T2	T2	T2
0.079	🟥	2.1		26		1	T2	T2	T2	T2	T2
0	🟥	0.26		380		1	T2	T2	T2	T2	T2
0.47	🟥	12		420		1	T2	T2	-	T2	T2
0.55	🟥	12		150		1	T2	T2	-	T2	T2
0.21	🟥	10		59		1	T2	T2	-	T2	T2
0.21	🟥	1.3		26		1	T2	T2	T2	T2	T2
0.12	🟥	0.96		20		1	T2	T2	T2	T2	T2
0	🟥	20	Y	32		1	-	T2	-	T2	T2
0.74	🟥	0.88		29		1	T2	T2	T2	T2	T2
0.15	🟥	0.18		26		1	T2	T2	T2	T2	T2
0.85	🟥	0.012		19		1	T2	T2	T2	T2	T2
0.77	🟥	0.015		30		1	T2	T2	T2	T2	T2
0.6	🟥	4.2		33		1	T2	T2	T2	T2	T2
0.26	🟥	3.7		360		1	T2	T2	T2	T2	T2
0	🟥	3.6		18		1	T2	T2	T2	T2	T2
0	🟥	2.2		110		1	T2	T2	T2	T2	T2
0.95	🟥	69	Y	28		1	-	-	-	-	-
0	🟥	82	Y	570		1	-	-	-	-	-
0	🟥	6.8		18		1	T2	T2	-	T2	T2
0.39	🟥	16		68		1	T2	T2	-	T2	T2
0.67	🟥	36	Y	34		1	-	-	-	-	T2
0.23	🟥	0.013		20		1	T2	T2	T2	T2	T2
0	🟥	3.9		32		1	T2	T2	T2	T2	T2
0	🟥	0.61		23		1	T2	T2	T2	T2	T2
0	🟥	0.56		150		1	T2	T2	T2	T2	T2
0	🟥	0.044		76		1	T2	T2	T2	T2	T2
0.38	🟥	0.39		21		1	T2	T2	T2	T2	T2
0	🟥	8.2		37		1	T2	T2	-	T2	T2
0	🟥	0.94		20		1	T2	T2	T2	T2	T2
0	🟥	0.21		19		1	T2	T2	T2	T2	T2
0	🟥	0.82		18		1	T2	T2	T2	T2	T2
0	🟥	1.3		55		1	T2	T2	T2	T2	T2
0	🟥	2.3		140		1	T2	T2	T2	T2	T2
0	🟥	0.52		280		1	T2	T2	T2	T2	T2
0.32	🟥	7		54		1	T2	T2	-	T2	T2
0	🟥	12		21		1	T2	T2	-	T2	T2
0.54	🟥	5.8		20		1	T2	T2	T2	T2	T2
0.082	🟥	0.19		25		1	T2	T2	T2	T2	T2
0.292	🟥	0.21				1	T2	T2	T2	T2	T2
0.358	🟥	0.34				1	T2	T2	T2	T2	T2
0.142	🟥	0.98				1	T2	T2	T2	T2	T2
0	🟥	0.79				1	T2	T2	T2	T2	T2
0.126	🟥	25	Y			1	-	T2	-	-	T2
0.356	🟥	13				1	T2	T2	-	T2	T2
0.364	🟥	0.00125				1	T2	T2	T2	T2	T2
0.36	🟥	0.64				1	T2	T2	T2	T2	T2
0.072	🟥	0.92				1	T2	T2	T2	T2	T2
0	🟥	0.85				1	T2	T2	T2	T2	T2
0.032	🟥	5.8				1	T2	T2	T2	T2	T2
0.074	🟥	3.1				1	T2	T2	T2	T2	T2
0.144	🟥	0.069				1	T2	T2	T2	T2	T2
0.154	🟥	4.1				1	T2	T2	T2	T2	T2
0.112	🟥	4.6				1	T2	T2	T2	T2	T2
0.05	🟥	0.026				1	T2	T2	T2	T2	T2
0	🟥	90	Y			1	-	-	-	-	-
0	🟥	120	Y			1	-	-	-	-	-
0	🟥	1.9				1	T2	T2	T2	T2	T2
0	🟥	0.0074				1	T2	T2	T2	T2	T2
0.269	🟥	3.7				1	T2	T2	T2	T2	T2
0	🟥	17	Y			1	T2	T2	-	T2	T2
0	🟥	12				1	T2	T2	-	T2	T2
0	🟥	12				1	T2	T2	-	T2	T2
0	🟥	15				1	T2	T2	-	T2	T2
0	🟥	20	Y			1	-	T2	-	T2	T2
0	🟥	110	Y			1	-	-	-	-	-
0	🟥	16				1	T2	T2	-	T2	T2
0.389	🟥	11				1	T2	T2	-	T2	T2
0	🟥	16				1	T2	T2	-	T2	T2
0	🟥	17	Y			1	T2	T2	-	T2	T2
0	🟥	130	Y			1	-	-	-	-	-
0.35	🟥	15				1	T2	T2	-	T2	T2
0	🟥	110	Y			1	-	-	-	-	-
0	🟥	14				1	T2	T2	-	T2	T2
0	🟥	12				1	T2	T2	-	T2	T2
0	🟥	13				1	T2	T2	-	T2	T2
0	🟥	11				1	T2	T2	-	T2	T2
0.125	🟥	36	Y			1	-	-	-	-	T2
0.727	🟥	330	Y			1	-	-	-	-	-
0	🟥	120	Y			1	-	-	-	-	-
0.0769	🟥	11				1	T2	T2	-	T2	T2
0	🟥	30	Y			1	-	T2	-	-	T2
0.45	🟥	39	Y			1	-	-	-	-	T2
0	🟥	44	Y			1	-	-	-	-	-
0	🟥	15				1	T2	T2	-	T2	T2

Average Survival Rate	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
87	b	1.2		2x mean NOEC	14.1	0	-	-	-	-	-
87	b	31	Y	Median NOEC	2.3	0	T1	-	T1	T1	-
91	b	13				0	-	-	T1	-	-
88	b	0.00125		ER-L	16	0	-	-	-	-	-
87	b	0.64		ER-M	32	0	-	-	-	-	-
87	b	2		15th Percentile E	17	0	-	-	-	-	-
88	b	11		TEL	6.2	0	-	-	T1	-	-
100	b	17	Y	85th Percentile NE	12.9	0	T1	-	T1	-	-
90	b	19	Y	PEL	20.3	0	T1	-	T1	-	-
90	b	28	Y	AET	64	0	T1	-	T1	T1	-
100	b	43	Y			0	T1	T1	T1	T1	-
90	b	0.27			85	0	-	-	-	-	-
95	b	20	Y	Effects Data N	78	0	T1	-	T1	-	-
100	b	1.5				0	-	-	-	-	-
100	b	11		**Effects Data Set**		0	-	-	T1	-	-
100	b	0.62		19		0	-	-	-	-	-
90	b	1.4		19		0	-	-	-	-	-
100	b	0.75		430		0	-	-	-	-	-
90	b	5.2		64		0	-	-	-	-	-
100	b	2.1		92		0	-	-	-	-	-
95	b	6.9		24		0	-	-	T1	-	-
100	b	3.8		19		0	-	-	-	-	-
100	b	4.5		24		0	-	-	-	-	-
90	b	3.1		20		0	-	-	-	-	-
95	b	3.5		41		0	-	-	-	-	-
100	b	2.4		69		0	-	-	-	-	-
100	b	1		82		0	-	-	-	-	-
90	b	0.33		16		0	-	-	-	-	-
100	b	4.1		36		0	-	-	-	-	-
90	b	4.2		25		0	-	-	-	-	-
95	b	11		90		0	-	-	T1	-	-
77	b	2.8		120		0	-	-	-	-	-
71	b	1.9		17		0	-	-	-	-	-
80	b	64	Y	15		0	T1	T1	T1	T1	-
80	b	0.025		20		0	-	-	-	-	-
76	b	0.1		110		0	-	-	-	-	-
76	b	3.6		16		0	-	-	-	-	-
72	b	0.18		11		0	-	-	-	-	-
80	b	0.19		16		0	-	-	-	-	-
80	b	0.21		17		0	-	-	-	-	-
82	b	0.34		130		0	-	-	-	-	-
79	b	1		15		0	-	-	-	-	-
84	b	0.98		44		0	-	-	-	-	-
84	b	1.4		110		0	-	-	-	-	-
85	b	5.8		36		0	-	-	-	-	-
81	b	0.069		330		0	-	-	-	-	-
69	b	0.1		120		0	-	-	-	-	-
78	b	3.1		30		0	-	-	-	-	-
54	🟥	19	Y	39		1	-	T2	-	T2	T2
48	🟥	19	Y	44		1	-	T2	-	T2	T2
56	🟥	430	Y	15		1	-	-	-	-	-
53	🟥	0.19		28		1	T2	T2	T2	T2	T2
63	🟥	1.2		240		1	T2	T2	T2	T2	T2
68	🟥	92	Y	38		1	-	-	-	-	-
61	🟥	0.79		26		1	T2	T2	T2	T2	T2
50	🟥	0.7		380		1	T2	T2	T2	T2	T2
37	🟥	24	Y	420		1	-	T2	-	-	T2
35	🟥	19	Y	150		1	-	T2	-	T2	T2
1	🟥	3.7		59		1	T2	T2	T2	T2	T2
62	🟥	0.87		26		1	T2	T2	T2	T2	T2
30	🟥	2.2		20		1	T2	T2	T2	T2	T2
54	🟥	24	Y	15		1	-	T2	-	-	T2
42	🟥	0.0305		32		1	T2	T2	T2	T2	T2
40	🟥	0.06		39		1	T2	T2	T2	T2	T2
15	🟥	2.1		26		1	T2	T2	T2	T2	T2
42	🟥	0.032		19		1	T2	T2	T2	T2	T2
25	🟥	0.97		30		1	T2	T2	T2	T2	T2
0	🟥	0.26		33		1	T2	T2	T2	T2	T2
63	🟥	12		15		1	T2	T2	-	T2	T2
24	🟥	12		360		1	T2	T2	-	T2	T2
15	🟥	10		110		1	T2	T2	-	T2	T2
33	🟥	1.3		28		1	T2	T2	T2	T2	T2
17	🟥	0.72		570		1	T2	T2	T2	T2	T2
66	🟥	0.67		68		1	T2	T2	T2	T2	T2
3	🟥	2.8		34		1	T2	T2	T2	T2	T2
23	🟥	0.96		32		1	T2	T2	T2	T2	T2
15	🟥	20	Y	23		1	-	T2	-	T2	T2
58	🟥	0.88		16		1	T2	T2	T2	T2	T2
37	🟥	41	Y	150		1	-	-	-	-	T2
36	🟥	0.012		76		1	T2	T2	T2	T2	T2
34	🟥	0.015		21		1	T2	T2	T2	T2	T2
62	🟥	4.2		37		1	T2	T2	T2	T2	T2
65	🟥	3.7		20		1	T2	T2	T2	T2	T2
0	🟥	2.2		19		1	T2	T2	T2	T2	T2
7	🟥	3.6		55		1	T2	T2	T2	T2	T2
42	🟥	69	Y	140		1	-	-	-	-	-
0	🟥	82	Y	280		1	-	-	-	-	-
0	🟥	6.8		54		1	T2	T2	-	T2	T2
45	🟥	16	Y	21		1	-	T2	-	T2	T2
29	🟥	36	Y	20		1	-	-	-	-	T2
32	🟥	0.013		25		1	T2	T2	T2	T2	T2
3	🟥	3.9		18		1	T2	T2	T2	T2	T2
12	🟥	0.61		15		1	T2	T2	T2	T2	T2
14	🟥	0.56				1	T2	T2	T2	T2	T2
4	🟥	0.044				1	T2	T2	T2	T2	T2
36	🟥	0.39				1	T2	T2	T2	T2	T2
23	🟥	8.2				1	T2	T2	-	T2	T2
0	🟥	0.94				1	T2	T2	T2	T2	T2
19	🟥	0.21				1	T2	T2	T2	T2	T2
16	🟥	0.82				1	T2	T2	T2	T2	T2
2	🟥	1.3				1	T2	T2	T2	T2	T2
0	🟥	2.3				1	T2	T2	T2	T2	T2
0	🟥	0.52				1	T2	T2	T2	T2	T2
26	🟥	7				1	T2	T2	-	T2	T2
6	🟥	12				1	T2	T2	-	T2	T2
39	🟥	5.8				1	T2	T2	T2	T2	T2
70	🟥	0.059				1	T2	T2	T2	T2	T2
60	🟥	0.79				1	T2	T2	T2	T2	T2
67	🟥	25	Y			1	-	T2	-	-	T2
41	🟥	0.92				1	T2	T2	T2	T2	T2
1	🟥	0.85				1	T2	T2	T2	T2	T2
66	🟥	4.1				1	T2	T2	T2	T2	T2
74	🟥	4.6				1	T2	T2	T2	T2	T2
72	🟥	0.026				1	T2	T2	T2	T2	T2
55	🟥	90	Y			1	-	-	-	-	-
0	🟥	120	Y			1	-	-	-	-	-
20	🟥	1.9				1	T2	T2	T2	T2	T2
70	🟥	0.0074				1	T2	T2	T2	T2	T2
75	🟥	3.7				1	T2	T2	T2	T2	T2
80	🟥	17	Y			1	-	T2	-	T2	T2
70	🟥	12				1	T2	T2	-	T2	T2
0	🟥	12				1	T2	T2	-	T2	T2
50	🟥	15	Y			1	T2	T2	-	T2	T2
75	🟥	20	Y			1	-	T2	-	T2	T2
75	🟥	110	Y			1	-	-	-	-	-
50	🟥	16	Y			1	-	T2	-	T2	T2
80	🟥	11				1	T2	T2	-	T2	T2

APPENDIX H - Amphipod Tox - Aroclor 1268

Reproductive Response	b	Aroclor 1268		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0		28	Y	1	-	T2	-	-	T2
0		240	Y	1	-	-	-	-	-
0		38	Y	1	-	-	-	-	T2
0		9.5		1	T2	T2	-	T2	T2
1.0		43	Y	1	-	-	-	-	T2
0		0.15		1	T2	T2	T2	T2	T2
0		4		1	T2	T2	T2	T2	T2
0		26	Y	1	-	T2	-	-	T2
0		2.9		1	T2	T2	T2	T2	T2
0		380	Y	1	-	-	-	-	-
0.2308		1.7		1	T2	T2	T2	T2	T2
0		420	Y	1	-	-	-	-	-
0		150	Y	1	-	-	-	-	-
0		59	Y	1	-	-	-	-	-
0		26	Y	1	-	T2	-	-	T2
0.269		20	Y	1	-	T2	-	T2	T2
0.167		4.1		1	T2	T2	T2	T2	T2
0		15		1	T2	T2	-	T2	T2
0		13		1	T2	T2	-	T2	T2
0		32	Y	1	-	T2	-	-	T2
0		39	Y	1	-	-	-	-	T2
0		26	Y	1	-	T2	-	-	T2
0.9		19	Y	1	-	T2	-	T2	T2
0.375		14		1	T2	T2	-	T2	T2
0		30	Y	1	-	T2	-	-	T2
0		33	Y	1	-	T2	-	-	T2
0		15		1	T2	T2	-	T2	T2
0		360	Y	1	-	-	-	-	-
0.375		18	Y	1	T2	T2	-	T2	T2
0.611		110	Y	1	-	-	-	-	-
0		28	Y	1	-	T2	-	-	T2
0		570	Y	1	-	-	-	-	-
0		18	Y	1	T2	T2	-	T2	T2
0		68	Y	1	-	-	-	-	-
0.167		34	Y	1	-	T2	-	-	T2
0.654		20	Y	1	-	T2	-	T2	T2
0		4.8		1	T2	T2	T2	T2	T2
0		8.2		1	T2	T2	-	T2	T2
0		32	Y	1	-	T2	-	-	T2
0		23	Y	1	-	T2	-	T2	T2
0.6		16		1	T2	T2	-	T2	T2
0		12		1	T2	T2	-	T2	T2
0		10		1	T2	T2	-	T2	T2
0		150	Y	1	-	-	-	-	-
0		76	Y	1	-	-	-	-	-
0.15		21	Y	1	-	T2	-	T2	T2
0.688		37	Y	1	-	-	-	-	T2
0		20	Y	1	-	T2	-	T2	T2
0		19	Y	1	-	T2	-	T2	T2
0		9.2		1	T2	T2	-	T2	T2
0		18	Y	1	T2	T2	-	T2	T2
0		8.1		1	T2	T2	-	T2	T2
0		55	Y	1	-	-	-	-	-
0		140	Y	1	-	-	-	-	-
0		280	Y	1	-	-	-	-	-
0		54	Y	1	-	-	-	-	-
0		1		1	T2	T2	T2	T2	T2
0.25		1.5		1	T2	T2	T2	T2	T2
0		8.3		1	T2	T2	-	T2	T2
0.909		1.5		1	T2	T2	T2	T2	T2
0		1.8		1	T2	T2	T2	T2	T2
0		21	Y	1	-	T2	-	T2	T2
0.8		11		1	T2	T2	-	T2	T2
1.04		11		1	T2	T2	-	T2	T2
0.833		0.62		1	T2	T2	T2	T2	T2
0.938		0.75		1	T2	T2	T2	T2	T2
0.5		2.4		1	T2	T2	T2	T2	T2
0		2.2		1	T2	T2	T2	T2	T2
0.2		2.5		1	T2	T2	T2	T2	T2
0		20	Y	1	-	T2	-	T2	T2
0		25	Y	1	-	T2	-	-	T2
0.083		1.8		1	T2	T2	T2	T2	T2
0.556		0.63		1	T2	T2	T2	T2	T2
1.111		2.4		1	T2	T2	T2	T2	T2
0.571		4.8		1	T2	T2	T2	T2	T2
0.792		3.8		1	T2	T2	T2	T2	T2
0.643		3.1		1	T2	T2	T2	T2	T2
0		2.1		1	T2	T2	T2	T2	T2
0.708		3.5		1	T2	T2	T2	T2	T2
0.5		2		1	T2	T2	T2	T2	T2
0.818		0.78		1	T2	T2	T2	T2	T2
0		4.3		1	T2	T2	T2	T2	T2
0.778		2.4		1	T2	T2	T2	T2	T2
0		1.7		1	T2	T2	T2	T2	T2
0		0.76		1	T2	T2	T2	T2	T2
0.5		4.9		1	T2	T2	T2	T2	T2
0.017		2.4		1	T2	T2	T2	T2	T2
0		0.35		1	T2	T2	T2	T2	T2
0		0.33		1	T2	T2	T2	T2	T2
0		2.5		1	T2	T2	T2	T2	T2
0		2.5		1	T2	T2	T2	T2	T2
0		5.5		1	T2	T2	T2	T2	T2
0		0.16		1	T2	T2	T2	T2	T2
0		2.2		1	T2	T2	T2	T2	T2
0		0.0079		1	T2	T2	T2	T2	T2
0		0.023		1	T2	T2	T2	T2	T2
0		4.3		1	T2	T2	T2	T2	T2
0.962		1		1	T2	T2	T2	T2	T2
0		15		1	T2	T2	-	T2	T2
0		1.9		1	T2	T2	T2	T2	T2
0		1.8		1	T2	T2	T2	T2	T2
0		7		1	T2	T2	-	T2	T2
0		1.7		1	T2	T2	T2	T2	T2
				197	4	2	11	4	0
				230	116	142	75	129	149
					120	144	86	133	149

Average Survival Rate	b	Aroclor 1268		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
25		16	Y	1	-	T2	-	T2	T2
30		17	Y	1	-	T2	-	T2	T2
55		130	Y	1	-	-	-	-	-
85		15	Y	1	T2	T2	-	T2	T2
80		44	Y	1	-	-	-	-	T2
85		110	Y	1	-	-	-	-	-
85		14		1	T2	T2	-	T2	T2
0		12		1	T2	T2	-	T2	T2
0		13		1	T2	T2	-	T2	T2
50		11		1	T2	T2	-	T2	T2
75		36	Y	1	-	-	-	-	T2
85		330	Y	1	-	-	-	-	-
55		120	Y	1	-	-	-	-	-
70		11		1	T2	T2	-	T2	T2
80		30	Y	1	-	T2	-	-	T2
60		39	Y	1	-	-	-	-	T2
80		44	Y	1	-	-	-	-	T2
40		15	Y	1	T2	T2	-	T2	T2
75		28	Y	1	-	T2	-	-	T2
50		240	Y	1	-	-	-	-	-
20		38	Y	1	-	-	-	-	T2
10		9.5		1	T2	T2	-	T2	T2
35		0.150		1	T2	T2	T2	T2	T2
10		4		1	T2	T2	T2	T2	T2
10		26	Y	1	-	T2	-	-	T2
0		2.9		1	T2	T2	T2	T2	T2
65		380	Y	1	-	-	-	-	-
80		1.7		1	T2	T2	T2	T2	T2
60		420	Y	1	-	-	-	-	-
0		150	Y	1	-	-	-	-	-
75		59	Y	1	-	-	-	-	T2
65		26	Y	1	-	T2	-	-	T2
85		20	Y	1	-	T2	-	T2	T2
75		4.1		1	T2	T2	T2	T2	T2
80		15	Y	1	T2	T2	-	T2	T2
65		13		1	T2	T2	-	T2	T2
80		32	Y	1	-	-	-	-	T2
15		39	Y	1	-	-	-	-	T2
75		26	Y	1	-	T2	-	-	T2
85		19	Y	1	-	T2	-	T2	T2
55		14		1	T2	T2	-	T2	T2
60		30	Y	1	-	T2	-	-	T2
50		33	Y	1	-	-	-	-	T2
80		15	Y	1	T2	T2	-	T2	T2
55		360	Y	1	-	-	-	-	-
80		18	Y	1	-	T2	-	T2	T2
80		110	Y	1	-	-	-	-	-
35		28	Y	1	-	T2	-	-	T2
15		570	Y	1	-	-	-	-	-
65		18	Y	1	-	T2	-	T2	T2
55		68	Y	1	-	-	-	-	-
75		34	Y	1	-	-	-	-	T2
50		4.8		1	T2	T2	T2	T2	T2
65		8.2		1	T2	T2	-	T2	T2
70		32	Y	1	-	-	-	-	T2
55		23	Y	1	-	T2	-	-	T2
75		16	Y	1	-	T2	-	T2	T2
45		12		1	T2	T2	-	T2	T2
5		10		1	T2	T2	-	T2	T2
85		11		1	T2	T2	-	T2	T2
25		150	Y	1	-	-	-	-	-
65		76	Y	1	-	-	-	-	-
70		21	Y	1	-	T2	-	-	T2
75		37	Y	1	-	-	-	-	T2
65		20	Y	1	-	T2	-	T2	T2
5		19	Y	1	-	T2	-	T2	T2
35		9.2		1	T2	T2	-	T2	T2
60		18	Y	1	-	T2	-	T2	T2
5		8.1		1	T2	T2	-	T2	T2
15		55	Y	1	-	-	-	-	T2
50		140	Y	1	-	-	-	-	-
55		280	Y	1	-	-	-	-	-
0		54	Y	1	-	-	-	-	T2
0		1		1	T2	T2	T2	T2	T2
75		1.5		1	T2	T2	T2	T2	T2
15		8.3		1	T2	T2	-	T2	T2
35		1.8		1	T2	T2	T2	T2	T2
35		21	Y	1	-	T2	-	-	T2
80		11		1	T2	T2	-	T2	T2
70		2.4		1	T2	T2	T2	T2	T2
85		2.2		1	T2	T2	T2	T2	T2
80		2.5		1	T2	T2	T2	T2	T2
75		20	Y	1	-	T2	-	T2	T2
65		25	Y	1	-	T2	-	-	T2
80		1.8		1	T2	T2	T2	T2	T2
65		0.63		1	T2	T2	T2	T2	T2
85		2.4		1	T2	T2	T2	T2	T2
80		4.8		1	T2	T2	T2	T2	T2
75		1.7		1	T2	T2	T2	T2	T2
75		2.1		1	T2	T2	T2	T2	T2
85		2		1	T2	T2	T2	T2	T2
85		0.78		1	T2	T2	T2	T2	T2
0		4.3		1	T2	T2	T2	T2	T2
30		1.7		1	T2	T2	T2	T2	T2
25		0.76		1	T2	T2	T2	T2	T2
85		4.9		1	T2	T2	T2	T2	T2
80		2.4		1	T2	T2	T2	T2	T2
75		0.35		1	T2	T2	T2	T2	T2
30		2.5		1	T2	T2	T2	T2	T2
50		2.5		1	T2	T2	T2	T2	T2
10		5.5		1	T2	T2	T2	T2	T2
85		13		1	T2	T2	-	T2	T2
55		0.16		1	T2	T2	T2	T2	T2
40		2.2		1	T2	T2	T2	T2	T2
45		0.0079		1	T2	T2	T2	T2	T2
5		0.023		1	T2	T2	T2	T2	T2
85		4.3		1	T2	T2	T2	T2	T2
85		1		1	T2	T2	T2	T2	T2
50		15	Y	1	T2	T2	-	T2	T2
80		1.9		1	T2	T2	T2	T2	T2
55		1.8		1	T2	T2	T2	T2	T2
5		7		1	T2	T2	-	T2	T2
60		1.7		1	T2	T2	T2	T2	T2
				192	7	2	12	4	0
				240	120	153	86	139	169
					127	155	98	143	169

Survivor's Average Weight	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.37	b	0.10		2x mean NOEC	52.1	0	-	-	-	-	-
0.35	b	0.10		Median NOEC	5.8	0	-	-	-	-	-
0.350	b	0.03				0	-	-	-	-	-
0.302	b	2.10		ER-L	61	0	-	-	-	-	-
0.362	b	0.03		ER-M	110	0	-	-	-	-	-
0.308	b	0.97		15th Percentile E	65	0	-	-	-	-	-
0.400	b	12.0		TEL	19	0	-	-	-	-	-
0.500	b	12		85th Percentile NE	34	0	-	-	-	-	-
0.286	b	10		PEL	61	0	-	-	-	-	-
0.406	b	1.30		AET	420	0	-	-	-	-	-
0.294	b	3.60				0	-	-	-	-	-
0.398	b	0.72			27	0	-	-	-	-	-
0.316	b	0.670		Effects Data N	15	0	-	-	-	-	-
0.250	b	2.8				0	-	-	-	-	-
0.264	b	0.96		**Effects Data Set**		0	-	-	-	-	-
0.452	b	20		430		0	-	-	T1	-	-
0.384	b	41		64		0	-	-	T1	-	-
0.39	b	4.2		92		0	-	-	-	-	-
0.408	b	3.7		82		0	-	-	-	-	-
0.45	b	3.6		90		0	-	-	-	-	-
0.39	b	69	Y	120		0	T1	-	T1	T1	-
0.532	b	16		110		0	-	-	-	-	-
0.512	b	36		330		0	-	-	T1	-	-
0.528	b	0.210		150		0	-	-	-	-	-
0.438	b	0.820		59		0	-	-	-	-	-
0.55	b	12.0		360		0	-	-	-	-	-
0.756	b	0.1		110		0	-	-	-	-	-
0.712	b	31.0		570		0	-	-	T1	-	-
0.744	b	4.6		76		0	-	-	-	-	-
0.440	b	17.0		54		0	-	-	-	-	-
0.450	b	12.0				0	-	-	-	-	-
0.500	b	16.0				0	-	-	-	-	-
0.610	b	130	Y			0	T1	T1	T1	T1	-
0.440	b	15.0				0	-	-	-	-	-
0.460	b	17.0				0	-	-	-	-	-
0.450	b	11.0				0	-	-	-	-	-
0.350	b	36.0				0	-	-	T1	-	-
0.640	b	120	Y			0	T1	T1	T1	T1	-
0.560	b	30.0				0	-	-	T1	-	-
0.590	b	44.0				0	-	-	T1	-	-
0.610	b	28.0				0	-	-	T1	-	-
0.550	b	19.0				0	-	-	-	-	-
0.690	b	240	Y			0	T1	T1	T1	T1	-
0.480	b	38.0				0	-	-	T1	-	-
0.530	b	28.0				0	-	-	T1	-	-
0.480	b	43.0				0	-	-	T1	-	-
0.690	b	0.15				0	-	-	-	-	-
0.430	b	0.27				0	-	-	-	-	-
0.710	b	380	Y			0	T1	T1	T1	T1	-
0.470	b	420	Y			0	T1	T1	T1	T1	-
0.680	b	13.0				0	-	-	-	-	-
0.560	b	19.0				0	-	-	-	-	-
0.550	b	14.0				0	-	-	-	-	-
0.480	b	30.0				0	-	-	T1	-	-
0.440	b	15.0				0	-	-	-	-	-
0.510	b	18.0				0	-	-	-	-	-
0.490	b	28.0				0	-	-	T1	-	-
0.570	b	34.0				0	-	-	T1	-	-
0.440	b	20.0				0	-	-	T1	-	-
0.440	b	32.0				0	-	-	T1	-	-
0.430	b	23.0				0	-	-	T1	-	-
0.450	b	11				0	-	-	-	-	-
0.660	b	150	Y			0	T1	T1	T1	T1	-
0.510	b	9.2				0	-	-	-	-	-
0.530	b	55	Y			0	-	-	T1	-	-
0.570	b	280	Y			0	T1	T1	T1	T1	-
0.430	b	1.50				0	-	-	-	-	-
0.530	b	1.50				0	-	-	-	-	-
0.440	b	1.80				0	-	-	-	-	-
0.430	b	11.00				0	-	-	-	-	-
0.580	b	11.00				0	-	-	-	-	-
0.570	b	1.40				0	-	-	-	-	-
0.680	b	0.75				0	-	-	-	-	-
0.450	b	2.40				0	-	-	-	-	-
0.490	b	2.20				0	-	-	-	-	-
0.440	b	5.20				0	-	-	-	-	-
0.730	b	2.10				0	-	-	-	-	-
0.430	b	1.80				0	-	-	-	-	-
0.750	b	0.63				0	-	-	-	-	-
0.460	b	2.40				0	-	-	-	-	-
0.510	b	6.90				0	-	-	-	-	-
0.650	b	3.80				0	-	-	-	-	-
0.430	b	4.50				0	-	-	-	-	-
0.570	b	3.10				0	-	-	-	-	-
0.800	b	1.70				0	-	-	-	-	-
0.550	b	2.10				0	-	-	-	-	-
0.480	b	2.40				0	-	-	-	-	-
0.490	b	1.00				0	-	-	-	-	-
0.490	b	2.40				0	-	-	-	-	-
0.420	b	0.35				0	-	-	-	-	-
0.600	b	4.10				0	-	-	-	-	-
0.620	b	4.20				0	-	-	-	-	-
0.460	b	2.20				0	-	-	-	-	-
0.560	b	4.30				0	-	-	-	-	-
0.440	b	1.00				0	-	-	-	-	-
0.510	b	15.00				0	-	-	-	-	-
0.70	b	2.8				0	-	-	-	-	-
0.234	b	0.9				0	-	-	-	-	-
0.230	b	0.18				0	-	-	-	-	-
0.58	b	0.190				0	-	-	-	-	-
0.62	b	1				0	-	-	-	-	-
0.592	b	25.000				0	-	-	T1	-	-
0.556	b	13.000				0	-	-	-	-	-
0.65	b	5.800				0	-	-	-	-	-
0.410	b	3.700				0	-	-	-	-	-
0.370	b	110.000	Y			0	T1	-	T1	T1	-
0.410	b	14.000				0	-	-	-	-	-
0.370	b	39.00				0	-	-	T1	-	-
0.400	b	15.00				0	-	-	-	-	-
0.390	b	20.00				0	-	-	T1	-	-
0.410	b	26.00				0	-	-	T1	-	-
0.390	b	33.00				0	-	-	T1	-	-
0.370	b	18.00				0	-	-	-	-	-
0.390	b	68.00	Y			0	T1	-	T1	T1	-
0.380	b	21.00				0	-	-	T1	-	-
0.400	b	140.00	Y			0	T1	T1	T1	T1	-
0.400	b	0.62				0	-	-	-	-	-
0.410	b	2.50				0	-	-	-	-	-
0.410	b	25.00				0	-	-	T1	-	-
0.390	b	4.80				0	-	-	-	-	-
0.380	b	0.78				0	-	-	-	-	-
0.410	b	4.90				0	-	-	-	-	-
0.410	b	0.33				0	-	-	-	-	-
0.360	b	0.01				0	-	-	-	-	-
0.390	b	11.00				0	-	-	-	-	-
0.282	b	0.012				0	-	-	-	-	-
0.29	b	0.013				0	-	-	-	-	-

APPENDIX H - Amphipod Tox - Aroclor 1268

Survivor's Average Weight	b	Aroclor 1268		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.34	b	0.610		0	-	-	-	-	-
0.302	b	0.390		0	-	-	-	-	-
0.326	b	8.200		0	-	-	-	-	-
0.334	b	5.800		0	-	-	-	-	-
0.60	🟥	1.9		1	T2	T2	T2	T2	T2
0.42	🟥	19.0		1	T2	T2	T2	T2	T2
0.51	🟥	19		1	T2	T2	T2	T2	T2
0.43	🟥	430	Y	1	-	-	-	-	-
0.47	🟥	0.19		1	T2	T2	T2	T2	T2
0.61	🟥	1.2		1	T2	T2	T2	T2	T2
0.46	🟥	64	Y	1	-	T2	-	-	T2
0.46	🟥	92	Y	1	-	T2	-	-	T2
0.63	🟥	0.03		1	T2	T2	T2	T2	T2
0.17	🟥	0.79		1	T2	T2	T2	T2	T2
0.10	🟥	0.70		1	T2	T2	T2	T2	T2
0.11	🟥	24		1	T2	T2	-	T2	T2
0.08	🟥	19		1	T2	T2	T2	T2	T2
0.02	🟥	3.70		1	T2	T2	T2	T2	T2
0.17	🟥	0.87		1	T2	T2	T2	T2	T2
0.09	🟥	2.20		1	T2	T2	T2	T2	T2
0.15	🟥	24.00		1	T2	T2	-	T2	T2
0.178	🟥	0.06		1	T2	T2	T2	T2	T2
0	🟥	0.3		1	T2	T2	T2	T2	T2
0.272	🟥	0.015		1	T2	T2	T2	T2	T2
0	🟥	2.2		1	T2	T2	T2	T2	T2
0	🟥	82.000	Y	1	-	T2	-	-	T2
0	🟥	6.800		1	T2	T2	T2	T2	T2
0.14	🟥	3.900		1	T2	T2	T2	T2	T2
0.26	🟥	0.560		1	T2	T2	T2	T2	T2
0.25	🟥	0.044		1	T2	T2	T2	T2	T2
0	🟥	0.94		1	T2	T2	T2	T2	T2
0.1	🟥	1.3		1	T2	T2	T2	T2	T2
0	🟥	2.3		1	T2	T2	T2	T2	T2
0	🟥	0.52		1	T2	T2	T2	T2	T2
0.208	🟥	7.000		1	T2	T2	T2	T2	T2
0.358	🟥	0.210		1	T2	T2	T2	T2	T2
0.488	🟥	0.34		1	T2	T2	T2	T2	T2
0.378	🟥	1.2		1	T2	T2	T2	T2	T2
0.382	🟥	0.980		1	T2	T2	T2	T2	T2
0.426	🟥	1.400		1	T2	T2	T2	T2	T2
0.34	🟥	0.790		1	T2	T2	T2	T2	T2
0.322	🟥	0.001		1	T2	T2	T2	T2	T2
0.534	🟥	0.640		1	T2	T2	T2	T2	T2
0.322	🟥	0.920		1	T2	T2	T2	T2	T2
0.1	🟥	0.850		1	T2	T2	T2	T2	T2
0.43	🟥	2.000		1	T2	T2	T2	T2	T2
0.426	🟥	11.000		1	T2	T2	T2	T2	T2
0.352	🟥	3.100		1	T2	T2	T2	T2	T2
0.318	🟥	0.069		1	T2	T2	T2	T2	T2
0.458	🟥	4.100		1	T2	T2	T2	T2	T2
0.402	🟥	0.026		1	T2	T2	T2	T2	T2
0.310	🟥	90.000	Y	1	-	T2	-	-	T2
0	🟥	120.000	Y	1	-	-	-	-	T2
0.250	🟥	1.900		1	T2	T2	T2	T2	T2
0.330	🟥	0.007		1	T2	T2	T2	T2	T2
0	🟥	12.000		1	T2	T2	T2	T2	T2
0.320	🟥	15.000		1	T2	T2	T2	T2	T2
0.340	🟥	20.000		1	T2	T2	-	T2	T2
0.350	🟥	110.000	Y	1	-	-	-	-	T2
0.290	🟥	16.000		1	T2	T2	T2	T2	T2
0.200	🟥	11.000		1	T2	T2	T2	T2	T2
0.180	🟥	17.000		1	T2	T2	T2	T2	T2
0.290	🟥	44.000		1	T2	T2	-	T2	T2
0	🟥	12.00		1	T2	T2	T2	T2	T2
0	🟥	13.00		1	T2	T2	T2	T2	T2
0.350	🟥	330.00	Y	1	-	-	-	-	T2
0.330	🟥	11.00		1	T2	T2	T2	T2	T2
0.350	🟥	9.50		1	T2	T2	T2	T2	T2
0.150	🟥	4.00		1	T2	T2	T2	T2	T2
0.200	🟥	26.00		1	T2	T2	-	T2	T2
0	🟥	2.90		1	T2	T2	T2	T2	T2
0.330	🟥	1.70		1	T2	T2	T2	T2	T2
0	🟥	150.00	Y	1	-	-	-	-	T2
0.300	🟥	59.00	Y	1	T2	T2	-	T2	T2
0.190	🟥	26.00		1	T2	T2	-	T2	T2
0.340	🟥	4.10		1	T2	T2	T2	T2	T2
0.310	🟥	15.00		1	T2	T2	T2	T2	T2
0.340	🟥	32.00		1	T2	T2	-	T2	T2
0.300	🟥	39.00		1	T2	T2	-	T2	T2
0.270	🟥	360.00	Y	1	-	-	-	-	T2
0.240	🟥	110.00	Y	1	-	-	-	-	T2
0.270	🟥	570.00	Y	1	-	-	-	-	-
0.330	🟥	4.80		1	T2	T2	T2	T2	T2
0.390	🟥	8.20		1	T2	T2	T2	T2	T2
0.330	🟥	16.00		1	T2	T2	T2	T2	T2
0.190	🟥	12.00		1	T2	T2	T2	T2	T2
0.200	🟥	10.00		1	T2	T2	T2	T2	T2
0.310	🟥	76.00	Y	1	-	T2	-	-	T2
0.330	🟥	37.00		1	T2	T2	-	T2	T2
0.250	🟥	20.00		1	T2	T2	-	T2	T2
0.300	🟥	19.00		1	T2	T2	T2	T2	T2
0.340	🟥	18.00		1	T2	T2	T2	T2	T2
0.300	🟥	8.10		1	T2	T2	T2	T2	T2
0	🟥	54.00	Y	1	T2	T2	-	T2	T2
0	🟥	1.00		1	T2	T2	T2	T2	T2
0.330	🟥	8.30		1	T2	T2	T2	T2	T2
0.330	🟥	21.00		1	T2	T2	-	T2	T2
0.310	🟥	20.00		1	T2	T2	-	T2	T2
0.350	🟥	3.50		1	T2	T2	T2	T2	T2
0.310	🟥	2.00		1	T2	T2	T2	T2	T2
0.000	🟥	4.30		1	T2	T2	T2	T2	T2
0.350	🟥	1.70		1	T2	T2	T2	T2	T2
0.280	🟥	0.76		1	T2	T2	T2	T2	T2
0.130	🟥	2.50		1	T2	T2	T2	T2	T2
0.300	🟥	2.50		1	T2	T2	T2	T2	T2
0.150	🟥	5.50		1	T2	T2	T2	T2	T2
0.350	🟥	13.00		1	T2	T2	T2	T2	T2
0.350	🟥	0.16		1	T2	T2	T2	T2	T2
0.200	🟥	0.02		1	T2	T2	T2	T2	T2
0.240	🟥	1.90		1	T2	T2	T2	T2	T2
0.330	🟥	1.80		1	T2	T2	T2	T2	T2
0.200	🟥	7.00		1	T2	T2	T2	T2	T2
0.290	🟥	1.7		1	T2	T2	T2	T2	T2
				109	11	8	36	11	0
				240	96	101	82	96	107
					107	109	118	107	107

APPENDIX H - Amphipod Tox - Aroclor 12680C

Reproductive Response	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
5.31	b	0.353		2x mean NOEC	2.7	0	-	-	-	-	-
3.23	b	0.018		Median NOEC	0.29	0	-	-	-	-	-
2.87	b	0.153				0	-	-	-	-	-
3.01	b	0.146		ER-L	3.0	0	-	-	-	-	-
2.85	b	7.885	Y	ER-M	4.9	0	T1	T1	T1	T1	-
0.86	b	0.237		15th Percentile E	3.2	0	-	-	-	-	-
0.656	b	1.250		TEL	1.0	0	-	-	T1	-	-
1.18	b	0.036		85th Percentile NE	2.2	0	-	-	-	-	-
0.508	b	0.300		PEL	3.3	0	-	-	-	-	-
0.61	b	6.568	Y	AET	7.9	0	T1	T1	T1	T1	-
0.906	b	0.259				0	-	-	-	-	-
0.464	b	2.529			18	0	-	-	T1	-	-
1.94	b	0.064		Effects Data N	16	0	-	-	-	-	-
1.59	b	0.277				0	-	-	-	-	-
1.61	b	0.766		**Effects Data Set**		0	-	-	-	-	-
1.45	b	0.667		4.318		0	-	-	-	-	-
0.47	🟥	0.651		7.037		1	T2	T2	T2	T2	T2
0.29	🟥	0.432		78.182		1	T2	T2	T2	T2	T2
0.07	🟥	4.318	Y	12.308		1	-	T2	-	-	T2
0	🟥	7.037	Y	24.211		1	-	-	-	-	T2
0	🟥	78.182	Y	3.000		1	-	-	-	-	-
0.1	🟥	0.056		3.000		1	T2	T2	T2	T2	T2
0	🟥	0.240		3.030		1	T2	T2	T2	T2	T2
0.01	🟥	12.308	Y	4.255		1	-	-	-	-	-
0	🟥	24.211	Y	5.240		1	-	-	-	-	-
0.025	🟥	0.010		15.066		1	T2	T2	T2	T2	T2
0.079	🟥	1.235		14.437		1	T2	T2	-	T2	T2
0	🟥	0.087		4.651		1	T2	T2	T2	T2	T2
0.47	🟥	3.000	Y	7.143		1	T2	T2	-	T2	T2
0.55	🟥	3.000	Y	3.540		1	T2	T2	-	T2	T2
0.21	🟥	3.030	Y	3.811		1	-	T2	-	T2	T2
0.21	🟥	0.302				1	T2	T2	T2	T2	T2
0.12	🟥	0.223				1	T2	T2	T2	T2	T2
0	🟥	4.255	Y			1	-	T2	-	-	T2
0.74	🟥	0.205				1	T2	T2	T2	T2	T2
0.15	🟥	0.021				1	T2	T2	T2	T2	T2
0.85	🟥	0.004				1	T2	T2	T2	T2	T2
0.77	🟥	0.005				1	T2	T2	T2	T2	T2
0.6	🟥	1.129				1	T2	T2	-	T2	T2
0.26	🟥	0.925				1	T2	T2	T2	T2	T2
0	🟥	0.452				1	T2	T2	T2	T2	T2
0	🟥	5.240	Y			1	-	-	-	-	T2
0.95	🟥	15.066	Y			1	-	-	-	-	-
0	🟥	14.437	Y			1	-	-	-	-	-
0	🟥	1.518				1	T2	T2	-	T2	T2
0.39	🟥	4.651	Y			1	-	T2	-	-	T2
0.67	🟥	7.143	Y			1	-	-	-	-	T2
0.23	🟥	0.003				1	T2	T2	T2	T2	T2
0	🟥	0.687				1	T2	T2	T2	T2	T2
0	🟥	0.183				1	T2	T2	T2	T2	T2
0	🟥	0.103				1	T2	T2	T2	T2	T2
0	🟥	0.012				1	T2	T2	T2	T2	T2
0.38	🟥	0.060				1	T2	T2	T2	T2	T2
0	🟥	2.005				1	T2	T2	-	T2	T2
0	🟥	0.364				1	T2	T2	T2	T2	T2
0	🟥	0.077				1	T2	T2	T2	T2	T2
0	🟥	0.170				1	T2	T2	T2	T2	T2
0	🟥	0.374				1	T2	T2	T2	T2	T2
0	🟥	0.392				1	T2	T2	T2	T2	T2
0	🟥	0.135				1	T2	T2	T2	T2	T2
0.32	🟥	2.500				1	T2	T2	-	T2	T2
0	🟥	3.540	Y			1	-	T2	-	-	T2
0.54	🟥	0.754				1	T2	T2	T2	T2	T2
0.082	🟥	0.035				1	T2	T2	T2	T2	T2
0.292	🟥	0.061				1	T2	T2	T2	T2	T2
0.358	🟥	0.144				1	T2	T2	T2	T2	T2
0.142	🟥	0.187				1	T2	T2	T2	T2	T2
0	🟥	0.161				1	T2	T2	T2	T2	T2
0.126	🟥	3.811	Y			1	-	T2	-	-	T2
0.356	🟥	2.261				1	T2	T2	-	T2	T2
0.364	🟥	0.002				1	T2	T2	T2	T2	T2
0.36	🟥	0.123				1	T2	T2	T2	T2	T2
0.072	🟥	0.379				1	T2	T2	T2	T2	T2
0	🟥	0.111				1	T2	T2	T2	T2	T2
0.032	🟥	2.292				1	T2	T2	-	T2	T2
0.074	🟥	0.521				1	T2	T2	T2	T2	T2
0.144	🟥	0.168				1	T2	T2	T2	T2	T2
0.154	🟥	0.706				1	T2	T2	T2	T2	T2
0.112	🟥	1.041				1	T2	T2	-	T2	T2
0.05	🟥	0.009				1	T2	T2	T2	T2	T2
						64	2	2	4	2	0
						80	50	56	40	51	59

Average Survival Rate	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
87	b	1.250		2x mean NOEC	2.7	0	-	-	T1	-	-
87	b	6.568	Y	Median NOEC	0.26	0	T1	T1	T1	T1	-
91	b	2.261				0	-	-	T1	-	-
88	b	0.002		ER-L	3.0	0	-	-	-	-	-
87	b	0.123		ER-M	5.2	0	-	-	-	-	-
87	b	0.259		15th Percentile E	3.4	0	-	-	-	-	-
88	b	2.529		TEL	0.9	0	-	-	T1	-	-
77	b	0.651		85th Percentile NE	2.3	0	-	-	-	-	-
71	b	0.432		PEL	3.5	0	-	-	-	-	-
80	b	12.308	Y	AET	12.3	0	T1	T1	T1	T1	-
76	b	0.091				0	-	-	-	-	-
69	b	0.077			21	0	-	-	-	-	-
76	b	0.766		Effects Data N	19	0	-	-	-	-	-
72	b	0.021				0	-	-	-	-	-
80	b	0.035		**Effects Data Set**		0	-	-	-	-	-
80	b	0.061		4.318		0	-	-	-	-	-
82	b	0.144		7.037		0	-	-	-	-	-
79	b	0.237		78.182		0	-	-	-	-	-
84	b	0.187		24.211		0	-	-	-	-	-
84	b	0.300		7.500		0	-	-	-	-	-
85	b	2.292		5.135		0	-	-	T1	-	-
78	b	0.521		7.273		0	-	-	-	-	-
81	b	0.168		3.000		0	-	-	-	-	-
54	🟥	4.318	Y	3.000		1	-	T2	-	-	T2
48	🟥	7.037	Y	3.030		1	-	-	-	-	T2
56	🟥	78.182	Y	4.255		1	-	-	-	-	-
53	🟥	0.056		7.885		1	T2	T2	T2	T2	T2
63	🟥	0.240		5.240		1	T2	T2	T2	T2	T2
68	🟥	24.211	Y	15.066		1	-	-	-	-	-
80	🟥	0.010		14.437		1	T2	T2	T2	T2	T2
61	🟥	0.226		4.651		1	T2	T2	T2	T2	T2
50	🟥	0.233		7.143		1	T2	T2	T2	T2	T2
37	🟥	7.500	Y	3.54		1	-	-	-	-	T2
35	🟥	5.135	Y	3.811		1	-	T2	-	-	T2
1	🟥	1.194				1	T2	T2	-	T2	T2
62	🟥	0.272				1	T2	T2	T2	T2	T2
30	🟥	0.733				1	T2	T2	T2	T2	T2
54	🟥	7.273	Y			1	-	-	-	-	T2
42	🟥	0.064				1	T2	T2	T2	T2	T2
40	🟥	0.353				1	T2	T2	T2	T2	T2
15	🟥	1.235				1	T2	T2	-	T2	T2
42	🟥	0.018				1	T2	T2	T2	T2	T2
25	🟥	0.277				1	T2	T2	T2	T2	T2
0	🟥	0.087				1	T2	T2	T2	T2	T2
63	🟥	3.000	Y			1	T2	T2	-	T2	T2
24	🟥	3.000	Y			1	T2	T2	-	T2	T2
15	🟥	3.030	Y			1	-	T2	-	T2	T2
33	🟥	0.302				1	T2	T2	T2	T2	T2
17	🟥	0.153				1	T2	T2	T2	T2	T2
66	🟥	0.146				1	T2	T2	T2	T2	T2
3	🟥	0.667				1	T2	T2	T2	T2	T2
23	🟥	0.223				1	T2	T2	T2	T2	T2
15	🟥	4.255	Y			1	-	T2	-	-	T2
58	🟥	0.205				1	T2	T2	T2	T2	T2
37	🟥	7.885	Y			1	-	-	-	-	T2
36	🟥	0.004				1	T2	T2	T2	T2	T2
34	🟥	0.005				1	T2	T2	T2	T2	T2
62	🟥	1.129				1	T2	T2	-	T2	T2
65	🟥	0.925				1	T2	T2	T2	T2	T2
0	🟥	0.452				1	T2	T2	T2	T2	T2
7	🟥	5.240	Y			1	-	-	-	-	T2
42	🟥	15.066	Y			1	-	-	-	-	-
0	🟥	14.437	Y			1	-	-	-	-	-
0	🟥	1.518				1	T2	T2	-	T2	T2
45	🟥	4.651	Y			1	-	T2	-	-	T2
29	🟥	7.143	Y			1	-	-	-	-	T2
32	🟥	0.003				1	T2	T2	T2	T2	T2
3	🟥	0.687				1	T2	T2	T2	T2	T2
12	🟥	0.183				1	T2	T2	T2	T2	T2
14	🟥	0.103				1	T2	T2	T2	T2	T2
4	🟥	0.012				1	T2	T2	T2	T2	T2
36	🟥	0.060				1	T2	T2	T2	T2	T2
23	🟥	2.005				1	T2	T2	-	T2	T2
0	🟥	0.364				1	T2	T2	T2	T2	T2
19	🟥	0.077				1	T2	T2	T2	T2	T2
16	🟥	0.170				1	T2	T2	T2	T2	T2
2	🟥	0.374				1	T2	T2	T2	T2	T2
0	🟥	0.392				1	T2	T2	T2	T2	T2
0	🟥	0.135				1	T2	T2	T2	T2	T2
26	🟥	2.500				1	T2	T2	-	T2	T2
6	🟥	3.540	Y			1	-	T2	-	-	T2
39	🟥	0.754				1	T2	T2	T2	T2	T2
70	🟥	0.036				1	T2	T2	T2	T2	T2
60	🟥	0.161				1	T2	T2	T2	T2	T2
67	🟥	3.811	Y			1	-	T2	-	-	T2
41	🟥	0.379				1	T2	T2	T2	T2	T2
1	🟥	0.111				1	T2	T2	T2	T2	T2
66	🟥	0.706				1	T2	T2	T2	T2	T2
74	🟥	1.041				1	T2	T2	-	T2	T2
72	🟥	0.009				1	T2	T2	T2	T2	T2
						67	2	2	6	2	0
						90	50	57	41	51	63

Survivor's Average Weight	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.37	b	0.091		2x mean NOEC	3.9	0	-	-	-	-	-
0.35	b	0.077		Median NOEC	0.67	0	-	-	-	-	-
0.350	b	0.064				0	-	-	-	-	-
0.302	b	1.235		ER-L	5.0	0	-	-	-	-	-
0.362	b	0.018		ER-M	7.5	0	-	-	-	-	-
0.308	b	0.277		15th Percentile E	5.5	0	-	-	-	-	-
0.400	b	3.000		TEL	1.9	0	-	-	T1	-	-
0.500	b	3.000		85th Percentile NE	4.1	0	-	-	T1	-	-
0.286	b	3.030		PEL	5.6	0	-	-	T1	-	-
0.406	b	0.302		AET	15.1	0	-	-	-	-	-
0.294	b	0.766				0	-	-	-	-	-
0.398	b	0.153			16	0	-	-	-	-	-
0.316	b	0.146		Effects Data N	9	0	-	-	-	-	-
0.250	b	0.667				0	-	-	-	-	-
0.264	b	0.223		**Effects Data Set**		0	-	-	-	-	-
0.452	b	4.255	Y	4.318		0	-	-	T1	-	-
0.384	b	7.885	Y	7.037		0	T1	T1	T1	T1	-
0.39	b	1.129		78.182		0	-	-	-	-	-
0.408	b	0.925		12.308		0	-	-	-	-	-
0.45	b	5.240	Y	24.211		0	T1	-	T1	-	-
0.39	b	15.066	Y	7.500		0	T1	T1	T1	T1	-
0.532	b	4.651	Y	5.135		0	-	-	T1	-	-
0.512	b	7.143	Y	7.273		0	T1	-	T1	T1	-
0.528	b	0.077		14.437		0	-	-	-	-	-
0.438	b	0.170				0	-	-	-	-	-
0.55	b	3.540				0	-	-	T1	-	-
0.756	b	0.036				0	-	-	-	-	-
0.712	b	6.568	Y			0	T1	-	T1	T1	-
0.744	b	1.041				0	-	-	-	-	-
0.70	b	0.651				0	-	-	-	-	-
0.234	b	0.205				0	-	-	-	-	-
0.230	b	0.021				0	-	-	-	-	-
0.58	b	0.035				0	-	-	-	-	-
0.62	b	0.237				0	-	-	-	-	-
0.592	b	3.811				0	-	-	T1	-	-
0.556	b	2.261				0	-	-	T1	-	-
0.65	b	2.292				0	-	-	T1	-	-
0.282	b	0.004				0	-	-	-	-	-
0.29	b	0.003				0	-	-	-	-	-
0.302	b	0.060				0	-	-	-	-	-
0.326	b	2.005				0	-	-	T1	-	-
0.334	b	0.754				0	-	-	-	-	-
0.34	b	0.183				0	-	-	-	-	-
0.60	🟥	0.432				1	T2	T2	T2	T2	T2
0.42	🟥	4.318	Y			1	T2	T2	-	T2	T2
0.51	🟥	7.037	Y			1	-	T2	-	-	T2
0.43	🟥	78.182	Y			1	-	-	-	-	-
0.47	🟥	0.056				1	T2	T2	T2	T2	T2
0.61	🟥	0.240				1	T2	T2	T2	T2	T2
0.46	🟥	12.308	Y			1	-	-	-	-	T2
0.46	🟥	24.211	Y			1	-	-	-	-	-
0.63	🟥	0.010				1	T2	T2	T2	T2	T2
0.17	🟥	0.226				1	T2	T2	T2	T2	T2
0.10	🟥	0.233				1	T2	T2	T2	T2	T2
0.11	🟥	7.500	Y			1	-	-	-	-	T2
0.08	🟥	5.135	Y			1	-	T2	-	T2	T2
0.02	🟥	1.194				1	T2	T2	T2	T2	T2
0.17	🟥	0.272				1	T2	T2	T2	T2	T2
0.09	🟥	0.733				1	T2	T2	T2	T2	T2
0.15	🟥	7.273	Y			1	-	T2	-	-	T2
0.178	🟥	0.353				1	T2	T2	T2	T2	T2
0	🟥	0.087				1	T2	T2	T2	T2	T2
0.272	🟥	0.005				1	T2	T2	T2	T2	T2
0	🟥	0.452				1	T2	T2	T2	T2	T2
0	🟥	14.437	Y			1	-	-	-	-	T2
0	🟥	1.518				1	T2	T2	T2	T2	T2
0.14	🟥	0.687				1	T2	T2	T2	T2	T2
0.26	🟥	0.103				1	T2	T2	T2	T2	T2
0.25	🟥	0.012				1	T2	T2	T2	T2	T2
0	🟥	0.364				1	T2	T2	T2	T2	T2
0.1	🟥	0.374				1	T2	T2	T2	T2	T2
0	🟥	0.392				1	T2	T2	T2	T2	T2
0	🟥	0.135				1	T2	T2	T2	T2	T2
0.208	🟥	2.500				1	T2	T2	-	T2	T2
0.358	🟥	0.061				1	T2	T2	T2	T2	T2
0.488	🟥	0.144				1	T2	T2	T2	T2	T2
0.378	🟥	1.250				1	T2	T2	T2	T2	T2
0.382	🟥	0.187				1	T2	T2	T2	T2	T2
0.426	🟥	0.300				1	T2	T2	T2	T2	T2
0.34	🟥	0.161				1	T2	T2	T2	T2	T2
0.322	🟥	0.002				1	T2	T2	T2	T2	T2
0.534	🟥	0.123				1	T2	T2	T2	T2	T2
0.322	🟥	0.379				1	T2	T2	T2	T2	T2
0.1	🟥	0.111				1	T2	T2	T2	T2	T2
0.43	🟥	0.259				1	T2	T2	T2	T2	T2
0.426	🟥	2.529				1	T2	T2	-	T2	T2
0.352	🟥	0.521				1	T2	T2	T2	T2	T2
0.318	🟥	0.168				1	T2	T2	T2	T2	T2
0.458	🟥	0.706				1	T2	T2	T2	T2	T2
0.402	🟥	0.009				1	T2	T2	T2	T2	T2
						47	5	2	15	4	0
						90	39	42	36	40	45

APPENDIX H - Amphipod Tox - PAHs

Reproductive Response	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
5.31	b	0.090		2x mean NOEC	2.3	0	-	-	-	-	-
3.23	b	0.468		Median NOEC	0.6	0	-	-	-	-	-
2.87	b	0.612				0	-	-	-	-	-
3.01	b	0.788		ER-L	3.1	0	-	-	-	-	-
2.85	b	11.510	Y	ER-M	5.6	0	T1	T1	T1	T1	-
0.86	b	0.434		15th Percentile E	3.6	0	-	-	-	-	-
0.656	b	2.560	Y	TEL	1.4	0	-	-	T1	-	-
1.18	b	0.975		85th Percentile NE	1.8	0	-	-	-	-	-
0.508	b	0.563		PEL	3.1	0	-	-	-	-	-
0.61	b	2.154		AET	11.5	0	-	-	T1	-	-
0.906	b	0.951				0	-	-	-	-	-
0.464	b	1.755			20	0	-	-	T1	-	-
2.58	b	0.471		Effects Data N	17	0	-	-	-	-	-
2.06	b	0.614				0	-	-	-	-	-
1.88	b	2.533	Y	**Effects Data Set**		0	-	-	T1	-	-
1.56	b	0.060		4.363		0	-	-	-	-	-
1.625	b	0.456		7.290		0	-	-	-	-	-
3.64	b	0.271		2.350		0	-	-	-	-	-
1.733	b	0.308		4.945		0	-	-	-	-	-
1.682	b	0.293		3.550		0	-	-	-	-	-
1.571	b	0.397		6.072		0	-	-	-	-	-
2.833	b	0.402		5.097		0	-	-	-	-	-
1.91	b	0.182		52.80		0	-	-	-	-	-
2.27	b	0.894		2.454		0	-	-	-	-	-
2.17	b	0.623		5.551		0	-	-	-	-	-
1.625	b	1.319		38.448		0	-	-	-	-	-
1.94	b	0.441		3.729		0	-	-	-	-	-
1.59	b	1.067		3.760		0	-	-	-	-	-
1.61	b	1.820		16.679		0	-	-	T1	-	-
1.45	b	1.360		16.192		0	-	-	-	-	-
1.38	b	0.342		11.367		0	-	-	-	-	-
1.42	b	0.351		7.799		0	-	-	-	-	-
2.25	b	0.511				0	-	-	-	-	-
0.47	🟥	0.060				1	T2	T2	T2	T2	T2
0.29	🟥	0.140				1	T2	T2	T2	T2	T2
0.07	🟥	1.110				1	T2	T2	T2	T2	T2
0	🟥	4.363	Y			1	-	T2	-	-	T2
0	🟥	0.454				1	T2	T2	T2	T2	T2
0.1	🟥	0.060				1	T2	T2	T2	T2	T2
0	🟥	0.087				1	T2	T2	T2	T2	T2
0.01	🟥	1.060				1	T2	T2	T2	T2	T2
0	🟥	0.828				1	T2	T2	T2	T2	T2
0.025	🟥	0.060				1	T2	T2	T2	T2	T2
0.079	🟥	7.290	Y			1	-	-	-	-	T2
0	🟥	0.632				1	T2	T2	T2	T2	T2
0.47	🟥	2.350	Y			1	T2	T2	-	T2	T2
0.55	🟥	4.945	Y			1	-	T2	-	-	T2
0.21	🟥	1.684				1	T2	T2	-	T2	T2
0.21	🟥	0.477				1	T2	T2	T2	T2	T2
0.12	🟥	0.625				1	T2	T2	T2	T2	T2
0	🟥	3.550	Y			1	-	T2	-	-	T2
0.74	🟥	1.044				1	T2	T2	T2	T2	T2
0.15	🟥	0.630				1	T2	T2	T2	T2	T2
0.85	🟥	0.136				1	T2	T2	T2	T2	T2
0.77	🟥	0.112				1	T2	T2	T2	T2	T2
0.6	🟥	1.067				1	T2	T2	T2	T2	T2
0.26	🟥	1.189				1	T2	T2	T2	T2	T2
0	🟥	0.826				1	T2	T2	T2	T2	T2
0	🟥	0.274				1	T2	T2	T2	T2	T2
0.95	🟥	1.484				1	T2	T2	-	T2	T2
0	🟥	6.072	Y			1	-	-	-	-	T2
0	🟥	1.015				1	T2	T2	T2	T2	T2
0.39	🟥	0.876				1	T2	T2	T2	T2	T2
0.67	🟥	1.296				1	T2	T2	T2	T2	T2
0.23	🟥	0.649				1	T2	T2	T2	T2	T2
0	🟥	0.794				1	T2	T2	T2	T2	T2
0	🟥	0.725				1	T2	T2	T2	T2	T2
0	🟥	0.492				1	T2	T2	T2	T2	T2
0	🟥	1.647				1	T2	T2	-	T2	T2
0.38	🟥	0.565				1	T2	T2	T2	T2	T2
0	🟥	1.365				1	T2	T2	T2	T2	T2
0	🟥	1.166				1	T2	T2	T2	T2	T2
0	🟥	0.442				1	T2	T2	T2	T2	T2
0	🟥	0.980				1	T2	T2	T2	T2	T2
0	🟥	0.490				1	T2	T2	T2	T2	T2
0	🟥	5.097	Y			1	-	T2	-	-	T2
0	🟥	52.800	Y			1	-	-	-	-	-
0.32	🟥	0.561				1	T2	T2	T2	T2	T2
0	🟥	1.394				1	T2	T2	T2	T2	T2
0.54	🟥	0.608				1	T2	T2	T2	T2	T2
0.082	🟥	0.273				1	T2	T2	T2	T2	T2
0.292	🟥	0.228				1	T2	T2	T2	T2	T2
0.358	🟥	0.149				1	T2	T2	T2	T2	T2
0.142	🟥	0.515				1	T2	T2	T2	T2	T2
0	🟥	0.558				1	T2	T2	T2	T2	T2
0.126	🟥	0.372				1	T2	T2	T2	T2	T2
0.356	🟥	0.473				1	T2	T2	T2	T2	T2
0.364	🟥	0.015				1	T2	T2	T2	T2	T2
0.36	🟥	0.289				1	T2	T2	T2	T2	T2
0.072	🟥	0.224				1	T2	T2	T2	T2	T2
0	🟥	2.454	Y			1	T2	T2	-	T2	T2
0.032	🟥	0.292				1	T2	T2	T2	T2	T2
0.074	🟥	0.240				1	T2	T2	T2	T2	T2
0.144	🟥	0.044				1	T2	T2	T2	T2	T2
0.154	🟥	0.286				1	T2	T2	T2	T2	T2
0.112	🟥	0.247				1	T2	T2	T2	T2	T2
0.05	🟥	0.042				1	T2	T2	T2	T2	T2
0	🟥	0.994				1	T2	T2	T2	T2	T2
0	🟥	0.585				1	T2	T2	T2	T2	T2
0	🟥	0.986				1	T2	T2	T2	T2	T2
0	🟥	0.006				1	T2	T2	T2	T2	T2
0.269	🟥	0.315				1	T2	T2	T2	T2	T2
0	🟥	0.553				1	T2	T2	T2	T2	T2
0	🟥	0.668				1	T2	T2	T2	T2	T2
0	🟥	0.773				1	T2	T2	T2	T2	T2
0	🟥	0.379				1	T2	T2	T2	T2	T2
0	🟥	1.333				1	T2	T2	T2	T2	T2
0	🟥	1.525				1	T2	T2	-	T2	T2
0	🟥	0.563				1	T2	T2	T2	T2	T2
0.389	🟥	0.433				1	T2	T2	T2	T2	T2
0	🟥	0.506				1	T2	T2	T2	T2	T2
0	🟥	5.551	Y			1	-	-	-	-	T2
0	🟥	0.908				1	T2	T2	T2	T2	T2
0.35	🟥	0.566				1	T2	T2	T2	T2	T2
0	🟥	0.876				1	T2	T2	T2	T2	T2
0	🟥	0.419				1	T2	T2	T2	T2	T2
0	🟥	0.304				1	T2	T2	T2	T2	T2
0	🟥	0.545				1	T2	T2	T2	T2	T2
0	🟥	0.483				1	T2	T2	T2	T2	T2
0.125	🟥	0.635				1	T2	T2	T2	T2	T2
0.727	🟥	0.881				1	T2	T2	T2	T2	T2
0	🟥	0.634				1	T2	T2	T2	T2	T2
0.0769	🟥	0.746				1	T2	T2	T2	T2	T2
0	🟥	0.458				1	T2	T2	T2	T2	T2
0.45	🟥	0.808				1	T2	T2	T2	T2	T2
0	🟥	0.710				1	T2	T2	T2	T2	T2

Average Survival Rate	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
87	b	2.560	Y	2x mean NOEC	1.4	0	T1	-	T1	T1	-
87	b	2.154	Y	Median NOEC	0.4	0	T1	-	T1	T1	-
91	b	0.473				0	-	-	-	-	-
88	b	0.015		ER-L	1.5	0	-	-	-	-	-
87	b	0.289		ER-M	4.4	0	-	-	-	-	-
87	b	0.951		15th Percentile E	1.6	0	-	-	T1	-	-
88	b	1.755	Y	TEL	0.8	0	T1	-	T1	-	-
100	b	0.471		85th Percentile NE	1.1	0	-	-	-	-	-
90	b	0.614		PEL	2.1	0	-	-	-	-	-
90	b	2.533	Y	AET	6.19	0	T1	-	T1	T1	-
100	b	0.350				0	-	-	-	-	-
90	b	0.060			33	0	-	-	-	-	-
95	b	0.628		Effects Data N	27	0	-	-	-	-	-
100	b	0.229				0	-	-	-	-	-
100	b	0.530		**Effects Data Set**		0	-	-	-	-	-
100	b	6.192	Y	4.363		0	T1	T1	T1	T1	-
90	b	0.271		2.553		0	-	-	-	-	-
100	b	0.275		11.782		0	-	-	-	-	-
90	b	0.308		5.042		0	-	-	-	-	-
100	b	0.293		7.290		0	-	-	-	-	-
95	b	0.397		2.350		0	-	-	-	-	-
100	b	0.421		4.945		0	-	-	-	-	-
100	b	0.402		1.684		0	-	-	-	-	-
90	b	0.317		3.550		0	-	-	-	-	-
95	b	0.288		11.510		0	-	-	-	-	-
100	b	0.251		1.484		0	-	-	-	-	-
100	b	0.182		6.072		0	-	-	-	-	-
90	b	0.410		1.647		0	-	-	-	-	-
100	b	0.894		5.097		0	-	-	T1	-	-
90	b	0.351		52.80		0	-	-	-	-	-
95	b	1.319		1.39		0	-	-	T1	-	-
77	b	0.060		2.454		0	-	-	-	-	-
71	b	0.140		1.525		0	-	-	-	-	-
80	b	1.060		5.551		0	-	-	T1	-	-
80	b	0.060		38.448		0	-	-	-	-	-
76	b	0.084		3.729		0	-	-	-	-	-
69	b	0.061		2.233		0	-	-	-	-	-
76	b	1.820	Y	3.376		0	T1	-	T1	-	-
72	b	0.630		16.679		0	-	-	-	-	-
80	b	0.273		1.508		0	-	-	-	-	-
80	b	0.228		11.367		0	-	-	-	-	-
82	b	0.149		7.799		0	-	-	-	-	-
79	b	0.434				0	-	-	-	-	-
84	b	0.515				0	-	-	-	-	-
84	b	0.563				0	-	-	-	-	-
85	b	0.292				0	-	-	-	-	-
78	b	0.240				0	-	-	-	-	-
81	b	0.044				0	-	-	-	-	-
54	🟥	1.110				1	T2	T2	-	T2	T2
48	🟥	4.363	Y			1	-	T2	-	-	T2
56	🟥	0.454				1	T2	T2	T2	T2	T2
53	🟥	0.060				1	T2	T2	T2	T2	T2
63	🟥	0.087				1	T2	T2	T2	T2	T2
68	🟥	0.828				1	T2	T2	-	T2	T2
61	🟥	0.446				1	T2	T2	T2	T2	T2
50	🟥	0.180				1	T2	T2	T2	T2	T2
37	🟥	2.553	Y			1	-	T2	-	-	T2
35	🟥	0.811				1	T2	T2	-	T2	T2
1	🟥	11.782	Y			1	-	-	-	-	-
62	🟥	0.243				1	T2	T2	T2	T2	T2
30	🟥	0.222				1	T2	T2	T2	T2	T2
54	🟥	5.042	Y			1	-	-	-	-	T2
42	🟥	0.441				1	T2	T2	T2	T2	T2
40	🟥	0.090				1	T2	T2	T2	T2	T2
15	🟥	7.290	Y			1	-	-	-	-	-
42	🟥	0.468				1	T2	T2	T2	T2	T2
25	🟥	1.067				1	T2	T2	-	T2	T2
0	🟥	0.632				1	T2	T2	T2	T2	T2
63	🟥	2.350	Y			1	-	T2	-	-	T2
24	🟥	4.945	Y			1	-	-	-	-	T2
15	🟥	1.684	Y			1	-	T2	-	T2	T2
33	🟥	0.477				1	T2	T2	T2	T2	T2
17	🟥	0.612				1	T2	T2	T2	T2	T2
66	🟥	0.788				1	T2	T2	-	T2	T2
3	🟥	1.360				1	T2	T2	-	T2	T2
23	🟥	0.625				1	T2	T2	T2	T2	T2
15	🟥	3.550	Y			1	-	T2	-	-	T2
58	🟥	1.044				1	T2	T2	-	T2	T2
37	🟥	11.510	Y			1	-	-	-	-	-
36	🟥	0.136				1	T2	T2	T2	T2	T2
34	🟥	0.112				1	T2	T2	T2	T2	T2
62	🟥	1.067				1	T2	T2	-	T2	T2
65	🟥	1.189				1	T2	T2	-	T2	T2
0	🟥	0.826				1	T2	T2	-	T2	T2
7	🟥	0.274				1	T2	T2	T2	T2	T2
42	🟥	1.484	Y			1	T2	T2	-	T2	T2
0	🟥	6.072	Y			1	-	-	-	-	T2
0	🟥	1.015				1	T2	T2	-	T2	T2
45	🟥	0.876				1	T2	T2	-	T2	T2
29	🟥	1.296				1	T2	T2	-	T2	T2
32	🟥	0.649				1	T2	T2	T2	T2	T2
3	🟥	0.794				1	T2	T2	-	T2	T2
12	🟥	0.725				1	T2	T2	T2	T2	T2
14	🟥	0.492				1	T2	T2	T2	T2	T2
4	🟥	1.647	Y			1	-	T2	-	T2	T2
36	🟥	0.565				1	T2	T2	T2	T2	T2
23	🟥	1.365				1	T2	T2	-	T2	T2
0	🟥	1.166				1	T2	T2	-	T2	T2
19	🟥	0.442				1	T2	T2	T2	T2	T2
16	🟥	0.980				1	T2	T2	-	T2	T2
2	🟥	0.490				1	T2	T2	T2	T2	T2
0	🟥	5.097	Y			1	-	-	-	-	T2
0	🟥	52.800	Y			1	-	-	-	-	-
26	🟥	0.561				1	T2	T2	T2	T2	T2
6	🟥	1.394	Y			1	T2	T2	-	T2	T2
39	🟥	0.608				1	T2	T2	T2	T2	T2
70	🟥	0.975				1	T2	T2	-	T2	T2
60	🟥	0.558				1	T2	T2	T2	T2	T2
67	🟥	0.372				1	T2	T2	T2	T2	T2
41	🟥	0.224				1	T2	T2	T2	T2	T2
1	🟥	2.454	Y			1	-	T2	-	-	T2
66	🟥	0.286				1	T2	T2	T2	T2	T2
74	🟥	0.247				1	T2	T2	T2	T2	T2
72	🟥	0.042				1	T2	T2	T2	T2	T2
55	🟥	0.994				1	T2	T2	-	T2	T2
0	🟥	0.585				1	T2	T2	T2	T2	T2
20	🟥	0.986				1	T2	T2	-	T2	T2
70	🟥	0.006				1	T2	T2	T2	T2	T2
75	🟥	0.315				1	T2	T2	T2	T2	T2
80	🟥	0.553				1	T2	T2	T2	T2	T2
70	🟥	0.668				1	T2	T2	T2	T2	T2
0	🟥	0.773				1	T2	T2	-	T2	T2
50	🟥	0.379				1	T2	T2	T2	T2	T2
75	🟥	1.333				1	T2	T2	-	T2	T2
75	🟥	1.525	Y			1	-	T2	-	T2	T2
50	🟥	0.563				1	T2	T2	T2	T2	T2

Reproductive Response	b	Total PAHs		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0	🟥	0.473		1	T2	T2	T2	T2	T2
0	🟥	0.358		1	T2	T2	T2	T2	T2
0	🟥	0.535		1	T2	T2	T2	T2	T2
0	🟥	0.607		1	T2	T2	T2	T2	T2
0	🟥	0.239		1	T2	T2	T2	T2	T2
1	🟥	0.350		1	T2	T2	T2	T2	T2
0	🟥	0.037		1	T2	T2	T2	T2	T2
0	🟥	0.727		1	T2	T2	T2	T2	T2
0	🟥	1.097		1	T2	T2	T2	T2	T2
0	🟥	38.448	Y	1	-	-	-	-	-
0	🟥	3.729	Y	1	-	T2	-	-	T2
0.2308	🟥	0.126		1	T2	T2	T2	T2	T2
0	🟥	1.238		1	T2	T2	T2	T2	T2
0	🟥	0.572		1	T2	T2	T2	T2	T2
0	🟥	0.646		1	T2	T2	T2	T2	T2
0	🟥	0.623		1	T2	T2	T2	T2	T2
0.269	🟥	0.758		1	T2	T2	T2	T2	T2
0.167	🟥	0.388		1	T2	T2	T2	T2	T2
0	🟥	0.610		1	T2	T2	T2	T2	T2
0	🟥	0.524		1	T2	T2	T2	T2	T2
0	🟥	0.647		1	T2	T2	T2	T2	T2
0	🟥	0.362		1	T2	T2	T2	T2	T2
0	🟥	0.597		1	T2	T2	T2	T2	T2
0.9	🟥	0.431		1	T2	T2	T2	T2	T2
0.375	🟥	0.391		1	T2	T2	T2	T2	T2
0	🟥	0.719		1	T2	T2	T2	T2	T2
0	🟥	0.568		1	T2	T2	T2	T2	T2
0	🟥	0.680		1	T2	T2	T2	T2	T2
0	🟥	2.233		1	T2	T2	-	T2	T2
0.375	🟥	0.588		1	T2	T2	T2	T2	T2
0.611	🟥	0.656		1	T2	T2	T2	T2	T2
0	🟥	0.500		1	T2	T2	T2	T2	T2
0	🟥	3.760	Y	1	-	T2	-	-	T2
0	🟥	0.726		1	T2	T2	T2	T2	T2
0	🟥	0.854		1	T2	T2	T2	T2	T2
0.167	🟥	0.640		1	T2	T2	T2	T2	T2
0.654	🟥	0.628		1	T2	T2	T2	T2	T2
0	🟥	0.184		1	T2	T2	T2	T2	T2
0	🟥	0.489		1	T2	T2	T2	T2	T2
0	🟥	0.393		1	T2	T2	T2	T2	T2
0	🟥	0.631		1	T2	T2	T2	T2	T2
0.6	🟥	0.655		1	T2	T2	T2	T2	T2
0	🟥	0.539		1	T2	T2	T2	T2	T2
0	🟥	0.404		1	T2	T2	T2	T2	T2
0	🟥	0.844		1	T2	T2	T2	T2	T2
0	🟥	0.766		1	T2	T2	T2	T2	T2
0.15	🟥	0.433		1	T2	T2	T2	T2	T2
0.688	🟥	0.515		1	T2	T2	T2	T2	T2
0	🟥	1.008		1	T2	T2	T2	T2	T2
0	🟥	0.370		1	T2	T2	T2	T2	T2
0	🟥	0.419		1	T2	T2	T2	T2	T2
0	🟥	0.395		1	T2	T2	T2	T2	T2
0	🟥	16.679	Y	1	-	-	-	-	-
0	🟥	0.452		1	T2	T2	T2	T2	T2
0	🟥	0.741		1	T2	T2	T2	T2	T2
0	🟥	0.952		1	T2	T2	T2	T2	T2
0	🟥	0.712		1	T2	T2	T2	T2	T2
0	🟥	0.158		1	T2	T2	T2	T2	T2
0.25	🟥	0.356		1	T2	T2	T2	T2	T2
0	🟥	0.478		1	T2	T2	T2	T2	T2
0.909	🟥	0.229		1	T2	T2	T2	T2	T2
0	🟥	0.342		1	T2	T2	T2	T2	T2
0	🟥	0.759		1	T2	T2	T2	T2	T2
0.8	🟥	0.858		1	T2	T2	T2	T2	T2
1.04	🟥	0.530		1	T2	T2	T2	T2	T2
0.833	🟥	6.192	Y	1	-	-	-	-	T2
0.938	🟥	0.275		1	T2	T2	T2	T2	T2
0.5	🟥	0.358		1	T2	T2	T2	T2	T2
0	🟥	0.245		1	T2	T2	T2	T2	T2
0.2	🟥	0.317		1	T2	T2	T2	T2	T2
0	🟥	0.394		1	T2	T2	T2	T2	T2
0	🟥	0.312		1	T2	T2	T2	T2	T2
0.083	🟥	0.286		1	T2	T2	T2	T2	T2
0.556	🟥	1.508		1	T2	T2	-	T2	T2
1.111	🟥	0.267		1	T2	T2	T2	T2	T2
0.571	🟥	0.338		1	T2	T2	T2	T2	T2
0.792	🟥	0.421		1	T2	T2	T2	T2	T2
0.643	🟥	0.317		1	T2	T2	T2	T2	T2
0	🟥	0.206		1	T2	T2	T2	T2	T2
0.708	🟥	0.288		1	T2	T2	T2	T2	T2
0.5	🟥	0.137		1	T2	T2	T2	T2	T2
0.818	🟥	11.367	Y	1	-	-	-	-	T2
0	🟥	0.240		1	T2	T2	T2	T2	T2
0.778	🟥	0.251		1	T2	T2	T2	T2	T2
0	🟥	0.161		1	T2	T2	T2	T2	T2
0	🟥	0.409		1	T2	T2	T2	T2	T2
0.5	🟥	0.580		1	T2	T2	T2	T2	T2
0.917	🟥	0.241		1	T2	T2	T2	T2	T2
0	🟥	0.425		1	T2	T2	T2	T2	T2
0	🟥	0.410		1	T2	T2	T2	T2	T2
0	🟥	0.150		1	T2	T2	T2	T2	T2
0	🟥	0.398		1	T2	T2	T2	T2	T2
0	🟥	0.229		1	T2	T2	T2	T2	T2
0	🟥	0.524		1	T2	T2	T2	T2	T2
0	🟥	0.426		1	T2	T2	T2	T2	T2
0	🟥	0.876		1	T2	T2	T2	T2	T2
0	🟥	0.445		1	T2	T2	T2	T2	T2
0	🟥	7.799	Y	1	-	-	-	-	T2
0.962	🟥	1.098		1	T2	T2	T2	T2	T2
0	🟥	0.656		1	T2	T2	T2	T2	T2
0	🟥	0.322		1	T2	T2	T2	T2	T2
0	🟥	0.365		1	T2	T2	T2	T2	T2
0	🟥	0.358		1	T2	T2	T2	T2	T2
0	🟥	0.317		1	T2	T2	T2	T2	T2
				197	1	1	6	1	0
				230	182	188	174	182	194
					183	189	180	183	194

Average Survival Rate	b	Total PAHs		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
80	🟥	0.433		1	T2	T2	T2	T2	T2
25	🟥	0.506		1	T2	T2	T2	T2	T2
30	🟥	5.551	Y	1	-	-	-	-	T2
55	🟥	0.908		1	T2	T2	-	T2	T2
85	🟥	0.566		1	T2	T2	T2	T2	T2
80	🟥	0.342		1	T2	T2	T2	T2	T2
85	🟥	0.876		1	T2	T2	-	T2	T2
85	🟥	0.419		1	T2	T2	T2	T2	T2
0	🟥	0.304		1	T2	T2	T2	T2	T2
0	🟥	0.545		1	T2	T2	T2	T2	T2
50	🟥	0.483		1	T2	T2	T2	T2	T2
75	🟥	0.635		1	T2	T2	T2	T2	T2
85	🟥	0.881		1	T2	T2	-	T2	T2
55	🟥	0.634		1	T2	T2	T2	T2	T2
70	🟥	0.746		1	T2	T2	T2	T2	T2
80	🟥	0.458		1	T2	T2	T2	T2	T2
60	🟥	0.808		1	T2	T2	-	T2	T2
80	🟥	0.710		1	T2	T2	T2	T2	T2
40	🟥	0.473		1	T2	T2	T2	T2	T2
75	🟥	0.358		1	T2	T2	T2	T2	T2
50	🟥	0.535		1	T2	T2	T2	T2	T2
20	🟥	0.607		1	T2	T2	T2	T2	T2
10	🟥	0.239		1	T2	T2	T2	T2	T2
35	🟥	0.037		1	T2	T2	T2	T2	T2
10	🟥	0.727		1	T2	T2	T2	T2	T2
10	🟥	1.097		1	T2	T2	-	T2	T2
0	🟥	38.448	Y	1	-	-	-	-	-
65	🟥	3.729	Y	1	-	T2	-	-	T2
80	🟥	0.126		1	T2	T2	T2	T2	T2
60	🟥	1.238		1	T2	T2	-	T2	T2
0	🟥	0.572		1	T2	T2	T2	T2	T2
75	🟥	0.646		1	T2	T2	T2	T2	T2
65	🟥	0.623		1	T2	T2	T2	T2	T2
85	🟥	0.758		1	T2	T2	-	T2	T2
75	🟥	0.388		1	T2	T2	T2	T2	T2
80	🟥	0.610		1	T2	T2	T2	T2	T2
65	🟥	0.524		1	T2	T2	T2	T2	T2
80	🟥	0.647		1	T2	T2	T2	T2	T2
15	🟥	0.362		1	T2	T2	T2	T2	T2
75	🟥	0.597		1	T2	T2	T2	T2	T2
85	🟥	0.431		1	T2	T2	T2	T2	T2
55	🟥	0.391		1	T2	T2	T2	T2	T2
60	🟥	0.719		1	T2	T2	T2	T2	T2
50	🟥	0.568		1	T2	T2	T2	T2	T2
80	🟥	0.680		1	T2	T2	T2	T2	T2
55	🟥	2.233	Y	1	-	T2	-	-	T2
80	🟥	0.588		1	T2	T2	T2	T2	T2
80	🟥	0.656		1	T2	T2	T2	T2	T2
35	🟥	0.500		1	T2	T2	T2	T2	T2
15	🟥	3.760	Y	1	-	T2	-	-	T2
65	🟥	0.726		1	T2	T2	T2	T2	T2
55	🟥	0.854		1	T2	T2	-	T2	T2
75	🟥	0.640		1	T2	T2	T2	T2	T2
50	🟥	0.184		1	T2	T2	T2	T2	T2
65	🟥	0.489		1	T2	T2	T2	T2	T2
70	🟥	0.393		1	T2	T2	T2	T2	T2
55	🟥	0.631		1	T2	T2	T2	T2	T2
75	🟥	0.655		1	T2	T2	T2	T2	T2
45	🟥	0.539		1	T2	T2	T2	T2	T2
5	🟥	0.404		1	T2	T2	T2	T2	T2
85	🟥	0.456		1	T2	T2	T2	T2	T2
25	🟥	0.844		1	T2	T2	-	T2	T2
65	🟥	0.766		1	T2	T2	-	T2	T2
70	🟥	0.433		1	T2	T2	T2	T2	T2
75	🟥	0.515		1	T2	T2	T2	T2	T2
65	🟥	1.008		1	T2	T2	-	T2	T2
5	🟥	0.370		1	T2	T2	T2	T2	T2
35	🟥	0.419		1	T2	T2	T2	T2	T2
60	🟥	0.395		1	T2	T2	T2	T2	T2
5	🟥	16.679	Y	1	-	-	-	-	-
15	🟥	0.452		1	T2	T2	T2	T2	T2
50	🟥	0.741		1	T2	T2	T2	T2	T2
55	🟥	0.952		1	T2	T2	-	T2	T2
0	🟥	0.712		1	T2	T2	T2	T2	T2
0	🟥	0.158		1	T2	T2	T2	T2	T2
75	🟥	0.356		1	T2	T2	T2	T2	T2
15	🟥	0.478		1	T2	T2	T2	T2	T2
35	🟥	0.342		1	T2	T2	T2	T2	T2
35	🟥	0.759		1	T2	T2	-	T2	T2
80	🟥	0.858		1	T2	T2	-	T2	T2
70	🟥	0.358		1	T2	T2	T2	T2	T2
85	🟥	0.245		1	T2	T2	T2	T2	T2
80	🟥	0.317		1	T2	T2	T2	T2	T2
75	🟥	0.394		1	T2	T2	T2	T2	T2
65	🟥	0.312		1	T2	T2	T2	T2	T2
80	🟥	0.286		1	T2	T2	T2	T2	T2
65	🟥	1.508	Y	1	T2	T2	-	T2	T2
85	🟥	0.267		1	T2	T2	T2	T2	T2
80	🟥	0.338		1	T2	T2	T2	T2	T2
75	🟥	0.511		1	T2	T2	T2	T2	T2
75	🟥	0.206		1	T2	T2	T2	T2	T2
85	🟥	0.137		1	T2	T2	T2	T2	T2
85	🟥	11.367	Y	1	-	-	-	-	-
0	🟥	0.240		1	T2	T2	T2	T2	T2
30	🟥	0.161		1	T2	T2	T2	T2	T2
25	🟥	0.409		1	T2	T2	T2	T2	T2
85	🟥	0.580		1	T2	T2	T2	T2	T2
80	🟥	0.241		1	T2	T2	T2	T2	T2
75	🟥	0.425		1	T2	T2	T2	T2	T2
30	🟥	0.150		1	T2	T2	T2	T2	T2
50	🟥	0.398		1	T2	T2	T2	T2	T2
10	🟥	0.229		1	T2	T2	T2	T2	T2
85	🟥	0.623		1	T2	T2	T2	T2	T2
55	🟥	0.524		1	T2	T2	T2	T2	T2
40	🟥	0.426		1	T2	T2	T2	T2	T2
45	🟥	0.876		1	T2	T2	-	T2	T2
5	🟥	0.445		1	T2	T2	T2	T2	T2
85	🟥	7.799	Y	1	-	-	-	-	-
85	🟥	1.098		1	T2	T2	-	T2	T2
50	🟥	0.656		1	T2	T2	T2	T2	T2
80	🟥	0.322		1	T2	T2	T2	T2	T2
55	🟥	0.365		1	T2	T2	T2	T2	T2
5	🟥	0.358		1	T2	T2	T2	T2	T2
60	🟥	0.317		1	T2	T2	T2	T2	T2
				192	6	1	10	4	0
				240	168	179	127	171	184
					174	180	137	175	184

Survivor's Average Weight	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.37	b	0.084		2x mean NOEC	2.1	0	-	-	-	-	-
0.35	b	0.061		Median NOEC	0.6	0	-	-	-	-	-
0.350	b	0.441				0	-	-	-	-	-
0.302	b	7.290	Y	ER-L	2.5	0	T1	T1	T1	T1	-
0.362	b	0.468		ER-M	5.1	0	-	-	-	-	-
0.308	b	1.067		15th Percentile E	2.5	0	-	-	-	-	-
0.400	b	2.350	Y	TEL	1.2	0	-	-	T1	-	-
0.500	b	4.945	Y	85th Percentile NE	1.3	0	T1	-	T1	T1	-
0.286	b	1.684		PEL	3	0	-	-	T1	-	-
0.406	b	0.477		AET	11.5	0	-	-	-	-	-
0.294	b	1.820				0	-	-	T1	-	-
0.398	b	0.612			25	0	-	-	-	-	-
0.316	b	0.788		Effects Data N	14	0	-	-	-	-	-
0.250	b	1.360				0	-	-	T1	-	-
0.264	b	0.625		**Effects Data Set**		0	-	-	-	-	-
0.452	b	3.550	Y	4.363		0	T1	-	T1	T1	-
0.384	b	11.510	Y	2.553		0	T1	T1	T1	T1	-
0.39	b	1.067		11.782		0	-	-	-	-	-
0.408	b	1.189		5.042		0	-	-	T1	-	-
0.45	b	0.274		6.072		0	-	-	-	-	-
0.39	b	1.484		5.097		0	-	-	T1	-	-
0.532	b	0.876		52.80		0	-	-	-	-	-
0.512	b	1.296		2.560		0	-	-	T1	-	-
0.528	b	0.442		2.454		0	-	-	-	-	-
0.438	b	0.980		5.551		0	-	-	-	-	-
0.55	b	1.394		38.448		0	-	-	T1	-	-
0.756	b	0.975		2.233		0	-	-	-	-	-
0.712	b	2.154	Y	3.760		0	-	-	T1	-	-
0.744	b	0.247		16.679		0	-	-	-	-	-
0.440	b	0.553				0	-	-	-	-	-
0.450	b	0.668				0	-	-	-	-	-
0.500	b	0.506				0	-	-	-	-	-
0.610	b	0.908				0	-	-	-	-	-
0.440	b	0.566				0	-	-	-	-	-
0.460	b	0.471				0	-	-	-	-	-
0.450	b	0.483				0	-	-	-	-	-
0.640	b	0.634				0	-	-	-	-	-
0.560	b	0.458				0	-	-	-	-	-
0.590	b	0.710				0	-	-	-	-	-
0.610	b	0.358				0	-	-	-	-	-
0.550	b	0.614				0	-	-	-	-	-
0.690	b	0.535				0	-	-	-	-	-
0.480	b	0.607				0	-	-	-	-	-
0.530	b	2.533	Y			0	T1	-	T1	-	-
0.480	b	0.350				0	-	-	-	-	-
0.690	b	0.037				0	-	-	-	-	-
0.430	b	0.060				0	-	-	-	-	-
0.710	b	3.729	Y			0	T1	-	T1	T1	-
0.470	b	1.238				0	-	-	T1	-	-
0.680	b	0.524				0	-	-	-	-	-
0.560	b	0.431				0	-	-	-	-	-
0.550	b	0.391				0	-	-	-	-	-
0.480	b	0.719				0	-	-	-	-	-
0.440	b	0.680				0	-	-	-	-	-
0.510	b	0.588				0	-	-	-	-	-
0.490	b	0.500				0	-	-	-	-	-
0.570	b	0.640				0	-	-	-	-	-
0.440	b	0.628				0	-	-	-	-	-
0.440	b	0.393				0	-	-	-	-	-
0.430	b	0.631				0	-	-	-	-	-
0.450	b	0.456				0	-	-	-	-	-
0.660	b	0.844				0	-	-	-	-	-
0.510	b	0.419				0	-	-	-	-	-
0.530	b	0.452				0	-	-	-	-	-
0.570	b	0.952				0	-	-	-	-	-
0.430	b	0.356				0	-	-	-	-	-
0.530	b	0.229				0	-	-	-	-	-
0.440	b	0.342				0	-	-	-	-	-
0.430	b	0.858				0	-	-	-	-	-
0.580	b	0.530				0	-	-	-	-	-
0.570	b	0.271				0	-	-	-	-	-
0.680	b	0.275				0	-	-	-	-	-
0.450	b	0.358				0	-	-	-	-	-
0.490	b	0.245				0	-	-	-	-	-
0.440	b	0.308				0	-	-	-	-	-
0.730	b	0.293				0	-	-	-	-	-
0.430	b	0.286				0	-	-	-	-	-
0.750	b	1.508				0	-	-	T1	-	-
0.460	b	0.267				0	-	-	-	-	-
0.510	b	0.397				0	-	-	-	-	-
0.650	b	0.421				0	-	-	-	-	-
0.430	b	0.402				0	-	-	-	-	-
0.570	b	0.317				0	-	-	-	-	-
0.800	b	0.511				0	-	-	-	-	-
0.550	b	0.206				0	-	-	-	-	-
0.480	b	0.251				0	-	-	-	-	-
0.490	b	0.182				0	-	-	-	-	-
0.490	b	0.241				0	-	-	-	-	-
0.420	b	0.425				0	-	-	-	-	-
0.600	b	0.894				0	-	-	-	-	-
0.620	b	0.351				0	-	-	-	-	-
0.460	b	0.426				0	-	-	-	-	-
0.560	b	7.799	Y			0	T1	T1	T1	T1	-
0.440	b	1.098				0	-	-	-	-	-
0.510	b	0.656				0	-	-	-	-	-
0.70	b	0.060				0	-	-	-	-	-
0.234	b	1.044				0	-	-	-	-	-
0.230	b	0.630				0	-	-	-	-	-
0.58	b	0.273				0	-	-	-	-	-
0.62	b	0.434				0	-	-	-	-	-
0.592	b	0.372				0	-	-	-	-	-
0.556	b	0.473				0	-	-	-	-	-
0.65	b	0.292				0	-	-	-	-	-
0.410	b	0.315				0	-	-	-	-	-
0.370	b	0.876				0	-	-	-	-	-
0.410	b	0.419				0	-	-	-	-	-
0.370	b	0.808				0	-	-	-	-	-
0.400	b	0.473				0	-	-	-	-	-
0.390	b	0.758				0	-	-	-	-	-
0.410	b	0.597				0	-	-	-	-	-
0.390	b	0.568				0	-	-	-	-	-
0.370	b	0.726				0	-	-	-	-	-
0.390	b	0.854				0	-	-	-	-	-
0.390	b	0.489				0	-	-	-	-	-
0.380	b	0.433				0	-	-	-	-	-
0.400	b	0.741				0	-	-	-	-	-
0.400	b	6.192	Y			0	T1	T1	T1	T1	-
0.410	b	0.317				0	-	-	-	-	-
0.410	b	0.312				0	-	-	-	-	-
0.390	b	0.338				0	-	-	-	-	-
0.380	b	11.367	Y			0	T1	T1	T1	T1	-
0.410	b	0.580				0	-	-	-	-	-
0.410	b	0.410				0	-	-	-	-	-
0.360	b	0.876				0	-	-	-	-	-
0.390	b	1.319				0	-	-	T1	-	-
0.282	b	0.136				0	-	-	-	-	-

APPENDIX H - Amphipod Tox - PAHs

Survivor's Average Weight	b	Total PAHs		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.29	b	0.649		0	-	-	-	-	-
0.34	b	0.725		0	-	-	-	-	-
0.302	b	0.565		0	-	-	-	-	-
0.326	b	1.365		0	-	-	T1	-	-
0.334	b	0.608		0	-	-	-	-	-
0.60	🟥	0.140		1	T2	T2	T2	T2	T2
0.42	🟥	1.110		1	T2	T2	T2	T2	T2
0.51	🟥	4.363	Y	1	-	T2	-	-	T2
0.43	🟥	0.454		1	T2	T2	T2	T2	T2
0.47	🟥	0.060		1	T2	T2	T2	T2	T2
0.61	🟥	0.087		1	T2	T2	T2	T2	T2
0.46	🟥	1.060		1	T2	T2	T2	T2	T2
0.46	🟥	0.828		1	T2	T2	T2	T2	T2
0.63	🟥	0.060		1	T2	T2	T2	T2	T2
0.17	🟥	0.446		1	T2	T2	T2	T2	T2
0.10	🟥	0.180		1	T2	T2	T2	T2	T2
0.11	🟥	2.553	Y	1	-	T2	-	-	T2
0.08	🟥	0.811		1	T2	T2	T2	T2	T2
0.02	🟥	11.782	Y	1	-	-	-	-	-
0.17	🟥	0.243		1	T2	T2	T2	T2	T2
0.09	🟥	0.222		1	T2	T2	T2	T2	T2
0.15	🟥	5.042	Y	1	-	T2	-	-	T2
0.178	🟥	0.090		1	T2	T2	T2	T2	T2
0	🟥	0.632		1	T2	T2	T2	T2	T2
0.272	🟥	0.112		1	T2	T2	T2	T2	T2
0	🟥	0.826		1	T2	T2	T2	T2	T2
0	🟥	6.072	Y	1	-	-	-	-	T2
0	🟥	1.015		1	T2	T2	T2	T2	T2
0.14	🟥	0.794		1	T2	T2	T2	T2	T2
0.26	🟥	0.492		1	T2	T2	T2	T2	T2
0.25	🟥	1.647		1	T2	T2	-	T2	T2
0	🟥	1.166		1	T2	T2	T2	T2	T2
0.1	🟥	0.490		1	T2	T2	T2	T2	T2
0	🟥	5.097	Y	1	-	-	-	-	T2
0	🟥	52.800	Y	1	-	-	-	-	-
0.208	🟥	0.561		1	T2	T2	T2	T2	T2
0.358	🟥	0.228		1	T2	T2	T2	T2	T2
0.488	🟥	0.149		1	T2	T2	T2	T2	T2
0.378	🟥	2.560	Y	1	-	T2	-	-	T2
0.382	🟥	0.515		1	T2	T2	T2	T2	T2
0.426	🟥	0.563		1	T2	T2	T2	T2	T2
0.34	🟥	0.558		1	T2	T2	T2	T2	T2
0.322	🟥	0.015		1	T2	T2	T2	T2	T2
0.534	🟥	0.289		1	T2	T2	T2	T2	T2
0.322	🟥	0.224		1	T2	T2	T2	T2	T2
0.1	🟥	2.454	Y	1	T2	T2	-	T2	T2
0.43	🟥	0.951		1	T2	T2	T2	T2	T2
0.426	🟥	1.755		1	T2	T2	-	T2	T2
0.352	🟥	0.240		1	T2	T2	T2	T2	T2
0.318	🟥	0.044		1	T2	T2	T2	T2	T2
0.458	🟥	0.286		1	T2	T2	T2	T2	T2
0.402	🟥	0.042		1	T2	T2	T2	T2	T2
0.310	🟥	0.994		1	T2	T2	T2	T2	T2
0	🟥	0.585		1	T2	T2	T2	T2	T2
0.250	🟥	0.986		1	T2	T2	T2	T2	T2
0.330	🟥	0.006		1	T2	T2	T2	T2	T2
0	🟥	0.773		1	T2	T2	T2	T2	T2
0.320	🟥	0.379		1	T2	T2	T2	T2	T2
0.340	🟥	1.333		1	T2	T2	-	T2	T2
0.350	🟥	1.525		1	T2	T2	-	T2	T2
0.290	🟥	0.563		1	T2	T2	T2	T2	T2
0.200	🟥	0.433		1	T2	T2	T2	T2	T2
0.180	🟥	5.551	Y	1	-	-	-	-	T2
0.290	🟥	0.342		1	T2	T2	T2	T2	T2
0	🟥	0.304		1	T2	T2	T2	T2	T2
0	🟥	0.545		1	T2	T2	T2	T2	T2
0.350	🟥	0.635		1	T2	T2	T2	T2	T2
0.350	🟥	0.881		1	T2	T2	T2	T2	T2
0.330	🟥	0.746		1	T2	T2	T2	T2	T2
0.350	🟥	0.239		1	T2	T2	T2	T2	T2
0.150	🟥	0.727		1	T2	T2	T2	T2	T2
0.200	🟥	1.097		1	T2	T2	T2	T2	T2
0	🟥	38.448	Y	1	-	-	-	-	-
0.330	🟥	0.126		1	T2	T2	T2	T2	T2
0	🟥	0.572		1	T2	T2	T2	T2	T2
0.300	🟥	0.646		1	T2	T2	T2	T2	T2
0.190	🟥	0.623		1	T2	T2	T2	T2	T2
0.340	🟥	0.388		1	T2	T2	T2	T2	T2
0.310	🟥	0.610		1	T2	T2	T2	T2	T2
0.340	🟥	0.647		1	T2	T2	T2	T2	T2
0.300	🟥	0.362		1	T2	T2	T2	T2	T2
0.270	🟥	2.233	Y	1	T2	T2	-	T2	T2
0.240	🟥	0.656		1	T2	T2	T2	T2	T2
0.270	🟥	3.760	Y	1	-	T2	-	-	T2
0.330	🟥	0.184		1	T2	T2	T2	T2	T2
0.330	🟥	0.655		1	T2	T2	T2	T2	T2
0.190	🟥	0.539		1	T2	T2	T2	T2	T2
0.200	🟥	0.404		1	T2	T2	T2	T2	T2
0.310	🟥	0.766		1	T2	T2	T2	T2	T2
0.330	🟥	0.515		1	T2	T2	T2	T2	T2
0.250	🟥	1.008		1	T2	T2	T2	T2	T2
0.300	🟥	0.370		1	T2	T2	T2	T2	T2
0.340	🟥	0.395		1	T2	T2	T2	T2	T2
0.300	🟥	16.679	Y	1	-	-	-	-	-
0	🟥	0.712		1	T2	T2	T2	T2	T2
0	🟥	0.158		1	T2	T2	T2	T2	T2
0.330	🟥	0.478		1	T2	T2	T2	T2	T2
0.330	🟥	0.759		1	T2	T2	T2	T2	T2
0.310	🟥	0.394		1	T2	T2	T2	T2	T2
0.350	🟥	0.288		1	T2	T2	T2	T2	T2
0.310	🟥	0.137		1	T2	T2	T2	T2	T2
0.000	🟥	0.240		1	T2	T2	T2	T2	T2
0.350	🟥	0.161		1	T2	T2	T2	T2	T2
0.280	🟥	0.409		1	T2	T2	T2	T2	T2
0.130	🟥	0.150		1	T2	T2	T2	T2	T2
0.300	🟥	0.398		1	T2	T2	T2	T2	T2
0.150	🟥	0.229		1	T2	T2	T2	T2	T2
0.350	🟥	0.623		1	T2	T2	T2	T2	T2
0.350	🟥	0.524		1	T2	T2	T2	T2	T2
0.200	🟥	0.445		1	T2	T2	T2	T2	T2
0.240	🟥	0.322		1	T2	T2	T2	T2	T2
0.330	🟥	0.365		1	T2	T2	T2	T2	T2
0.200	🟥	0.358		1	T2	T2	T2	T2	T2
0.290	🟥	0.317		1	T2	T2	T2	T2	T2
				109	9	5	22	8	0
				240	97	102	91	97	105
					106	107	113	105	105

Reproductive Response	b	OC Norm PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
5.31	b	0.529		2x mean NOEC	1.2	0	-	-	-	-	-
3.23	b	0.260		Median NOEC	0.4	0	-	-	-	-	-
2.87	b	0.130				0	-	-	-	-	-
3.01	b	0.171		ER-L	2.2	0	-	-	-	-	-
2.85	b	2.213	Y	ER-M	4.3	0	T1	-	T1	T1	-
0.86	b	0.103		15th Percentile E	2.4	0	-	-	-	-	-
0.656	b	2.666	Y	TEL	0.9	0	T1	-	T1	T1	-
1.18	b	0.598		85th Percentile NE	0.8	0	-	-	-	-	-
0.508	b	0.121		PEL	1.9	0	-	-	-	-	-
0.61	b	0.456		AET	2.7	0	-	-	-	-	-
0.906	b	0.123				0	-	-	-	-	-
0.464	b	0.403			6	0	-	-	-	-	-
1.94	b	0.919		Effects Data N	3	0	-	-	-	-	-
1.59	b	0.305				0	-	-	-	-	-
1.61	b	0.387		**Effects Data Set**		0	-	-	-	-	-
1.45	b	0.324		1.62		0	-	-	-	-	-
0.47		0.014		4.29		1	T2	T2	T2	T2	T2
0.29		0.032		13.71		1	T2	T2	T2	T2	T2
0.07		0.252				1	T2	T2	T2	T2	T2
0		1.616	Y			1	T2	T2	-	T2	T2
0		0.082				1	T2	T2	T2	T2	T2
0.1		0.018				1	T2	T2	T2	T2	T2
0		0.017				1	T2	T2	T2	T2	T2
0.01		0.204				1	T2	T2	T2	T2	T2
0		0.218				1	T2	T2	T2	T2	T2
0.025		0.023				1	T2	T2	T2	T2	T2
0.079		4.288	Y			1	-	-	-	-	-
0		0.211				1	T2	T2	T2	T2	T2
0.47		0.588				1	T2	T2	T2	T2	T2
0.55		1.236	Y			1	T2	T2	-	T2	T2
0.21		0.510				1	T2	T2	T2	T2	T2
0.21		0.111				1	T2	T2	T2	T2	T2
0.12		0.145				1	T2	T2	T2	T2	T2
0		0.755				1	T2	T2	T2	T2	T2
0.74		0.243				1	T2	T2	T2	T2	T2
0.15		0.074				1	T2	T2	T2	T2	T2
0.85		0.047				1	T2	T2	T2	T2	T2
0.77		0.039				1	T2	T2	T2	T2	T2
0.6		0.287				1	T2	T2	T2	T2	T2
0.26		0.297				1	T2	T2	T2	T2	T2
0		0.170				1	T2	T2	T2	T2	T2
0		0.399				1	T2	T2	T2	T2	T2
0.95		0.324				1	T2	T2	T2	T2	T2
0		1.069				1	T2	T2	-	T2	T2
0		0.227				1	T2	T2	T2	T2	T2
0.39		0.255				1	T2	T2	T2	T2	T2
0.67		0.257				1	T2	T2	T2	T2	T2
0.23		0.150				1	T2	T2	T2	T2	T2
0		0.140				1	T2	T2	T2	T2	T2
0		0.218				1	T2	T2	T2	T2	T2
0		0.090				1	T2	T2	T2	T2	T2
0		0.448				1	T2	T2	T2	T2	T2
0.38		0.087				1	T2	T2	T2	T2	T2
0		0.334				1	T2	T2	T2	T2	T2
0		0.452				1	T2	T2	T2	T2	T2
0		0.162				1	T2	T2	T2	T2	T2
0		0.203				1	T2	T2	T2	T2	T2
0		0.141				1	T2	T2	T2	T2	T2
0		0.870				1	T2	T2	T2	T2	T2
0		13.714	Y			1	-	-	-	-	-
0.32		0.200				1	T2	T2	T2	T2	T2
0		0.411				1	T2	T2	T2	T2	T2
0.54		0.079				1	T2	T2	T2	T2	T2
0.082		0.050				1	T2	T2	T2	T2	T2
0.292		0.066				1	T2	T2	T2	T2	T2
0.358		0.063				1	T2	T2	T2	T2	T2
0.142		0.099				1	T2	T2	T2	T2	T2
0		0.113				1	T2	T2	T2	T2	T2
0.126		0.057				1	T2	T2	T2	T2	T2
0.356		0.082				1	T2	T2	T2	T2	T2
0.364		0.023				1	T2	T2	T2	T2	T2
0.36		0.055				1	T2	T2	T2	T2	T2
0.072		0.092				1	T2	T2	T2	T2	T2
0		0.319				1	T2	T2	T2	T2	T2
0.032		0.115				1	T2	T2	T2	T2	T2
0.074		0.040				1	T2	T2	T2	T2	T2
0.144		0.107				1	T2	T2	T2	T2	T2
0.154		0.049				1	T2	T2	T2	T2	T2
0.112		0.056				1	T2	T2	T2	T2	T2
0.05		0.014				1	T2	T2	T2	T2	T2
						64	2	0	2	2	0
						80	62	62	59	62	62
							64	62	61	64	62

Average Survival Rate	b	OC Norm PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
87	b	2.666	Y	2x mean NOEC	0.5	0	T1	T1	T1	T1	-
87	b	0.456		Median NOEC	0.1	0	-	-	T1	-	-
91	b	0.082				0	-	-	-	-	-
88	b	0.023		ER-L	0.6	0	-	-	-	-	-
87	b	0.055		ER-M	1.0	0	-	-	-	-	-
87	b	0.123		15th Percentile E	0.6	0	-	-	-	-	-
88	b	0.403		TEL	0.2	0	-	-	T1	-	-
77	b	0.014		85th Percentile NE	0.3	0	-	-	-	-	-
71	b	0.032		PEL	0.6	0	-	-	-	-	-
80	b	0.204		AET	2.7	0	-	-	-	-	-
76	b	0.076				0	-	-	-	-	-
69	b	0.047			17	0	-	-	-	-	-
76	b	0.387		Effects Data N	16	0	-	-	T1	-	-
72	b	0.074				0	-	-	-	-	-
80	b	0.050		**Effects Data Set**		0	-	-	-	-	-
80	b	0.066		1.616		0	-	-	-	-	-
82	b	0.063		0.798		0	-	-	-	-	-
79	b	0.103		3.801		0	-	-	-	-	-
84	b	0.099		1.528		0	-	-	-	-	-
84	b	0.121		0.919		0	-	-	-	-	-
85	b	0.115		0.529		0	-	-	-	-	-
78	b	0.040		4.288		0	-	-	-	-	-
81	b	0.107		0.588		0	-	-	-	-	-
54		0.252		1.236		1	T2	T2	-	T2	T2
48		1.616	Y	0.510		1	-	-	-	-	T2
56		0.082		0.755		1	T2	T2	T2	T2	T2
53		0.018		2.213		1	T2	T2	T2	T2	T2
63		0.017		1.069		1	T2	T2	T2	T2	T2
68		0.218		0.870		1	T2	T2	T2	T2	T2
80		0.023		13.714		1	T2	T2	T2	T2	T2
61		0.127		0.6		1	T2	T2	T2	T2	T2
50		0.060				1	T2	T2	T2	T2	T2
37		0.798	Y			1	-	T2	-	-	T2
35		0.219				1	T2	T2	T2	T2	T2
1		3.801	Y			1	-	-	-	-	-
62		0.076				1	T2	T2	T2	T2	T2
30		0.074				1	T2	T2	T2	T2	T2
54		1.528	Y			1	-	-	-	-	T2
42		0.919	Y			1	-	T2	-	-	T2
40		0.529	Y			1	T2	T2	-	T2	T2
15		4.288	Y			1	-	-	-	-	-
42		0.260				1	T2	T2	-	T2	T2
25		0.305				1	T2	T2	-	T2	T2
0		0.211				1	T2	T2	T2	T2	T2
63		0.588	Y			1	-	T2	-	-	T2
24		1.236	Y			1	-	-	-	-	T2
15		0.510	Y			1	T2	T2	-	T2	T2
33		0.111				1	T2	T2	T2	T2	T2
17		0.130				1	T2	T2	T2	T2	T2
66		0.171				1	T2	T2	T2	T2	T2
3		0.324				1	T2	T2	-	T2	T2
23		0.145				1	T2	T2	T2	T2	T2
15		0.755	Y			1	-	T2	-	-	T2
58		0.243				1	T2	T2	-	T2	T2
37		2.213	Y			1	-	-	-	-	T2
36		0.047				1	T2	T2	T2	T2	T2
34		0.039				1	T2	T2	T2	T2	T2
62		0.287				1	T2	T2	-	T2	T2
65		0.297				1	T2	T2	-	T2	T2
0		0.170				1	T2	T2	T2	T2	T2
7		0.399				1	T2	T2	-	T2	T2
42		0.324				1	T2	T2	-	T2	T2
0		1.069	Y			1	-	-	-	-	T2
0		0.227				1	T2	T2	-	T2	T2
45		0.255				1	T2	T2	-	T2	T2
29		0.257				1	T2	T2	-	T2	T2
32		0.150				1	T2	T2	T2	T2	T2
3		0.140				1	T2	T2	T2	T2	T2
12		0.218				1	T2	T2	T2	T2	T2
14		0.090				1	T2	T2	T2	T2	T2
4		0.448				1	T2	T2	-	T2	T2
36		0.087				1	T2	T2	T2	T2	T2
23		0.334				1	T2	T2	-	T2	T2
0		0.452				1	T2	T2	-	T2	T2
19		0.162				1	T2	T2	T2	T2	T2
16		0.203				1	T2	T2	T2	T2	T2
2		0.141				1	T2	T2	T2	T2	T2
0		0.870	Y			1	-	T2	-	-	T2
0		13.714	Y			1	-	-	-	-	-
26		0.200				1	T2	T2	T2	T2	T2
6		0.411				1	T2	T2	-	T2	T2
39		0.079				1	T2	T2	T2	T2	T2
70		0.598	Y			1	-	T2	-	-	T2
60		0.113				1	T2	T2	T2	T2	T2
67		0.057				1	T2	T2	T2	T2	T2
41		0.092				1	T2	T2	T2	T2	T2
1		0.319				1	T2	T2	-	T2	T2
66		0.049				1	T2	T2	T2	T2	T2
74		0.056				1	T2	T2	T2	T2	T2
72		0.014				1	T2	T2	T2	T2	T2
						67	1	1	4	1	0
						90	53	59	34	53	64
							54	60	38	54	64

Survivor's Average Weight	b	OC Norm PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.37	b	0.076		2x mean NOEC	0.8	0	-	-	-	-	-
0.35	b	0.047		Median NOEC	0.2	0	-	-	-	-	-
0.350	b	0.919	Y			0	-	-	T1	-	-
0.302	b	4.288	Y	ER-L	1.0	0	T1	T1	T1	T1	-
0.362	b	0.260		ER-M	1.6	0	-	-	-	-	-
0.308	b	0.305		15th Percentile E	1.0	0	-	-	-	-	-
0.400	b	0.588		TEL	0.5	0	-	-	T1	-	-
0.500	b	1.236	Y	85th Percentile NE	0.6	0	T1	-	T1	T1	-
0.286	b	0.510		PEL	1	0	-	-	T1	-	-
0.406	b	0.111		AET	4.3	0	-	-	-	-	-
0.294	b	0.387				0	-	-	-	-	-
0.398	b	0.130			11	0	-	-	-	-	-
0.316	b	0.171		Effects Data N	7	0	-	-	-	-	-
0.250	b	0.324				0	-	-	-	-	-
0.264	b	0.145		**Effects Data Set**		0	-	-	-	-	-
0.452	b	0.755		1.616		0	-	-	T1	-	-
0.384	b	2.213	Y	3.801		0	T1	T1	T1	T1	-
0.39	b	0.287		1.528		0	-	-	-	-	-
0.408	b	0.297		1.069		0	-	-	-	-	-
0.45	b	0.399		0.870		0	-	-	-	-	-
0.39	b	0.324		13.714		0	-	-	-	-	-
0.532	b	0.255		2.666		0	-	-	-	-	-
0.512	b	0.257				0	-	-	-	-	-
0.528	b	0.162				0	-	-	-	-	-
0.438	b	0.203				0	-	-	-	-	-
0.55	b	0.411				0	-	-	-	-	-
0.756	b	0.598				0	-	-	T1	-	-
0.712	b	0.456				0	-	-	-	-	-
0.70	b	0.014				0	-	-	-	-	-
0.234	b	0.243				0	-	-	-	-	-
0.230	b	0.074				0	-	-	-	-	-
0.58	b	0.050				0	-	-	-	-	-
0.62	b	0.103				0	-	-	-	-	-
0.592	b	0.057				0	-	-	-	-	-
0.556	b	0.082				0	-	-	-	-	-
0.65	b	0.115				0	-	-	-	-	-
0.744	b	0.056				0	-	-	-	-	-
0.282	b	0.047				0	-	-	-	-	-
0.29	b	0.150				0	-	-	-	-	-
0.34	b	0.218				0	-	-	-	-	-
0.302	b	0.087				0	-	-	-	-	-
0.326	b	0.334				0	-	-	-	-	-
0.334	b	0.079				0	-	-	-	-	-
0.60	🟥	0.032				1	T2	T2	T2	T2	T2
0.42	🟥	0.252				1	T2	T2	T2	T2	T2
0.51	🟥	1.616	Y			1	-	T2	-	-	T2
0.43	🟥	0.082				1	T2	T2	T2	T2	T2
0.47	🟥	0.018				1	T2	T2	T2	T2	T2
0.61	🟥	0.017				1	T2	T2	T2	T2	T2
0.46	🟥	0.204				1	T2	T2	T2	T2	T2
0.46	🟥	0.218				1	T2	T2	T2	T2	T2
0.63	🟥	0.023				1	T2	T2	T2	T2	T2
0.17	🟥	0.127				1	T2	T2	T2	T2	T2
0.10	🟥	0.060				1	T2	T2	T2	T2	T2
0.11	🟥	0.798				1	T2	T2	-	T2	T2
0.08	🟥	0.219				1	T2	T2	T2	T2	T2
0.02	🟥	3.801	Y			1	-	-	-	-	T2
0.17	🟥	0.076				1	T2	T2	T2	T2	T2
0.09	🟥	0.074				1	T2	T2	T2	T2	T2
0.15	🟥	1.528	Y			1	-	T2	-	-	T2
0.178	🟥	0.529				1	T2	T2	-	T2	T2
0	🟥	0.211				1	T2	T2	T2	T2	T2
0.272	🟥	0.039				1	T2	T2	T2	T2	T2
0	🟥	0.170				1	T2	T2	T2	T2	T2
0	🟥	1.069	Y			1	-	T2	-	-	T2
0	🟥	0.227				1	T2	T2	T2	T2	T2
0.14	🟥	0.140				1	T2	T2	T2	T2	T2
0.26	🟥	0.090				1	T2	T2	T2	T2	T2
0.25	🟥	0.448				1	T2	T2	T2	T2	T2
0	🟥	0.452				1	T2	T2	T2	T2	T2
0.1	🟥	0.141				1	T2	T2	T2	T2	T2
0	🟥	0.870	Y			1	T2	T2	-	T2	T2
0	🟥	13.714	Y			1	-	-	-	-	-
0.208	🟥	0.200				1	T2	T2	T2	T2	T2
0.358	🟥	0.066				1	T2	T2	T2	T2	T2
0.488	🟥	0.063				1	T2	T2	T2	T2	T2
0.378	🟥	2.666	Y			1	-	-	-	-	T2
0.382	🟥	0.099				1	T2	T2	T2	T2	T2
0.426	🟥	0.121				1	T2	T2	T2	T2	T2
0.34	🟥	0.113				1	T2	T2	T2	T2	T2
0.322	🟥	0.023				1	T2	T2	T2	T2	T2
0.534	🟥	0.055				1	T2	T2	T2	T2	T2
0.322	🟥	0.092				1	T2	T2	T2	T2	T2
0.1	🟥	0.319				1	T2	T2	T2	T2	T2
0.43	🟥	0.123				1	T2	T2	T2	T2	T2
0.426	🟥	0.403				1	T2	T2	T2	T2	T2
0.352	🟥	0.040				1	T2	T2	T2	T2	T2
0.318	🟥	0.107				1	T2	T2	T2	T2	T2
0.458	🟥	0.049				1	T2	T2	T2	T2	T2
0.402	🟥	0.014				1	T2	T2	T2	T2	T2
						47	3	2	8	3	0
						90	41	44	38	41	46
							44	46	46	44	46

APPENDIX H - Amphipod Tox - Lead

Reproductive Response	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
5.31	b	2.2		2x mean NOEC	58.1	0	-	-	-	-	-
3.23	b	8		Median NOEC	27.0	0	-	-	-	-	-
2.87	b	15				0	-	-	-	-	-
3.01	b	23		ER-L	66.3	0	-	-	-	-	-
2.85	b	27		ER-M	238.0	0	-	-	-	-	-
0.86	b	25.8		15th Percentile E	74.3	0	-	-	-	-	-
0.656	b	6.55		TEL	44.8	0	-	-	-	-	-
1.18	b	27.8		85th Percentile NE	33.1	0	-	-	-	-	-
0.508	b	28.9		PEL	88.7	0	-	-	-	-	-
0.61	b	40.9		AET	177	0	-	-	-	-	-
0.906	b	177	Y			0	T1	-	T1	T1	-
0.464	b	29.7			10	0	-	-	-	-	-
2.58	b	27.9		Effects Data N	9	0	-	-	-	-	-
2.06	b	25.4				0	-	-	-	-	-
1.88	b	26.9		**Effects Data Set**		0	-	-	-	-	-
1.56	b	15.9		419		0	-	-	-	-	-
1.625	b	30.4		154		0	-	-	-	-	-
3.64	b	24.3		387		0	-	-	-	-	-
1.733	b	25.3		1190		0	-	-	-	-	-
1.682	b	29.6		275		0	-	-	-	-	-
1.571	b	31		99.8		0	-	-	-	-	-
2.833	b	27.2		238		0	-	-	-	-	-
2.25	b	29.3		68		0	-	-	-	-	-
1.91	b	24.8		60.1		0	-	-	-	-	-
2.27	b	33.3				0	-	-	-	-	-
2.17	b	34.5				0	-	-	-	-	-
1.625	b	33.8				0	-	-	-	-	-
1.94	b	8.9				0	-	-	-	-	-
1.59	b	20				0	-	-	-	-	-
1.61	b	23				0	-	-	-	-	-
1.45	b	28				0	-	-	-	-	-
1.38	b	14.6				0	-	-	-	-	-
1.42	b	33				0	-	-	-	-	-
0.36		23.3				1	T2	T2	T2	T2	T2
0.47		32				1	T2	T2	T2	T2	T2
0.29		18				1	T2	T2	T2	T2	T2
0.07		21				1	T2	T2	T2	T2	T2
0		20				1	T2	T2	T2	T2	T2
0		36				1	T2	T2	T2	T2	T2
0.1		12				1	T2	T2	T2	T2	T2
0		18				1	T2	T2	T2	T2	T2
0.01		29				1	T2	T2	T2	T2	T2
0		27				1	T2	T2	T2	T2	T2
0.025		14				1	T2	T2	T2	T2	T2
0.079		15				1	T2	T2	T2	T2	T2
0		12				1	T2	T2	T2	T2	T2
0.47		28				1	T2	T2	T2	T2	T2
0.55		34				1	T2	T2	T2	T2	T2
0.21		46				1	T2	T2	-	T2	T2
0.21		16				1	T2	T2	T2	T2	T2
0.12		13				1	T2	T2	T2	T2	T2
0		29				1	T2	T2	T2	T2	T2
0.74		27				1	T2	T2	T2	T2	T2
0.15		3.9				1	T2	T2	T2	T2	T2
0.85		12.4				1	T2	T2	T2	T2	T2
0.77		16.6				1	T2	T2	T2	T2	T2
0.6		25.8				1	T2	T2	T2	T2	T2
0.26		29.1				1	T2	T2	T2	T2	T2
0		25.4				1	T2	T2	T2	T2	T2
0		5.85				1	T2	T2	T2	T2	T2
0.95		42.1				1	T2	T2	T2	T2	T2
0		52				1	T2	T2	-	T2	T2
0		25.3				1	T2	T2	T2	T2	T2
0.39		29.5				1	T2	T2	T2	T2	T2
0.67		28.8				1	T2	T2	T2	T2	T2
0.23		419	Y			1	-	-	-	-	-
0		35.5				1	T2	T2	T2	T2	T2
0		20.3				1	T2	T2	T2	T2	T2
0		24.2				1	T2	T2	T2	T2	T2
0		25.7				1	T2	T2	T2	T2	T2
0.38		22.9				1	T2	T2	T2	T2	T2
0		154	Y			1	-	T2	-	-	T2
0		16.3				1	T2	T2	T2	T2	T2
0		17.2				1	T2	T2	T2	T2	T2
0		60.1	Y			1	T2	T2	-	T2	T2
0		32				1	T2	T2	T2	T2	T2
0		387	Y			1	-	-	-	-	-
0		1190	Y			1	-	-	-	-	-
0.32		15.4				1	T2	T2	T2	T2	T2
0		27.2				1	T2	T2	T2	T2	T2
0.54		27.6				1	T2	T2	T2	T2	T2
0.082		26.8				1	T2	T2	T2	T2	T2
0.292		17.3				1	T2	T2	T2	T2	T2
0.358		18.1				1	T2	T2	T2	T2	T2
0.142		25.7				1	T2	T2	T2	T2	T2
0		26.4				1	T2	T2	T2	T2	T2
0.126		31.9				1	T2	T2	T2	T2	T2
0.356		27.9				1	T2	T2	T2	T2	T2
0.364		4.29				1	T2	T2	T2	T2	T2
0.072		44.2				1	T2	T2	T2	T2	T2
0		275	Y			1	-	-	-	-	-
0.032		14.9				1	T2	T2	T2	T2	T2
0.074		28.6				1	T2	T2	T2	T2	T2
0.144		2.53				1	T2	T2	T2	T2	T2
0.154		27.2				1	T2	T2	T2	T2	T2
0.112		30				1	T2	T2	T2	T2	T2
0.05		17.4				1	T2	T2	T2	T2	T2
0		48.6				1	T2	T2	-	T2	T2
0		39.9				1	T2	T2	T2	T2	T2
0		16.5				1	T2	T2	T2	T2	T2
0		13.9				1	T2	T2	T2	T2	T2
0.269		33.6				1	T2	T2	T2	T2	T2
0		30.7				1	T2	T2	T2	T2	T2
0		33.9				1	T2	T2	T2	T2	T2
0		27.8				1	T2	T2	T2	T2	T2
0		8.72				1	T2	T2	T2	T2	T2
0		17.7				1	T2	T2	T2	T2	T2
0		27.7				1	T2	T2	T2	T2	T2
0		23.3				1	T2	T2	T2	T2	T2
0.389		30.8				1	T2	T2	T2	T2	T2
0		25.8				1	T2	T2	T2	T2	T2
0		56.7				1	T2	T2	-	T2	T2
0		36.2				1	T2	T2	T2	T2	T2
0.35		13.3				1	T2	T2	T2	T2	T2
0		35.7				1	T2	T2	T2	T2	T2
0		11				1	T2	T2	T2	T2	T2
0		27				1	T2	T2	T2	T2	T2
0		25.4				1	T2	T2	T2	T2	T2
0		29.5				1	T2	T2	T2	T2	T2
0.125		25.6				1	T2	T2	T2	T2	T2
0.727		31.9				1	T2	T2	T2	T2	T2
0		36.2				1	T2	T2	T2	T2	T2
0.0769		51.8				1	T2	T2	-	T2	T2
0		33.8				1	T2	T2	T2	T2	T2
0.45		23.3				1	T2	T2	T2	T2	T2
0		38.3				1	T2	T2	T2	T2	T2
0		20.6				1	T2	T2	T2	T2	T2
0		26.7				1	T2	T2	T2	T2	T2

Average Survival Rate	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
87	b	6.55		2x mean NOEC	53.5	0	-	-	-	-	-
87	b	40.9		Median NOEC	26.4	0	-	-	T1	-	-
91	b	27.9				0	-	-	-	-	-
88	b	4.29		ER-L	59.8	0	-	-	-	-	-
87	b	23.3		ER-M	196.0	0	-	-	-	-	-
87	b	177	Y	15th Percentile E	62.8	0	T1	-	T1	T1	-
88	b	29.7		TEL	40.8	0	-	-	-	-	-
100	b	27.9		85th Percentile NE	39.9	0	-	-	-	-	-
90	b	25.4		PEL	88.4	0	-	-	-	-	-
90	b	26.9		AET	177	0	-	-	-	-	-
100	b	26.9				0	-	-	-	-	-
90	b	15.9			11	0	-	-	-	-	-
95	b	27.5		Effects Data N	10	0	-	-	-	-	-
100	b	3.9				0	-	-	-	-	-
100	b	21.9		**Effects Data Set**		0	-	-	-	-	-
100	b	26.5		419		0	-	-	-	-	-
90	b	24.3		154		0	-	-	-	-	-
100	b	25.3		387		0	-	-	-	-	-
90	b	25.3		1190		0	-	-	-	-	-
100	b	29.6		275		0	-	-	-	-	-
95	b	31		99.8		0	-	-	-	-	-
100	b	32.4		238		0	-	-	-	-	-
100	b	27.2		68		0	-	-	-	-	-
90	b	26.4		60.1		0	-	-	-	-	-
95	b	28.9		56.7		0	-	-	-	-	-
100	b	34.1				0	-	-	-	-	-
100	b	24.8				0	-	-	-	-	-
90	b	36.6				0	-	-	-	-	-
100	b	33.3				0	-	-	-	-	-
90	b	33				0	-	-	-	-	-
95	b	33.8				0	-	-	-	-	-
77	b	32				0	-	-	-	-	-
71	b	18				0	-	-	-	-	-
80	b	29				0	-	-	-	-	-
80	b	14				0	-	-	-	-	-
80	b	26.8				0	-	-	-	-	-
80	b	17.3				0	-	-	-	-	-
82	b	18.1				0	-	-	-	-	-
79	b	25.8				0	-	-	-	-	-
84	b	25.7				0	-	-	-	-	-
84	b	28.9				0	-	-	-	-	-
85	b	14.9				0	-	-	-	-	-
78	b	28.6				0	-	-	-	-	-
81	b	2.53				0	-	-	-	-	-
76	b	7.5				0	-	-	-	-	-
69	b	9.4				0	-	-	-	-	-
72	b	3.9				0	-	-	-	-	-
76	b	23				0	-	-	-	-	-
54		21				1	T2	T2	T2	T2	T2
48		20				1	T2	T2	T2	T2	T2
56		36				1	T2	T2	T2	T2	T2
53		12				1	T2	T2	T2	T2	T2
63		18				1	T2	T2	T2	T2	T2
68		27				1	T2	T2	T2	T2	T2
61		28				1	T2	T2	T2	T2	T2
50		17				1	T2	T2	T2	T2	T2
37		24				1	T2	T2	T2	T2	T2
35		47				1	T2	T2	-	T2	T2
1		43				1	T2	T2	-	T2	T2
62		22				1	T2	T2	T2	T2	T2
30		21				1	T2	T2	T2	T2	T2
54		26				1	T2	T2	T2	T2	T2
42		8.9				1	T2	T2	T2	T2	T2
40		2.2				1	T2	T2	T2	T2	T2
15		15				1	T2	T2	T2	T2	T2
42		8				1	T2	T2	T2	T2	T2
25		20				1	T2	T2	T2	T2	T2
0		12				1	T2	T2	T2	T2	T2
63		28				1	T2	T2	T2	T2	T2
24		34				1	T2	T2	T2	T2	T2
15		46				1	T2	T2	-	T2	T2
33		16				1	T2	T2	T2	T2	T2
17		15				1	T2	T2	T2	T2	T2
66		23				1	T2	T2	T2	T2	T2
3		28				1	T2	T2	T2	T2	T2
23		13				1	T2	T2	T2	T2	T2
15		29				1	T2	T2	T2	T2	T2
58		27				1	T2	T2	T2	T2	T2
37		27				1	T2	T2	T2	T2	T2
36		12.4				1	T2	T2	T2	T2	T2
34		16.6				1	T2	T2	T2	T2	T2
62		25.8				1	T2	T2	T2	T2	T2
65		29.1				1	T2	T2	T2	T2	T2
0		25.4				1	T2	T2	T2	T2	T2
7		5.85				1	T2	T2	T2	T2	T2
42		42.1				1	T2	T2	-	T2	T2
0		52				1	T2	T2	-	T2	T2
0		25.3				1	T2	T2	T2	T2	T2
45		29.5				1	T2	T2	T2	T2	T2
29		28.8				1	T2	T2	T2	T2	T2
32		419	Y			1	-	-	-	-	-
3		35.5				1	T2	T2	T2	T2	T2
12		20.3				1	T2	T2	T2	T2	T2
14		24.2				1	T2	T2	T2	T2	T2
4		25.7				1	T2	T2	T2	T2	T2
36		22.9				1	T2	T2	T2	T2	T2
23		154	Y			1	-	T2	-	-	T2
0		16.3				1	T2	T2	T2	T2	T2
19		17.2				1	T2	T2	T2	T2	T2
16		60.1	Y			1	-	T2	-	T2	T2
2		32				1	T2	T2	T2	T2	T2
0		387	Y			1	-	-	-	-	-
0		1190	Y			1	-	-	-	-	-
26		15.4				1	T2	T2	T2	T2	T2
6		27.2				1	T2	T2	T2	T2	T2
39		27.6				1	T2	T2	T2	T2	T2
70		27.8				1	T2	T2	T2	T2	T2
60		26.4				1	T2	T2	T2	T2	T2
67		31.9				1	T2	T2	T2	T2	T2
41		44.2				1	T2	T2	-	T2	T2
1		275	Y			1	-	-	-	-	-
66		27.2				1	T2	T2	T2	T2	T2
74		30				1	T2	T2	T2	T2	T2
72		17.4				1	T2	T2	T2	T2	T2
55		48.6				1	T2	T2	-	T2	T2
0		39.9				1	T2	T2	T2	T2	T2
20		16.5				1	T2	T2	T2	T2	T2
70		13.9				1	T2	T2	T2	T2	T2
75		33.6				1	T2	T2	T2	T2	T2
80		30.7				1	T2	T2	T2	T2	T2
70		33.9				1	T2	T2	T2	T2	T2
0		27.8				1	T2	T2	T2	T2	T2
50		8.72				1	T2	T2	T2	T2	T2
75		17.7				1	T2	T2	T2	T2	T2
75		27.7				1	T2	T2	T2	T2	T2
50		23.3				1	T2	T2	T2	T2	T2
80		30.8				1	T2	T2	T2	T2	T2
25		25.8				1	T2	T2	T2	T2	T2

APPENDIX H - Amphipod Tox - Lead

Reproductive Response	b	Lead		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0		37.3		1	T2	T2	T2	T2	T2
0		27.1		1	T2	T2	T2	T2	T2
0		9.13		1	T2	T2	T2	T2	T2
1.0		26.9		1	T2	T2	T2	T2	T2
0		12.6		1	T2	T2	T2	T2	T2
0		25.1		1	T2	T2	T2	T2	T2
0		99.8	Y	1	-	T2	-	-	T2
0		238	Y	1	-	-	-	-	-
0		48.2		1	T2	T2	-	T2	T2
0.2308		5.74		1	T2	T2	T2	T2	T2
0		44.8		1	T2	T2	-	T2	T2
0		32.6		1	T2	T2	T2	T2	T2
0		38.8		1	T2	T2	T2	T2	T2
0		42.9		1	T2	T2	T2	T2	T2
0.269		26.6		1	T2	T2	T2	T2	T2
0.167		21.3		1	T2	T2	T2	T2	T2
0		30.5		1	T2	T2	T2	T2	T2
0		29.1		1	T2	T2	T2	T2	T2
0		40.9		1	T2	T2	T2	T2	T2
0		27.2		1	T2	T2	T2	T2	T2
0		24.8		1	T2	T2	T2	T2	T2
0.9		12.8		1	T2	T2	T2	T2	T2
0.375		13.7		1	T2	T2	T2	T2	T2
0		14		1	T2	T2	T2	T2	T2
0		29.4		1	T2	T2	T2	T2	T2
0		25.10		1	T2	T2	T2	T2	T2
0		37.9		1	T2	T2	T2	T2	T2
0.375		24.5		1	T2	T2	T2	T2	T2
0.611		32.3		1	T2	T2	T2	T2	T2
0		28		1	T2	T2	T2	T2	T2
0		34.1		1	T2	T2	T2	T2	T2
0		41.2		1	T2	T2	T2	T2	T2
0		32.8		1	T2	T2	T2	T2	T2
0.167		34.6		1	T2	T2	T2	T2	T2
0.654		27.5		1	T2	T2	T2	T2	T2
0		12.5		1	T2	T2	T2	T2	T2
0		42.3		1	T2	T2	T2	T2	T2
0		24.3		1	T2	T2	T2	T2	T2
0		28.7		1	T2	T2	T2	T2	T2
0.6		34.3		1	T2	T2	T2	T2	T2
0		31.3		1	T2	T2	T2	T2	T2
0		29.7		1	T2	T2	T2	T2	T2
0		39.9		1	T2	T2	T2	T2	T2
0		30.9		1	T2	T2	T2	T2	T2
0.15		28.6		1	T2	T2	T2	T2	T2
0.688		30.9		1	T2	T2	T2	T2	T2
0		21.90		1	T2	T2	T2	T2	T2
0		32.8		1	T2	T2	T2	T2	T2
0		31.5		1	T2	T2	T2	T2	T2
0		30.9		1	T2	T2	T2	T2	T2
0		67.9	Y	1	-	T2	-	T2	T2
0		40.5		1	T2	T2	T2	T2	T2
0		28.8		1	T2	T2	T2	T2	T2
0		41.5		1	T2	T2	T2	T2	T2
0		41.9		1	T2	T2	T2	T2	T2
0		5.75		1	T2	T2	T2	T2	T2
0.25		4.36		1	T2	T2	T2	T2	T2
0		22.90		1	T2	T2	T2	T2	T2
0.909		3.9		1	T2	T2	T2	T2	T2
0		25.2		1	T2	T2	T2	T2	T2
0		23.8		1	T2	T2	T2	T2	T2
0.8		22.5		1	T2	T2	T2	T2	T2
1.04		21.9		1	T2	T2	T2	T2	T2
0.833		26.5		1	T2	T2	T2	T2	T2
0.938		25.3		1	T2	T2	T2	T2	T2
0.5		27.7		1	T2	T2	T2	T2	T2
0		31.2		1	T2	T2	T2	T2	T2
0.2		35.6		1	T2	T2	T2	T2	T2
0		40.3		1	T2	T2	T2	T2	T2
0		51.6		1	T2	T2	-	T2	T2
0.083		27.1		1	T2	T2	T2	T2	T2
0.556		24.5		1	T2	T2	T2	T2	T2
1.111		29.9		1	T2	T2	T2	T2	T2
0.571		47		1	T2	T2	-	T2	T2
0.792		32.4		1	T2	T2	T2	T2	T2
0.643		26.4		1	T2	T2	T2	T2	T2
0		29.5		1	T2	T2	T2	T2	T2
0.708		28.9		1	T2	T2	T2	T2	T2
0.5		27.8		1	T2	T2	T2	T2	T2
0.818		26.7		1	T2	T2	T2	T2	T2
0		23.7		1	T2	T2	T2	T2	T2
0.778		34.1		1	T2	T2	T2	T2	T2
0		27.3		1	T2	T2	T2	T2	T2
0		39.7		1	T2	T2	T2	T2	T2
0.5		32.5		1	T2	T2	T2	T2	T2
0.917		37.2		1	T2	T2	T2	T2	T2
0		38.4		1	T2	T2	T2	T2	T2
0		36.6		1	T2	T2	T2	T2	T2
0		41.5		1	T2	T2	T2	T2	T2
0		45.3		1	T2	T2	-	T2	T2
0		36.1		1	T2	T2	T2	T2	T2
0		39.4		1	T2	T2	T2	T2	T2
0		33.6		1	T2	T2	T2	T2	T2
0		51.8		1	T2	T2	-	T2	T2
0		35		1	T2	T2	T2	T2	T2
0		35.7		1	T2	T2	T2	T2	T2
0.962		34.6		1	T2	T2	T2	T2	T2
0		38.4		1	T2	T2	T2	T2	T2
0		27		1	T2	T2	T2	T2	T2
0		27.1		1	T2	T2	T2	T2	T2
0		34.2		1	T2	T2	T2	T2	T2
0		25.9		1	T2	T2	T2	T2	T2
				197	1	0	1	1	0
				230	189	192	177	190	192
					190	192	178	191	192

Average Survival Rate	b	Lead		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
30		56.7	Y	1	T2	T2	-	T2	T2
55		36.2		1	T2	T2	T2	T2	T2
85		13.3		1	T2	T2	T2	T2	T2
80		14.6		1	T2	T2	T2	T2	T2
85		35.7		1	T2	T2	T2	T2	T2
85		11		1	T2	T2	T2	T2	T2
0		27		1	T2	T2	T2	T2	T2
0		25.4		1	T2	T2	T2	T2	T2
50		29.5		1	T2	T2	T2	T2	T2
75		25.6		1	T2	T2	T2	T2	T2
85		31.9		1	T2	T2	T2	T2	T2
55		36.2		1	T2	T2	T2	T2	T2
70		51.8		1	T2	T2	-	T2	T2
80		33.8		1	T2	T2	T2	T2	T2
60		23.3		1	T2	T2	T2	T2	T2
80		38.3		1	T2	T2	T2	T2	T2
40		20.6		1	T2	T2	T2	T2	T2
75		26.7		1	T2	T2	T2	T2	T2
50		37.3		1	T2	T2	T2	T2	T2
20		27.1		1	T2	T2	T2	T2	T2
10		9.13		1	T2	T2	T2	T2	T2
35		12.6		1	T2	T2	T2	T2	T2
10		25.1		1	T2	T2	T2	T2	T2
10		99.8	Y	1	-	T2	-	-	T2
0		238	Y	1	-	-	-	-	-
65		48.2		1	T2	T2	-	T2	T2
80		5.74		1	T2	T2	T2	T2	T2
60		44.8		1	T2	T2	-	T2	T2
0		32.6		1	T2	T2	T2	T2	T2
75		38.8		1	T2	T2	T2	T2	T2
65		42.9		1	T2	T2	-	T2	T2
85		26.6		1	T2	T2	T2	T2	T2
75		21.3		1	T2	T2	T2	T2	T2
80		30.5		1	T2	T2	T2	T2	T2
65		29.1		1	T2	T2	T2	T2	T2
80		40.9		1	T2	T2	-	T2	T2
15		27.2		1	T2	T2	T2	T2	T2
75		24.8		1	T2	T2	T2	T2	T2
85		12.8		1	T2	T2	T2	T2	T2
55		13.7		1	T2	T2	T2	T2	T2
60		14		1	T2	T2	T2	T2	T2
50		29.4		1	T2	T2	T2	T2	T2
80		25.1		1	T2	T2	T2	T2	T2
55		37.9		1	T2	T2	T2	T2	T2
80		24.5		1	T2	T2	T2	T2	T2
80		32.3		1	T2	T2	T2	T2	T2
35		28		1	T2	T2	T2	T2	T2
15		34.1		1	T2	T2	T2	T2	T2
65		41.2		1	T2	T2	-	T2	T2
55		32.8		1	T2	T2	T2	T2	T2
75		34.6		1	T2	T2	T2	T2	T2
50		12.5		1	T2	T2	T2	T2	T2
65		42.3		1	T2	T2	-	T2	T2
70		24.3		1	T2	T2	T2	T2	T2
55		28.7		1	T2	T2	T2	T2	T2
75		34.3		1	T2	T2	T2	T2	T2
45		31.3		1	T2	T2	T2	T2	T2
5		29.7		1	T2	T2	T2	T2	T2
85		30.4		1	T2	T2	T2	T2	T2
25		39.9		1	T2	T2	T2	T2	T2
65		30.9		1	T2	T2	T2	T2	T2
70		28.6		1	T2	T2	T2	T2	T2
75		30.9		1	T2	T2	T2	T2	T2
65		21.9		1	T2	T2	T2	T2	T2
5		32.8		1	T2	T2	T2	T2	T2
35		31.5		1	T2	T2	T2	T2	T2
60		30.9		1	T2	T2	T2	T2	T2
5		67.9	Y	1	-	T2	-	T2	T2
15		40.5		1	T2	T2	T2	T2	T2
50		28.8		1	T2	T2	T2	T2	T2
55		41.5		1	T2	T2	-	T2	T2
0		41.9		1	T2	T2	-	T2	T2
0		5.75		1	T2	T2	T2	T2	T2
75		4.36		1	T2	T2	T2	T2	T2
15		22.9		1	T2	T2	T2	T2	T2
35		25.2		1	T2	T2	T2	T2	T2
35		23.8		1	T2	T2	T2	T2	T2
80		22.5		1	T2	T2	T2	T2	T2
70		27.7		1	T2	T2	T2	T2	T2
85		31.2		1	T2	T2	T2	T2	T2
80		35.6		1	T2	T2	T2	T2	T2
75		40.3		1	T2	T2	T2	T2	T2
65		51.6		1	T2	T2	-	T2	T2
80		27.1		1	T2	T2	T2	T2	T2
65		24.5		1	T2	T2	T2	T2	T2
85		29.9		1	T2	T2	T2	T2	T2
80		47		1	T2	T2	-	T2	T2
75		29.3		1	T2	T2	T2	T2	T2
75		29.5		1	T2	T2	T2	T2	T2
85		27.8		1	T2	T2	T2	T2	T2
85		26.7		1	T2	T2	T2	T2	T2
0		23.7		1	T2	T2	T2	T2	T2
30		27.3		1	T2	T2	T2	T2	T2
25		39.7		1	T2	T2	T2	T2	T2
85		32.5		1	T2	T2	T2	T2	T2
80		37.2		1	T2	T2	T2	T2	T2
75		38.4		1	T2	T2	T2	T2	T2
30		41.5		1	T2	T2	-	T2	T2
50		45.3		1	T2	T2	-	T2	T2
10		36.1		1	T2	T2	T2	T2	T2
85		34.5		1	T2	T2	T2	T2	T2
55		39.4		1	T2	T2	T2	T2	T2
40		33.6		1	T2	T2	T2	T2	T2
45		51.8		1	T2	T2	-	T2	T2
5		35		1	T2	T2	T2	T2	T2
85		35.7		1	T2	T2	T2	T2	T2
85		34.6		1	T2	T2	T2	T2	T2
50		38.4		1	T2	T2	T2	T2	T2
80		27		1	T2	T2	T2	T2	T2
55		27.1		1	T2	T2	T2	T2	T2
5		34.2		1	T2	T2	T2	T2	T2
60		25.9		1	T2	T2	T2	T2	T2
				192	1	0	2	1	0
				240	183	187	161	185	187
					184	187	163	186	187

APPENDIX H - Amphipod Tox - Lead

Survivor's Average Weight	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.37	b	7.5		2x mean NOEC	63.6	0	-	-	-	-	-
0.35	b	9.4		Median NOEC	28.0	0	-	-	-	-	-
0.350	b	8.9				0	-	-	-	-	-
0.302	b	15		ER-L	87.0	0	-	-	-	-	-
0.362	b	8		ER-M	238.0	0	-	-	-	-	-
0.308	b	20		15th Percentile E	96.6	0	-	-	-	-	-
0.400	b	28		TEL	52.0	0	-	-	-	-	-
0.500	b	34		85th Percentile NE	37.3	0	-	-	-	-	-
0.286	b	46		PEL	94	0	-	-	-	-	-
0.406	b	16		AET	419	0	-	-	-	-	-
0.294	b	23				0	-	-	-	-	-
0.398	b	15			9	0	-	-	-	-	-
0.316	b	23		Effects Data N	7	0	-	-	-	-	-
0.250	b	28				0	-	-	-	-	-
0.264	b	13		**Effects Data Set**		0	-	-	-	-	-
0.452	b	29		387		0	-	-	-	-	-
0.384	b	27		1190		0	-	-	-	-	-
0.39	b	25.8		275		0	-	-	-	-	-
0.408	b	29.1		177		0	-	-	-	-	-
0.45	b	5.85		99.8		0	-	-	-	-	-
0.39	b	42.1		238		0	-	-	-	-	-
0.532	b	29.5		67.9		0	-	-	-	-	-
0.512	b	28.8				0	-	-	-	-	-
0.528	b	17.2				0	-	-	-	-	-
0.438	b	60.1				0	-	-	T1	-	-
0.55	b	27.2				0	-	-	-	-	-
0.756	b	27.8				0	-	-	-	-	-
0.712	b	40.9				0	-	-	-	-	-
0.744	b	30				0	-	-	-	-	-
0.440	b	30.7				0	-	-	-	-	-
0.450	b	33.9				0	-	-	-	-	-
0.500	b	25.8				0	-	-	-	-	-
0.610	b	36.2				0	-	-	-	-	-
0.440	b	13.3				0	-	-	-	-	-
0.460	b	27.9				0	-	-	-	-	-
0.450	b	29.5				0	-	-	-	-	-
0.640	b	36.2				0	-	-	-	-	-
0.560	b	33.8				0	-	-	-	-	-
0.590	b	38.3				0	-	-	-	-	-
0.610	b	26.7				0	-	-	-	-	-
0.550	b	25.4				0	-	-	-	-	-
0.690	b	37.3				0	-	-	-	-	-
0.480	b	27.1				0	-	-	-	-	-
0.530	b	26.9				0	-	-	-	-	-
0.480	b	26.9				0	-	-	-	-	-
0.690	b	12.6				0	-	-	-	-	-
0.430	b	15.9				0	-	-	-	-	-
0.710	b	48.2				0	-	-	-	-	-
0.470	b	44.8				0	-	-	-	-	-
0.680	b	29.1				0	-	-	-	-	-
0.560	b	12.8				0	-	-	-	-	-
0.550	b	13.7				0	-	-	-	-	-
0.480	b	14				0	-	-	-	-	-
0.440	b	25.1				0	-	-	-	-	-
0.510	b	24.5				0	-	-	-	-	-
0.490	b	28				0	-	-	-	-	-
0.570	b	34.6				0	-	-	-	-	-
0.440	b	27.5				0	-	-	-	-	-
0.440	b	24.3				0	-	-	-	-	-
0.430	b	28.7				0	-	-	-	-	-
0.450	b	30.4				0	-	-	-	-	-
0.660	b	39.9				0	-	-	-	-	-
0.510	b	31.5				0	-	-	-	-	-
0.530	b	40.5				0	-	-	-	-	-
0.570	b	41.5				0	-	-	-	-	-
0.430	b	4.36				0	-	-	-	-	-
0.530	b	3.9				0	-	-	-	-	-
0.440	b	25.2				0	-	-	-	-	-
0.430	b	22.5				0	-	-	-	-	-
0.580	b	21.9				0	-	-	-	-	-
0.570	b	24.3				0	-	-	-	-	-
0.680	b	25.3				0	-	-	-	-	-
0.450	b	27.7				0	-	-	-	-	-
0.490	b	31.2				0	-	-	-	-	-
0.440	b	25.3				0	-	-	-	-	-
0.730	b	29.6				0	-	-	-	-	-
0.430	b	27.1				0	-	-	-	-	-
0.750	b	24.5				0	-	-	-	-	-
0.460	b	29.9				0	-	-	-	-	-
0.510	b	31				0	-	-	-	-	-
0.650	b	32.4				0	-	-	-	-	-
0.430	b	27.20				0	-	-	-	-	-
0.570	b	26.4				0	-	-	-	-	-
0.800	b	29.3				0	-	-	-	-	-
0.550	b	29.5				0	-	-	-	-	-
0.480	b	34.1				0	-	-	-	-	-
0.490	b	24.800				0	-	-	-	-	-
0.490	b	37.2				0	-	-	-	-	-
0.420	b	38.4				0	-	-	-	-	-
0.600	b	33.3				0	-	-	-	-	-
0.620	b	33				0	-	-	-	-	-
0.460	b	33.6				0	-	-	-	-	-
0.560	b	35.7				0	-	-	-	-	-
0.440	b	34.6				0	-	-	-	-	-
0.510	b	38.4				0	-	-	-	-	-
0.70	b	32				0	-	-	-	-	-
0.58	b	26.8				0	-	-	-	-	-
0.62	b	25.8				0	-	-	-	-	-
0.592	b	31.9				0	-	-	-	-	-
0.556	b	27.9				0	-	-	-	-	-
0.410	b	33.6				0	-	-	-	-	-
0.370	b	35.7				0	-	-	-	-	-
0.410	b	11				0	-	-	-	-	-
0.370	b	23.3				0	-	-	-	-	-
0.400	b	20.6				0	-	-	-	-	-
0.390	b	26.6				0	-	-	-	-	-
0.410	b	24.8				0	-	-	-	-	-
0.390	b	29.4				0	-	-	-	-	-
0.370	b	41.2				0	-	-	-	-	-
0.390	b	32.8				0	-	-	-	-	-
0.390	b	42.3				0	-	-	-	-	-
0.400	b	28.8				0	-	-	-	-	-
0.410	b	35.6				0	-	-	-	-	-
0.410	b	51.6				0	-	-	-	-	-
0.390	b	47				0	-	-	-	-	-
0.410	b	32.5				0	-	-	-	-	-
0.410	b	36.6				0	-	-	-	-	-
0.390	b	33.8				0	-	-	-	-	-
0.234	b	27				0	-	-	-	-	-
0.230	b	3.9				0	-	-	-	-	-
0.65	b	14.9				0	-	-	-	-	-
0.380	b	28.6				0	-	-	-	-	-
0.400	b	26.5				0	-	-	-	-	-
0.380	b	26.7				0	-	-	-	-	-
0.360	b	51.8				0	-	-	-	-	-
0.282	b	12.4				0	-	-	-	-	-
0.29	b	419	Y			0	T1	T1	T1	T1	-
0.34	b	20.3				0	-	-	-	-	-

APPENDIX H - Amphipod Tox - Lead

Survivor's Average Weight	b	Lead		Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
0.302	b	22.9		0	-	-	-	-	-
0.326	b	154	Y	0	T1	-	T1	T1	-
0.334	b	27.6		0	-	-	-	-	-
0.60	🟥	18		1	T2	T2	T2	T2	T2
0.42	🟥	21		1	T2	T2	T2	T2	T2
0.51	🟥	20		1	T2	T2	T2	T2	T2
0.43	🟥	36		1	T2	T2	T2	T2	T2
0.47	🟥	12		1	T2	T2	T2	T2	T2
0.61	🟥	18		1	T2	T2	T2	T2	T2
0.46	🟥	29		1	T2	T2	T2	T2	T2
0.46	🟥	27		1	T2	T2	T2	T2	T2
0.63	🟥	14		1	T2	T2	T2	T2	T2
0.17	🟥	28		1	T2	T2	T2	T2	T2
0.10	🟥	17		1	T2	T2	T2	T2	T2
0.11	🟥	24		1	T2	T2	T2	T2	T2
0.08	🟥	47		1	T2	T2	T2	T2	T2
0.02	🟥	43		1	T2	T2	T2	T2	T2
0.17	🟥	22		1	T2	T2	T2	T2	T2
0.09	🟥	21		1	T2	T2	T2	T2	T2
0.15	🟥	26		1	T2	T2	T2	T2	T2
0.178	🟥	2.2		1	T2	T2	T2	T2	T2
0	🟥	12		1	T2	T2	T2	T2	T2
0.272	🟥	16.6		1	T2	T2	T2	T2	T2
0	🟥	25.4		1	T2	T2	T2	T2	T2
0	🟥	52		1	T2	T2	T2	T2	T2
0	🟥	25.3		1	T2	T2	T2	T2	T2
0.14	🟥	35.5		1	T2	T2	T2	T2	T2
0.26	🟥	24.2		1	T2	T2	T2	T2	T2
0.25	🟥	25.7		1	T2	T2	T2	T2	T2
0	🟥	16.3		1	T2	T2	T2	T2	T2
0.1	🟥	32		1	T2	T2	T2	T2	T2
0	🟥	387	Y	1	-	-	-	-	T2
0	🟥	1190	Y	1	-	-	-	-	-
0.208	🟥	15.4		1	T2	T2	T2	T2	T2
0.358	🟥	17.3		1	T2	T2	T2	T2	T2
0.488	🟥	18.1		1	T2	T2	T2	T2	T2
0.378	🟥	6.55		1	T2	T2	T2	T2	T2
0.382	🟥	25.7		1	T2	T2	T2	T2	T2
0.426	🟥	28.9		1	T2	T2	T2	T2	T2
0.34	🟥	26.4		1	T2	T2	T2	T2	T2
0.322	🟥	4.29		1	T2	T2	T2	T2	T2
0.534	🟥	23.3		1	T2	T2	T2	T2	T2
0.322	🟥	44.2		1	T2	T2	T2	T2	T2
0.1	🟥	275	Y	1	-	-	-	-	T2
0.43	🟥	177	Y	1	-	T2	-	-	T2
0.426	🟥	29.7		1	T2	T2	T2	T2	T2
0.352	🟥	28.6		1	T2	T2	T2	T2	T2
0.318	🟥	2.53		1	T2	T2	T2	T2	T2
0.458	🟥	27.2		1	T2	T2	T2	T2	T2
0.402	🟥	17.4		1	T2	T2	T2	T2	T2
0.310	🟥	48.6		1	T2	T2	T2	T2	T2
0	🟥	39.9		1	T2	T2	T2	T2	T2
0.250	🟥	16.5		1	T2	T2	T2	T2	T2
0.330	🟥	13.9		1	T2	T2	T2	T2	T2
0	🟥	27.8		1	T2	T2	T2	T2	T2
0.320	🟥	8.72		1	T2	T2	T2	T2	T2
0.340	🟥	17.7		1	T2	T2	T2	T2	T2
0.350	🟥	27.7		1	T2	T2	T2	T2	T2
0.290	🟥	23.3		1	T2	T2	T2	T2	T2
0.200	🟥	30.8		1	T2	T2	T2	T2	T2
0.180	🟥	56.7		1	T2	T2	-	T2	T2
0.290	🟥	14.6		1	T2	T2	T2	T2	T2
0	🟥	27		1	T2	T2	T2	T2	T2
0	🟥	25.4		1	T2	T2	T2	T2	T2
0.350	🟥	25.6		1	T2	T2	T2	T2	T2
0.350	🟥	31.9		1	T2	T2	T2	T2	T2
0.330	🟥	51.8		1	T2	T2	T2	T2	T2
0.350	🟥	9.13		1	T2	T2	T2	T2	T2
0.150	🟥	25.1		1	T2	T2	T2	T2	T2
0.200	🟥	99.8	Y	1	-	T2	-	-	T2
0	🟥	238	Y	1	-	-	-	-	T2
0.330	🟥	5.74		1	T2	T2	T2	T2	T2
0	🟥	32.6		1	T2	T2	T2	T2	T2
0.300	🟥	38.8		1	T2	T2	T2	T2	T2
0.190	🟥	42.9		1	T2	T2	T2	T2	T2
0.340	🟥	21.3		1	T2	T2	T2	T2	T2
0.310	🟥	30.5		1	T2	T2	T2	T2	T2
0.340	🟥	40.9		1	T2	T2	T2	T2	T2
0.300	🟥	27.2		1	T2	T2	T2	T2	T2
0.270	🟥	37.9		1	T2	T2	T2	T2	T2
0.240	🟥	32.3		1	T2	T2	T2	T2	T2
0.270	🟥	34.1		1	T2	T2	T2	T2	T2
0.330	🟥	12.5		1	T2	T2	T2	T2	T2
0.330	🟥	34.3		1	T2	T2	T2	T2	T2
0.190	🟥	31.3		1	T2	T2	T2	T2	T2
0.200	🟥	29.7		1	T2	T2	T2	T2	T2
0.310	🟥	30.9		1	T2	T2	T2	T2	T2
0.330	🟥	30.9		1	T2	T2	T2	T2	T2
0.250	🟥	21.9		1	T2	T2	T2	T2	T2
0.300	🟥	32.8		1	T2	T2	T2	T2	T2
0.340	🟥	30.9		1	T2	T2	T2	T2	T2
0.300	🟥	67.9	Y	1	T2	T2	-	T2	T2
0	🟥	41.9		1	T2	T2	T2	T2	T2
0	🟥	5.75		1	T2	T2	T2	T2	T2
0.330	🟥	22.9		1	T2	T2	T2	T2	T2
0.330	🟥	23.8		1	T2	T2	T2	T2	T2
0.310	🟥	40.3		1	T2	T2	T2	T2	T2
0.350	🟥	28.9		1	T2	T2	T2	T2	T2
0.310	🟥	27.8		1	T2	T2	T2	T2	T2
0.000	🟥	23.7		1	T2	T2	T2	T2	T2
0.350	🟥	27.3		1	T2	T2	T2	T2	T2
0.280	🟥	39.7		1	T2	T2	T2	T2	T2
0.130	🟥	41.5		1	T2	T2	T2	T2	T2
0.300	🟥	45.3		1	T2	T2	T2	T2	T2
0.150	🟥	36.1		1	T2	T2	T2	T2	T2
0.350	🟥	34.5		1	T2	T2	T2	T2	T2
0.350	🟥	39.4		1	T2	T2	T2	T2	T2
0.200	🟥	35		1	T2	T2	T2	T2	T2
0.240	🟥	27		1	T2	T2	T2	T2	T2
0.330	🟥	27.1		1	T2	T2	T2	T2	T2
0.200	🟥	34.2		1	T2	T2	T2	T2	T2
0.290	🟥	25.9		1	T2	T2	T2	T2	T2
				109	2	1	3	2	0
				240	103	105	101	103	108
					105	106	104	105	108

Sediment Effect Concentrations Summary - Grass Shrimp

Mercury

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.2	10.5	1.4	4.8	11.0	77
Number of Type 1 Errors	2	1	5	1	0	
Number of Type 2 Errors	30	40	21	35	40	
Number predicted correctly	45	36	51	41	37	
Overall Reliability (%)	58%	47%	66%	53%	48%	

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	13.5	46.0	3.9	15.4	86.6	77
Number of Type 1 Errors	3	2	12	3	0	
Number of Type 2 Errors	13	16	9	14	20	
Number predicted correctly	61	59	56	60	57	
Overall Accuracy (%)	79%	77%	73%	78%	74%	

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	13.0	46.0	3.4	17.3	86.6	77
Number of Type 1 Errors	4	2	13	4	0	
Number of Type 2 Errors	16	18	12	17	22	
Number predicted correctly	57	57	52	56	55	
Overall Accuracy (%)	74%	74%	68%	73%	71%	

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	16.4	46.0	4.3	14.8	86.6	77
Number of Type 1 Errors	3	2	8	3	0	
Number of Type 2 Errors	26	28	20	26	32	
Number predicted correctly	48	47	49	48	45	
Overall Accuracy (%)	62%	61%	64%	62%	58%	

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	10.8	22.0	3.5	8.5	86.6	64
Number of Type 1 Errors	3	2	7	4	1	
Number of Type 2 Errors	12	15	9	11	20	
Number predicted correctly	49	47	48	49	43	
Overall Accuracy (%)	77%	73%	75%	77%	67%	

Aroclor 1268

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	12.0	20.0	3.2	10.7	41.0	77
Number of Type 1 Errors	1	1	5	2	0	
Number of Type 2 Errors	35	43	26	35	48	
Number predicted correctly	41	33	46	40	29	
Overall Reliability (%)	53%	43%	60%	52%	38%	

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	18.6	23.0	5.0	16.6	69.0	77
Number of Type 1 Errors	6	5	15	6	0	
Number of Type 2 Errors	12	15	10	11	17	
Number predicted correctly	59	57	52	60	60	
Overall Accuracy (%)	77%	74%	68%	78%	78%	

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	18.4	43.5	4.8	25.3	69.0	77
Number of Type 1 Errors	7	1	16	3	0	
Number of Type 2 Errors	15	18	13	18	19	
Number predicted correctly	55	58	48	56	58	
Overall Accuracy (%)	71%	75%	62%	73%	75%	

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	19.0	41.0	5.8	27.9	69.0	77
Number of Type 1 Errors	4	1	14	2	0	
Number of Type 2 Errors	22	26	20	26	28	
Number predicted correctly	51	50	43	49	49	
Overall Accuracy (%)	66%	65%	56%	64%	64%	

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	19.0	24.0	6.2	16.3	69.0	65
Number of Type 1 Errors	4	4	12	4	1	
Number of Type 2 Errors	12	16	12	12	19	
Number predicted correctly	49	44	40	48	44	
Overall Accuracy (%)	75%	68%	62%	74%	68%	

OC-normalized Aroclor 1268

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.5	5.2	1.0	2.9	7.9	77
Number of Type 1 Errors	1	1	6	2	0	
Number of Type 2 Errors	35	43	31	33	48	
Number predicted correctly	41	33	40	42	29	
Overall Reliability (%)	53%	43%	52%	55%	38%	

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	4.2	7.0	1.3	5.4	15.1	77
Number of Type 1 Errors	9	5	15	5	0	
Number of Type 2 Errors	12	15	10	15	18	
Number predicted correctly	56	57	52	57	59	
Overall Accuracy (%)	73%	74%	68%	74%	77%	

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.9	7.0	1.2	5.7	15.1	77
Number of Type 1 Errors	10	5	17	5	0	
Number of Type 2 Errors	14	17	13	17	20	
Number predicted correctly	53	55	47	55	57	
Overall Accuracy (%)	69%	71%	61%	71%	74%	

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	4.3	7.5	1.3	5.7	15.1	77
Number of Type 1 Errors	7	2	13	4	0	
Number of Type 2 Errors	22	26	19	25	29	
Number predicted correctly	48	49	45	48	48	
Overall Accuracy (%)	62%	64%	58%	62%	62%	

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	4.3	7.3	1.4	4.7	15.1	65
Number of Type 1 Errors	11	5	15	9	1	
Number of Type 2 Errors	19	20	18	19	21	
Number predicted correctly	35	39	31	36	42	
Overall Accuracy (%)	54%	60%	48%	55%	65%	

Sediment Effect Concentrations Summary - Grass Shrimp

Total Polycyclic Aromatic Hydrocarbons

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	4.0	6.1	1.6	4.5	11.5	77
Number of Type 1 Errors	4	2	4	4	0	
Number of Type 2 Errors	47	50	41	48	50	
Number predicted correctly	26	25	32	25	27	
Overall Reliability (%)	34%	32%	42%	32%	35%	

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	3.9	6.1	1.6	3.3	11.8	77
Number of Type 1 Errors	6	3	10	6	0	
Number of Type 2 Errors	16	18	14	15	19	
Number predicted correctly	55	56	53	56	58	
Overall Accuracy (%)	71%	73%	69%	73%	75%	

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	6.1	6.1	2.0	4.6	52.8	77
Number of Type 1 Errors	5	5	10	8	0	
Number of Type 2 Errors	21	21	19	21	22	
Number predicted correctly	51	51	48	48	55	
Overall Accuracy (%)	66%	66%	62%	62%	71%	

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	7.2	11.5	2.1	4.8	52.8	77
Number of Type 1 Errors	3	2	7	6	0	
Number of Type 2 Errors	29	29	25	28	31	
Number predicted correctly	45	46	45	43	46	
Overall Accuracy (%)	58%	60%	58%	56%	60%	

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	6.6	8.8	2.3	3.9	52.8	65
Number of Type 1 Errors	4	3	7	6	1	
Number of Type 2 Errors	21	21	16	18	22	
Number predicted correctly	40	41	42	41	42	
Overall Accuracy (%)	62%	63%	65%	63%	65%	

OC-normalized PAHs

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.3	2.5	0.5	1.4	4.3	77
Number of Type 1 Errors	2	1	6	2	0	
Number of Type 2 Errors	48	50	43	48	52	
Number predicted correctly	27	26	28	27	25	
Overall Reliability (%)	35%	34%	36%	35%	32%	

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.0	1.6	0.4	0.9	4.3	77
Number of Type 1 Errors	5	3	11	5	0	
Number of Type 2 Errors	16	18	13	15	19	
Number predicted correctly	56	56	53	57	58	
Overall Accuracy (%)	73%	73%	69%	74%	75%	

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.6	1.6	0.6	1.2	13.7	77
Number of Type 1 Errors	5	5	11	7	0	
Number of Type 2 Errors	22	22	20	21	22	
Number predicted correctly	50	50	46	49	55	
Overall Accuracy (%)	65%	65%	60%	64%	71%	

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.7	2.2	0.6	1.1	13.7	77
Number of Type 1 Errors	3	3	7	5	0	
Number of Type 2 Errors	29	29	25	28	31	
Number predicted correctly	45	45	45	44	46	
Overall Accuracy (%)	58%	58%	58%	57%	60%	

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1.5	1.6	0.6	0.9	13.7	65
Number of Type 1 Errors	4	4	9	6	1	
Number of Type 2 Errors	19	20	15	17	21	
Number predicted correctly	42	41	41	42	43	
Overall Accuracy (%)	65%	63%	63%	65%	66%	

Lead

Embryo Development

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1190	1190	139	198	419	77
Number of Type 1 Errors	0	0	3	2	0	
Number of Type 2 Errors	52	52	52	52	52	
Number predicted correctly	25	25	22	23	25	
Overall Reliability (%)	32%	32%	29%	30%	32%	

Embryo Hatching

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	1190	1190	174	204	419	77
Number of Type 1 Errors	0	0	2	2	0	
Number of Type 2 Errors	19	19	19	19	19	
Number predicted correctly	58	58	56	56	58	
Overall Accuracy (%)	75%	75%	73%	73%	75%	

Ovary Maturation

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	NA	NA	NA	NA	1190	77
Number of Type 1 Errors	0	0	0	0	0	
Number of Type 2 Errors	0	0	0	0	22	
Number predicted correctly	77	77	77	77	55	
Overall Accuracy (%)	100%	100%	100%	100%	71%	

Survival Rate

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	NA	NA	NA	NA	1190	77
Number of Type 1 Errors	0	0	0	0	0	
Number of Type 2 Errors	0	0	0	0	31	
Number predicted correctly	0	0	0	0	46	
Overall Accuracy (%)	0%	0%	0%	0%	60%	

DNA Strand Damage

	ER-L	*ER-M*	*TEL*	*PEL*	*AET*	*Total # of samples*
	NA	NA	NA	NA	1190	65
Number of Type 1 Errors	0	0	0	0	0	
Number of Type 2 Errors	0	0	0	0	22	
Number predicted correctly	65	65	65	65	43	
Overall Accuracy (%)	0%	0%	0%	0%	66%	

APPENDIX H - Grass Shrimp Tox - Mercury

Embryo Development Rate	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
73	b	0.0135		2x mean NOEC	2.6	0	-	-	-	-	-
74	b	1.3		Median NOEC	0.56	0	-	-	-	-	-
53	b	0.025				0	-	-	-	-	-
77	b	0.038		ER-L	3.2	0	-	-	-	-	-
45	b	0.62		ER-M	10.5	0	-	-	-	-	-
50	b	0.044		15th Percentile E	3.3	0	-	-	-	-	-
38	b	0.01		TEL	1.4	0	-	-	-	-	-
34	b	2.5		85th Percentile NE	2.2	0	-	-	T1	-	-
39	b	0.026		PEL	4.8	0	-	-	-	-	-
38	b	0.82		AET	11	0	-	-	-	-	-
49	b	0.51				0	-	-	-	-	-
44	b	1.2			28	0	-	-	-	-	-
33	b	11	Y	Effects Data N	26	0	T1	T1	T1	T1	-
56.3	b	0.0952		**Effects Data Set**		0	-	-	-	-	-
52.3	b	0.243		11.5		0	-	-	-	-	-
56.3	b	2.17		30.5		0	-	-	T1	-	-
55	b	2.28		6.6		0	-	-	T1	-	-
28	b	0.73		4.16		0	-	-	-	-	-
29	b	0.3		3.1		0	-	-	-	-	-
29	b	0.16		12.3		0	-	-	-	-	-
46.7	b	4.43	Y	11		0	T1	-	T1	-	-
47.3	b	0.218		48		0	-	-	-	-	-
37.7	b	1.16		14		0	-	-	-	-	-
29.3	b	1.1		62		0	-	-	-	-	-
29	🟥	2.1		46		1	T2	T2	-	T2	T2
44	🟥	0.279		2.8		1	T2	T2	T2	T2	T2
36	🟥	0.0787		10		1	T2	T2	T2	T2	T2
11	🟥	11.5	Y	80		1	-	-	-	-	-
11	🟥	30.5	Y	4.1		1	-	-	-	-	-
48	🟥	6.6	Y	6.8		1	-	T2	-	-	T2
0	🟥	4.16	Y	22		1	-	T2	-	T2	T2
0	🟥	3.1	Y	3.0		1	T2	T2	-	T2	T2
45	🟥	12.3	Y	3.3		1	-	-	-	-	-
44	🟥	0.052		18		1	T2	T2	T2	T2	T2
25	🟥	0.24		86.6		1	T2	T2	T2	T2	T2
21	🟥	11	Y	80.4		1	-	-	-	-	-
16	🟥	48	Y	5.68		1	-	-	-	-	-
18	🟥	14	Y	4.31		1	-	-	-	-	-
28	🟥	0.55		3.32		1	T2	T2	T2	T2	T2
8	🟥	62	Y	8.79		1	-	-	-	-	-
0	🟥	46	Y			1	-	-	-	-	-
21	🟥	2.8	Y			1	T2	T2	-	T2	T2
28	🟥	10	Y			1	-	T2	-	-	T2
32	🟥	80	Y			1	-	-	-	-	-
30	🟥	4.1	Y			1	-	T2	-	T2	T2
29	🟥	0.01				1	T2	T2	T2	T2	T2
29	🟥	0.56				1	T2	T2	T2	T2	T2
9	🟥	6.8	Y			1	-	T2	-	-	T2
15	🟥	22	Y			1	-	-	-	-	-
9	🟥	0.044				1	T2	T2	T2	T2	T2
10	🟥	0.53				1	T2	T2	T2	T2	T2
11	🟥	0.2				1	T2	T2	T2	T2	T2
17	🟥	3	Y			1	T2	T2	-	T2	T2
26	🟥	0.79				1	T2	T2	T2	T2	T2
25	🟥	3.3	Y			1	-	T2	-	T2	T2
3	🟥	18	Y			1	-	-	-	-	-
21	🟥	0.68				1	T2	T2	T2	T2	T2
30.7	🟥	0.0921				1	T2	T2	T2	T2	T2
38.7	🟥	1.92				1	T2	T2	-	T2	T2
22	🟥	1.05				1	T2	T2	T2	T2	T2
28.3	🟥	0.572				1	T2	T2	T2	T2	T2
37	🟥	86.6	Y			1	-	-	-	-	-
8.7	🟥	80.4	Y			1	-	-	-	-	-
27	🟥	2.11				1	T2	T2	-	T2	T2
31.7	🟥	5.68	Y			1	-	T2	-	-	T2
31.7	🟥	4.31	Y			1	-	T2	-	T2	T2
18	🟥	1.87				1	T2	T2	-	T2	T2
12	🟥	0.245				1	T2	T2	T2	T2	T2
34.7	🟥	1.99				1	T2	T2	-	T2	T2
27.7	🟥	1.9				1	T2	T2	-	T2	T2
28.3	🟥	0.0396				1	T2	T2	T2	T2	T2
28.7	🟥	1.01				1	T2	T2	T2	T2	T2
24.7	🟥	0.88				1	T2	T2	T2	T2	T2
29	🟥	0.686				1	T2	T2	T2	T2	T2
3.7	🟥	0.76				1	T2	T2	T2	T2	T2
34	🟥	3.32	Y			1	-	T2	-	T2	T2
22.3	🟥	8.79	Y			1	-	T2	-	-	T2
						53 77	2 30	1 40	5 21	1 35	0 40

Embryo Hatching Rate	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
96	b	0.0135		2x mean NOEC	10.5	0	-	-	-	-	-
92	b	6.6		Median NOEC	1.0	0	-	-	T1	-	-
88	b	2.28				0	-	-	-	-	-
89	b	1.3		ER-L	13.5	0	-	-	-	-	-
88	b	0.025		ER-M	46.0	0	-	-	-	-	-
88	b	0.55		15th Percentile E	14.8	0	-	-	-	-	-
90	b	0.038		TEL	3.9	0	-	-	-	-	-
87	b	2.8		85th Percentile NE	5.2	0	-	-	-	-	-
88	b	0.62		PEL	15.4	0	-	-	-	-	-
88	b	10		AET	87	0	-	-	T1	-	-
88	b	80	Y			0	T1	T1	T1	T1	-
93	b	4.1			14	0	-	-	T1	-	-
97	b	0.01		Effects Data N	9	0	-	-	-	-	-
87	b	0.56		**Effects Data Set**		0	-	-	-	-	-
87	b	22	Y	14		0	T1	-	T1	T1	-
93	b	0.01		11.5		0	-	-	-	-	-
85	b	2.5		30.5		0	-	-	-	-	-
92	b	0.79		48		0	-	-	-	-	-
87	b	0.73		62		0	-	-	-	-	-
85	b	0.51		46		0	-	-	-	-	-
88	b	1.2		18		0	-	-	-	-	-
92	b	0.3		86.6		0	-	-	-	-	-
87	b	0.16		80.4		0	-	-	-	-	-
86.7	b	0.0952				0	-	-	-	-	-
90	b	0.0921				0	-	-	-	-	-
88.3	b	4.31				0	-	-	T1	-	-
90	b	0.243				0	-	-	-	-	-
90	b	1.99				0	-	-	-	-	-
86.7	b	1.9				0	-	-	-	-	-
86.7	b	4.43				0	-	-	T1	-	-
88.3	b	1.01				0	-	-	-	-	-
86.7	b	0.88				0	-	-	-	-	-
86.7	b	0.686				0	-	-	-	-	-
85	b	12.3	Y			0	-	-	T1	-	-
84	b	0.052				0	-	-	-	-	-
84	b	0.24				0	-	-	-	-	-
82	b	0.044				0	-	-	-	-	-
83	b	2.1				0	-	-	-	-	-
82	b	0.82				0	-	-	-	-	-
83	b	3.3				0	-	-	-	-	-
82	b	11	Y			0	-	-	T1	-	-
80	b	1.1				0	-	-	-	-	-
80	b	1.92				0	-	-	-	-	-
76.7	b	5.68				0	-	-	T1	-	-
81.7	b	0.0396				0	-	-	-	-	-
83.3	b	0.218				0	-	-	-	-	-
81.7	b	2.17				0	-	-	-	-	-
81.7	b	3.32				0	-	-	-	-	-
81.7	b	8.79				0	-	-	T1	-	-
76	b	0.279				0	-	-	-	-	-
73	b	0.026				0	-	-	-	-	-
85	b	1.05				0	-	-	-	-	-
85	b	0.572				0	-	-	-	-	-
83.3	b	86.6	Y			0	T1	T1	T1	T1	-
85	b	2.11				0	-	-	-	-	-
85	b	1.87				0	-	-	-	-	-
85	b	1.16				0	-	-	-	-	-
77	🟥	14	Y			1	-	T2	-	T2	T2
39	🟥	0.0787				1	T2	T2	T2	T2	T2
0	🟥	11.5	Y			1	T2	T2	-	T2	T2
0	🟥	30.5	Y			1	-	T2	-	-	T2
0	🟥	4.16				1	T2	T2	-	T2	T2
0	🟥	3.1				1	T2	T2	T2	T2	T2
61	🟥	11	Y			1	T2	T2	-	T2	T2
50	🟥	48	Y			1	-	-	-	-	T2
65	🟥	62	Y			1	-	-	-	-	T2
0	🟥	46	Y			1	-	-	-	-	T2
35	🟥	6.8				1	T2	T2	-	T2	T2
67	🟥	0.044				1	T2	T2	T2	T2	T2
63	🟥	0.53				1	T2	T2	T2	T2	T2
65	🟥	0.2				1	T2	T2	T2	T2	T2
70	🟥	3				1	T2	T2	T2	T2	T2
45	🟥	18	Y			1	-	T2	-	-	T2
72	🟥	0.68				1	T2	T2	T2	T2	T2
46.7	🟥	80.4	Y			1	-	-	-	-	T2
23.3	🟥	0.245				1	T2	T2	T2	T2	T2
8.3	🟥	0.76				1	T2	T2	T2	T2	T2
						20 77	3 13	2 16	12 9	3 14	0 20

Ovary Maturation Rate	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
76	b	0.0787		2x mean NOEC	11.4	0	-	-	-	-	-
73	b	0.0135		Median NOEC	0.8	0	-	-	-	-	-
93	b	1.3				0	-	-	-	-	-
85	b	0.038		ER-L	13.0	0	-	-	-	-	-
78	b	0.62		ER-M	46.0	0	-	-	-	-	-
78	b	80	Y	15th Percentile E	13.8	0	T1	T1	T1	T1	-
78	b	4.1		TEL	3.4	0	-	-	T1	-	-
83	b	0.044		85th Percentile NE	6.5	0	-	-	-	-	-
78	b	0.044		PEL	17.3	0	-	-	-	-	-
80	b	0.01		AET	86.6	0	-	-	-	-	-
78	b	2.5				0	-	-	-	-	-
72	b	0.026			12	0	-	-	-	-	-
76	b	0.53		Effects Data N	7	0	-	-	-	-	-
76	b	0.82		**Effects Data Set**		0	-	-	-	-	-
70	b	3		11.5		0	-	-	-	-	-
78	b	3.3		30.5		0	-	-	-	-	-
75	b	0.68		48.0		0	-	-	-	-	-
77	b	0.16		14		0	-	-	-	-	-
72	b	11		62.0		0	-	-	T1	-	-
61	b	0.279		46.0		0	-	-	-	-	-
63	b	2.28		80.4		0	-	-	-	-	-
60	b	3.1				0	-	-	-	-	-
64	b	12.3	Y			0	-	-	T1	-	-
73	b	0.025				0	-	-	-	-	-
73	b	2.8				0	-	-	-	-	-
73	b	0.01				0	-	-	-	-	-
74	b	0.56				0	-	-	-	-	-
71	b	22	Y			0	T1	-	T1	T1	-
62	b	0.79				0	-	-	-	-	-
61	b	0.51				0	-	-	-	-	-
59	b	1.2				0	-	-	-	-	-
58	b	18	Y			0	T1	-	T1	T1	-
75.7	b	0.0952				0	-	-	-	-	-
77.3	b	0.0921				0	-	-	-	-	-
79	b	1.92				0	-	-	-	-	-
69.3	b	86.6	Y			0	T1	T1	T1	T1	-
75.7	b	2.11				0	-	-	-	-	-
83.3	b	5.68				0	-	-	T1	-	-
79.7	b	4.31				0	-	-	T1	-	-
83.7	b	0.243				0	-	-	-	-	-
72.3	b	4.43				0	-	-	T1	-	-
70.7	b	0.218				0	-	-	-	-	-
76.3	b	0.686				0	-	-	-	-	-
75.3	b	2.17				0	-	-	-	-	-
70.3	b	0.76				0	-	-	-	-	-
68.7	b	1.16				0	-	-	-	-	-
77.3	b	3.32				0	-	-	-	-	-
72	b	10				0	-	-	T1	-	-
57	b	6.6				0	-	-	T1	-	-
52	b	0.052				0	-	-	-	-	-
56	b	0.73				0	-	-	-	-	-
66.7	b	0.572				0	-	-	-	-	-
68	b	0.0396				0	-	-	-	-	-
68	b	1.01				0	-	-	-	-	-
66.7	b	8.79				0	-	-	T1	-	-
20	🟥	11.5	Y			1	T2	T2	-	T2	T2
32	🟥	30.5	Y			1	-	T2	-	-	T2
48	🟥	4.16				1	T2	T2	-	T2	T2
39	🟥	0.24				1	T2	T2	T2	T2	T2
40	🟥	11				1	T2	T2	-	T2	T2
32	🟥	48	Y			1	-	-	-	-	T2
38	🟥	14	Y			1	-	T2	-	T2	T2
57	🟥	0.55				1	T2	T2	T2	T2	T2
36	🟥	62	Y			1	-	-	-	-	T2
0	🟥	46	Y			1	-	-	-	-	T2
33	🟥	6.8				1	T2	T2	-	T2	T2
55	🟥	0.2				1	T2	T2	T2	T2	T2
54	🟥	2.1				1	T2	T2	T2	T2	T2
54	🟥	0.3				1	T2	T2	T2	T2	T2
66	🟥	1.1				1	T2	T2	T2	T2	T2
63.7	🟥	1.05				1	T2	T2	T2	T2	T2
50.3	🟥	80.4	Y			1	-	-	-	-	T2
63.7	🟥	1.87				1	T2	T2	T2	T2	T2
21.3	🟥	0.245				1	T2	T2	T2	T2	T2
60.3	🟥	1.99				1	T2	T2	T2	T2	T2
66	🟥	1.9				1	T2	T2	T2	T2	T2
63.7	🟥	0.88				1	T2	T2	T2	T2	T2
						22	4	2	13	4	0
						77	16	18	12	17	22

Survival Rate	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
92	b	0.0135		2x mean NOEC	11.7	0	-	-	-	-	-
93	b	6.6		Median NOEC	1.1	0	-	-	T1	-	-
89	b	4.16				0	-	-	-	-	-
88	b	0.052		ER-L	16.4	0	-	-	-	-	-
87	b	1.3		ER-M	46.0	0	-	-	-	-	-
87	b	0.038		15th Percentile E	17.6	0	-	-	-	-	-
85	b	0.62		TEL	4.3	0	-	-	-	-	-
85	b	10		85th Percentile NE	4.7	0	-	-	T1	-	-
87	b	0.01		PEL	14.8	0	-	-	-	-	-
83	b	0.56		AET	86.6	0	-	-	-	-	-
83	b	22	Y			0	T1	-	T1	T1	-
83	b	0.044			11	0	-	-	-	-	-
87	b	0.01		Effects Data N	7	0	-	-	-	-	-
76.7	b	0.0952		**Effects Data Set**		0	-	-	-	-	-
83.3	b	0.0921		30.5		0	-	-	-	-	-
76.7	b	2.11		48		0	-	-	-	-	-
81.7	b	5.68		14		0	-	-	T1	-	-
83.3	b	0.243		62		0	-	-	-	-	-
78.3	b	1.99		46		0	-	-	-	-	-
83.3	b	0.0396		18		0	-	-	-	-	-
81.7	b	4.43		80.4		0	-	-	T1	-	-
83.3	b	1.01				0	-	-	-	-	-
80	b	0.218				0	-	-	-	-	-
76.7	b	0.88				0	-	-	-	-	-
83.3	b	0.686				0	-	-	-	-	-
78.3	b	2.17				0	-	-	-	-	-
76.7	b	0.76				0	-	-	-	-	-
81.7	b	1.16				0	-	-	-	-	-
76.7	b	3.32				0	-	-	-	-	-
84	b	0.0787				0	-	-	-	-	-
83	b	2.28				0	-	-	-	-	-
73	b	0.025				0	-	-	-	-	-
72	b	80	Y			0	T1	T1	T1	T1	-
77	b	4.1				0	-	-	-	-	-
83	b	2.5				0	-	-	-	-	-
82	b	0.026				0	-	-	-	-	-
78	b	0.82				0	-	-	-	-	-
73	b	3.3				0	-	-	-	-	-
73.3	b	1.92				0	-	-	-	-	-
71.7	b	1.05				0	-	-	-	-	-
71.7	b	0.572				0	-	-	-	-	-
73.3	b	86.6	Y			0	T1	T1	T1	T1	-
73.3	b	4.31				0	-	-	-	-	-
71.7	b	1.9				0	-	-	-	-	-
71.7	b	8.79				0	-	-	T1	-	-
65	b	1.1				1	T2	T2	T2	T2	T2
77	🟥	30.5	Y			1	-	T2	-	-	T2
76	🟥	3.1				1	T2	T2	T2	T2	T2
76	🟥	12.3	Y			1	T2	T2	-	T2	T2
80	🟥	11.5				1	T2	T2	-	T2	T2
72	🟥	0.279				1	T2	T2	T2	T2	T2
40	🟥	0.24				1	T2	T2	T2	T2	T2
57	🟥	11				1	T2	T2	-	T2	T2
15	🟥	48	Y			1	-	-	-	-	T2
23	🟥	14	Y			1	T2	T2	-	T2	T2
67	🟥	0.55				1	T2	T2	T2	T2	T2
20	🟥	62	Y			1	-	-	-	-	T2
48	🟥	46	Y			1	-	-	-	-	T2
58	🟥	2.8				1	T2	T2	T2	T2	T2
27	🟥	6.8				1	T2	T2	-	T2	T2
42	🟥	0.044				1	T2	T2	T2	T2	T2
13	🟥	0.53				1	T2	T2	T2	T2	T2
63	🟥	0.2				1	T2	T2	T2	T2	T2
67	🟥	2.1				1	T2	T2	T2	T2	T2
67	🟥	3				1	T2	T2	T2	T2	T2
52	🟥	0.79				1	T2	T2	T2	T2	T2
32	🟥	0.73				1	T2	T2	T2	T2	T2
30	🟥	0.51				1	T2	T2	T2	T2	T2
65	🟥	1.2				1	T2	T2	T2	T2	T2
47	🟥	0.3				1	T2	T2	T2	T2	T2
27	🟥	18	Y			1	-	T2	-	-	T2
60	🟥	0.68				1	T2	T2	T2	T2	T2
28	🟥	0.16				1	T2	T2	T2	T2	T2
40	🟥	11				1	T2	T2	-	T2	T2
36.7	🟥	80.4	Y			1	-	-	-	-	T2
56.7	🟥	1.87				1	T2	T2	T2	T2	T2
25	🟥	0.245				1	T2	T2	T2	T2	T2
						32	3	2	8	3	0
						77	26	28	20	26	32

DNA Strand Damage	b	Mercury				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
2.1	b	1.3		2x mean NOEC	7.3	0	T1	T1	T1	T1	T1
2.3	b	0.24		Median NOEC	1.0	0	-	-	-	-	-
2.2	b	0.03				0	-	-	-	-	-
2.3	b	0.6		ER-L	10.8	0	-	-	-	-	-
2.1	b	0.04		ER-M	22.0	0	-	-	-	-	-
2.0	b	0.0		15th Percentile E	11.6	0	-	-	-	-	-
1.9	b	2.5		TEL	3.5	0	-	-	-	-	-
2.2	b	2.1		85th Percentile NE	3.3	0	-	-	-	-	-
2.2	b	0.8		PEL	8.5	0	-	-	-	-	-
2.3	b	3.0		AET	86.6	0	-	-	-	-	-
1.9	b	0.8				0	-	-	-	-	-
2.3	b	3.3			12	0	-	-	-	-	-
2.3	b	0.73		Effects Data N	9	0	-	-	-	-	-
2.3	b	0.51		**Effects Data Set**		0	-	-	-	-	-
2.1	b	1.2		11.0		0	-	-	-	-	-
2.0	b	0.3		48.0		0	-	-	-	-	-
2.2	b	0.16		14.0		0	-	-	-	-	-
1.8	b	0.10		62.0		0	-	-	-	-	-
1.9	b	1.92		10.0		0	-	-	-	-	-
1.9	b	1.05		80.0		0	-	-	-	-	-
1.6	b	86.6	Y	22.0		0	T1	T1	T1	T1	-
2.1	b	2.11		18.0		0	-	-	-	-	-
2.0	b	5.68		80.4		0	-	-	T1	-	-
1.9	b	4.31				0	-	-	T1	-	-
1.7	b	0.24				0	-	-	-	-	-
2.0	b	1.87				0	-	-	-	-	-
2.0	b	1.99				0	-	-	-	-	-
1.7	b	1.9				0	-	-	-	-	-
2.1	b	0.0396				0	-	-	-	-	-
1.8	b	4.43				0	-	-	T1	-	-
1.7	b	0.22				0	-	-	-	-	-
1.9	b	0.88				0	-	-	-	-	-
1.9	b	2.17				0	-	-	-	-	-
1.9	b	0.76				0	-	-	-	-	-
2.1	b	1.16				0	-	-	-	-	-
1.7	b	3.32				0	-	-	-	-	-
1.9	b	8.79	Y			0	-	-	T1	T1	-
2.4	b	11.00	Y			0	T1	-	T1	T1	-
2.2	b	0.09				0	-	-	-	-	-
2.2	b	1.10				0	-	-	-	-	-
2.1	b	0.57				0	-	-	-	-	-
2.1	b	1.01				0	-	-	-	-	-
2.2	b	0.69				0	-	-	-	-	-
2.5	b	0.026				0	-	-	-	-	-
4.3	🟥	11	Y			1	-	T2	-	-	T2
3.6	🟥	48	Y			1	-	-	-	-	T2
3.9	🟥	14	Y			1	-	T2	-	-	T2
3.8	🟥	62	Y			1	-	-	-	-	T2
1.9	🟥	2.8				1	T2	T2	T2	T2	T2
1.7	🟥	0.62				1	T2	T2	T2	T2	T2
2.7	🟥	10	Y			1	T2	T2	-	-	T2
2.2	🟥	80	Y			1	-	-	-	-	T2
1.9	🟥	4.1				1	T2	T2	-	T2	T2
1.7	🟥	0.01				1	T2	T2	T2	T2	T2
1.8	🟥	0.56				1	T2	T2	T2	T2	T2
3.6	🟥	6.8				1	T2	T2	-	T2	T2
2.2	🟥	22.0	Y			1	-	-	-	-	T2
2.4	🟥	0.044				1	T2	T2	T2	T2	T2
2.6	🟥	0.044				1	T2	T2	T2	T2	T2
3.0	🟥	0.5				1	T2	T2	T2	T2	T2
2.8	🟥	0.2				1	T2	T2	T2	T2	T2
3.5	🟥	18.0	Y			1	-	T2	-	-	T2
2.7	🟥	0.68				1	T2	T2	T2	T2	T2
3.67	🟥	80.40	Y			1	-	-	-	-	T2
4.43	🟥	0.25				1	T2	T2	T2	T2	T2
						20	3	2	7	4	1
						64	12	15	9	11	20

APPENDIX H - Grass Shrimp Tox - Aroclor 1268

Embryo Development Rate	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
73	b	0.02		2x mean NOEC	7.3	0	-	-	-	-	-
74	b	2.8		Median NOEC	0.71	0	-	-	-	-	-
53	b	0.19				0	-	-	-	-	-
77	b	0.03		ER-L	12.0	0	-	-	-	-	-
45	b	0.7		ER-M	20.0	0	-	-	-	-	-
50	b	0.10		15th Percentile E	14.1	0	-	-	-	-	-
38	b	0.06		TEL	3.2	0	-	-	-	-	-
34	b	2.1		85th Percentile NE	5.7	0	-	-	-	-	-
39	b	0.03		PEL	10.7	0	-	-	-	-	-
38	b	12	Y	AET	41	0	-	-	T1	T1	-
49	b	0.67				0	-	-	-	-	-
44	b	2.8			22	0	-	-	-	-	-
33	b	41	Y	Effects Data N	19	0	T1	T1	T1	T1	-
56.3	b	0.01		**Effects Data Set**		0	-	-	-	-	-
52.3	b	0.01		12		0	-	-	-	-	-
56.3	b	2.3		23		0	-	-	-	-	-
37.7	b	7.0		15		0	-	-	T1	-	-
55	b	1.4		17		0	-	-	-	-	-
28	b	0.72		19		0	-	-	-	-	-
29	b	0.96		19		0	-	-	-	-	-
29	b	0.18		430		0	-	-	-	-	-
46.7	b	8.2	Y	64		0	-	-	T1	-	-
47.3	b	0.21		92		0	-	-	-	-	-
29.3	b	4.2		24		0	-	-	T1	-	-
29	🟥	12	Y	19		1	-	T2	-	-	T2
44	🟥	0.60		24		1	T2	T2	T2	T2	T2
36	🟥	0.02		10		1	T2	T2	T2	T2	T2
11	🟥	3.7		20		1	T2	T2	-	T2	T2
11	🟥	23	Y	69		1	-	-	-	-	T2
48	🟥	15	Y	82		1	-	T2	-	-	T2
0	🟥	17	Y	16		1	-	T2	-	-	T2
0	🟥	0.33		36		1	T2	T2	T2	T2	T2
45	🟥	0.63		12		1	T2	T2	T2	T2	T2
44	🟥	0.04				1	T2	T2	T2	T2	T2
25	🟥	1.9				1	T2	T2	T2	T2	T2
21	🟥	19	Y			1	-	T2	-	-	T2
16	🟥	19	Y			1	-	T2	-	-	T2
18	🟥	430	Y			1	-	-	-	-	-
28	🟥	1.2				1	T2	T2	T2	T2	T2
8	🟥	64	Y			1	-	-	-	-	-
0	🟥	92	Y			1	-	-	-	-	-
21	🟥	0.79				1	T2	T2	T2	T2	T2
28	🟥	24	Y			1	-	-	-	-	T2
32	🟥	19	Y			1	-	T2	-	-	T2
30	🟥	3.7				1	T2	T2	-	T2	T2
29	🟥	0.10				1	T2	T2	T2	T2	T2
29	🟥	0.87				1	T2	T2	T2	T2	T2
9	🟥	2.2				1	T2	T2	T2	T2	T2
15	🟥	24	Y			1	-	-	-	-	T2
9	🟥	0.03				1	T2	T2	T2	T2	T2
10	🟥	0.97				1	T2	T2	T2	T2	T2
11	🟥	0.26				1	T2	T2	T2	T2	T2
17	🟥	10	Y			1	T2	T2	-	T2	T2
26	🟥	1.3				1	T2	T2	T2	T2	T2
25	🟥	3.6				1	T2	T2	-	T2	T2
3	🟥	20	Y			1	-	-	-	-	T2
21	🟥	0.88				1	T2	T2	T2	T2	T2
30.7	🟥	0.02				1	T2	T2	T2	T2	T2
38.7	🟥	3.7				1	T2	T2	-	T2	T2
22	🟥	2.2				1	T2	T2	T2	T2	T2
28.3	🟥	3.6				1	T2	T2	-	T2	T2
37	🟥	69	Y			1	-	-	-	-	-
8.7	🟥	82	Y			1	-	-	-	-	-
27	🟥	6.8				1	T2	T2	-	T2	T2
31.7	🟥	16	Y			1	-	T2	-	-	T2
31.7	🟥	36	Y			1	-	-	-	-	T2
18	🟥	3.9				1	T2	T2	-	T2	T2
12	🟥	0.61				1	T2	T2	T2	T2	T2
34.7	🟥	0.56				1	T2	T2	T2	T2	T2
27.7	🟥	0.04				1	T2	T2	T2	T2	T2
28.3	🟥	0.39				1	T2	T2	T2	T2	T2
28.7	🟥	0.94				1	T2	T2	T2	T2	T2
24.7	🟥	0.82				1	T2	T2	T2	T2	T2
29	🟥	1.3				1	T2	T2	T2	T2	T2
3.7	🟥	0.52				1	T2	T2	T2	T2	T2
34	🟥	12	Y			1	-	T2	-	-	T2
22.3	🟥	5.8				1	T2	T2	-	T2	T2
						53	1	1	5	2	0
						77	35	43	26	35	48

Embryo Hatching Rate	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
96	b	0.02		2x mean NOEC	12.6	0	-	-	-	-	-
92	b	15	Y	Median NOEC	1.3	0	-	-	T1	-	-
88	b	1.4				0	-	-	-	-	-
89	b	2.8		ER-L	18.6	0	-	-	-	-	-
88	b	0.19		ER-M	23.0	0	-	-	-	-	-
88	b	1.2		15th Percentile E	19.0	0	-	-	-	-	-
90	b	0.03		TEL	5.0	0	-	-	-	-	-
87	b	0.79		85th Percentile NE	12.0	0	-	-	-	-	-
88	b	0.7		PEL	16.6	0	-	-	-	-	-
88	b	24	Y	AET	69	0	T1	T1	T1	T1	-
88	b	19	Y			0	T1	-	T1	T1	-
93	b	3.7			17	0	-	-	-	-	-
97	b	0.10		Effects Data N	9	0	-	-	-	-	-
87	b	0.87		**Effects Data Set**		0	-	-	-	-	-
87	b	24	Y	23		0	T1	T1	T1	T1	-
93	b	0.06		17		0	-	-	-	-	-
85	b	2.1		19		0	-	-	-	-	-
92	b	1.3		19		0	-	-	-	-	-
87	b	0.72		430		0	-	-	-	-	-
85	b	0.67		64		0	-	-	-	-	-
88	b	2.8		92		0	-	-	-	-	-
92	b	0.96		20		0	-	-	-	-	-
87	b	0.18		82		0	-	-	-	-	-
86.7	b	0.01				0	-	-	-	-	-
90	b	0.02				0	-	-	-	-	-
88.3	b	36	Y			0	T1	T1	T1	T1	-
90	b	0.01				0	-	-	-	-	-
90	b	0.56				0	-	-	-	-	-
86.7	b	0.04				0	-	-	-	-	-
86.7	b	8.2				0	-	-	T1	-	-
88.3	b	0.94				0	-	-	-	-	-
86.7	b	0.82				0	-	-	-	-	-
86.7	b	1.3				0	-	-	-	-	-
76	b	0.6				0	-	-	-	-	-
85	b	0.63				0	-	-	-	-	-
84	b	0.04				0	-	-	-	-	-
84	b	1.9				0	-	-	-	-	-
82	b	0.10				0	-	-	-	-	-
73	b	0.03				0	-	-	-	-	-
83	b	12				0	-	-	T1	-	-
82	b	12				0	-	-	T1	-	-
83	b	3.6				0	-	-	-	-	-
82	b	41	Y			0	T1	T1	T1	T1	-
80	b	4.2				0	-	-	-	-	-
80	b	3.7				0	-	-	-	-	-
85	b	2.2				0	-	-	-	-	-
85	b	3.6				0	-	-	-	-	-
83.3	b	69	Y			0	T1	T1	T1	T1	-
85	b	6.8				0	-	-	T1	-	-
76.7	b	16	Y			0	-	-	T1	-	-
85	b	3.9				0	-	-	-	-	-
81.7	b	0.39				0	-	-	-	-	-
83.3	b	0.21				0	-	-	-	-	-
81.7	b	2.3				0	-	-	-	-	-
85	b	7.0				0	-	-	T1	-	-
81.7	b	12				0	-	-	T1	-	-
81.7	b	5.8				0	-	-	T1	-	-
39	🟥	0.02				1	T2	T2	T2	T2	T2
0	🟥	3.7				1	T2	T2	T2	T2	T2
0	🟥	23	Y			1	-	-	-	-	T2
0	🟥	17	Y			1	T2	T2	-	-	T2
0	🟥	0.33				1	T2	T2	T2	T2	T2
61	🟥	19	Y			1	-	T2	-	-	T2
50	🟥	19	Y			1	-	T2	-	-	T2
77	🟥	430	Y			1	-	-	-	-	-
65	🟥	64	Y			1	-	-	-	-	T2
0	🟥	92	Y			1	-	-	-	-	-
35	🟥	2.2				1	T2	T2	T2	T2	T2
67	🟥	0.03				1	T2	T2	T2	T2	T2
63	🟥	0.97				1	T2	T2	T2	T2	T2
65	🟥	0.26				1	T2	T2	T2	T2	T2
70	🟥	10				1	T2	T2	-	T2	T2
45	🟥	20	Y			1	-	T2	-	-	T2
72	🟥	0.88				1	T2	T2	T2	T2	T2
46.7	🟥	82	Y			1	-	-	-	-	-
23.3	🟥	0.61				1	T2	T2	T2	T2	T2
8.3	🟥	0.52				1	T2	T2	T2	T2	T2
						20	6	5	15	6	0
						77	12	15	10	11	17

Ovary Maturation Rate	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
76	b	0.02		2x mean NOEC	13.3	0	-	-	-	-	-
73	b	0.02		Median NOEC	1.2	0	-	-	-	-	-
93	b	2.8				0	-	-	-	-	-
85	b	0.03		ER-L	18.4	0	-	-	-	-	-
78	b	0.70		ER-M	43.5	0	-	-	-	-	-
78	b	19	Y	15th Percentile E	19.0	0	T1	-	T1	-	-
78	b	3.7		TEL	4.8	0	-	-	-	-	-
83	b	0.10		85th Percentile NE	14.7	0	-	-	-	-	-
78	b	0.03		PEL	25.3	0	-	-	-	-	-
80	b	0.06		AET	69	0	-	-	-	-	-
78	b	2.1				0	-	-	-	-	-
72	b	0.03			17	0	-	-	-	-	-
76	b	0.97		Effects Data N	8	0	-	-	-	-	-
76	b	12		**Effects Data Set**		0	-	-	T1	-	-
70	b	10		23		0	-	-	T1	-	-
78	b	3.6		17		0	-	-	-	-	-
75	b	0.88		19		0	-	-	-	-	-
77	b	0.18		19		0	-	-	-	-	-
72	b	41	Y	430		0	T1	-	T1	T1	-
83.3	b	16	Y	64		0	-	-	T1	-	-
83.7	b	0.01		92		0	-	-	-	-	-
61	b	0.60		82		0	-	-	-	-	-
57	b	15	Y			0	-	-	T1	-	-
60	b	0.33				0	-	-	-	-	-
64	b	0.63				0	-	-	-	-	-
52	b	0.04				0	-	-	-	-	-
73	b	0.19				0	-	-	-	-	-
73	b	0.79				0	-	-	-	-	-
72	b	24	Y			0	T1	-	T1	-	-
73	b	0.10				0	-	-	-	-	-
61	b	0.67				0	-	-	-	-	-
59	b	2.8				0	-	-	-	-	-
58	b	20	Y			0	T1	-	T1	-	-
75.7	b	0.01				0	-	-	-	-	-
77.3	b	0.02				0	-	-	-	-	-
79	b	3.7				0	-	-	-	-	-
75.7	b	6.8				0	-	-	T1	-	-
79.7	b	36	Y			0	T1	-	T1	T1	-
68	b	0.39				0	-	-	-	-	-
72.3	b	8.2				0	-	-	T1	-	-
68	b	0.94				0	-	-	-	-	-
70.7	b	0.21				0	-	-	-	-	-
76.3	b	1.3				0	-	-	-	-	-
75.3	b	2.3				0	-	-	-	-	-
70.3	b	0.52				0	-	-	-	-	-
68.7	b	7.0				0	-	-	T1	-	-
77.3	b	12				0	-	-	T1	-	-
66.7	b	5.8				0	-	-	T1	-	-
74	b	0.87				0	-	-	-	-	-
71	b	24	Y			0	T1	-	T1	-	-
66.7	b	3.6				0	-	-	-	-	-
69.3	b	69	Y			0	T1	T1	T1	T1	-
63	b	1.4				0	-	-	-	-	-
57	b	1.2				0	-	-	-	-	-
62	b	1.3				0	-	-	-	-	-
20	🟥	3.7				1	T2	T2	T2	T2	T2
32	🟥	23	Y			1	-	T2	-	T2	T2
48	🟥	17	Y			1	T2	T2	-	T2	T2
39	🟥	1.9				1	T2	T2	T2	T2	T2
40	🟥	19	Y			1	-	T2	-	T2	T2
32	🟥	19	Y			1	-	T2	-	T2	T2
38	🟥	430	Y			1	-	-	-	-	-
36	🟥	64	Y			1	-	-	-	-	T2
0	🟥	92	Y			1	-	-	-	-	-
33	🟥	2.2				1	T2	T2	T2	T2	T2
55	🟥	0.26				1	T2	T2	T2	T2	T2
54	🟥	12				1	T2	T2	-	T2	T2
56	🟥	0.72				1	T2	T2	T2	T2	T2
54	🟥	0.96				1	T2	T2	T2	T2	T2
66	🟥	4.2				1	T2	T2	T2	T2	T2
63.7	🟥	2.2				1	T2	T2	T2	T2	T2
50.3	🟥	82	Y			1	-	-	-	-	-
63.7	🟥	3.9				1	T2	T2	T2	T2	T2
21.3	🟥	0.61				1	T2	T2	T2	T2	T2
60.3	🟥	0.56				1	T2	T2	T2	T2	T2
66	🟥	0.04				1	T2	T2	T2	T2	T2
63.7	🟥	0.82				1	T2	T2	T2	T2	T2
						22	7	1	16	3	0
						77	15	18	13	18	19

Survival Rate	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
92	b	0.022		2x mean NOEC	13.4	0	-	-	-	-	-
93	b	15.000	Y	Median NOEC	1.8	0	-	-	T1	-	-
89	b	17.000	Y			0	-	-	T1	-	-
88	b	0.045		ER-L	19.0	0	-	-	-	-	-
87	b	2.800		ER-M	41.0	0	-	-	-	-	-
87	b	0.025		15th Percentile E	19.2	0	-	-	-	-	-
85	b	0.700		TEL	5.8	0	-	-	-	-	-
85	b	24.000	Y	85th Percentile NE	19.0	0	T1	-	T1	-	-
87	b	0.100		PEL	27.9	0	-	-	-	-	-
83	b	0.870		AET	69.0	0	-	-	-	-	-
83	b	24.000	Y			0	T1	-	T1	-	-
83	b	0.100			17	0	-	-	-	-	-
87	b	0.060		Effects Data N	9	0	-	-	-	-	-
76.7	b	0.012		**Effects Data Set**		0	-	-	-	-	-
83.3	b	0.015		23		0	-	-	-	-	-
76.7	b	6.800		19		0	-	-	T1	-	-
81.7	b	16.000	Y	19		0	-	-	T1	-	-
83.3	b	0.013		430		0	-	-	-	-	-
78.3	b	0.560		64		0	-	-	-	-	-
83.3	b	0.390		92		0	-	-	-	-	-
81.7	b	8.200		20		0	-	-	T1	-	-
83.3	b	0.940		41		0	-	-	-	-	-
80	b	0.210		82		0	-	-	-	-	-
76.7	b	0.820				0	-	-	-	-	-
83.3	b	1.300				0	-	-	-	-	-
78.3	b	2.300				0	-	-	-	-	-
76.7	b	0.520				0	-	-	-	-	-
81.7	b	7.000				0	-	-	T1	-	-
76.7	b	12.000				0	-	-	T1	-	-
84	b	0.015				0	-	-	-	-	-
83	b	1.400				0	-	-	-	-	-
73	b	0.190				0	-	-	-	-	-
72	b	19.000	Y			0	-	-	T1	-	-
77	b	3.700				0	-	-	-	-	-
83	b	2.100				0	-	-	-	-	-
82	b	0.032				0	-	-	-	-	-
78	b	12.000				0	-	-	T1	-	-
73	b	3.600				0	-	-	-	-	-
73.3	b	3.700				0	-	-	-	-	-
71.7	b	2.200				0	-	-	-	-	-
71.7	b	3.600				0	-	-	-	-	-
73.3	b	69.000	Y			0	T1	T1	T1	T1	-
73.3	b	36.000	Y			0	T1	-	T1	T1	-
71.7	b	0.044				0	-	-	-	-	-
71.7	b	5.800				0	-	-	T1	-	-
65	b	4.200				0	-	-	-	-	-
80	🟥	3.700				1	T2	T2	T2	T2	T2
77	🟥	23.000	Y			1	-	T2	-	T2	T2
76	🟥	0.330				1	T2	T2	T2	T2	T2
76	🟥	0.630				1	T2	T2	T2	T2	T2
72	🟥	0.600				1	T2	T2	T2	T2	T2
40	🟥	1.900				1	T2	T2	T2	T2	T2
57	🟥	19.000	Y			1	-	T2	-	T2	T2
15	🟥	19.000	Y			1	-	T2	-	T2	T2
23	🟥	430.000	Y			1	-	-	-	-	-
67	🟥	1.200				1	T2	T2	T2	T2	T2
20	🟥	64.000	Y			1	-	-	-	-	T2
48	🟥	92.000	Y			1	-	-	-	-	-
58	🟥	0.790				1	T2	T2	T2	T2	T2
27	🟥	2.200				1	T2	T2	T2	T2	T2
42	🟥	0.031				1	T2	T2	T2	T2	T2
13	🟥	0.970				1	T2	T2	T2	T2	T2
63	🟥	0.260				1	T2	T2	T2	T2	T2
67	🟥	12.000				1	T2	T2	-	T2	T2
67	🟥	10.000				1	T2	T2	-	T2	T2
52	🟥	1.300				1	T2	T2	T2	T2	T2
32	🟥	0.720				1	T2	T2	T2	T2	T2
30	🟥	0.670				1	T2	T2	T2	T2	T2
65	🟥	2.800				1	T2	T2	T2	T2	T2
47	🟥	0.960				1	T2	T2	T2	T2	T2
27	🟥	20.000	Y			1	-	T2	-	T2	T2
60	🟥	0.880				1	T2	T2	T2	T2	T2
28	🟥	0.180				1	T2	T2	T2	T2	T2
40	🟥	41.000	Y			1	-	-	-	-	T2
36.7	🟥	82.000	Y			1	-	-	-	-	-
56.7	🟥	3.900				1	T2	T2	T2	T2	T2
25	🟥	0.610				1	T2	T2	T2	T2	T2
						31	4	1	14	2	0
						77	22	26	20	26	28

DNA Strand Damage	b	Aroclor 1268				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
2.1	b	2.8		2x mean NOEC	12.7	0	T1	T1	T1	T1	T1
2.3	b	1.9		Median NOEC	2.0	0	-	-	-	-	-
2.2	b	0.19				0	-	-	-	-	-
2.3	b	1.2		ER-L	19.0	0	-	-	-	-	-
2.1	b	0.03		ER-M	24.0	0	-	-	-	-	-
2.0	b	0.06		15th Percentile E	19.0	0	-	-	-	-	-
1.9	b	2.1		TEL	6.2	0	-	-	-	-	-
2.2	b	12		85th Percentile NE	11.1	0	-	-	-	-	-
2.2	b	12		PEL	16.3	0	-	-	T1	-	-
2.3	b	10		AET	69.0	0	-	-	T1	-	-
1.9	b	1.3				0	-	-	T1	-	-
2.3	b	3.6			13	0	-	-	-	-	-
2.3	b	0.72		Effects Data N	9	0	-	-	-	-	-
2.3	b	0.67		**Effects Data Set**		0	-	-	-	-	-
2.1	b	2.8		19.0		0	-	-	-	-	-
2.0	b	0.96		19.0		0	-	-	-	-	-
2.2	b	0.18		430.0		0	-	-	-	-	-
1.8	b	0.01		64.0		0	-	-	-	-	-
1.9	b	3.7		24.0		0	-	-	-	-	-
1.9	b	2.2		19.0		0	-	-	-	-	-
1.63	b	69	Y	24.0		0	-	-	-	-	-
2.07	b	6.8		20.0		0	T1	T1	T1	T1	-
2.0	b	16	Y	82.0		0	-	-	T1	-	-
1.87	b	36	Y			0	-	-	T1	-	-
1.70	b	0.013				0	T1	T1	T1	T1	-
2.0	b	3.9				0	-	-	-	-	-
1.97	b	0.56				0	-	-	-	-	-
1.7	b	0.044				0	-	-	-	-	-
2.07	b	0.39				0	-	-	-	-	-
1.8	b	8.2				0	-	-	-	-	-
1.67	b	0.21				0	-	-	T1	-	-
1.9	b	0.82				0	-	-	-	-	-
1.87	b	2.3				0	-	-	-	-	-
1.9	b	0.52				0	-	-	-	-	-
2.07	b	7				0	-	-	-	-	-
1.7	b	12				0	-	-	T1	-	-
1.87	b	5.8				0	-	-	T1	-	-
2.4	b	41	Y			0	-	-	-	-	-
2.23	b	0.015				0	T1	T1	T1	T1	-
2.2	b	4.2				0	-	-	-	-	-
2.1	b	3.6				0	-	-	-	-	-
2.13	b	0.94				0	-	-	-	-	-
2.23	b	1.3				0	-	-	-	-	-
2.5	b	0.032				0	-	-	-	-	-
4.3	🟥	19	Y			1	T2	T2	T2	T2	T2
3.6	🟥	19	Y			1	-	T2	-	-	T2
3.9	🟥	430	Y			1	-	T2	-	-	T2
3.8	🟥	64	Y			1	-	-	-	-	-
1.9	🟥	0.79				1	-	-	-	-	T2
1.7	🟥	0.7				1	T2	T2	T2	T2	T2
2.7	🟥	24	Y			1	T2	T2	T2	T2	T2
2.2	🟥	19	Y			1	-	-	-	-	T2
1.9	🟥	3.7				1	-	T2	-	-	T2
1.7	🟥	0.10				1	T2	T2	T2	T2	T2
1.8	🟥	0.87				1	T2	T2	T2	T2	T2
3.6	🟥	2.2				1	T2	T2	T2	T2	T2
2.2	🟥	24	Y			1	T2	T2	T2	T2	T2
2.4	🟥	0.10				1	-	-	-	-	T2
2.6	🟥	0.031				1	T2	T2	T2	T2	T2
3.0	🟥	0.97				1	T2	T2	T2	T2	T2
2.8	🟥	0.26				1	T2	T2	T2	T2	T2
3.5	🟥	20	Y			1	T2	T2	T2	T2	T2
2.7	🟥	0.88				1	-	T2	-	-	T2
3.67	🟥	82	Y			1	T2	T2	T2	T2	T2
4.43	🟥	0.61				1	-	-	-	-	-
						21	4	4	12	4	1
						65	12	16	12	12	19

Embryo Development Rate	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
73	b	0.013		2x mean NOEC	1.77	0	-	-	-	-	-
74	b	0.651		Median NOEC	0.23	0	-	-	-	-	-
53	b	0.056				0	-	-	-	-	-
77	b	0.010		ER-L	3.5	0	-	-	-	-	-
45	b	0.233		ER-M	5.2	0	-	-	-	-	-
50	b	0.077		15th Percentile E	4.1	0	-	-	-	-	-
38	b	0.353		TEL	1.0	0	-	-	-	-	-
34	b	1.235		85th Percentile NE	1.7	0	-	-	T1	-	-
39	b	0.018		PEL	2.9	0	-	-	-	-	-
38	b	3.00	Y	AET	7.9	0	-	-	T1	T1	-
49	b	0.146				0	-	-	-	-	-
44	b	0.667			24	0	-	-	-	-	-
33	b	7.885	Y	Effects Data N	20	0	T1	T1	T1	T1	-
56.3	b	0.004		**Effects Data Set**		0	-	-	-	-	-
52.3	b	0.003		3.00		0	-	-	-	-	-
56.3	b	0.392		4.68		0	-	-	-	-	-
55	b	0.415		4.69		0	-	-	-	-	-
28	b	0.153		4.18		0	-	-	-	-	-
29	b	0.223		4.32		0	-	-	-	-	-
29	b	0.021		7.04		0	-	-	-	-	-
46.7	b	2.005	Y	78.18		0	-	-	T1	-	-
47.3	b	0.077		12.31		0	-	-	-	-	-
37.7	b	2.500	Y	24.21		0	-	-	T1	-	-
29.3	b	1.129		7.50		0	-	-	T1	-	-
29	🟥	3.000	Y	5.135		1	T2	T2	-	-	T2
44	🟥	0.245		7.273		1	T2	T2	T2	T2	T2
36	🟥	0.009		3.030		1	T2	T2	T2	T2	T2
11	🟥	0.923		4.26		1	T2	T2	T2	T2	T2
11	🟥	4.684	Y	5.24		1	-	T2	-	-	T2
48	🟥	4.688	Y	15.07		1	-	T2	-	-	T2
0	🟥	4.177	Y	14.44		1	-	T2	-	-	T2
0	🟥	0.095		4.65		1	T2	T2	T2	T2	T2
45	🟥	0.102		7.14		1	T2	T2	T2	T2	T2
44	🟥	0.019		3.54		1	T2	T2	T2	T2	T2
25	🟥	0.432				1	T2	T2	T2	T2	T2
21	🟥	4.318	Y			1	-	T2	-	-	T2
16	🟥	7.037	Y			1	-	-	-	-	T2
18	🟥	78.182	Y			1	-	-	-	-	-
28	🟥	0.240				1	T2	T2	T2	T2	T2
8	🟥	12.308	Y			1	-	-	-	-	-
0	🟥	24.211	Y			1	-	-	-	-	-
21	🟥	0.226				1	T2	T2	T2	T2	T2
28	🟥	7.500	Y			1	-	-	-	-	T2
32	🟥	5.135	Y			1	-	T2	-	-	T2
30	🟥	1.194				1	T2	T2	-	T2	T2
29	🟥	0.091				1	T2	T2	T2	T2	T2
29	🟥	0.272				1	T2	T2	T2	T2	T2
9	🟥	0.733				1	T2	T2	T2	T2	T2
15	🟥	7.273	Y			1	-	-	-	-	T2
9	🟥	0.064				1	T2	T2	T2	T2	T2
10	🟥	0.277				1	T2	T2	T2	T2	T2
11	🟥	0.087				1	T2	T2	T2	T2	T2
17	🟥	3.030	Y			1	T2	T2	-	-	T2
26	🟥	0.302				1	T2	T2	T2	T2	T2
25	🟥	0.766				1	T2	T2	T2	T2	T2
3	🟥	4.255	Y			1	-	T2	-	-	T2
21	🟥	0.205				1	T2	T2	T2	T2	T2
30.7	🟥	0.005				1	T2	T2	T2	T2	T2
38.7	🟥	0.925				1	T2	T2	T2	T2	T2
22	🟥	0.452				1	T2	T2	T2	T2	T2
28.3	🟥	5.240	Y			1	-	-	-	-	T2
37	🟥	15.066	Y			1	-	-	-	-	-
8.7	🟥	14.437	Y			1	-	-	-	-	-
27	🟥	1.518				1	T2	T2	-	T2	T2
31.7	🟥	4.651	Y			1	-	T2	-	-	T2
31.7	🟥	7.143	Y			1	-	-	-	-	T2
18	🟥	0.687				1	T2	T2	T2	T2	T2
12	🟥	0.183				1	T2	T2	T2	T2	T2
34.7	🟥	0.103				1	T2	T2	T2	T2	T2
27.7	🟥	0.012				1	T2	T2	T2	T2	T2
28.3	🟥	0.060				1	T2	T2	T2	T2	T2
28.7	🟥	0.364				1	T2	T2	T2	T2	T2
24.7	🟥	0.170				1	T2	T2	T2	T2	T2
29	🟥	0.374				1	T2	T2	T2	T2	T2
3.7	🟥	0.135				1	T2	T2	T2	T2	T2
34	🟥	3.540	Y			1	-	T2	-	-	T2
22.3	🟥	0.754				1	T2	T2	T2	T2	T2
						53	1	1	6	2	0
						77	35	43	31	33	48

Embryo Hatching Rate	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
96	b	0.013		2x mean NOEC	3.29	0	-	-	-	-	-
92	b	4.688	Y	Median NOEC	0.37	0	T1	-	T1	-	-
88	b	0.415				0	-	-	-	-	-
89	b	0.651		ER-L	4.2	0	-	-	-	-	-
88	b	0.056		ER-M	7.0	0	-	-	-	-	-
88	b	0.240		15th Percentile E	4.3	0	-	-	-	-	-
90	b	0.010		TEL	1.3	0	-	-	-	-	-
87	b	0.226		85th Percentile NE	4.2	0	-	-	-	-	-
88	b	0.233		PEL	5.4	0	-	-	-	-	-
88	b	7.500	Y	AET	15.1	0	T1	T1	T1	T1	-
88	b	5.135	Y			0	T1	-	T1	-	-
93	b	1.194			19	0	-	-	-	-	-
97	b	0.091		Effects Data N	9	0	-	-	-	-	-
87	b	0.272		**Effects Data Set**		0	-	-	-	-	-
87	b	7.273	Y	4.684		0	T1	T1	T1	T1	-
93	b	0.353		4.177		0	-	-	-	-	-
85	b	1.235		4.318		0	-	-	-	-	-
92	b	0.302		7.037		0	-	-	-	-	-
87	b	0.153		78.182		0	-	-	-	-	-
85	b	0.146		12.308		0	-	-	-	-	-
88	b	0.667		24.211		0	-	-	-	-	-
92	b	0.223		4.255		0	-	-	-	-	-
87	b	0.021		14.437		0	-	-	-	-	-
86.7	b	0.004				0	-	-	-	-	-
90	b	0.005				0	-	-	-	-	-
88.3	b	7.143	Y			0	T1	T1	T1	T1	-
90	b	0.003				0	-	-	-	-	-
90	b	0.103				0	-	-	-	-	-
86.7	b	0.012				0	-	-	-	-	-
86.7	b	2.005				0	-	-	T1	-	-
88.3	b	0.364				0	-	-	-	-	-
86.7	b	0.170				0	-	-	-	-	-
86.7	b	0.374				0	-	-	-	-	-
76	b	0.245				0	-	-	-	-	-
85	b	0.102				0	-	-	-	-	-
84	b	0.019				0	-	-	-	-	-
84	b	0.432				0	-	-	-	-	-
82	b	0.077				0	-	-	-	-	-
73	b	0.018				0	-	-	-	-	-
83	b	3.000				0	-	-	T1	-	-
82	b	3.000				0	-	-	T1	-	-
83	b	0.766				0	-	-	-	-	-
82	b	7.885	Y			0	T1	T1	T1	T1	-
80	b	1.129				0	-	-	-	-	-
80	b	0.925				0	-	-	-	-	-
85	b	0.452				0	-	-	-	-	-
85	b	5.240	Y			0	T1	-	T1	-	-
83.3	b	15.066	Y			0	T1	T1	T1	T1	-
85	b	1.518				0	-	-	T1	-	-
76.7	b	4.651	Y			0	T1	-	T1	-	-
85	b	0.687				0	-	-	-	-	-
81.7	b	0.060				0	-	-	-	-	-
83.3	b	0.077				0	-	-	-	-	-
81.7	b	0.392				0	-	-	-	-	-
85	b	2.500				0	-	-	T1	-	-
81.7	b	3.540	Y			0	-	-	T1	-	-
81.7	b	0.754				0	-	-	-	-	-
39	🟥	0.009				1	T2	T2	T2	T2	T2
0	🟥	0.923				1	T2	T2	T2	T2	T2
0	🟥	4.684	Y			1	-	T2	-	T2	T2
0	🟥	4.177	Y			1	T2	T2	-	T2	T2
0	🟥	0.095				1	T2	T2	T2	T2	T2
61	🟥	4.318	Y			1	-	T2	-	T2	T2
50	🟥	7.037	Y			1	-	-	-	-	T2
77	🟥	78.182	Y			1	-	-	-	-	-
65	🟥	12.308	Y			1	-	-	-	-	T2
0	🟥	24.211	Y			1	-	-	-	-	-
35	🟥	0.733				1	T2	T2	T2	T2	T2
67	🟥	0.064				1	T2	T2	T2	T2	T2
63	🟥	0.277				1	T2	T2	T2	T2	T2
65	🟥	0.087				1	T2	T2	T2	T2	T2
70	🟥	3.030				1	T2	T2	-	T2	T2
45	🟥	4.255	Y			1	-	T2	-	T2	T2
72	🟥	0.205				1	T2	T2	T2	T2	T2
46.7	🟥	14.437	Y			1	-	-	-	-	T2
23.3	🟥	0.183				1	T2	T2	T2	T2	T2
8.3	🟥	0.135				1	T2	T2	T2	T2	T2
						20	9	5	15	5	0
						77	12	15	10	15	18

Ovary Maturation Rate	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
76	b	0.009		2x mean NOEC	3.47	0	-	-	-	-	-
73	b	0.013		Median NOEC	0.35	0	-	-	-	-	-
93	b	0.651				0	-	-	-	-	-
85	b	0.010		ER-L	3.9	0	-	-	-	-	-
78	b	0.233		ER-M	7.0	0	-	-	-	-	-
78	b	5.135	Y	15th Percentile E	4.2	0	T1	-	T1	-	-
78	b	1.194		TEL	1.2	0	-	-	-	-	-
83	b	0.077		85th Percentile NE	4.6	0	-	-	-	-	-
78	b	0.064		PEL	5.7	0	-	-	-	-	-
80	b	0.353		AET	15.1	0	-	-	-	-	-
78	b	1.235				0	-	-	T1	-	-
72	b	0.018			19	0	-	-	-	-	-
76	b	0.277		Effects Data N	9	0	-	-	-	-	-
76	b	3.000		**Effects Data Set**		0	-	-	T1	-	-
70	b	3.030		4.684		0	-	-	T1	-	-
78	b	0.766		4.177		0	-	-	-	-	-
75	b	0.205		4.318		0	-	-	-	-	-
77	b	0.021		7.037		0	-	-	-	-	-
72	b	7.885	Y	78.18		0	T1	T1	T1	T1	-
83.3	b	4.651	Y	12.308		0	T1	-	T1	-	-
83.7	b	0.003		24.211		0	-	-	-	-	-
61	b	0.245		3.000		0	-	-	-	-	-
57	b	4.688	Y	14.437		0	T1	-	T1	-	-
63	b	0.415				0	-	-	-	-	-
64	b	0.102				0	-	-	-	-	-
52	b	0.019				0	-	-	-	-	-
73	b	0.056				0	-	-	-	-	-
57	b	0.240				0	-	-	-	-	-
73	b	0.226				0	-	-	-	-	-
72	b	7.500	Y			0	T1	T1	T1	T1	-
73	b	0.091				0	-	-	-	-	-
74	b	0.272				0	-	-	-	-	-
56	b	0.153				0	-	-	-	-	-
61	b	0.146				0	-	-	-	-	-
59	b	0.667				0	-	-	-	-	-
58	b	4.255	Y			0	T1	-	T1	-	-
75.7	b	0.004				0	-	-	-	-	-
66.7	b	5.240	Y			0	T1	-	T1	-	-
69.3	b	15.066	Y			0	T1	T1	T1	T1	-
75.7	b	1.518				0	-	-	T1	-	-
68	b	0.060				0	-	-	-	-	-
72.3	b	2.005				0	-	-	T1	-	-
68	b	0.364				0	-	-	-	-	-
70.7	b	0.077				0	-	-	-	-	-
76.3	b	0.374				0	-	-	-	-	-
75.3	b	0.392				0	-	-	-	-	-
70.3	b	0.135				0	-	-	-	-	-
68.7	b	2.500				0	-	-	T1	-	-
77.3	b	3.540	Y			0	-	-	T1	-	-
66.7	b	0.754				0	-	-	-	-	-
71	b	7.273	Y			0	T1	T1	T1	T1	-
77.3	b	0.005				0	-	-	-	-	-
79.7	b	7.143	Y			0	T1	T1	T1	T1	-
60	b	0.095				0	-	-	-	-	-
79	b	0.925				0	-	-	-	-	-
20	🟥	0.923				1	T2	T2	T2	T2	T2
32	🟥	4.684	Y			1	-	T2	-	T2	T2
48	🟥	4.177	Y			1	-	T2	-	T2	T2
39	🟥	0.432				1	T2	T2	T2	T2	T2
40	🟥	4.318	Y			1	-	T2	-	T2	T2
32	🟥	7.037	Y			1	-	-	-	-	T2
38	🟥	78.182	Y			1	-	-	-	-	-
36	🟥	12.308	Y			1	-	-	-	-	T2
0	🟥	24.211	Y			1	-	-	-	-	-
33	🟥	0.733				1	T2	T2	T2	T2	T2
55	🟥	0.087				1	T2	T2	T2	T2	T2
54	🟥	3.000				1	T2	T2	-	T2	T2
62	🟥	0.302				1	T2	T2	T2	T2	T2
54	🟥	0.223				1	T2	T2	T2	T2	T2
66	🟥	1.129				1	T2	T2	T2	T2	T2
63.7	🟥	0.452				1	T2	T2	T2	T2	T2
50.3	🟥	14.437	Y			1	-	-	-	-	T2
63.7	🟥	0.687				1	T2	T2	T2	T2	T2
21.3	🟥	0.183				1	T2	T2	T2	T2	T2
60.3	🟥	0.103				1	T2	T2	T2	T2	T2
66	🟥	0.012				1	T2	T2	T2	T2	T2
63.7	🟥	0.170				1	T2	T2	T2	T2	T2
						22	10	5	17	5	0
						77	14	17	13	17	20

Survival Rate	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
92	b	0.013		2x mean NOEC	3.43	0	-	-	-	-	-
93	b	4.688	Y	Median NOEC	0.38	0	T1	-	T1	-	-
89	b	4.177	Y			0	-	-	T1	-	-
88	b	0.019		ER-L	4.3	0	-	-	-	-	-
87	b	0.651		ER-M	7.5	0	-	-	-	-	-
87	b	0.010		15th Percentile E	4.4	0	-	-	-	-	-
85	b	0.233		TEL	1.3	0	-	-	-	-	-
85	b	7.500	Y	85th Percentile NE	4.3	0	T1	T1	T1	T1	-
87	b	0.091		PEL	5.7	0	-	-	-	-	-
83	b	0.272		AET	15.1	0	-	-	-	-	-
83	b	7.273	Y			0	T1	-	T1	T1	-
83	b	0.077			19	0	-	-	-	-	-
87	b	0.353		Effects Data N	10	0	-	-	-	-	-
76.7	b	0.004		**Effects Data Set**		0	-	-	-	-	-
83.3	b	0.005		4.684		0	-	-	-	-	-
76.7	b	1.518		4.318		0	-	-	T1	-	-
81.7	b	4.651	Y	7.037		0	T1	-	T1	-	-
83.3	b	0.003		78.182		0	-	-	-	-	-
78.3	b	0.103		12.308		0	-	-	-	-	-
83.3	b	0.060		24.211		0	-	-	-	-	-
81.7	b	2.005		5.135		0	-	-	T1	-	-
83.3	b	0.364		4.255		0	-	-	-	-	-
80	b	0.077		7.885		0	-	-	-	-	-
76.7	b	0.170		14.437		0	-	-	-	-	-
83.3	b	0.374				0	-	-	-	-	-
78.3	b	0.392				0	-	-	-	-	-
76.7	b	0.135				0	-	-	-	-	-
81.7	b	2.500				0	-	-	T1	-	-
76.7	b	3.540	Y			0	-	-	T1	-	-
72	b	0.245				0	-	-	-	-	-
84	b	0.009				0	-	-	-	-	-
83	b	0.415				0	-	-	-	-	-
77	b	1.194				0	-	-	-	-	-
83	b	1.235				0	-	-	-	-	-
82	b	0.018				0	-	-	-	-	-
78	b	3.000				0	-	-	T1	-	-
73	b	0.766				0	-	-	-	-	-
73.3	b	0.925				0	-	-	-	-	-
71.7	b	0.452				0	-	-	-	-	-
71.7	b	5.240	Y			0	T1	-	T1	-	-
73.3	b	15.066	Y			0	T1	T1	T1	T1	-
73.3	b	7.143	Y			0	T1	-	T1	T1	-
71.7	b	0.012				0	-	-	-	-	-
71.7	b	0.754				0	-	-	-	-	-
73	b	0.056				0	-	-	-	-	-
65	b	1.129				0	-	-	-	-	-
80	🟥	0.923				1	T2	T2	T2	T2	T2
77	🟥	4.684	Y			1	-	T2	-	T2	T2
76	🟥	0.095				1	T2	T2	T2	T2	T2
76	🟥	0.102				1	T2	T2	T2	T2	T2
40	🟥	0.432				1	T2	T2	T2	T2	T2
57	🟥	4.318	Y			1	-	T2	-	T2	T2
15	🟥	7.037	Y			1	-	T2	-	-	T2
23	🟥	78.182	Y			1	-	-	-	-	-
67	🟥	0.240				1	T2	T2	T2	T2	T2
20	🟥	12.308	Y			1	-	-	-	-	T2
48	🟥	24.211	Y			1	-	-	-	-	-
58	🟥	0.226				1	T2	T2	T2	T2	T2
72	🟥	5.135	Y			1	-	T2	-	T2	T2
27	🟥	0.733				1	T2	T2	T2	T2	T2
42	🟥	0.064				1	T2	T2	T2	T2	T2
13	🟥	0.277				1	T2	T2	T2	T2	T2
63	🟥	0.087				1	T2	T2	T2	T2	T2
67	🟥	3.000				1	T2	T2	-	T2	T2
67	🟥	3.030				1	T2	T2	-	T2	T2
52	🟥	0.302				1	T2	T2	T2	T2	T2
32	🟥	0.153				1	T2	T2	T2	T2	T2
30	🟥	0.146				1	T2	T2	T2	T2	T2
65	🟥	0.667				1	T2	T2	T2	T2	T2
47	🟥	0.223				1	T2	T2	T2	T2	T2
27	🟥	4.255	Y			1	T2	T2	-	T2	T2
60	🟥	0.205				1	T2	T2	T2	T2	T2
28	🟥	0.021				1	T2	T2	T2	T2	T2
40	🟥	7.885	Y			1	-	-	-	-	T2
36.7	🟥	14.437	Y			1	-	-	-	-	T2
56.7	🟥	0.687				1	T2	T2	T2	T2	T2
25	🟥	0.183				1	T2	T2	T2	T2	T2
						31	7	2	13	4	0
						77	22	26	19	25	29

APPENDIX H - Grass Shrimp Tox - 1268OC

DNA Strand Damage	b	Aroclor 1268 OC normlzd				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
2.1	b	0.65		2x mean NOEC	3.16	0	-	-	-	-	-
2.3	b	0.4318		Median NOEC	0.412	0	-	-	-	-	-
2.2	b	0.06				0	-	-	-	-	-
2.3	b	0.2		ER-L	4.3	0	-	-	-	-	-
2.1	b	0.01		ER-M	7.3	0	-	-	-	-	-
2.0	b	0.353		15th Percentile E	4.5	0	-	-	-	-	-
1.9	b	1.24		TEL	1.4	0	-	-	-	-	-
2.2	b	3.00		85th Percentile NE	3.0	0	-	-	-	-	-
2.2	b	3.000		PEL	4.7	0	-	-	-	-	-
2.3	b	3.030		AET	15.1	0	T1	T1	T1	T1	-
1.9	b	0.302				0	-	-	T1	-	-
2.3	b	0.77			15	0	T1	-	T1	-	-
2.3	b	0.15		Effects Data N	9	0	T1	-	T1	T1	-
2.3	b	0.146		**Effects Data Set**		0	-	-	-	-	-
2.1	b	0.667		4.320		0	-	-	-	-	-
2.0	b	0.2233		7.037		0	-	-	-	-	-
2.2	b	0.021		78.182		0	-	-	-	-	-
1.8	b	0.00		12.300		0	-	-	-	-	-
1.9	b	0.9250		7.500		0	-	-	T1	-	-
1.9	b	0.45		5.100		0	-	-	-	-	-
1.63	b	15.07	Y	7.300		0	-	-	-	-	-
2.07	b	1.518		4.255		0	-	-	-	-	-
2.0	b	4.6512	Y	14.437		0	-	-	-	-	-
1.87	b	7.14	Y			0	-	-	T1	-	-
1.7	b	0.0030				0	-	-	T1	-	-
2.0	b	0.687				0	-	-	-	-	-
1.97	b	0.103				0	-	-	-	-	-
1.7	b	0.012				0	-	-	-	-	-
2.07	b	0.0601				0	-	-	-	-	-
1.8	b	2.0049				0	-	-	-	-	-
1.67	b	0.077				0	-	-	-	-	-
1.9	b	0.170				0	T1	T1	T1	T1	-
1.87	b	0.39				0	T1	-	T1	T1	-
1.9	b	0.14				0	T1	-	T1	-	-
2.07	b	2.500				0	T1	-	T1	T1	-
1.7	b	3.540	Y			0	T1	T1	T1	T1	T1
1.87	b	0.754				0	T1	T1	T1	T1	-
2.5	b	0.018				0	-	-	-	-	-
2.23	b	0.005				0	-	-	-	-	-
2.2	b	1.129				0	T1	T1	T1	T1	-
2.13	b	0.3643				0	T1	-	T1	T1	-
2.23	b	0.374				0	-	-	-	-	-
2.4	b	7.885	Y			0	-	-	-	-	-
2.1	b	5.24	Y			0	-	-	-	-	-
4.3	🟥	4.32	Y			1	T2	T2	T2	T2	T2
3.6	🟥	7.037	Y			1	-	T2	-	-	T2
3.9	🟥	78.182	Y			1	T2	T2	T2	T2	T2
3.8	🟥	12.3	Y			1	T2	T2	T2	T2	T2
1.9	🟥	0.226				1	T2	T2	T2	T2	T2
1.7	🟥	0.23				1	T2	T2	T2	T2	T2
2.7	🟥	7.5000	Y			1	T2	T2	-	T2	T2
2.2	🟥	5.1	Y			1	T2	T2	T2	T2	T2
1.9	🟥	1.2				1	-	-	-	-	T2
1.7	🟥	0.09				1	T2	T2	T2	T2	T2
1.8	🟥	0.27				1	T2	T2	T2	T2	T2
3.6	🟥	0.73				1	T2	T2	T2	T2	T2
2.2	🟥	7.3	Y			1	T2	T2	T2	T2	T2
2.4	🟥	0.077				1	T2	T2	T2	T2	T2
2.6	🟥	0.064				1	T2	T2	T2	T2	T2
3.0	🟥	0.277				1	T2	T2	T2	T2	T2
2.8	🟥	0.087				1	T2	T2	T2	T2	T2
3.5	🟥	4.255	Y			1	T2	T2	T2	T2	T2
2.7	🟥	0.20				1	T2	T2	T2	T2	T2
3.67	🟥	14.437	Y			1	T2	T2	T2	T2	T2
4.43	🟥	0.183				1	T2	T2	T2	T2	T2
						21	11	5	15	9	1
						65	19	20	18	19	21

APPENDIX H - Grass Shrimp Tox - PAHs

Embryo Development Rate	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
73	b	0.080		2x mean NOEC	3.198	0	-	-	-	-	-
74	b	0.060		Median NOEC	0.587	0	-	-	-	-	-
53	b	0.060				0	-	-	-	-	-
77	b	0.060		ER-L	4.0	0	-	-	-	-	-
45	b	0.180		ER-M	6.1	0	-	-	-	-	-
50	b	0.061		15th Percentile E	4.3	0	-	-	-	-	-
38	b	0.090		TEL	1.6	0	-	-	-	-	-
34	b	7.290	Y	85th Percentile NE	3.3	0	T1	T1	T1	T1	-
39	b	0.468		PEL	4.5	0	-	-	-	-	-
38	b	4.945	Y	AET	11.5	0	T1	-	T1	T1	-
49	b	0.788				0	-	-	-	-	-
44	b	1.360			11	0	-	-	-	-	-
33	b	11.510	Y	Effects Data N	7	0	T1	T1	T1	T1	-
56.3	b	0.136		**Effects Data Set**		0	-	-	-	-	-
52.3	b	0.649		11.726		0	-	-	-	-	-
56.3	b	5.097	Y	4.363		0	T1	-	T1	T1	-
55	b	0.234		11.7820		0	-	-	-	-	-
28	b	0.612		5.042		0	-	-	-	-	-
29	b	0.625		3.550		0	-	-	-	-	-
29	b	0.630		6.072		0	-	-	-	-	-
46.7	b	1.365		52.8		0	-	-	-	-	-
47.3	b	0.442				0	-	-	-	-	-
37.7	b	0.561				0	-	-	-	-	-
29.3	b	1.067				0	-	-	-	-	-
29	🟥	2.350				1	T2	T2	-	T2	T2
44	🟥	0.107				1	T2	T2	T2	T2	T2
36	🟥	0.086				1	T2	T2	T2	T2	T2
11	🟥	0.270				1	T2	T2	T2	T2	T2
11	🟥	0.229				1	T2	T2	T2	T2	T2
48	🟥	0.562				1	T2	T2	T2	T2	T2
0	🟥	0.204				1	T2	T2	T2	T2	T2
0	🟥	11.726	Y			1	-	-	-	-	-
45	🟥	0.564				1	T2	T2	T2	T2	T2
44	🟥	0.810				1	T2	T2	T2	T2	T2
25	🟥	0.140				1	T2	T2	T2	T2	T2
21	🟥	1.110				1	T2	T2	T2	T2	T2
16	🟥	4.363	Y			1	-	T2	-	T2	T2
18	🟥	0.454				1	T2	T2	T2	T2	T2
28	🟥	0.087				1	T2	T2	T2	T2	T2
8	🟥	1.060				1	T2	T2	T2	T2	T2
0	🟥	0.828				1	T2	T2	T2	T2	T2
21	🟥	0.446				1	T2	T2	T2	T2	T2
28	🟥	2.553				1	T2	T2	-	T2	T2
32	🟥	0.811				1	T2	T2	T2	T2	T2
30	🟥	11.782	Y			1	-	-	-	-	-
29	🟥	0.084				1	T2	T2	T2	T2	T2
29	🟥	0.243				1	T2	T2	T2	T2	T2
9	🟥	0.222				1	T2	T2	T2	T2	T2
15	🟥	5.042	Y			1	-	T2	-	-	T2
9	🟥	0.441				1	T2	T2	T2	T2	T2
10	🟥	1.067				1	T2	T2	T2	T2	T2
11	🟥	0.632				1	T2	T2	T2	T2	T2
17	🟥	1.684				1	T2	T2	-	T2	T2
26	🟥	0.477				1	T2	T2	T2	T2	T2
25	🟥	1.820				1	T2	T2	-	T2	T2
3	🟥	3.550	Y			1	T2	T2	-	T2	T2
21	🟥	1.044				1	T2	T2	T2	T2	T2
30.7	🟥	0.112				1	T2	T2	T2	T2	T2
38.7	🟥	1.189				1	T2	T2	T2	T2	T2
22	🟥	0.826				1	T2	T2	T2	T2	T2
28.3	🟥	0.274				1	T2	T2	T2	T2	T2
37	🟥	1.484				1	T2	T2	T2	T2	T2
8.7	🟥	6.072	Y			1	-	T2	-	-	T2
27	🟥	1.015				1	T2	T2	T2	T2	T2
31.7	🟥	0.876				1	T2	T2	T2	T2	T2
31.7	🟥	1.296				1	T2	T2	T2	T2	T2
18	🟥	0.794				1	T2	T2	T2	T2	T2
12	🟥	0.725				1	T2	T2	T2	T2	T2
34.7	🟥	0.492				1	T2	T2	T2	T2	T2
27.7	🟥	1.647				1	T2	T2	-	T2	T2
28.3	🟥	0.565				1	T2	T2	T2	T2	T2
28.7	🟥	1.166				1	T2	T2	T2	T2	T2
24.7	🟥	0.980				1	T2	T2	T2	T2	T2
29	🟥	0.490				1	T2	T2	T2	T2	T2
3.7	🟥	52.800	Y			1	-	-	-	-	-
34	🟥	1.394				1	T2	T2	T2	T2	T2
22.3	🟥	0.608				1	T2	T2	T2	T2	T2
						53	4	2	4	4	0
						77	47	50	41	48	50

Embryo Hatching Rate	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
96	b	0.0801		2x mean NOEC	2.86	0	-	-	-	-	-
92	b	0.562		Median NOEC	0.62	0	-	-	-	-	-
88	b	0.2340				0	-	-	-	-	-
89	b	0.06		ER-L	3.9	0	-	-	-	-	-
88	b	0.0603		ER-M	6.1	0	-	-	-	-	-
88	b	0.0870		15th Percentile E	4.0	0	-	-	-	-	-
90	b	0.0603		TEL	1.6	0	-	-	-	-	-
87	b	0.4460		85th Percentile NE	1.8	0	-	-	-	-	-
88	b	0.1800		PEL	3.3	0	-	-	-	-	-
88	b	2.553		AET	12	0	-	-	T1	-	-
88	b	0.8110				0	-	-	-	-	-
93	b	11.782	Y		11	0	T1	T1	T1	T1	-
97	b	0.0836		Effects Data N	5	0	-	-	-	-	-
87	b	0.24		**Effects Data Set**		0	-	-	-	-	-
87	b	5.042	Y	11.726		0	T1	-	T1	T1	-
93	b	0.090		4.363		0	-	-	-	-	-
85	b	7.290	Y	3.55		0	T1	T1	T1	T1	-
92	b	0.477		6.072		0	-	-	-	-	-
87	b	0.6120		52.8		0	-	-	-	-	-
85	b	0.788				0	-	-	-	-	-
88	b	1.3600				0	-	-	-	-	-
92	b	0.625				0	-	-	-	-	-
87	b	0.6300				0	-	-	-	-	-
86.7	b	0.136				0	-	-	-	-	-
90	b	0.112				0	-	-	-	-	-
88.3	b	1.2960				0	-	-	-	-	-
90	b	0.6490				0	-	-	-	-	-
90	b	0.492				0	-	-	-	-	-
86.7	b	1.6470				0	-	-	T1	-	-
86.7	b	1.3650				0	-	-	-	-	-
88.3	b	1.1660				0	-	-	-	-	-
86.7	b	0.9795				0	-	-	-	-	-
86.7	b	0.4895				0	-	-	-	-	-
76	b	0.1065				0	-	-	-	-	-
85	b	0.5640				0	-	-	-	-	-
84	b	0.810				0	-	-	-	-	-
84	b	0.1396				0	-	-	-	-	-
82	b	0.061				0	-	-	-	-	-
83	b	2.35				0	-	-	T1	-	-
82	b	4.945	Y			0	T1	-	T1	T1	-
83	b	1.8200				0	-	-	T1	-	-
82	b	11.51	Y			0	T1	T1	T1	T1	-
80	b	1.0670				0	-	-	-	-	-
80	b	1.1890				0	-	-	-	-	-
85	b	0.8260				0	-	-	-	-	-
85	b	0.274				0	-	-	-	-	-
83.3	b	1.4840				0	-	-	-	-	-
85	b	1.015				0	-	-	-	-	-
76.7	b	0.8760				0	-	-	-	-	-
85	b	0.7940				0	-	-	-	-	-
81.7	b	0.5650				0	-	-	-	-	-
83.3	b	0.4415				0	-	-	-	-	-
81.7	b	5.0970	Y			0	T1	-	T1	T1	-
85	b	0.5610				0	-	-	-	-	-
81.7	b	1.3940				0	-	-	-	-	-
81.7	b	0.6080				0	-	-	-	-	-
73	b	0.4680				0	-	-	-	-	-
39	🟥	0.0857				1	T2	T2	T2	T2	T2
0	🟥	0.27				1	T2	T2	T2	T2	T2
0	🟥	0.229				1	T2	T2	T2	T2	T2
0	🟥	0.204				1	T2	T2	T2	T2	T2
0	🟥	11.726	Y			1	-	-	-	-	T2
61	🟥	1.1095				1	T2	T2	T2	T2	T2
50	🟥	4.3629	Y			1	-	T2	-	-	T2
77	🟥	0.4536				1	T2	T2	T2	T2	T2
65	🟥	1.0602				1	T2	T2	T2	T2	T2
0	🟥	0.8279				1	T2	T2	T2	T2	T2
35	🟥	0.2220				1	T2	T2	T2	T2	T2
67	🟥	0.441				1	T2	T2	T2	T2	T2
63	🟥	1.067				1	T2	T2	T2	T2	T2
65	🟥	0.632				1	T2	T2	T2	T2	T2
70	🟥	1.684				1	T2	T2	-	T2	T2
45	🟥	3.5500	Y			1	T2	T2	-	-	T2
72	🟥	1.0440				1	T2	T2	T2	T2	T2
46.7	🟥	6.0715	Y			1	-	T2	-	-	T2
23.3	🟥	0.7250				1	T2	T2	T2	T2	T2
8.3	🟥	52.7995	Y			1	-	-	-	-	-
						20	6	3	10	6	0
						77	16	18	14	15	19

Ovary Maturation Rate	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
76	b	0.0857		2x mean NOEC	5.25	0	-	-	-	-	-
73	b	0.0801		Median NOEC	0.630	0	-	-	-	-	-
93	b	0.0603				0	-	-	-	-	-
85	b	0.0603		ER-L	6.1	0	-	-	-	-	-
78	b	0.1800		ER-M	6.1	0	-	-	-	-	-
78	b	0.8110		15th Percentile E	6.1	0	-	-	-	-	-
78	b	11.78	Y	TEL	2.0	0	T1	T1	T1	T1	-
83	b	0.0612		85th Percentile NE	3.5	0	-	-	-	-	-
78	b	0.441		PEL	4.6	0	-	-	-	-	-
80	b	0.090		AET	52.8	0	-	-	-	-	-
78	b	7.290	Y			0	T1	T1	T1	T1	-
72	b	0.468			6	0	-	-	-	-	-
76	b	1.067		Effects Data N	1	0	-	-	-	-	-
76	b	4.945		**Effects Data Set**		0	-	-	T1	T1	-
70	b	1.684		6.072		0	-	-	-	-	-
78	b	1.820				0	-	-	-	-	-
75	b	1.044				0	-	-	-	-	-
77	b	0.630				0	-	-	-	-	-
72	b	11.510	Y			0	T1	T1	T1	T1	-
83.3	b	0.8760				0	-	-	-	-	-
83.7	b	0.6490				0	-	-	-	-	-
61	b	0.1065				0	-	-	-	-	-
57	b	0.5623				0	-	-	-	-	-
60	b	11.7260	Y			0	T1	T1	T1	T1	-
64	b	0.5640				0	-	-	-	-	-
73	b	0.0603				0	-	-	-	-	-
73	b	0.4460				0	-	-	-	-	-
72	b	2.5530				0	-	-	T1	-	-
73	b	0.0836				0	-	-	-	-	-
74	b	0.2430				0	-	-	-	-	-
71	b	5.0420				0	-	-	T1	T1	-
61	b	0.788				0	-	-	-	-	-
59	b	1.360				0	-	-	-	-	-
58	b	3.550				0	-	-	T1	-	-
75.7	b	0.1360				0	-	-	-	-	-
77.3	b	0.1115				0	-	-	-	-	-
79	b	1.1890				0	-	-	-	-	-
66.7	b	0.2740				0	-	-	-	-	-
75.7	b	1.0150				0	-	-	-	-	-
79.7	b	1.2960				0	-	-	-	-	-
63.7	b	0.7940				0	-	-	-	-	-
68	b	0.5650				0	-	-	-	-	-
72.3	b	1.3650				0	-	-	-	-	-
68	b	1.1660				0	-	-	-	-	-
70.7	b	0.4415				0	-	-	-	-	-
76.3	b	0.4895				0	-	-	-	-	-
75.3	b	5.0970				0	-	-	T1	T1	-
70.3	b	52.7995	Y			0	T1	T1	T1	T1	-
68.7	b	0.5610				0	-	-	-	-	-
77.3	b	1.3940				0	-	-	-	-	-
66.7	b	0.6080				0	-	-	-	-	-
63	b	0.2340				0	-	-	-	-	-
57	b	0.08695				0	-	-	-	-	-
56	b	0.612				0	-	-	-	-	-
69.3	b	1.4840				0	-	-	-	-	-
20	🟥	0.2700				1	T2	T2	T2	T2	T2
32	🟥	0.2290				1	T2	T2	T2	T2	T2
48	🟥	0.2040				1	T2	T2	T2	T2	T2
52	🟥	0.8100				1	T2	T2	T2	T2	T2
39	🟥	0.140				1	T2	T2	T2	T2	T2
40	🟥	1.110				1	T2	T2	T2	T2	T2
32	🟥	4.36				1	T2	T2	-	T2	T2
38	🟥	0.4536				1	T2	T2	T2	T2	T2
36	🟥	1.06				1	T2	T2	T2	T2	T2
0	🟥	0.828				1	T2	T2	T2	T2	T2
33	🟥	0.2220				1	T2	T2	T2	T2	T2
55	🟥	0.632				1	T2	T2	T2	T2	T2
54	🟥	2.350				1	T2	T2	-	T2	T2
62	🟥	0.477				1	T2	T2	T2	T2	T2
54	🟥	0.625				1	T2	T2	T2	T2	T2
66	🟥	1.0670				1	T2	T2	T2	T2	T2
63.7	🟥	0.8260				1	T2	T2	T2	T2	T2
50.3	🟥	6.0715	Y			1	-	-	-	-	T2
21.3	🟥	0.7250				1	T2	T2	T2	T2	T2
60.3	🟥	0.4915				1	T2	T2	T2	T2	T2
66	🟥	1.6470				1	T2	T2	T2	T2	T2
63.7	🟥	0.9795				1	T2	T2	T2	T2	T2
						22	5	5	10	8	0
						77	21	21	19	21	22

Survival Rate	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
92	b	0.08		2x mean NOEC	4.93	0	-	-	-	-	-
93	b	0.5623		Median NOEC	0.587	0	-	-	-	-	-
89	b	0.2040				0	-	-	-	-	-
88	b	0.8100		ER-L	7.2	0	-	-	-	-	-
87	b	0.0603		ER-M	11.5	0	-	-	-	-	-
87	b	0.0603		15th Percentile E	7.7	0	-	-	-	-	-
85	b	0.18		TEL	2.1	0	-	-	-	-	-
85	b	2.553		85th Percentile NE	2.0	0	-	-	T1	-	-
87	b	0.0836		PEL	4.8	0	-	-	-	-	-
83	b	0.243		AET	52.8	0	-	-	-	-	-
83	b	5.042	Y			0	-	-	T1	T1	-
83	b	0.0612			9	0	-	-	-	-	-
87	b	0.090		Effects Data N	3	0	-	-	-	-	-
76.7	b	0.136		**Effects Data Set**		0	-	-	-	-	-
83.3	b	0.1115		11.51		0	-	-	-	-	-
76.7	b	1.0150		6.1		0	-	-	-	-	-
81.7	b	0.8760		11.726		0	-	-	-	-	-
83.3	b	0.6490				0	-	-	-	-	-
78.3	b	0.4915				0	-	-	-	-	-
83.3	b	0.5650				0	-	-	-	-	-
81.7	b	1.3650				0	-	-	-	-	-
83.3	b	1.1660				0	-	-	-	-	-
80	b	0.4415				0	-	-	-	-	-
76.7	b	0.9795				0	-	-	-	-	-
83.3	b	0.4895				0	-	-	-	-	-
78.3	b	5.0970	Y			0	-	-	T1	T1	-
76.7	b	52.7995	Y			0	T1	T1	T1	T1	-
81.7	b	0.5610				0	-	-	-	-	-
76.7	b	1.3940				0	-	-	-	-	-
72	b	0.1065				0	-	-	-	-	-
84	b	0.086				0	-	-	-	-	-
83	b	0.2340				0	-	-	-	-	-
73	b	0.0603				0	-	-	-	-	-
77	b	11.782	Y			0	T1	T1	T1	T1	-
83	b	7.29	Y			0	T1	-	T1	T1	-
82	b	0.468				0	-	-	-	-	-
78	b	4.9450	Y			0	-	-	T1	T1	-
73	b	1.82				0	-	-	-	-	-
73.3	b	1.1890				0	-	-	-	-	-
71.7	b	0.826				0	-	-	-	-	-
71.7	b	0.2740				0	-	-	-	-	-
73.3	b	1.4840				0	-	-	-	-	-
73.3	b	1.2960				0	-	-	-	-	-
71.7	b	1.6470				0	-	-	-	-	-
71.7	b	0.6080				0	-	-	-	-	-
65	b	1.0670				0	-	-	-	-	-
80	🟥	0.2700				1	T2	T2	T2	T2	T2
77	🟥	0.229				1	T2	T2	T2	T2	T2
76	🟥	11.7260	Y			1	-	-	-	-	T2
76	🟥	0.5640				1	T2	T2	T2	T2	T2
72	🟥	0.811				1	T2	T2	T2	T2	T2
40	🟥	0.1396				1	T2	T2	T2	T2	T2
57	🟥	1.1095				1	T2	T2	T2	T2	T2
15	🟥	4.3629				1	T2	T2	-	T2	T2
23	🟥	0.454				1	T2	T2	T2	T2	T2
67	🟥	0.087				1	T2	T2	T2	T2	T2
20	🟥	1.0602				1	T2	T2	T2	T2	T2
48	🟥	0.83				1	T2	T2	T2	T2	T2
58	🟥	0.4460				1	T2	T2	T2	T2	T2
27	🟥	0.222				1	T2	T2	T2	T2	T2
42	🟥	0.441				1	T2	T2	T2	T2	T2
13	🟥	1.067				1	T2	T2	T2	T2	T2
63	🟥	0.632				1	T2	T2	T2	T2	T2
67	🟥	2.3500				1	T2	T2	-	T2	T2
67	🟥	1.6840				1	T2	T2	T2	T2	T2
52	🟥	0.477				1	T2	T2	T2	T2	T2
32	🟥	0.6120				1	T2	T2	T2	T2	T2
30	🟥	0.788				1	T2	T2	T2	T2	T2
65	🟥	1.360				1	T2	T2	T2	T2	T2
47	🟥	0.6245				1	T2	T2	T2	T2	T2
27	🟥	3.5500				1	T2	T2	-	T2	T2
60	🟥	1.0440				1	T2	T2	T2	T2	T2
28	🟥	0.63				1	T2	T2	T2	T2	T2
40	🟥	11.51	Y			1	-	-	-	-	T2
36.7	🟥	6.072	Y			1	T2	T2	-	-	T2
56.7	🟥	0.7940				1	T2	T2	T2	T2	T2
25	🟥	0.725				1	T2	T2	T2	T2	T2
						31	3	2	7	6	0
						77	29	29	25	28	31

DNA Strand Damage	b	Total PAHs				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
2.1	b	0.0603		2x mean NOEC	5.11	0	T1	T1	T1	T1	T1
2.3	b	0.1396		Median NOEC	0.791	0	-	-	-	-	-
2.2	b	0.0603				0	-	-	-	-	-
2.3	b	0.0870		ER-L	6.6	0	-	-	-	-	-
2.1	b	0.0603		ER-M	8.8	0	-	-	-	-	-
2.0	b	0.09		15th Percentile E	6.9	0	-	-	-	-	-
1.9	b	7.29	Y	TEL	2.3	0	-	-	-	-	-
2.2	b	2.350		85th Percentile NE	1.8	0	T1	-	T1	T1	-
2.2	b	4.945		PEL	3.9	0	-	-	T1	-	-
2.3	b	1.6840		AET	52.8	0	-	-	T1	T1	-
1.9	b	0.477				0	-	-	-	-	-
2.3	b	1.820			5	0	-	-	-	-	-
2.3	b	0.612		Effects Data N	2	0	-	-	-	-	-
2.3	b	0.7880		**Effects Data Set**		0	-	-	-	-	-
2.1	b	1.360		11.5		0	-	-	-	-	-
2.0	b	0.625		6.1		0	-	-	-	-	-
2.2	b	0.630				0	-	-	-	-	-
1.8	b	0.1360				0	-	-	-	-	-
1.9	b	1.189				0	-	-	-	-	-
1.9	b	0.8260				0	-	-	-	-	-
1.63	b	1.484				0	-	-	-	-	-
2.07	b	1.0150				0	-	-	-	-	-
2.0	b	0.8760				0	-	-	-	-	-
1.87	b	1.296				0	-	-	-	-	-
1.7	b	0.649				0	-	-	-	-	-
2.0	b	0.794				0	-	-	-	-	-
1.97	b	0.4915				0	-	-	-	-	-
1.7	b	1.6470				0	-	-	-	-	-
2.07	b	0.565				0	-	-	-	-	-
1.8	b	1.3650				0	-	-	-	-	-
1.67	b	0.442				0	-	-	-	-	-
1.9	b	0.9795				0	-	-	-	-	-
1.87	b	5.0970				0	-	-	-	-	-
1.9	b	52.80	Y			0	-	-	T1	T1	-
2.07	b	0.5610				0	T1	T1	T1	T1	-
1.7	b	1.394				0	-	-	-	-	-
1.87	b	0.6080				0	-	-	-	-	-
2.5	b	0.4680				1	T2	T2	T2	T2	T2
2.4	b	11.510	Y			0	-	-	-	-	-
2.23	b	0.1115				0	T1	T1	T1	T1	-
2.20	b	1.067				0	-	-	-	-	-
2.1	b	0.274				0	-	-	-	-	-
2.13	b	1.1660				0	-	-	-	-	-
2.23	b	0.4895				0	-	-	-	-	-
4.3	🟥	1.1095				1	T2	T2	T2	T2	T2
3.6	🟥	4.3629				1	T2	T2	T2	T2	T2
3.9	🟥	0.4536				1	T2	T2	-	-	T2
3.8	🟥	1.0602				1	T2	T2	T2	T2	T2
1.9	🟥	0.4460				1	T2	T2	T2	T2	T2
1.7	🟥	0.180				1	T2	T2	T2	T2	T2
2.7	🟥	2.5530				1	T2	T2	T2	T2	T2
2.2	🟥	0.811				1	T2	T2	-	T2	T2
1.9	🟥	11.7820	Y			1	T2	T2	T2	T2	T2
1.7	🟥	0.0836				1	-	-	-	-	T2
1.8	🟥	0.243				1	T2	T2	T2	T2	T2
3.6	🟥	0.22				1	T2	T2	T2	T2	T2
2.2	🟥	5.0420				1	T2	T2	T2	T2	T2
2.4	🟥	0.0612				1	T2	T2	-	-	T2
2.6	🟥	0.441				1	T2	T2	T2	T2	T2
3.0	🟥	1.07				1	T2	T2	T2	T2	T2
2.8	🟥	0.632				1	T2	T2	T2	T2	T2
3.5	🟥	3.55				1	T2	T2	T2	T2	T2
2.7	🟥	1.044				1	T2	T2	-	T2	T2
3.67	🟥	6.0715	Y			1	T2	T2	T2	T2	T2
4.43	🟥	0.7250				1	T2	T2	-	-	T2
						22	4	3	7	6	1
						65	21	21	16	18	22

Embryo Development Rate	b	PAHs - OC				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
73	b	0.047		2x mean NOEC	1.000	0	-	-	-	-	-
55	b	0.069		Median NOEC	0.156	0	-	-	-	-	-
74	b	0.014				0	-	-	-	-	-
53	b	0.018		ER-L	1.3	0	-	-	-	-	-
77	b	0.023		ER-M	2.5	0	-	-	-	-	-
45	b	0.060		15th Percentile E	1.4	0	-	-	-	-	-
50	b	0.047		TEL	0.5	0	-	-	-	-	-
38	b	0.529		85th Percentile NE	0.7	0	-	-	T1	-	-
34	b	4.288	Y	PEL	1.4	0	T1	T1	T1	T1	-
39	b	0.260		AET	4.3	0	-	-	-	-	-
29	b	0.588				0	-	-	T1	-	-
38	b	1.236	Y		9	0	-	-	T1	-	-
28	b	0.130		Effects Data N	6	0	-	-	-	-	-
49	b	0.171		**Effects Data Set**		0	-	-	-	-	-
44	b	0.324		3.379		0	-	-	-	-	-
29	b	0.145		1.616		0	-	-	-	-	-
29	b	0.074		3.801		0	-	-	-	-	-
33	b	2.213	Y	1.528		0	T1	-	T1	T1	-
56.3	b	0.047		1.069		0	-	-	-	-	-
52.3	b	0.150		13.714		0	-	-	-	-	-
46.7	b	0.334				0	-	-	-	-	-
47.3	b	0.162				0	-	-	-	-	-
56.3	b	0.870				0	-	-	T1	-	-
37.7	b	0.200				0	-	-	-	-	-
44	🟥	0.0435				1	T2	T2	T2	T2	T2
36	🟥	0.052				1	T2	T2	T2	T2	T2
11	🟥	0.067				1	T2	T2	T2	T2	T2
11	🟥	0.047				1	T2	T2	T2	T2	T2
48	🟥	0.176				1	T2	T2	T2	T2	T2
0	🟥	0.050				1	T2	T2	T2	T2	T2
0	🟥	3.379	Y			1	-	-	-	-	T2
45	🟥	0.091				1	T2	T2	T2	T2	T2
44	🟥	0.349				1	T2	T2	T2	T2	T2
25	🟥	0.032				1	T2	T2	T2	T2	T2
21	🟥	0.252				1	T2	T2	T2	T2	T2
16	🟥	1.616	Y			1	-	T2	-	-	T2
18	🟥	0.082				1	T2	T2	T2	T2	T2
28	🟥	0.017				1	T2	T2	T2	T2	T2
8	🟥	0.204				1	T2	T2	T2	T2	T2
0	🟥	0.218				1	T2	T2	T2	T2	T2
21	🟥	0.127				1	T2	T2	T2	T2	T2
28	🟥	0.798				1	T2	T2	-	T2	T2
32	🟥	0.219				1	T2	T2	T2	T2	T2
30	🟥	3.801	Y			1	-	-	-	-	T2
29	🟥	0.076				1	T2	T2	T2	T2	T2
29	🟥	0.076				1	T2	T2	T2	T2	T2
9	🟥	0.074				1	T2	T2	T2	T2	T2
15	🟥	1.528	Y			1	-	T2	-	-	T2
9	🟥	0.919				1	T2	T2	-	T2	T2
10	🟥	0.305				1	T2	T2	T2	T2	T2
11	🟥	0.211				1	T2	T2	T2	T2	T2
17	🟥	0.510				1	T2	T2	-	T2	T2
26	🟥	0.111				1	T2	T2	T2	T2	T2
25	🟥	0.387				1	T2	T2	T2	T2	T2
3	🟥	0.755				1	T2	T2	-	T2	T2
21	🟥	0.243				1	T2	T2	T2	T2	T2
30.7	🟥	0.039				1	T2	T2	T2	T2	T2
29.3	🟥	0.287				1	T2	T2	T2	T2	T2
38.7	🟥	0.297				1	T2	T2	T2	T2	T2
22	🟥	0.170				1	T2	T2	T2	T2	T2
28.3	🟥	0.399				1	T2	T2	T2	T2	T2
37	🟥	0.324				1	T2	T2	T2	T2	T2
8.7	🟥	1.069	Y			1	T2	T2	-	T2	T2
27	🟥	0.227				1	T2	T2	T2	T2	T2
31.7	🟥	0.255				1	T2	T2	T2	T2	T2
31.7	🟥	0.257				1	T2	T2	T2	T2	T2
18	🟥	0.140				1	T2	T2	T2	T2	T2
12	🟥	0.218				1	T2	T2	T2	T2	T2
34.7	🟥	0.090				1	T2	T2	T2	T2	T2
27.7	🟥	0.448				1	T2	T2	T2	T2	T2
28.3	🟥	0.087				1	T2	T2	T2	T2	T2
28.7	🟥	0.452				1	T2	T2	T2	T2	T2
24.7	🟥	0.203				1	T2	T2	T2	T2	T2
29	🟥	0.141				1	T2	T2	T2	T2	T2
3.7	🟥	13.714	Y			1	-	-	-	-	-
34	🟥	0.411				1	T2	T2	T2	T2	T2
22.3	🟥	0.079				1	T2	T2	T2	T2	T2
						53	2	1	6	2	0
						77	48	50	43	48	52

Embryo Hatching Rate	b	PAHs - OC				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
76	b	0.043		2x mean NOEC	0.85	0	-	-	-	-	-
96	b	0.047		Median NOEC	0.17	0	-	-	-	-	-
92	b	0.176				0	-	-	-	-	-
88	b	0.069		ER-L	1.0	0	-	-	-	-	-
85	b	0.091		ER-M	1.6	0	-	-	-	-	-
84	b	0.349		15th Percentile E	1.0	0	-	-	-	-	-
89	b	0.014		TEL	0.4	0	-	-	-	-	-
84	b	0.032		85th Percentile NE	0.5	0	-	-	-	-	-
88	b	0.018		PEL	0.9	0	-	-	-	-	-
88	b	0.017		AET	4.3	0	-	-	-	-	-
90	b	0.023				0	-	-	-	-	-
87	b	0.127			11	0	-	-	-	-	-
88	b	0.060		Effects Data N	5	0	-	-	-	-	-
88	b	0.798		**Effects Data Set**		0	-	-	T1	-	-
88	b	0.219		3.379		0	-	-	-	-	-
93	b	3.801	Y	1.616		0	T1	T1	T1	T1	-
97	b	0.076		0.919		0	-	-	-	-	-
87	b	0.076		1.069		0	-	-	-	-	-
87	b	1.528	Y	13.714		0	T1	-	T1	T1	-
82	b	0.047				0	-	-	-	-	-
93	b	0.529				0	-	-	T1	-	-
85	b	4.288	Y			0	T1	T1	T1	T1	-
73	b	0.260				0	-	-	-	-	-
83	b	0.588				0	-	-	T1	-	-
82	b	1.236	Y			0	T1	-	T1	T1	-
92	b	0.111				0	-	-	-	-	-
83	b	0.387				0	-	-	-	-	-
87	b	0.130				0	-	-	-	-	-
85	b	0.171				0	-	-	-	-	-
88	b	0.324				0	-	-	-	-	-
92	b	0.145				0	-	-	-	-	-
87	b	0.074				0	-	-	-	-	-
82	b	2.213	Y			0	T1	T1	T1	T1	-
86.7	b	0.047				0	-	-	-	-	-
90	b	0.039				0	-	-	-	-	-
80	b	0.287				0	-	-	-	-	-
80	b	0.297				0	-	-	-	-	-
85	b	0.170				0	-	-	-	-	-
85	b	0.399				0	-	-	-	-	-
83.3	b	0.324				0	-	-	-	-	-
85	b	0.227				0	-	-	-	-	-
76.7	b	0.255				0	-	-	-	-	-
88.3	b	0.257				0	-	-	-	-	-
90	b	0.150				0	-	-	-	-	-
85	b	0.140				0	-	-	-	-	-
90	b	0.090				0	-	-	-	-	-
86.7	b	0.448				0	-	-	T1	-	-
81.7	b	0.087				0	-	-	-	-	-
86.7	b	0.334				0	-	-	-	-	-
88.3	b	0.452				0	-	-	T1	-	-
83.3	b	0.162				0	-	-	-	-	-
86.7	b	0.203				0	-	-	-	-	-
86.7	b	0.141				0	-	-	-	-	-
81.7	b	0.870	Y			0	-	-	T1	-	-
85	b	0.200				0	-	-	-	-	-
81.7	b	0.411				0	-	-	-	-	-
81.7	b	0.079				0	-	-	-	-	-
39	🟥	0.052				1	T2	T2	T2	T2	T2
0	🟥	0.067				1	T2	T2	T2	T2	T2
0	🟥	0.047				1	T2	T2	T2	T2	T2
0	🟥	0.050				1	T2	T2	T2	T2	T2
0	🟥	3.379	Y			1	-	-	-	-	T2
61	🟥	0.252				1	T2	T2	T2	T2	T2
50	🟥	1.616	Y			1	-	T2	-	-	T2
77	🟥	0.082				1	T2	T2	T2	T2	T2
65	🟥	0.204				1	T2	T2	T2	T2	T2
0	🟥	0.218				1	T2	T2	T2	T2	T2
35	🟥	0.074				1	T2	T2	T2	T2	T2
67	🟥	0.919	Y			1	T2	T2	-	-	T2
63	🟥	0.305				1	T2	T2	T2	T2	T2
65	🟥	0.211				1	T2	T2	T2	T2	T2
70	🟥	0.510				1	T2	T2	-	T2	T2
45	🟥	0.755				1	T2	T2	-	T2	T2
72	🟥	0.243				1	T2	T2	T2	T2	T2
46.7	🟥	1.069	Y			1	-	T2	-	-	T2
23.3	🟥	0.218				1	T2	T2	T2	T2	T2
8.3	🟥	13.714	Y			1	-	-	-	-	-
						20	5	3	11	5	0
						77	16	18	13	15	19

Ovary Maturation Rate	b	PAHs - OC				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
61	b	0.043		2x mean NOEC	1.52	0	-	-	-	-	-
76	b	0.052		Median NOEC	0.227	0	-	-	-	-	-
73	b	0.047				0	-	-	-	-	-
57	b	0.176		ER-L	1.6	0	-	-	-	-	-
63	b	0.069		ER-M	1.6	0	-	-	-	-	-
60	b	3.379	Y	15th Percentile E	1.6	0	T1	T1	T1	T1	-
64	b	0.091		TEL	0.6	0	-	-	-	-	-
52	b	0.349		85th Percentile NE	0.9	0	-	-	-	-	-
93	b	0.014		PEL	1.2	0	-	-	-	-	-
73	b	0.018		AET	13.7	0	-	-	-	-	-
85	b	0.023				0	-	-	-	-	-
73	b	0.127			7	0	-	-	-	-	-
78	b	0.060		Effects Data N	1	0	-	-	-	-	-
72	b	0.798		**Effects Data Set**		0	-	-	T1	-	-
78	b	0.219		1.616		0	-	-	-	-	-
78	b	3.801	Y			0	T1	T1	T1	T1	-
73	b	0.076				0	-	-	-	-	-
74	b	0.076				0	-	-	-	-	-
71	b	1.528	Y			0	-	-	T1	T1	-
83	b	0.047				0	-	-	-	-	-
78	b	0.919				0	-	-	T1	-	-
80	b	0.529				0	-	-	-	-	-
78	b	4.288	Y			0	T1	T1	T1	T1	-
72	b	0.260				0	-	-	-	-	-
76	b	0.305				0	-	-	-	-	-
76	b	1.236				0	-	-	T1	T1	-
70	b	0.510				0	-	-	-	-	-
62	b	0.111				0	-	-	-	-	-
78	b	0.387				0	-	-	-	-	-
56	b	0.130				0	-	-	-	-	-
61	b	0.171				0	-	-	-	-	-
59	b	0.324				0	-	-	-	-	-
58	b	0.755				0	-	-	T1	-	-
75	b	0.243				0	-	-	-	-	-
77	b	0.074				0	-	-	-	-	-
72	b	2.213	Y			0	T1	T1	T1	T1	-
75.7	b	0.047				0	-	-	-	-	-
77.3	b	0.039				0	-	-	-	-	-
79	b	0.297				0	-	-	-	-	-
66.7	b	0.399				0	-	-	-	-	-
69.3	b	0.324				0	-	-	-	-	-
75.7	b	0.227				0	-	-	-	-	-
83.3	b	0.255				0	-	-	-	-	-
79.7	b	0.257				0	-	-	-	-	-
83.7	b	0.150				0	-	-	-	-	-
68	b	0.087				0	-	-	-	-	-
72.3	b	0.334				0	-	-	-	-	-
68	b	0.452				0	-	-	-	-	-
70.7	b	0.162				0	-	-	-	-	-
76.3	b	0.141				0	-	-	-	-	-
75.3	b	0.870				0	-	-	T1	-	-
70.3	b	13.714	Y			0	T1	T1	T1	T1	-
68.7	b	0.200				0	-	-	-	-	-
77.3	b	0.411				0	-	-	-	-	-
66.7	b	0.079				0	-	-	-	-	-
20	🟥	0.067				1	T2	T2	T2	T2	T2
32	🟥	0.047				1	T2	T2	T2	T2	T2
48	🟥	0.050				1	T2	T2	T2	T2	T2
39	🟥	0.032				1	T2	T2	T2	T2	T2
40	🟥	0.252				1	T2	T2	T2	T2	T2
32	🟥	1.616	Y			1	T2	T2	-	-	T2
38	🟥	0.082				1	T2	T2	T2	T2	T2
57	🟥	0.017				1	T2	T2	T2	T2	T2
36	🟥	0.204				1	T2	T2	T2	T2	T2
0	🟥	0.218				1	T2	T2	T2	T2	T2
33	🟥	0.074				1	T2	T2	T2	T2	T2
55	🟥	0.211				1	T2	T2	T2	T2	T2
54	🟥	0.588				1	T2	T2	T2	T2	T2
54	🟥	0.145				1	T2	T2	T2	T2	T2
66	🟥	0.287				1	T2	T2	T2	T2	T2
63.7	🟥	0.170				1	T2	T2	T2	T2	T2
50.3	🟥	1.069				1	T2	T2	-	T2	T2
63.7	🟥	0.140				1	T2	T2	T2	T2	T2
21.3	🟥	0.218				1	T2	T2	T2	T2	T2
60.3	🟥	0.090				1	T2	T2	T2	T2	T2
66	🟥	0.448				1	T2	T2	T2	T2	T2
63.7	🟥	0.203				1	T2	T2	T2	T2	T2
						22	5	5	11	7	0
						77	22	22	20	21	22

Survival Rate	b	PAHs - OC				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
84	b	0.052		2x mean NOEC	1.47	0	-	-	-	-	-
92	b	0.047		Median NOEC	0.211	0	-	-	-	-	-
93	b	0.176				0	-	-	-	-	-
83	b	0.069		ER-L	1.7	0	-	-	-	-	-
89	b	0.050		ER-M	2.2	0	-	-	-	-	-
88	b	0.349		15th Percentile E	1.8	0	-	-	-	-	-
87	b	0.014		TEL	0.6	0	-	-	-	-	-
73	b	0.018		85th Percentile NE	0.6	0	-	-	-	-	-
87	b	0.023		PEL	1.1	0	-	-	-	-	-
85	b	0.060		AET	13.7	0	-	-	-	-	-
85	b	0.798				0	-	-	T1	-	-
72	b	0.219			7	0	-	-	-	-	-
77	b	3.801	Y	Effects Data N	3	0	T1	T1	T1	T1	-
87	b	0.076		**Effects Data Set**		0	-	-	-	-	-
83	b	0.076		3.379		0	-	-	-	-	-
83	b	1.528	Y	1.616		0	-	-	T1	T1	-
83	b	0.047		2.213		0	-	-	-	-	-
87	b	0.529				0	-	-	-	-	-
83	b	4.288	Y			0	T1	T1	T1	T1	-
82	b	0.260				0	-	-	-	-	-
78	b	1.236				0	-	-	T1	T1	-
73	b	0.387				0	-	-	-	-	-
76.7	b	0.047				0	-	-	-	-	-
83.3	b	0.039				0	-	-	-	-	-
65	b	0.287				0	-	-	-	-	-
73.3	b	0.297				0	-	-	-	-	-
71.7	b	0.170				0	-	-	-	-	-
71.7	b	0.399				0	-	-	-	-	-
73.3	b	0.324				0	-	-	-	-	-
76.7	b	0.227				0	-	-	-	-	-
81.7	b	0.255				0	-	-	-	-	-
73.3	b	0.257				0	-	-	-	-	-
83.3	b	0.150				0	-	-	-	-	-
78.3	b	0.090				0	-	-	-	-	-
71.7	b	0.448				0	-	-	-	-	-
83.3	b	0.087				0	-	-	-	-	-
81.7	b	0.334				0	-	-	-	-	-
83.3	b	0.452				0	-	-	-	-	-
80	b	0.162				0	-	-	-	-	-
76.7	b	0.203				0	-	-	-	-	-
83.3	b	0.141				0	-	-	-	-	-
78.3	b	0.870				0	-	-	T1	-	-
76.7	b	13.714	Y			0	T1	T1	T1	T1	-
81.7	b	0.200				0	-	-	-	-	-
76.7	b	0.411				0	-	-	-	-	-
71.7	b	0.079				0	-	-	-	-	-
72	🟥	0.043				1	T2	T2	T2	T2	T2
80	🟥	0.067				1	T2	T2	T2	T2	T2
77	🟥	0.047				1	T2	T2	T2	T2	T2
76	🟥	3.379	Y			1	-	-	-	-	T2
76	🟥	0.091				1	T2	T2	T2	T2	T2
40	🟥	0.032				1	T2	T2	T2	T2	T2
57	🟥	0.252				1	T2	T2	T2	T2	T2
15	🟥	1.616	Y			1	T2	T2	-	-	T2
23	🟥	0.082				1	T2	T2	T2	T2	T2
67	🟥	0.017				1	T2	T2	T2	T2	T2
20	🟥	0.204				1	T2	T2	T2	T2	T2
48	🟥	0.218				1	T2	T2	T2	T2	T2
58	🟥	0.127				1	T2	T2	T2	T2	T2
27	🟥	0.074				1	T2	T2	T2	T2	T2
42	🟥	0.919				1	T2	T2	-	T2	T2
13	🟥	0.305				1	T2	T2	T2	T2	T2
63	🟥	0.211				1	T2	T2	T2	T2	T2
67	🟥	0.588				1	T2	T2	T2	T2	T2
67	🟥	0.510				1	T2	T2	T2	T2	T2
52	🟥	0.111				1	T2	T2	T2	T2	T2
32	🟥	0.130				1	T2	T2	T2	T2	T2
30	🟥	0.171				1	T2	T2	T2	T2	T2
65	🟥	0.324				1	T2	T2	T2	T2	T2
47	🟥	0.145				1	T2	T2	T2	T2	T2
27	🟥	0.755				1	T2	T2	-	T2	T2
60	🟥	0.243				1	T2	T2	T2	T2	T2
28	🟥	0.074				1	T2	T2	T2	T2	T2
40	🟥	2.213	Y			1	-	-	-	-	T2
36.7	🟥	1.069				1	T2	T2	-	T2	T2
56.7	🟥	0.140				1	T2	T2	T2	T2	T2
25	🟥	0.218				1	T2	T2	T2	T2	T2
						31	3	3	7	5	0
						77	29	29	25	28	31

DNA Strand Damage	b	PAHs - OC				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
2.1	b	0.014		2x mean NOEC	1.40	0	T1	T1	T1	T1	T1
2.3	b	0.032		Median NOEC	0.215	0	-	-	-	-	-
2.2	b	0.018				0	-	-	-	-	-
2.3	b	0.017		ER-L	1.5	0	-	-	-	-	-
2.1	b	0.023		ER-M	1.6	0	-	-	-	-	-
2.0	b	0.529		15th Percentile E	1.6	0	-	-	-	-	-
1.9	b	4.288	Y	TEL	0.6	0	-	-	-	-	-
2.5	b	0.260		85th Percentile NE	0.5	0	T1	T1	T1	T1	-
2.2	b	0.588		PEL	0.9	0	-	-	-	-	-
2.2	b	1.236		AET	13.7	0	-	-	T1	-	-
2.3	b	0.510				0	-	-	T1	T1	-
1.9	b	0.111			6	0	-	-	T1	-	-
2.3	b	0.387		Effects Data N	3	0	-	-	T1	T1	-
2.3	b	0.130		**Effects Data Set**		0	-	-	-	-	-
2.3	b	0.171		1.616		0	-	-	-	-	-
2.1	b	0.324		3.801		0	-	-	-	-	-
2.0	b	0.145		1.528		0	-	-	-	-	-
2.2	b	0.074				0	-	-	-	-	-
2.4	b	2.213	Y			0	-	-	-	-	-
1.8	b	0.047				0	-	-	-	-	-
2.23	b	0.039				0	-	-	-	-	-
2.2	b	0.287				0	T1	T1	T1	T1	-
1.9	b	0.297				0	-	-	-	-	-
1.9	b	0.170				0	-	-	-	-	-
2.1	b	0.399				0	-	-	-	-	-
1.63	b	0.324				0	-	-	-	-	-
2.07	b	0.227				0	-	-	-	-	-
2	b	0.255				0	-	-	-	-	-
1.87	b	0.257				0	-	-	-	-	-
1.7	b	0.150				0	-	-	-	-	-
2	b	0.140				0	-	-	-	-	-
1.97	b	0.090				0	-	-	-	-	-
1.7	b	0.448				0	-	-	-	-	-
2.07	b	0.087				0	-	-	-	-	-
1.8	b	0.334				0	-	-	-	-	-
2.13	b	0.452				0	-	-	-	-	-
1.67	b	0.162				0	-	-	-	-	-
1.9	b	0.203				0	-	-	-	-	-
2.23	b	0.141				0	-	-	-	-	-
1.87	b	0.870				0	-	-	-	-	-
1.9	b	13.714	Y			0	-	-	-	-	-
2.07	b	0.200				0	-	-	-	-	-
1.7	b	0.411				0	-	-	T1	-	-
1.87	b	0.079				0	T1	T1	T1	T1	-
4.3	🟥	0.252				1	T2	T2	T2	T2	T2
3.6	🟥	1.616	Y			1	T2	T2	T2	T2	T2
3.9	🟥	0.082				1	T2	T2	T2	T2	T2
3.8	🟥	0.204				1	T2	T2	T2	T2	T2
1.9	🟥	0.127				1	-	T2	-	-	T2
1.7	🟥	0.060				1	T2	T2	T2	T2	T2
2.7	🟥	0.798				1	T2	T2	T2	T2	T2
2.2	🟥	0.219				1	T2	T2	T2	T2	T2
1.9	🟥	3.801	Y			1	T2	T2	T2	T2	T2
1.7	🟥	0.076				1	T2	T2	-	T2	T2
1.8	🟥	0.076				1	T2	T2	T2	T2	T2
3.6	🟥	0.074				1	-	-	-	-	T2
2.2	🟥	1.528	Y			1	T2	T2	T2	T2	T2
2.4	🟥	0.047				1	T2	T2	T2	T2	T2
2.6	🟥	0.919				1	T2	T2	T2	T2	T2
3.0	🟥	0.305				1	T2	T2	-	-	T2
2.8	🟥	0.211				1	T2	T2	T2	T2	T2
3.5	🟥	0.755				1	T2	T2	-	-	T2
2.7	🟥	0.243				1	T2	T2	T2	T2	T2
3.67	🟥	1.069				1	T2	T2	T2	T2	T2
4.43	🟥	0.218				1	T2	T2	-	T2	T2
						21	4	4	9	6	1
						65	19	20	15	17	21

APPENDIX H - Grass Shrimp Tox - Lead

Embryo Development Rate	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
73	b	2.0		2x mean NOEC	110	0	-	-	-	-	-
74	b	32.0		Median NOEC	16.2	0	-	-	-	-	-
53	b	12.0				0	-	-	-	-	-
77	b	14.0		ER-L	1190	0	-	-	-	-	-
45	b	17.0		ER-M	1190	0	-	-	-	-	-
50	b	9.4		15th Percentile E	1190	0	-	-	-	-	-
38	b	2.2		TEL	139	0	-	-	-	-	-
34	b	15.0		85th Percentile NE	33	0	-	-	-	-	-
39	b	8.0		PEL	198	0	-	-	-	-	-
38	b	34.0		AET	419	0	-	-	-	-	-
49	b	23.0				0	-	-	-	-	-
44	b	28.0			4	0	-	-	-	-	-
56.3	b	12.4		Effects Data N	1	0	-	-	-	-	-
52.3	b	419	Y	**Effects Data Set**		0	-	-	T1	T1	-
56.3	b	387	Y	1190		0	-	-	T1	T1	-
55	b	28.0				0	-	-	-	-	-
28	b	15.0				0	-	-	-	-	-
29	b	13.0				0	-	-	-	-	-
29	b	3.9				0	-	-	-	-	-
46.7	b	154	Y			0	-	-	T1	-	-
47.3	b	17.2				0	-	-	-	-	-
33	b	27.0				0	-	-	-	-	-
37.7	b	15.4				0	-	-	-	-	-
29.3	b	25.8				0	-	-	-	-	-
29	🟥	28.0				1	T2	T2	T2	T2	T2
44	🟥	3.7				1	T2	T2	T2	T2	T2
36	🟥	17.0				1	T2	T2	T2	T2	T2
11	🟥	36.0				1	T2	T2	T2	T2	T2
11	🟥	38.0				1	T2	T2	T2	T2	T2
48	🟥	28.0				1	T2	T2	T2	T2	T2
0	🟥	50.0				1	T2	T2	T2	T2	T2
0	🟥	47.0				1	T2	T2	T2	T2	T2
45	🟥	29.0				1	T2	T2	T2	T2	T2
44	🟥	12.0				1	T2	T2	T2	T2	T2
25	🟥	18.0				1	T2	T2	T2	T2	T2
21	🟥	21.0				1	T2	T2	T2	T2	T2
16	🟥	20.0				1	T2	T2	T2	T2	T2
18	🟥	36.0				1	T2	T2	T2	T2	T2
28	🟥	18.0				1	T2	T2	T2	T2	T2
8	🟥	29.0				1	T2	T2	T2	T2	T2
0	🟥	27.0				1	T2	T2	T2	T2	T2
21	🟥	28.0				1	T2	T2	T2	T2	T2
28	🟥	24.0				1	T2	T2	T2	T2	T2
32	🟥	47.0				1	T2	T2	T2	T2	T2
30	🟥	43.0				1	T2	T2	T2	T2	T2
29	🟥	7.5				1	T2	T2	T2	T2	T2
29	🟥	22.0				1	T2	T2	T2	T2	T2
9	🟥	21.0				1	T2	T2	T2	T2	T2
15	🟥	26.0				1	T2	T2	T2	T2	T2
9	🟥	8.9				1	T2	T2	T2	T2	T2
10	🟥	20.0				1	T2	T2	T2	T2	T2
11	🟥	12.0				1	T2	T2	T2	T2	T2
17	🟥	46.0				1	T2	T2	T2	T2	T2
26	🟥	16.0				1	T2	T2	T2	T2	T2
25	🟥	23.0				1	T2	T2	T2	T2	T2
3	🟥	29.0				1	T2	T2	T2	T2	T2
21	🟥	27.0				1	T2	T2	T2	T2	T2
30.7	🟥	16.6				1	T2	T2	T2	T2	T2
38.7	🟥	29.1				1	T2	T2	T2	T2	T2
22	🟥	25.4				1	T2	T2	T2	T2	T2
28.3	🟥	5.8				1	T2	T2	T2	T2	T2
37	🟥	42.1				1	T2	T2	T2	T2	T2
8.7	🟥	52.0				1	T2	T2	T2	T2	T2
27	🟥	25.3				1	T2	T2	T2	T2	T2
31.7	🟥	29.5				1	T2	T2	T2	T2	T2
31.7	🟥	28.8				1	T2	T2	T2	T2	T2
18	🟥	35.5				1	T2	T2	T2	T2	T2
12	🟥	20.3				1	T2	T2	T2	T2	T2
34.7	🟥	24.2				1	T2	T2	T2	T2	T2
27.7	🟥	25.7				1	T2	T2	T2	T2	T2
28.3	🟥	22.9				1	T2	T2	T2	T2	T2
28.7	🟥	16.3				1	T2	T2	T2	T2	T2
24.7	🟥	60.1				1	T2	T2	T2	T2	T2
29	🟥	32				1	T2	T2	T2	T2	T2
3.7	🟥	1190	Y			1	-	-	-	-	-
34	🟥	27.2				1	T2	T2	T2	T2	T2
22.3	🟥	27.6				1	T2	T2	T2	T2	T2
						53	0	0	3	2	0
						77	52	52	52	52	52

Embryo Hatching Rate	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
96	b	2.00		2x mean NOEC	77	0	-	-	-	-	-
92	b	28.00		Median NOEC	25.3	0	-	-	-	-	-
88	b	28.00				0	-	-	-	-	-
89	b	32.00		ER-L	1190	0	-	-	-	-	-
88	b	12.0		ER-M	1190	0	-	-	-	-	-
88	b	18.0		15th Percentile E	1190	0	-	-	-	-	-
90	b	14.0		TEL	174	0	-	-	-	-	-
87	b	28.0		85th Percentile NE	35	0	-	-	-	-	-
88	b	17.0		PEL	204	0	-	-	-	-	-
88	b	24.0		AET	419	0	-	-	-	-	-
88	b	47.0				0	-	-	-	-	-
93	b	43.0			4	0	-	-	-	-	-
97	b	7.5		Effects Data N	1	0	-	-	-	-	-
87	b	22.0		**Effects Data Set**		0	-	-	-	-	-
87	b	26.0		1190		0	-	-	-	-	-
93	b	2.2				0	-	-	-	-	-
85	b	15.0				0	-	-	-	-	-
92	b	16.0				0	-	-	-	-	-
87	b	15.0				0	-	-	-	-	-
85	b	23.0				0	-	-	-	-	-
88	b	28.0				0	-	-	-	-	-
92	b	13.0				0	-	-	-	-	-
87	b	3.9				0	-	-	-	-	-
86.7	b	12.4				0	-	-	-	-	-
90	b	16.6				0	-	-	-	-	-
88.3	b	28.8				0	-	-	-	-	-
90	b	419.0	Y			0	-	-	T1	T1	-
90	b	24.2				0	-	-	-	-	-
86.7	b	154.0	Y			0	-	-	-	-	-
88.3	b	16.3				0	-	-	-	-	-
86.7	b	60.1				0	-	-	-	-	-
86.7	b	32.0				0	-	-	-	-	-
76	b	3.7				0	-	-	-	-	-
85	b	29.00				0	-	-	-	-	-
84	b	12.00				0	-	-	-	-	-
84	b	18.00				0	-	-	-	-	-
82	b	9.4				0	-	-	-	-	-
83	b	28.0				0	-	-	-	-	-
82	b	34.0				0	-	-	-	-	-
83	b	23.0				0	-	-	-	-	-
82	b	27.0				0	-	-	-	-	-
80	b	25.8				0	-	-	-	-	-
80	b	29.1				0	-	-	-	-	-
85	b	25.4				0	-	-	-	-	-
85	b	5.8				0	-	-	-	-	-
83.3	b	42.1				0	-	-	-	-	-
85	b	25.3				0	-	-	-	-	-
76.7	b	29.5				0	-	-	-	-	-
85	b	35.5				0	-	-	-	-	-
86.7	b	25.7				0	-	-	-	-	-
81.7	b	22.9				0	-	-	-	-	-
83.3	b	17.2				0	-	-	-	-	-
81.7	b	387.0	Y			0	-	-	T1	T1	-
85	b	15.4				0	-	-	-	-	-
81.7	b	27.2				0	-	-	-	-	-
81.7	b	27.6				0	-	-	-	-	-
77	b	36.0				0	-	-	-	-	-
39	🟥	17.0				1	T2	T2	T2	T2	T2
0	🟥	36.0				1	T2	T2	T2	T2	T2
0	🟥	38.0				1	T2	T2	T2	T2	T2
0	🟥	50.00				1	T2	T2	T2	T2	T2
0	🟥	47.00				1	T2	T2	T2	T2	T2
61	🟥	21.00				1	T2	T2	T2	T2	T2
50	🟥	20.00				1	T2	T2	T2	T2	T2
65	🟥	29.0				1	T2	T2	T2	T2	T2
0	🟥	27.0				1	T2	T2	T2	T2	T2
35	🟥	21.0				1	T2	T2	T2	T2	T2
67	🟥	8.9				1	T2	T2	T2	T2	T2
73	🟥	8.0				1	T2	T2	T2	T2	T2
63	🟥	20.0				1	T2	T2	T2	T2	T2
65	🟥	12.0				1	T2	T2	T2	T2	T2
70	🟥	46.0				1	T2	T2	T2	T2	T2
45	🟥	29.0				1	T2	T2	T2	T2	T2
72	🟥	27.0				1	T2	T2	T2	T2	T2
46.7	🟥	52.0				1	T2	T2	T2	T2	T2
23.3	🟥	20.3				1	T2	T2	T2	T2	T2
8.3	🟥	1190.0	Y			1	-	-	-	-	-
						20	0	0	2	2	0
						77	19	19	19	19	19

Ovary Maturation Rate	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
76	b	17.0		2x mean NOEC	119	0	####	####	####	####	-
73	b	2.00		Median NOEC	25.3	0	####	####	####	####	-
93	b	32.00				0	####	####	####	####	-
85	b	14.0		ER-L	#NUM!	0	####	####	####	####	-
78	b	17.0		ER-M	#NUM!	0	####	####	####	####	-
78	b	47.0		15th Percentile E	#NUM!	0	####	####	####	####	-
78	b	43.0		TEL	#NUM!	0	####	####	####	####	-
83	b	9.4		85th Percentile NE	41	0	####	####	####	####	-
78	b	8.9		PEL	#NUM!	0	####	####	####	####	-
80	b	2.2		AET	1190	0	####	####	####	####	-
78	b	15.0				0	####	####	####	####	-
72	b	8.0			4	0	####	####	####	####	-
76	b	20.0		Effects Data N	0	0	####	####	####	####	-
76	b	34.0		**Effects Data Set**		0	####	####	####	####	-
70	b	46.0				0	####	####	####	####	-
78	b	23.0				0	####	####	####	####	-
75	b	27.0				0	####	####	####	####	-
77	b	3.9				0	####	####	####	####	-
72	b	27.0				0	####	####	####	####	-
83.3	b	29.5				0	####	####	####	####	-
83.7	b	419.0	Y			0	####	####	####	####	-
61	b	3.7				0	####	####	####	####	-
57	b	28.00				0	####	####	####	####	-
60	b	47.00				0	####	####	####	####	-
64	b	29.00				0	####	####	####	####	-
52	b	12.00				0	####	####	####	####	-
73	b	12.0				0	####	####	####	####	-
73	b	28.0				0	####	####	####	####	-
72	b	24.0				0	####	####	####	####	-
73	b	7.5				0	####	####	####	####	-
56	b	15.0				0	####	####	####	####	-
61	b	23.0				0	####	####	####	####	-
59	b	28.0				0	####	####	####	####	-
58	b	29.0				0	####	####	####	####	-
75.7	b	12.4				0	####	####	####	####	-
77.3	b	16.6				0	####	####	####	####	-
66	b	25.8				0	####	####	####	####	-
79	b	29.1				0	####	####	####	####	-
63.7	b	25.4				0	####	####	####	####	-
66.7	b	5.8				0	####	####	####	####	-
69.3	b	42.1				0	####	####	####	####	-
75.7	b	25.3				0	####	####	####	####	-
79.7	b	28.8				0	####	####	####	####	-
68	b	22.9				0	####	####	####	####	-
72.3	b	154.0	Y			0	####	####	####	####	-
68	b	16.3				0	####	####	####	####	-
70.7	b	17.2				0	####	####	####	####	-
76.3	b	32.0				0	####	####	####	####	-
75.3	b	387.0	Y			0	####	####	####	####	-
70.3	b	1190.0	Y			0	####	####	####	####	-
68.7	b	15.4				0	####	####	####	####	-
77.3	b	27.2				0	####	####	####	####	-
66.7	b	27.6				0	####	####	####	####	-
63	b	28.00				0	####	####	####	####	-
74	b	22.0				0	####	####	####	####	-
20	🟥	36.0				1	####	####	####	####	T2
32	🟥	38.0				1	####	####	####	####	T2
48	🟥	50.00				1	####	####	####	####	T2
39	🟥	18.00				1	####	####	####	####	T2
40	🟥	21.00				1	####	####	####	####	T2
32	🟥	20.00				1	####	####	####	####	T2
38	🟥	36.0				1	####	####	####	####	T2
57	🟥	18.0				1	####	####	####	####	T2
36	🟥	29.0				1	####	####	####	####	T2
0	🟥	27.0				1	####	####	####	####	T2
33	🟥	21.0				1	####	####	####	####	T2
71	🟥	26.0				1	####	####	####	####	T2
55	🟥	12.0				1	####	####	####	####	T2
54	🟥	28.0				1	####	####	####	####	T2
62	🟥	16.0				1	####	####	####	####	T2
54	🟥	13.0				1	####	####	####	####	T2
50.3	🟥	52.0				1	####	####	####	####	T2
63.7	🟥	35.5				1	####	####	####	####	T2
21.3	🟥	20.3				1	####	####	####	####	T2
60.3	🟥	24.2				1	####	####	####	####	T2
66	🟥	25.7				1	####	####	####	####	T2
63.7	🟥	60.1				1	####	####	####	####	T2
						22	0	0	0	0	0
						77	0	0	0	0	22

Survival Rate	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
92	b	2		2x mean NOEC	136	0	####	####	####	####	-
93	b	28		Median NOEC	25	0	####	####	####	####	-
89	b	50				0	####	####	####	####	-
88	b	12		ER-L	#####	0	####	####	####	####	-
87	b	32		ER-M	#####	0	####	####	####	####	-
87	b	14		15th Percentile E	#####	0	####	####	####	####	-
85	b	17		TEL	#####	0	####	####	####	####	-
85	b	24		85th Percentile NE	44	0	####	####	####	####	-
87	b	7.5		PEL	#####	0	####	####	####	####	-
83	b	22		AET	1190	0	####	####	####	####	-
83	b	26				0	####	####	####	####	-
83	b	9.4			4	0	####	####	####	####	-
87	b	2.2		Effects Data N	0	0	####	####	####	####	-
76.7	b	12.4		**Effects Data Set**		0	####	####	####	####	-
83.3	b	16.6				0	####	####	####	####	-
76.7	b	25.3				0	####	####	####	####	-
81.7	b	29.5				0	####	####	####	####	-
83.3	b	419	Y			0	####	####	####	####	-
78.3	b	24.2				0	####	####	####	####	-
83.3	b	22.9				0	####	####	####	####	-
81.7	b	154	Y			0	####	####	####	####	-
83.3	b	16.3				0	####	####	####	####	-
80	b	17.2				0	####	####	####	####	-
76.7	b	60.1				0	####	####	####	####	-
83.3	b	32				0	####	####	####	####	-
78.3	b	387	Y			0	####	####	####	####	-
76.7	b	1190	Y			0	####	####	####	####	-
81.7	b	15.4				0	####	####	####	####	-
76.7	b	27.2				0	####	####	####	####	-
84	b	17				0	####	####	####	####	-
83	b	28				0	####	####	####	####	-
73	b	12				0	####	####	####	####	-
72	b	47				0	####	####	####	####	-
77	b	43				0	####	####	####	####	-
83	b	15				0	####	####	####	####	-
82	b	8				0	####	####	####	####	-
65	b	25.8				0	####	####	####	####	-
73.3	b	29.1				0	####	####	####	####	-
71.7	b	25.4				0	####	####	####	####	-
71.7	b	5.85				0	####	####	####	####	-
73.3	b	42.1				0	####	####	####	####	-
73.3	b	28.8				0	####	####	####	####	-
71.7	b	25.7				0	####	####	####	####	-
71.7	b	27.6				0	####	####	####	####	-
78	b	34				0	####	####	####	####	-
73	b	23				0	####	####	####	####	-
80	🟥	36				1	####	####	####	####	T2
77	🟥	38				1	####	####	####	####	T2
76	🟥	47				1	####	####	####	####	T2
76	🟥	29				1	####	####	####	####	T2
72	🟥	3.7				1	####	####	####	####	T2
40	🟥	18				1	####	####	####	####	T2
57	🟥	21				1	####	####	####	####	T2
15	🟥	20				1	####	####	####	####	T2
23	🟥	36				1	####	####	####	####	T2
67	🟥	18				1	####	####	####	####	T2
20	🟥	29				1	####	####	####	####	T2
48	🟥	27				1	####	####	####	####	T2
58	🟥	28				1	####	####	####	####	T2
27	🟥	21				1	####	####	####	####	T2
42	🟥	8.9				1	####	####	####	####	T2
13	🟥	20				1	####	####	####	####	T2
63	🟥	12				1	####	####	####	####	T2
67	🟥	28				1	####	####	####	####	T2
67	🟥	46				1	####	####	####	####	T2
52	🟥	16				1	####	####	####	####	T2
32	🟥	15				1	####	####	####	####	T2
30	🟥	23				1	####	####	####	####	T2
65	🟥	28				1	####	####	####	####	T2
47	🟥	13				1	####	####	####	####	T2
27	🟥	29				1	####	####	####	####	T2
60	🟥	27				1	####	####	####	####	T2
28	🟥	3.9				1	####	####	####	####	T2
40	🟥	27				1	####	####	####	####	T2
36.7	🟥	52				1	####	####	####	####	T2
56.7	🟥	35.5				1	####	####	####	####	T2
25	🟥	20.3				1	####	####	####	####	T2
						31	0	0	0	0	0
						77	0	0	0	0	31

DNA Strand Damage	b	Lead				Actual Effects	Pred. Effects ER-L	Pred. Effects ER-M	Pred. Effects TEL	Pred. Effects PEL	Pred. Effects AET
2.1	b	32		2x mean NOEC	140	0	####	####	####	####	-
2.3	b	18		Median NOEC	25	0	####	####	####	####	-
2.2	b	12				0	####	####	####	####	-
2.3	b	18		ER-L	#NUM!	0	####	####	####	####	-
2.1	b	14		ER-M	#NUM!	0	####	####	####	####	-
2.0	b	2.2		15th Percentile E	#NUM!	0	####	####	####	####	-
1.9	b	15		TEL	#NUM!	0	####	####	####	####	-
2.2	b	28		85th Percentile NE	39	0	####	####	####	####	-
2.2	b	34		PEL	#NUM!	0	####	####	####	####	-
2.3	b	46		AET	1190	0	####	####	####	####	-
1.9	b	16				0	####	####	####	####	-
2.3	b	23			4	0	####	####	####	####	-
2.3	b	15		Effects Data N	0	0	####	####	####	####	-
2.3	b	23		**Effects Data Set**		0	####	####	####	####	-
2.1	b	28				0	####	####	####	####	-
2.0	b	13				0	####	####	####	####	-
2.2	b	3.9				0	####	####	####	####	-
1.8	b	12.4				0	####	####	####	####	-
1.9	b	29.1				0	####	####	####	####	-
1.9	b	25.4				0	####	####	####	####	-
1.63	b	42.1				0	####	####	####	####	-
2.07	b	25.3				0	####	####	####	####	-
2.0	b	29.5				0	####	####	####	####	-
1.87	b	28.8				0	####	####	####	####	-
1.70	b	419	Y			0	####	####	####	####	-
2.0	b	35.5				0	####	####	####	####	-
1.97	b	24.2				0	####	####	####	####	-
1.7	b	25.7				0	####	####	####	####	-
2.07	b	22.9				0	####	####	####	####	-
1.8	b	154	Y			0	####	####	####	####	-
1.67	b	17.2				0	####	####	####	####	-
1.9	b	60.1				0	####	####	####	####	-
1.87	b	387	Y			0	####	####	####	####	-
1.9	b	1190	Y			0	####	####	####	####	-
2.07	b	15.4				0	####	####	####	####	-
1.7	b	27.2				0	####	####	####	####	-
1.87	b	27.6				0	####	####	####	####	-
2.4	b	27				1	####	####	####	####	T2
2.23	b	16.6				0	####	####	####	####	-
2.2	b	25.8				0	####	####	####	####	-
2.1	b	5.8				0	####	####	####	####	-
2.13	b	16.3				0	####	####	####	####	-
2.23	b	32				0	####	####	####	####	-
2.5	b	8				0	####	####	####	####	-
4.3	🟥	21				1	####	####	####	####	T2
3.6	🟥	20				1	####	####	####	####	T2
3.9	🟥	36				1	####	####	####	####	T2
3.8	🟥	29				1	####	####	####	####	T2
1.9	🟥	28				1	####	####	####	####	T2
1.7	🟥	17				1	####	####	####	####	T2
2.7	🟥	24				1	####	####	####	####	T2
2.2	🟥	47				1	####	####	####	####	T2
1.9	🟥	43				1	####	####	####	####	T2
1.7	🟥	7.5				1	####	####	####	####	T2
1.8	🟥	22				1	####	####	####	####	T2
3.6	🟥	21				1	####	####	####	####	T2
2.2	🟥	26				1	####	####	####	####	T2
2.4	🟥	9.4				1	####	####	####	####	T2
2.6	🟥	8.9				1	####	####	####	####	T2
3.0	🟥	20				1	####	####	####	####	T2
2.8	🟥	12				1	####	####	####	####	T2
3.5	🟥	29				1	####	####	####	####	T2
2.7	🟥	27				1	####	####	####	####	T2
3.67	🟥	52				1	####	####	####	####	T2
4.43	🟥	20.3				1	####	####	####	####	T2
						22	0	0	0	0	0
						65	0	0	0	0	22

APPENDIX E

LIFE HISTORIES OF SELECTED FOOD ITEMS EMPLOYED IN FINFISH AND WILDLIFE FOOD-WEB EXPOSURE MODELS FOR ESTUARY AT LCP SITE

E.1 Cordgrass
E.2 Fiddler Crabs
E.3 Blue Crab
E.4 Mummichog
E.5 Silver Perch

Appendix E

Life Histories of Selected Food Items Employed in Fish and Wildlife Food - Web Exposure Models for Estuary at LCP Chemicals Superfund Site

Appendix E reviews relevant aspects of the life histories and vital statistics of five aquatic species at the LCP Chemicals Superfund Site (Site); cordgrass, fiddler crabs, blue crabs, mummichogs, and silver perch. These organisms are food items in the diet of higher-trophic-level fish and wildlife which are modeled for potential hazard associated with uptake of chemicals of potential concern (COPC) from the estuary. Only insects, employed as a food item for two avian species (the red-winged blackbird and clapper rail), are not addressed in this appendix.

E.1 Cordgrass (*Spartina alterniflora*)

The salt marsh in Georgia consists of four basic zones: 1) the levee, which is the area along the banks of the tidal creeks; 2) the low marsh, the area just behind the levee; 3) the high marsh, just inland of the low marsh; and 4) the border, located between the low marsh and the transitional area, which blends into the uplands (Univ. of Georgia, 2000).

Smooth cordgrass occurs in all of the above-identified marsh zones, in great part because of its special adaptations that allow it to live where few other plants could survive. These adaptations include a tough and well-anchored root system, as well as narrow, tough blades and special glands that secrete excess salt, permitting it to withstand high heat and daily exposure to salt water.

Smooth cordgrass grows tallest (up to about 3 meters [m]) on the levee because the frequent movement of water across the creek bank prevents sediment in this zone from becoming anaerobic or having high salt concentrations. In the low marsh, which is characterized by anaerobic sediment, a shorter variety of cordgrass is found, reaching a height of between about 0.5 to 1 m. Cordgrass in the high marsh, which typically contains a sandy sediment high in salt content, is either absent or stunted, often reaching a height of just 10 centimeters (cm). In the less salty border zone, a variety of plants successfully compete against smooth cordgrass.

Smooth cordgrass provides habitat, protection, and food to a variety of biota. Fiddler crabs (typically the mud fiddler), mud snails, marsh periwinkles, ribbed mussels, and Eastern oysters are found among the cordgrass in the low marsh, while sand fiddlers occur in the high marsh. Birds, such as the red-winged blackbird, feed on insects and seeds in the marsh. Other birds, such as herons and egrets, forage on fiddler crabs in the marsh. The clapper rail roosts on the marsh surface within the protective cover of cordgrass. Perhaps most importantly, decomposition of cordgrass results in formation of detritus, which is the base of the ecological food web in southeastern estuaries.

E.2 Fiddler Crabs (*Uca spp.*)

Three species of fiddler crabs inhabit the marsh at the Site: 1) the mud fiddler *(Uca pugnax); 2)* the sand fiddler *(U. pugilator);* and 3) the red-jointed fiddler *(U. minax).* The three species differ in terms of preferred habitat, with, as their common names imply, the mud and sand fiddlers preferring substrates of different textures, and the red-jointed fiddler being found on either substrate but at some distance from water of high salinity (Williams, 1965). In addition, the mud and sand fiddlers are generally smaller (carapace length of males: 15-17 millimeters [mm]) than the red-jointed fiddler (carapace length of males: 25 mm).

The males of all three species of fiddler crabs are characterized by one large cheliped with (mud and red-jointed fiddlers) or without (sand fiddler) an oblique tuberculate ridge on the inner surface of the palm extending upward from the lower margin. In addition, the red-jointed fiddler is so named because of red leg joints on the large cheliped. In this investigation, the easily identified red-jointed fiddler was often the primary species encountered at the two reference locations (Troup Creek and the Crescent River), while a combination of the less easily identified mud and sand fiddlers characterized the Site.

The mud fiddler (Pearse, 1914) lives primarily on intertidal flats of mud or clay among the roots of cordgrass, with the maximum number of burrows found about 2 feet (ft) below the high-tide mark. These burrows, which often extend to 2 ft in depth, are typically constructed during falling tides; on rising tides, mud fiddlers hasten to plug their burrows with mud, which keeps the water out and a small amount of air inside. When the tide is out, mud fiddlers feed on bacteria, algae, and detritus that cover the surface of the tidal flats. Mud fiddlers, in turn, are preyed upon by a variety of fishes, reptiles, birds, and mammals. Mud fiddlers spawn during the summer, producing eggs attached to the abdomens of the females, and hibernate in their burrows during the winter.

The sand fiddler and red-jointed fiddler display, in their preferred habitats, most of the characteristics described above for the mud fiddler. However, several differences exhibited by the red-jointed fiddler are its burrows, the openings of which are often considerably above the high-tide level, and the sometimes observed (Teal, 1958) predation on the two smaller fiddler crab species. Based on studies of red-jointed fiddlers by Teal (1958), it appears that fiddler crabs exhibit fidelity to their environment, with usually just one crab inhabiting a single burrow.

E.3 Blue Crab (*Callinectes sapidus*)

Blue crabs inhabit the upper (landward) part of the estuary from the megalopal stage to adulthood. Mating of crabs then typically occurs during all but the coldest months of the year. After mating, male crabs usually remain in the upper estuary, while females migrate to higher salinity water in the lower estuary or ocean to ensure egg development. Spawning of eggs (onto the ventral surface of the abdomen of the female, which is then termed a "sponge crab") usually occurs several months after mating. Eggs hatch in about two weeks and pass through a number of larval stages before reaching the megalopal stage, which then begins shoreward movement to the estuarine nursery grounds.

Blue crabs feed on a variety of plant and animal materials, both alive and dead. Blue crabs may live for as many as three years, but most die within a year (Sea Science, 2000). Tagging studies have documented that female crabs can migrate 800 kilometers (km) (500 miles) in 100 days (Sea-Stats, 2000).

The general restriction of male blue crabs to the upper estuary throughout their lives has resulted in their selection for analyses of chemical body burdens in this investigation. By this restriction, a conservative estimate of chemical contamination can be obtained for a key prey species with the capability of reflecting or "integrating" contamination over a moderately extensive geographical area.

E.4 Mummichog (*Fundulus heteroclitus*)

The mummichog is a cyprinodont fish that occurs from Labrador to Mexico, and which prefers brackish water (Perlmutter, 1961). It may reach up to about five (5) years in age and achieve a total length of approximately 100 mm (Abraham, 1985). Mummichogs are euryhaline and eurythermal.

Mummichogs are relatively stationary fish. Fish over 60 mm in length maintain a summer home range of 36-38 m along one bank of a tidal creek, although some may move as much as 375 m (Lotrich, 1975). In winter, fish may burrow 150-200 mm into the mud (Chidester, 1920; Hardy, 1978) or migrate to the mouth of the tidal channel where they have been living (Butner and Brattstrom, 1960). Spring migration back up the tidal channel occurs when the water temperature reaches about 15 degrees Celsius (°C) (Hardy, 1978).

Mummichogs become sexually mature and spawn as early as their first year (Hardy, 1978). Spawning generally occurs during the spring and summer in shallows containing heavy growths of vegetation, with eight or more spawning peaks per season during high spring tides (Taylor and DiMichele, 1980). Eggs, which typically number several hundred per spawning episode, are sometimes deposited inside the outer dead leaves of smooth cordgrass (Taylor and DiMichele, 1980). The eggs normally incubate in the air and are not submerged until the next spring tide after they are laid (Taylor and DiMichele, 1980). Eggs hatch in about 7-8 days at a temperature of 22-34^{o}C (Taylor et al., 1977).

Mummichogs are one of the more abundant estuarine fish species, with fish longer than 40 mm exhibiting a density ranging from 0.35 to 6.04 individuals / m^2 in the summer (Kelso, 1979). Mummichogs feed throughout the water column and in the sediment on a variety of food items, including fiddler crabs; however, they cannot subsist on a diet of plant material or detritus (Katz, 1975). Mummichogs, in turn, are commonly preyed upon by numerous species of larger fishes (including red drum; Peterson and Peterson, 1979), wading birds (e. g., green herons), and mammals.

E.5 Silver Perch (*Bairdiella chrysoura*)

The silver perch is a member of the drum family, Sciaenidae that occurs along the Atlantic coast and Gulf of Mexico from New York to Texas (Perlmutter, 1961). These fish may reach up to about six (6) years in age and achieve a total length of approximately 30 cm (Perlmutter, 1961).

Adult silver perch are typically "shore" fishes that only appear to migrate offshore during colder months (Breder, 1928). Adult fish (like red drum and spotted seatrout) generally spawn in shallow estuarine areas and young recruits appear to "settle and stay" in their nursery habitats (Rooker et al., 1997).

Silver perch become sexually mature by their second or third year (at a length of about 15 cm). Spawning generally occurs during the spring through early fall. Eggs are buoyant and generally hatch in less than 2 days (Breder, 1928).

Silver perch feed on a variety .of annelid worms, crustaceans, and smaller fishes (Perlmutter, 1961). They are preyed upon by larger fishes, wading birds, and mammals such as the river otter.

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APPENDIX F

RELATIONSHIPS BETWEEN BODY BURDENS OF TOTAL MERCURY AND METHYLMERCURY IN FOOD ITEMS EMPLOYED IN FISH AND WILDLIFE FOOD-WEB EXPOSURE MODELS FOR ESTUARY AT LCP SITE

Appendix F

RELATIONSHIPS BETWEEN BODY BURDENS OF TOTAL MERCURY AND METHYLMERCURY IN FOOD ITEMS EMPLOYED IN FISH AND WILDLIFE FOOD-WEB EXPOSURE MODELS FOR ESTUARY AT LCP SITE

Body-burden relationships between total mercury and methylmercury in major food items of modeled fish and wildlife are presented in Table 1. The relationship between the two forms of mercury and cordgrass (*Spartina alterniflora*), the sole food item for the marsh rabbit (*Sylvilagus palustris*), is addressed in Table 10 of the main body of this document. The last food item employed in wildlife modeling was insects, which were collected in 2000. Body burdens of total mercury and methylmercury in these insects were, respectively, 0.032 and 0.018 mg/kg (dw), which generates a methylmercury/total mercury ratio of 56%

Table 1.__Relationships between body burdens of total mercury and methylmercury in selected food items of modeled fish and wildlife for estuary at LCP Site (2000, 2005, and 2007 data)

Sample identifier (Sampling station)	Total mercury (mg/kg, dw)	Methylmercury	
		(mg/kg, dw)	% of total
Fidder Crabs (*Uca* spp.)			
	2000		
M-AB	1.07	0.611	57
M-25/NOAA 4	0.74	0.350	47
M-28/NOAA 10	0.16	0.118	74
Crescent River	0.018	0.013	72
Troup Creek	0.031	0.028	90
	2005		
Crescent River	0.054	0.042	78
Troup Creek	0.069	0.051	74
M-25/NOAA 4	0.543	0.448	82
M-NOAA 5	0.233	0.120	52
M-NOAA 3	0.186	0.167	90
M-NOAA 6	0.211	0.117	56
M-NOAA 7	0.234	0.169	72
M-NOAA 8	0.128	0.066	52
M-NOAA 9	0.211	0.114	54
M-AB	0.949	0.565	60
M-100	0.254	0.178	70
M-101	0.172	0.133	77
M-204	0.278	0.249	90
M-102	0.194	0.134	69
M-37	0.200	0.114	57
M-103	0.213	0.173	81
M-104	0.135	0.022	16
M-108	0.083	0.066	80
M-107	0.095	0.105	110
M-106	0.154	0.048	31
M-200	0.206	0.084	41
M-201	0.185	0.141	76
M-202	0.072	0.036	50
M-203	0.094	0.058	62
	2007		
M-NOAA 5	0.233	0.183	79
M-NOAA 3	0.447	0.327	73
M-NOAA 8	0.147	0.130	88
M-AB	0.960	0.793	83
		Mean:	**68**
Blue crabs (*Callinectes sapidus*)			
	2000		
Crescent River	0.078	0.085	109
Troup Creek	0.069	0.073	106
Upper Purvis Creek	1.714	1.93	113
Lower Purvis Creek	1.723	1.70	99
	2005		
Crescent River	0.138	0.143	104
Troup Creek	0.193	0.220	114
Upper Purvis Creek	1.390	1.240	89
Lower Purvis Creek	0.878	0.884	101
		Mean:	**<104**
Red Drum (*Sciaenops ocellatus*)			
	2005		
Crescent River	0.217	0.192	88
Troup Creek	0.553	0.422	76
Purvis Creek	0.728	0.758	104
		Mean:	**89**
Spotted Seatrout (*Cynoscion nebulosus*)			
	2000		
Purvis Creek	0.64	1.0	156
	2005		
Crescent River	0.117	0.116	99
Troup Creek	0.346	0.246	71
Purvis Creek	3.77	3.84	102
		Mean:	**<107**
Mummichogs (*Fundulus heteroclitus*)			
	2000		
Crescent River	0.025	0.027	108
Troup Creek	0.041	0.040	98
C-6	0.433	0.413	95
C-9	0.777	0.790	102
C-13	0.327	0.363	111
C-33	0.370	0.407	110
	2005		
Crescent River	0.092	0.050	54
Troup Creek	0.101	0.095	94
C-5	0.249	0.256	103
C-6	0.660	0.533	81
C-9	0.429	0.422	98
C-13	0.209	0.174	83
C-100	0.268	0.254	95
C-204	0.441	0.389	88
C-39	0.398	0.396	99
C-33	0.453	0.412	91
C-102	0.261	0.246	94
C-D	0.179	0.181	101
C-C	0.211	0.217	103
C-45	0.269	0.279	104
C-103	0.127	0.097	76
C-104	0.146	0.127	87
C-105	0.141	0.125	89
C-200	0.393	0.441	112
C-201	0.070	0.058	83
C-202	0.396	0.443	112
	2007		
C-5	0.497	0.343	69
C-9	0.910	0.673	74
C-33	0.327	0.203	62
C-39	0.523	0.380	73
		Mean:	**92**
Silver Perch (*Bairdiella chrysoura*)			
	2000		
Troup Creek	0.151	0.17	113
Purvis Creek	2.12	2.21	104
	2005		
Crescent River	0.134	0.165	123
Troup Creek	0.269	0.322	120
Purvis Creek	0.993	1.000	101
		Mean:	**<112**
Black Drum (*Pogonias cromis*)			
	2000		
Purvis Creek	0.925	0.92	99
	2005		
Crescent River	0.065	0.055	85
Troup Creek	0.082	0.075	91
Purvis Creek	0.923	0.823	89
		Mean:	**91**
Striped Mullet (*Mugil cephalus*)			
	2005		
Crescent River	0.017	0.004	24
Troup Creek	0.179	0.079	44
Purvis Creek	0.129	0.056	43
		Mean:	**37**

APPENDIX G

LIFE HISTORIES OF FINFISH AND WILDLIFE EVALUATED IN FOOD-WEB EXPOSURE MODELS FOR ESTUARY AT LCP SITE

G.1 Red Drum
G.2 Diamondback Terrapin
G.3 Red-Winged Blackbird
G.4 Clapper Rail
G.5 Green Heron
G.6 Marsh Rabbit
G.7 Raccoon
G.8 River Otter

Appendix G

Life Histories of Finfish and Wildlife Evaluated in Food - Web Exposure Models for Estuary at LCP Chemicals Superfund Site

Appendix G reviews relevant aspects of the life histories and vital statistics of the red drum and seven species of wildlife at the LCP Chemicals Superfund Site (Site) – diamondback terrapin, red-winged blackbird, clapper rail, green heron, marsh rabbit, raccoon, and river otter – employed as predator species evaluated (modeled) for potential hazard associated with uptake of chemicals of potential concern (COPC) from the estuary.

G.1 Red Drum (*Sciaenops ocellatus*)

The red drum is a member of the drum family, Sciaenidae, which ranges in the Atlantic Ocean from Massachusetts to Key West and throughout the Gulf of Mexico (Sea-Stats, 2000). The fish is both euryhaline and eurythermal, although younger fish are best able to tolerate freshwater conditions and can withstand a substantial range in temperature (from about 2 to 33 degrees Celsius (°C).

Red drum may reach up to about 25-35 years in age and weigh as much as about 45 kilograms (kg) (100 lb).

Red drum matures at about 2 years (males) and 4 years (females) of age (Sea-Stats, 2000). Most fish are fall spawners, and move out of the estuary to inlets and passes for this activity. The fertilized eggs are about 1 millimeter (mm) in diameter and contain small oil globules, which keep the eggs afloat as they are transported shoreward by tidal currents. The eggs hatch after about 20 to 30 hours, and the yolk sac is completely absorbed after about three days. The young larvae then feed mostly on plankton as they continue their journey into the estuarine nursery areas.

Inside the estuary, juvenile red drum settles in shallow water along the edges of thickly vegetated seagrass beds presumably for protection (Sea-Stats, 2000). Young-of-the-year fish (juveniles less than 1 year old) move in and out of backwater channels and canals as they develop. By the end of their first year, fish are about 35 centimeters (cm)

(13-14 inches) in length and will remain in the estuary for up to 4 years, where they may reach a size of perhaps 75 cm (30 inches). They will then move out of the estuary and return to inshore areas to spawn, thus repeating the cycle.

Red drum are not long-distance travelers and tend to remain in the same geographical area in which they were spawned (Sea-Stats, 2000). In tagging studies conducted along Florida's Gulf Coast, 50 to 85 percent of fish were recaptured within six miles of their original release site.

The diet of red drum changes as the fish grows (Texas Parks and Wildlife, 2000). The fish are generally bottom feeders, but will feed in the water column when the opportunity arises. Juvenile fish feed primarily on marine worms, shrimp, and small crabs. As the fish grow older, they feed on shrimp, larger crabs, and small fish. A phenomenon called "tailing"occurs when red drum feed in shallow water with their head down in the grass and tail exposed to the air.

Life history of the red drum is similar to the life history of the black drum (*Pogonias cromis*) except that diet of the black drum consists of a higher percentage of mollusks (e.g. mussels and oysters). Indeed, non-reproducing hybrids of the two species have been produced and stocked in Texas (Howells and Garrett, 1992).

G.2 Diamondback Terrapin (*Malaclemys terrapin*)

The diamondback terrapin is the only turtle species found exclusively in brackish coastal marshes and occurs from Massachusetts to Texas (Wood, 1995).

Male terrapins average from 10 to 14 cm in length; whereas females tend to be larger (15 to 24 cm in length) and more abundant than males (Behler and King, 1979; Wood, 1995). The maximum life span of terrapins is not known (Wood, 1995). In a laboratory study of the feeding habits and growth of terrapins (Allen and Littleford, 1955), animals of mixed sexes averaged 9.0 cm in length and 0.14 kg in weight at the end of their second year.

The diamondback terrapin is a highly aquatic species, and occurs out of water for an extended period of time only when nesting (Behler and King, 1979; Wood, 1995). Females typically lay from 4 to 18 pinkish-white eggs in July (Behler and King, 1979), although more than one clutch may be produced during the nesting season (Wood, 1995). Nests are 12.5- to 15- cm cavities dug at the sandy edges of marshes and dunes above the high-tide line. Terrapins hibernate within and below the intertidal zone of the marsh, singularly or in groups, from November to March (Wood, 1995). Terrapins do not exhibit site fidelity, often using local habitats for short periods and then moving on to other sites (Seigel, 1993).

The diamondback terrapin is capable of foraging aquatically in the upper reaches of the marsh during high tides, although food accessibility, rather than food availability, may be a limiting factor for terrapins in areas of high tidal variability (Tucker et al., 1995). In a South Carolina study (Tucker et al., 1995), 76 to 79 percent of the dietary volume of terrapins was marsh periwinkles, while crabs (including fiddler crabs and blue crabs), barnacles, and clams constituted the remainder of the diet. These authors concluded that diamondback terrapins are clearly prominent, but unrecognized, macro-consumers in salt marsh ecosystems.

G.3 Red-Winged Blackbird (*Agelaius phoeniceus*)

The red-winged blackbird is found from Canada to the West Indies and Costa Rica (Peterson, 1980). In Georgia, it is a year-round resident, with a territory that may range from 0.07 hectares (ha) (0.17 acres; Case and Hewitt, 1963) to 0.30 ha (0.74 acres; Nero, 1956). It is primarily a marsh bird, but will nest near virtually any body of water and occasionally breeds in upland pastures.

Adult male blackbirds average 0.064 kg in weight, while the female averages 0.042 kg (Clench and Leberman, 1978).

A pair of red-winged blackbirds raises two or three broods per season, building a new nest for each brood (Bull and Farrand, 1977). Nests are well-formed cups built from marsh grasses or reeds attached to growing marsh vegetation or, alternatively, built in bushes in the marsh. Each clutch consists of an average of from three to five young. Blackbird chicks may spend 12 days in the egg and 10 additional days as a nestling (Daniel, 1957). Males obtain adult plumage after about 1 year (Gill, 1990).

Red-winged blackbirds feed primarily on insects, small fruits, seeds and small aquatic life (Peterson, 1980). Insects are the dominant food item during the breeding season (Orians, 1980).

G.4 Clapper rail (*Rallus longirostris*)

The clapper rail is found primarily along the east coast if the United States from New Hampshire south to the Florida Keys and then to the Caribbean islands and along the Gulf Coast to Texas (U.S. Geological Survey [USGS], 2000). There is also a west coast population that extends from San Francisco Bay to Mexico. Southern populations, as in Georgia, are year-round residents, while northern populations winter in the southern part of their breeding range.

Adult clapper rails average from between 32 to 41 cm in length and between 0.16 to 0.40 kg in weight (USGS, 2000). Males average about 20 percent larger than females. The maximum recorded age of a clapper rail is 7 years and 6 months (Edelman and Conway, 1998).

Clapper rails are solitary ground nesters in salt, brackish, and freshwater marshes, as well as in mangrove swamps (USGS, 2000). A typical clutch consists of from 7 to 11 buff or olive-buff eggs in a basket-shaped nest of aquatic vegetation or tidal wrack hidden on a firm bank or under a small bush. Young rails are extremely precocial (Ehrlich et al., 1988).

Cumbee, et al (2008) reported a mean home range of clapper rails in the LCP estuary area as 1.2 ha or approximately 3 acres.

Clapper rails are opportunistic omnivores (Hear, 1982), but prefer crustaceans if available (USGS, 2000). In a study of rails from the Atlantic and Gulf coasts (Heard, 1982), crabs, mostly fiddler crabs, were the dominant prey (71 percent of diet, based on occurrence in stomachs) during the warmer months when they were available. During this time, insects were also eaten (10 percent of diet). In the colder months, snails became a major part of the diet. Fish remains were also part of the diet (1.6 percent occurrence).

G.5 Green Heron (*Butorides striatus*)

The green heron is found from the northwestern United States and Canada south to northern South America (Peterson, 1980). Along the southeastern coast of the United States, including Georgia, it is a year-round resident. It is the most widely distributed of all herons, and occurs near brooks, ponds, and marshes, whether freshwater or marine. Its territory may range from 1 ha (2.5 acres) to 3.3 ha (8 acres) during the breeding season (Palmer, 1962).

Adult green herons are approximately 45 cm in length and range from about 0.20 to 0.25 kg in weight (University of Guelph, 2000). Males and females are similar in size.

Green herons are usually solitary nesters; although the species may nest in colonies of up to about 30 pairs, sometimes with other herons or grackles (Pough, 1951). Low shrubs or marsh hummocks may be the nesting site, but the site need not be near water. The nest is a frail, unlined flat platform of loose sticks. The four or five eggs placed in the nest area are pale, glaucous green.

Diet of green herons has been reported (Palmer, 1962) to consist of 44 percent fish, 21 percent insects, 24 percent spiders and miscellaneous invertebrates, and 1 percent crustaceans.

G.6 Marsh Rabbit (*Sylvilagus palustris*)

The marsh rabbit is restricted to the Coastal Plain of extreme southeastern Virginia southwestward to southern Alabama (Georgia Museum Natural History, 2001a). It also occurs throughout Florida and on the larger barrier islands of North Carolina.

Adult marsh rabbits weigh about 1 kg – or 2 to 3 pounds (lbs) (Palmer, 1954). They range in length from 40 to 45 cm (Georgia Museum, 2001a).

Marsh rabbits breed throughout the year (Georgia Museum Natural History, 2001a). A mature female may produce five or six litters per year. After a 30- to 31-day gestation period, three to five young are born in a nest located in a shallow depression on the ground and made of dried grasses lined with the soft under-fur of the female. Young remain in the nest until they are weaned and may reach sexual maturity within a year.

Marsh rabbits are nocturnal, foraging at night for food (Georgia Museum Natural History, 2001a). Diet of rabbits consists strictly of vegetation, which may include cane, cattails, rushes, and the leaves and twigs of woody plants.

G.7 Raccoon (*Procyon lotor*)

The raccoon is ubiquitous throughout the United States and also occurs throughout Mexico and Central America (Kaufmann, 1982). Although adaptable to nearly all environments, it prefers wetland sites associated with rivers, streams, marshes, swamps, and lakes (Georgia Museum Natural History, 2001b).

Adult female raccoons in Alabama have been reported (Jognson, 1970) to exhibit a mean weight of 3.7 kg (8 lb). Other size measurements have been reported (Georgia Museum Natural History, 2001b) as from 5.4 to 11.8 kg (12 to 26 lb) in weight and from 71.1 to 83.8 cm in total length.

Raccoons breed from December to June, with peak breeding occurring in February and March (Georgia Museum Natural History, 2001b). A litter of from one to seven young is born about 2 months later. Young raccoons (termed kits) are weaned at from 10 to 12 weeks of age, at which time they begin to travel on foraging trips with their mother. Raccoons reach sexual maturity in the spring following their birth.

Raccoons are omnivores, feeding on whatever is available during a given season (Georgia Museum Natural History, 2001b). Their diet may include fruits, berries, nuts, acorns, insects, crayfish, crabs, fishes, turtle eggs, birds and their eggs, and small mammals. In a study conducted on St Catherines Island, Georgia (Harman and Stains, 1979), the dominant food of raccoons was fiddler crabs, which constituted from 57 to 89 percent of the volume of total animal food depending on season of the year. Other foods included unknown species of crabs and fishes.

G.8 River Otter (*Lutra canadensis*)

The river otter occurs throughout most of the United States and Canada (Georgia Museum Natural History, 2001c). It ranges widely along rivers, streams, swamps, and marshes. An individual otter may move from 77 to 97 kilometers (km) (48 to 60 miles) along a waterway in a season, although average movement is from 5 to 16 km (3 to 10 miles). In a Texas coastal marsh, the home range of adult female otters has been reported (Foy, 1984) to be 295 ha (730 acres), as compared to just 195 ha of available marsh at the LCP Site. Otters typically live for 5 to 7 years in the wild (Georgia Museum Natural History, 2001c).

Adult female river otters in Georgia have been reported (Lauhachinda, 1978) to exhibit a mean weight of 6.7 kg (15 lb). Other size measurements have been reported (Georgia Museum Natural History, 2001c) as from 5 to 10.4 kg (11 to 23 lb) in weight and from 0.9 to 1.2 m in total length.

River otters mate in late winter and early spring (Georgia Museum Natural History, 2001c). After mating, a delay of about 290 to 380 days occurs before development of the embryos begins. Gestation takes 60 to 63 days after embryos are implanted in the uterus. In March or April, one to six young (termed kits) are born in a leaf- and grass-lined den constructed in an old muskrat lodge, abandoned burrow, or hollow tree close to a water source. The young remain with the female until the breeding season after their birth. River otters are capable of breeding when they reach 2 years of age.

River otters are primarily piscivores, with 80 percent of their diet consisting of various families of fishes (Twill, 1974). Other food items included crustaceans, amphibians, and birds. Otters (Erlanger, 1968) appear to prefer larger fishes (15 to 17 cm) over smaller fishes (<15 cm).

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APPENDIX H

WORKSHEETS FOR FINFISH AND WILDLIFE FOOD-WEB EXPOSURE MODELS FOR ESTUARY AT LCP SITE

A. Wildlife Worksheet

1. The basic equation used to calculate HQs for wildlife is:

$$HQ = \frac{\{[(CF1 \times P1) + (\ldots \times \ldots) + (CF4 \times P4)]\,[FIR] + [CS]\,[SIR] + [CW]\,[WIR]\}\{TUF\}\{AUF\} / BW}{TRV}$$

with CF1, ..., CF4 = mean concentrations of COPC in food items of wildlife (mg/kg, dry wt); P1, ..., P4 = percentage of each food item in diet of wildlife (total for all food items = 1); FIR = food ingestion rate (kg dry wt / day); CS = mean concentration of COPC in sediment (mg/kg, dry wt); SIR = sediment ingestion rate (kg dry wt / day); CW = mean concentration of COPC in water (mg / L); WIR = water ingestion rate (L / day); TUF = time-use factor; AUF = area-use factor; BW = body weight of wildlife (kg / wet wt); and TRV = toxicity reference value (mg / kg BW / day.

2. HQs were not developed for PAHs because a previous investigation (CDR Environmental Specialists and GeoSyntec Consultants, 2001) indicated that PAHs were almost never detected in evaluated prey of wildlife and were demonstrated not to be hazardous in worst-case examples.

3. Estimated environmental exposure (EEE) of wildlife to COPC was derived by the following processes:

a. EEE of wildlife to COPC was determined for all exposure areas i.e., Eastern Creek, Main Canal, Purvis Creek, Western Creek Complex, Domains 1 through 4, Blythe Island, and Troup Creek Reference. In addition, Area A is included which is comprised of Eastern Creek, Main Canal, and Western Creek complex

b. Mean and 95UCL Concentrations of COPC in various environmental media were derived from the following sources:

- Surface water: Table 4-2a
- Surface sediment: Table 4-3a (with methylmercury based on mean relationship in Figure 8)
- Cordgrass: Table 4-6a
- Insects: CDR Environmental Specialists and GeoSyntec Consultants, 2001
- Fiddler crabs: Table 4-8a
- Blue crabs: Table 4-9a
- Mummichogs: Table 4-10a
- Silver perch: Table 4-11a

c. Concentrations of COPC in sediment and blue crabs from Purvis Creek are based on mean values for North and South Purvis Creek

d. The strategy for determining body burdens of the various forms of mercury in food items of wildlife was as follows:

- The mean concentration of total mercury in a food item from a particular area (i. e., domain or creek) was identified from the above-referenced tables.
- **Methylmercury** body burden in a food item from a particular area was determined as the product of the mean concentration of total mercury in that food item and the <u>overall</u> (all areas considered collectively) percentage (%) of total mercury in the form of methylmercury. These percentages were -- **1)** cordgrass: 9.93%; **2)** insects: 56%; **3)** fiddler crabs: 68%; **4)** blue crabs: 100%; **5)** mummichogs: 90%; and **6)** silver perch: 100%.
- Body burden of **inorganic mercury** in a food item from a particular area was derived by subtracting methylmercury body burden from mean total mercury concentration.

e. Concentration of a COPC in a food item from one evaluated area was extrapolated to another area(s) if the food item was not represented in the latter area(s). This occasionally occurred for all food items except cordgrass..

f. The diet of a wildlife species in a particular area was altered from its hypothetical diet if one (or more) of its hypothetical food items was not collected (was not present) in the area. In these cases, diet was proportionately shifted to remaining food items. This shift occurred in several areas for the following wildlife --

- Diamondback terrapin: 90% fiddler crabs and 10% mummichogs **<u>to</u>** 100% fiddler crabs
- Red-winged blackbird: 90% insects and 10% fiddler crabs **<u>to</u>** 100% fiddler crabs
- Clapper rail: 85% fiddler crabs, 10% insects, and 5% mummichogs **<u>to</u>** 90% fiddler crabs and 10% mummichogs
- River otter: 30% mummichogs, 50% silver perch, 10% fiddler crabs, and 10% blue crabs **<u>to</u>** 60% silver perch, 20% fiddler crabs, and 20% blue crabs

g. Exposure of wildlife to COPC in water was determined for water from either Troup Creek (for the reference purposes) or the site (grand mean values) since data were not available for fresh-water sources of water.

h. Evaluated, but undetected, COPC in all environmental media (food items, sediment, and water) were assigned 1/2 of their detection limits.

i. TUFs and AUFs for wildlife were assumed to be unity (1) except in the cases of AUFs for the raccoon and river otter.

Table H-1. Estimated Exposure Concentrations - Diamondback terrapin (*Malaclemys terrapin*)

COPC	Conc FC (mg/kg)	Fraction FC	Conc Mc (mg/kg)	Fraction Mc	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV (mg/kgBW/day)		Hazard Quotient	
														NOAEL	LOAEL	NOAEL HQ	LOAEL HQ
Methyl Mercury **Locations**																	
Reference																	
UCL95	0.03	0.9	0.10	0.10	0.00059	0.0001	0.000027	1.00E-07	0.000	1.0	1.0	0.14	0.00017	0.5	5	0.0003	0.00003
Mean	0.03	0.9	0.08	0.10	0.00059	0.0001	0.000027	5.00E-08	0.000	1.0	1.0	0.14	0.00014	0.5	5	0.0003	0.00003
Domain 1																	
UCL95	0.69	0.9	1.40	0.10	0.00059	0.009	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0032	0.5	5	0.006	0.0006
Mean	0.65	0.9	0.78	0.10	0.00059	0.004	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0028	0.5	5	0.006	0.0006
Domain 2																	
UCL95	0.21	0.9	0.32	0.10	0.00059	0.005	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0009	0.5	5	0.002	0.0002
Mean	0.19	0.9	0.26	0.10	0.00059	0.003	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0008	0.5	5	0.002	0.0002
Domain 3																	
UCL95	0.20	0.9	0.35	0.10	0.00059	0.002	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0009	0.5	5	0.002	0.0002
Mean	0.18	0.9	0.32	0.10	0.00059	0.002	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0008	0.5	5	0.002	0.0002
Domain 4																	
UCL95	0.16	0.9	0.22	0.10	0.00059	0.001	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0007	0.5	5	0.001	0.0001
Mean	0.15	0.9	0.18	0.10	0.00059	0.001	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0006	0.5	5	0.001	0.0001
Purvis Creek																	
UCL95	0.10	0.9	0.22	0.10	0.00059	0.001	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0005	0.5	5	0.001	0.0001
Mean	0.09	0.9	0.18	0.10	0.00059	0.001	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0004	0.5	5	0.001	0.0001
Main Canal																	
UCL95	0.41	0.9	0.70	0.10	0.00059	0.007	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0019	0.5	5	0.004	0.0004
Mean	0.39	0.9	0.52	0.10	0.00059	0.006	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0017	0.5	5	0.003	0.0003
Eastern Creek																	
UCL95	0.57	0.9	1.83	0.10	0.00059	0.020	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0029	0.5	5	0.006	0.0006
Mean	0.54	0.9	0.64	0.10	0.00059	0.016	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0023	0.5	5	0.005	0.0005
Western Creek Complex																	
UCL95	0.21	0.9	0.32	0.10	0.00059	0.003	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0009	0.5	5	0.002	0.0002
Mean	0.19	0.9	0.26	0.10	0.00059	0.002	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0008	0.5	5	0.002	0.0002
Area A																	
UCL95	0.57	0.9	1.40	0.10	0.00059	0.011	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0028	0.5	5	0.006	0.0006
Mean	0.54	0.9	0.78	0.10	0.00059	0.010	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0024	0.5	5	0.005	0.0005
Blythe Island																	
UCL95	0.14	0.9	0.15	0.10	0.00059	0.0003	0.000027	9.60E-07	0.000	1.0	1.0	0.14	0.0006	0.5	5	0.001	0.0001
Mean	0.13	0.9	0.14	0.10	0.00059	0.0002	0.000027	7.00E-07	0.000	1.0	1.0	0.14	0.0005	0.5	5	0.001	0.0001
Aroclor 1268 **Location**																	
Reference																	
UCL95	0.38	0.9	0.22	0.10	0.00059	0.08	0.000027	0.00060	0.000	1.0	1.0	0.14	0.0015	0.32	3.2	0.005	0.0005
Mean	0.22	0.9	0.15	0.10	0.00059	0.05	0.000027	0.00042	0.000	1.0	1.0	0.14	0.0009	0.32	3.2	0.003	0.0003
Domain 1																	
UCL95	2.49	0.9	0.156	0.10	0.00059	23.43	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0140	0.32	3.2	0.04	0.004
Mean	2.22	0.9	0.087	0.10	0.00059	11.45	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0107	0.32	3.2	0.03	0.003
Domain 2																	
UCL95	1.15	0.9	2.13	0.10	0.00059	5.05	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0062	0.32	3.2	0.02	0.002
Mean	1.06	0.9	1.62	0.10	0.00059	3.75	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0054	0.32	3.2	0.02	0.002
Domain 3																	
UCL95	0.93	0.9	3.29	0.10	0.00059	2.08	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0053	0.32	3.2	0.02	0.002
Mean	0.81	0.9	2.87	0.10	0.00059	1.67	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0046	0.32	3.2	0.01	0.001
Domain 4																	
UCL95	0.71	0.9	1.22	0.10	0.00059	1.36	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0035	0.32	3.2	0.01	0.001
Mean	0.61	0.9	1.01	0.10	0.00059	1.14	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0030	0.32	3.2	0.01	0.001
Purvis Creek																	
UCL95	0.98	0.9	1.22	0.10	0.00059	5.07	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0052	0.32	3.2	0.02	0.002
Mean	0.73	0.9	1.01	0.10	0.00059	3.78	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0039	0.32	3.2	0.01	0.001
Main Canal																	
UCL95	3.26	0.9	5.06	0.10	0.00059	41.71	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0225	0.32	3.2	0.07	0.007
Mean	2.86	0.9	4.28	0.10	0.00059	27.64	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0180	0.32	3.2	0.06	0.006
Eastern Creek																	
UCL95	2.75	0.9	7.27	0.10	0.00059	65.28	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0261	0.32	3.2	0.08	0.008
Mean	2.49	0.9	6.06	0.10	0.00059	49.57	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0216	0.32	3.2	0.07	0.007
Western Creek Complex																	
UCL95	1.15	0.9	2.13	0.10	0.00059	3.84	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0060	0.32	3.2	0.02	0.002
Mean	1.06	0.9	1.62	0.10	0.00059	3.18	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0053	0.32	3.2	0.02	0.002
Area A																	
UCL95	2.75	0.9	6.42	0.10	0.00059	40.14	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0209	0.32	3.2	0.07	0.007
Mean	2.49	0.9	5.58	0.10	0.00059	32.78	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0181	0.32	3.2	0.06	0.006
Blythe Island																	
UCL95	0.24	0.9	0.84	0.10	0.00059	0.25	0.000027	0.00038	0.000	1.0	1.0	0.14	0.0013	0.32	3.2	0.004	0.0004
Mean	0.22	0.9	0.72	0.10	0.00059	0.20	0.000027	0.00030	0.000	1.0	1.0	0.14	0.0012	0.32	3.2	0.004	0.0004
Lead **Location**																	
Reference																	
UCL95	0.84	0.9	1.43	0.10	0.00059	20.41	0.000027	0.0100	0.000	1.0	1.0	0.14	0.0077	0.28	2.8	0.03	0.003
Mean	0.71	0.9	0.87	0.10	0.00059	17.64	0.000027	0.0057	0.000	1.0	1.0	0.14	0.0065	0.28	2.8	0.02	0.002
Domain 1																	
UCL95	10.85	0.9	0.76	0.10	0.00059	40.73	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0493	0.28	2.8	0.18	0.018
Mean	7.93	0.9	0.62	0.10	0.00059	31.02	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0363	0.28	2.8	0.13	0.013
Domain 2																	
UCL95	0.56	0.9	1.26	0.10	0.00059	63.03	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0148	0.28	2.8	0.05	0.005
Mean	0.52	0.9	0.93	0.10	0.00059	40.85	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0102	0.28	2.8	0.04	0.004
Domain 3																	
UCL95	3.34	0.9	30.7	0.10	0.00059	132.5	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0512	0.28	2.8	0.18	0.018
Mean	2.11	0.9	2.41	0.10	0.00059	90.72	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0265	0.28	2.8	0.09	0.009
Domain 4																	
UCL95	0.57	0.9	0.65	0.10	0.00059	22.88	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0068	0.28	2.8	0.02	0.002
Mean	0.53	0.9	0.43	0.10	0.00059	21.66	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0064	0.28	2.8	0.02	0.002
Purvis Creek																	
UCL95	1.07	0.9	0.65	0.10	0.00059	23.08	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0088	0.28	2.8	0.03	0.003
Mean	0.92	0.9	0.43	0.10	0.00059	17.41	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0070	0.28	2.8	0.03	0.003
Main Canal																	
UCL95	1.77	0.9	0.55	0.10	0.00059	28.07	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0124	0.28	2.8	0.04	0.004
Mean	1.45	0.9	0.46	0.10	0.00059	26.07	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0107	0.28	2.8	0.04	0.004
Eastern Creek																	
UCL95	7.58	0.9	0.863	0.10	0.00059	41.5	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0371	0.28	2.8	0.13	0.013
Mean	5.21	0.9	0.68	0.10	0.00059	35.71	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0269	0.28	2.8	0.10	0.010
Western Creek Complex																	
UCL95	0.56	0.9	1.26	0.10	0.00059	30.1	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0085	0.28	2.8	0.03	0.003
Mean	0.52	0.9	0.93	0.10	0.00059	28.98	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0080	0.28	2.8	0.03	0.003
Area A																	
UCL95	7.58	0.9	0.76	0.10	0.00059	34.05	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0356	0.28	2.8	0.13	0.013
Mean	5.21	0.9	0.62	0.10	0.00059	31	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0260	0.28	2.8	0.09	0.009
Blythe Island																	
UCL95	0.54	0.9	0.29	0.10	0.00059	18.26	0.000027	0.0016	0.000	1.0	1.0	0.14	0.0057	0.28	2.8	0.02	0.002
Mean	0.504	0.9	0.25	0.10	0.00059	16.50	0.000027	0.0013	0.000	1.0	1.0	0.14	0.0052	0.28	2.8	0.02	0.002

Notes:
COPC - Chemical of Potential Concern
Conc - Concentration
FC - Fiddler Crab
Mc - Mummichog
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

Table H-2. Estimated Exposure Concentrations - Red-winged blackbird (*Agelaius phoeniceus*)

COPC	Conc Insects (mg/kg)	Fraction Insects	Conc FC (mg/kg)	Fraction FC	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV NOAEL (mg/kgBW/day)	TRV LOAEL (mg/kgBW/day)	Hazard Quotient NOAEL HQ	Hazard Quotient LOAEL HQ
Methyl Mercury Locations																	
Reference																	
UCL95	0.018	0.9	0.03	0.10	0.0086	0.0001	0.00017	1.00E-07	0.0065	1.0	1.0	0.037	0.0046	0.02	0.06	0.23	0.08
Mean	0.018	0.9	0.03	0.10	0.0086	0.0001	0.00017	5.00E-08	0.0065	1.0	1.0	0.037	0.0044	0.02	0.06	0.22	0.07
Domain 1																	
UCL95	0.018	0.9	0.69	0.10	0.0086	0.009	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0199	0.02	0.06	1.00	0.33
Mean	0.018	0.9	0.65	0.10	0.0086	0.004	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0188	0.02	0.06	0.94	0.31
Domain 2																	
UCL95	0.018	0.9	0.21	0.10	0.0086	0.005	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0087	0.02	0.06	0.43	0.14
Mean	0.018	0.9	0.19	0.10	0.0086	0.003	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0082	0.02	0.06	0.41	0.14
Domain 3																	
UCL95	0.018	0.9	0.20	0.10	0.0086	0.002	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0084	0.02	0.06	0.42	0.14
Mean	0.018	0.9	0.18	0.10	0.0086	0.002	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0080	0.02	0.06	0.40	0.13
Domain 4																	
UCL95	0.018	0.9	0.16	0.10	0.0086	0.001	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0076	0.02	0.06	0.38	0.13
Mean	0.018	0.9	0.15	0.10	0.0086	0.001	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0072	0.02	0.06	0.36	0.12
Purvis Creek																	
UCL95	0.018	0.9	0.10	0.10	0.0086	0.001	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0060	0.02	0.06	0.30	0.10
Mean	0.018	0.9	0.09	0.10	0.0086	0.001	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0058	0.02	0.06	0.29	0.10
Main Canal																	
UCL95	0.018	0.9	0.41	0.10	0.0086	0.007	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0134	0.02	0.06	0.67	0.22
Mean	0.018	0.9	0.39	0.10	0.0086	0.006	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0128	0.02	0.06	0.64	0.21
Eastern Creek																	
UCL95	0.018	0.9	0.57	0.10	0.0086	0.020	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0171	0.02	0.06	0.86	0.29
Mean	0.018	0.9	0.54	0.10	0.0086	0.016	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0163	0.02	0.06	0.82	0.27
Western Creek Complex																	
UCL95	0.018	0.9	0.21	0.10	0.0086	0.003	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0087	0.02	0.06	0.43	0.14
Mean	0.018	0.9	0.19	0.10	0.0086	0.002	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0082	0.02	0.06	0.41	0.14
Area A																	
UCL95	0.018	0.9	0.57	0.10	0.0086	0.011	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0171	0.02	0.06	0.85	0.28
Mean	0.018	0.9	0.54	0.10	0.0086	0.010	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0163	0.02	0.06	0.81	0.27
Blythe Island																	
UCL95	0.018	0.9	0.14	0.10	0.0086	0.0003	0.00017	9.60E-07	0.0065	1.0	1.0	0.037	0.0071	0.02	0.06	0.35	0.12
Mean	0.018	0.9	0.13	0.10	0.0086	0.0002	0.00017	7.00E-07	0.0065	1.0	1.0	0.037	0.0068	0.02	0.06	0.34	0.11
Inorganic Mercury Location																	
Reference																	
UCL95	0.018	0.9	0.02	0.10	0.0086	0.10	0.00017	0.000017	0.0065	1.0	1.0	0.037	0.0046	0.45	0.90	0.01	0.01
Mean	0.018	0.9	0.01	0.10	0.0086	0.08	0.00017	0.000008	0.0065	1.0	1.0	0.037	0.0044	0.45	0.90	0.01	0.00
Domain 1																	
UCL95	0.018	0.9	0.33	0.10	0.0086	11.501	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0642	0.45	0.90	0.14	0.07
Mean	0.018	0.9	0.30	0.10	0.0086	4.846	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0331	0.45	0.90	0.07	0.04
Domain 2																	
UCL95	0.018	0.9	0.10	0.10	0.0086	5.839	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0329	0.45	0.90	0.07	0.04
Mean	0.018	0.9	0.09	0.10	0.0086	3.850	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0235	0.45	0.90	0.05	0.03
Domain 3																	
UCL95	0.018	0.9	0.09	0.10	0.0086	2.225	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0162	0.45	0.90	0.04	0.02
Mean	0.018	0.9	0.09	0.10	0.0086	1.881	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0144	0.45	0.90	0.03	0.02
Domain 4																	
UCL95	0.018	0.9	0.08	0.10	0.0086	1.067	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0105	0.45	0.90	0.02	0.01
Mean	0.018	0.9	0.07	0.10	0.0086	0.631	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0083	0.45	0.90	0.02	0.01
Purvis Creek																	
UCL95	0.018	0.9	0.04	0.10	0.0086	1.53	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0119	0.45	0.90	0.03	0.01
Mean	0.018	0.9	0.04	0.10	0.0086	1.22	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0103	0.45	0.90	0.02	0.01
Main Canal																	
UCL95	0.018	0.9	0.20	0.10	0.0086	8.72	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0484	0.45	0.90	0.11	0.05
Mean	0.018	0.9	0.18	0.10	0.0086	7.39	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0420	0.45	0.90	0.09	0.05
Eastern Creek																	
UCL95	0.018	0.9	0.27	0.10	0.0086	25.02	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.1250	0.45	0.90	0.28	0.14
Mean	0.018	0.9	0.25	0.10	0.0086	20.26	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.1028	0.45	0.90	0.23	0.11
Western Creek Complex																	
UCL95	0.018	0.9	0.10	0.10	0.0086	3.31	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0213	0.45	0.90	0.05	0.02
Mean	0.018	0.9	0.09	0.10	0.0086	2.75	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0185	0.45	0.90	0.04	0.02
Area A																	
UCL95	0.018	0.9	0.27	0.10	0.0086	14.04	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0745	0.45	0.90	0.17	0.08
Mean	0.018	0.9	0.25	0.10	0.0086	11.99	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0647	0.45	0.90	0.14	0.07
Blythe Island																	
UCL95	0.018	0.9	0.07	0.10	0.0086	0.39	0.00017	0.000057	0.0065	1.0	1.0	0.037	0.0071	0.45	0.90	0.02	0.01
Mean	0.018	0.9	0.06	0.10	0.0086	0.30	0.00017	0.000044	0.0065	1.0	1.0	0.037	0.0066	0.45	0.90	0.01	0.01

Table H-2. Estimated Exposure Concentrations - Red-winged blackbird (*Agelaius phoeniceus*)

COPC	Conc Insects (mg/kg)	Fraction Insects	Conc FC (mg/kg)	Fraction FC	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV NOAEL (mg/kgBW/day)	TRV LOAEL (mg/kgBW/day)	Hazard Quotient NOAEL HQ	Hazard Quotient LOAEL HQ
Aroclor 1268 **Location**																	
Reference																	
UCL95	0.018	0.9	0.38	0.10	0.0086	0.08	0.00017	0.00060	0.0065	1.0	1.0	0.037	0.0131	1.3	3.9	0.01	0.003
Mean	0.018	0.9	0.22	0.10	0.0086	0.05	0.00017	0.00042	0.0065	1.0	1.0	0.037	0.0092	1.3	3.9	0.01	0.002
Domain 1																	
UCL95	0.018	0.9	2.49	0.10	0.0086	23.43	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.1694	1.3	3.9	0.13	0.043
Mean	0.018	0.9	2.22	0.10	0.0086	11.45	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.1080	1.3	3.9	0.08	0.028
Domain 2																	
UCL95	0.018	0.9	1.15	0.10	0.0086	5.05	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.0538	1.3	3.9	0.04	0.01
Mean	0.018	0.9	1.06	0.10	0.0086	3.75	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.0457	1.3	3.9	0.04	0.01
Domain 3																	
UCL95	0.018	0.9	0.93	0.10	0.0086	2.08	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.0350	1.3	3.9	0.03	0.009
Mean	0.018	0.9	0.81	0.10	0.0086	1.67	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.0303	1.3	3.9	0.02	0.008
Domain 4																	
UCL95	0.018	0.9	0.71	0.10	0.0086	1.36	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.0266	1.3	3.9	0.02	0.007
Mean	0.018	0.9	0.61	0.10	0.0086	1.14	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.0232	1.3	3.9	0.02	0.006
Purvis Creek																	
UCL95	0.018	0.9	0.98	0.10	0.0086	5.07	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.0499	1.3	3.9	0.04	0.01
Mean	0.018	0.9	0.73	0.10	0.0086	3.78	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.0381	1.3	3.9	0.03	0.01
Main Canal																	
UCL95	0.018	0.9	3.26	0.10	0.0086	41.71	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.2712	1.3	3.9	0.21	0.07
Mean	0.018	0.9	2.86	0.10	0.0086	27.64	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.1973	1.3	3.9	0.15	0.05
Eastern Creek																	
UCL95	0.018	0.9	2.75	0.10	0.0086	65.28	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.3677	1.3	3.9	0.28	0.09
Mean	0.018	0.9	2.49	0.10	0.0086	49.57	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.2894	1.3	3.9	0.22	0.07
Western Creek Complex																	
UCL95	0.018	0.9	1.15	0.10	0.0086	3.84	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.0482	1.3	3.9	0.04	0.01
Mean	0.018	0.9	1.06	0.10	0.0086	3.18	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.0430	1.3	3.9	0.03	0.01
Area A																	
UCL95	0.018	0.9	2.75	0.10	0.0086	40.14	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.2522	1.3	3.9	0.19	0.06
Mean	0.018	0.9	2.49	0.10	0.0086	32.78	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.2123	1.3	3.9	0.16	0.05
Blythe Island																	
UCL95	0.018	0.9	0.24	0.10	0.0086	0.25	0.00017	0.00038	0.0065	1.0	1.0	0.037	0.0105	1.3	3.9	0.01	0.003
Mean	0.018	0.9	0.22	0.10	0.0086	0.20	0.00017	0.00030	0.0065	1.0	1.0	0.037	0.0099	1.3	3.9	0.01	0.003
Lead **Location**																	
Reference																	
UCL95	0.018	0.9	0.84	0.10	0.0086	20.41	0.00017	0.0100	0.0065	1.0	1.0	0.037	0.1188	3.85	11.3	0.03	0.01
Mean	0.018	0.9	0.71	0.10	0.0086	17.64	0.00017	0.0057	0.0065	1.0	1.0	0.037	0.1023	3.85	11.3	0.03	0.01
Domain 1																	
UCL95	0.018	0.9	10.85	0.10	0.0086	40.73	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.4434	3.85	11.3	0.12	0.04
Mean	0.018	0.9	7.93	0.10	0.0086	31.02	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.3308	3.85	11.3	0.09	0.03
Domain 2																	
UCL95	0.018	0.9	0.56	0.10	0.0086	63.03	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.3067	3.85	11.3	0.08	0.03
Mean	0.018	0.9	0.52	0.10	0.0086	40.85	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.2038	3.85	11.3	0.05	0.02
Domain 3																	
UCL95	0.018	0.9	3.34	0.10	0.0086	132.5	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.6905	3.85	11.3	0.18	0.06
Mean	0.018	0.9	2.11	0.10	0.0086	90.72	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.4699	3.85	11.3	0.12	0.04
Domain 4																	
UCL95	0.018	0.9	0.57	0.10	0.0086	22.88	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.1224	3.85	11.3	0.03	0.01
Mean	0.018	0.9	0.53	0.10	0.0086	21.66	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.1158	3.85	11.3	0.03	0.01
Purvis Creek																	
UCL95	0.018	0.9	1.07	0.10	0.0086	23.08	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.1350	3.85	11.3	0.04	0.01
Mean	0.018	0.9	0.92	0.10	0.0086	17.41	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.1054	3.85	11.3	0.03	0.01
Main Canal																	
UCL95	0.018	0.9	1.77	0.10	0.0086	28.07	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.1742	3.85	11.3	0.05	0.02
Mean	0.018	0.9	1.45	0.10	0.0086	26.07	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.1575	3.85	11.3	0.04	0.01
Eastern Creek																	
UCL95	0.018	0.9	7.58	0.10	0.0086	41.5	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.3709	3.85	11.3	0.10	0.03
Mean	0.018	0.9	5.21	0.10	0.0086	35.71	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.2892	3.85	11.3	0.08	0.03
Western Creek Complex																	
UCL95	0.018	0.9	0.56	0.10	0.0086	30.1	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.1554	3.85	11.3	0.04	0.01
Mean	0.018	0.9	0.52	0.10	0.0086	28.98	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.1492	3.85	11.3	0.04	0.01
Area A																	
UCL95	0.018	0.9	7.58	0.10	0.0086	34.05	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.3367	3.85	11.3	0.09	0.03
Mean	0.018	0.9	5.21	0.10	0.0086	31	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.2675	3.85	11.3	0.07	0.02
Blythe Island																	
UCL95	0.018	0.9	0.54	0.10	0.0086	18.26	0.00017	0.0016	0.0065	1.0	1.0	0.037	0.1005	3.85	11.3	0.03	0.009
Mean	0.018	0.9	0.504	0.10	0.0086	16.50	0.00017	0.0013	0.0065	1.0	1.0	0.037	0.0915	3.85	11.3	0.02	0.008

Notes:

COPC - Chemical of Potential Concern
Conc - Concentration
FC - Fiddler Crab
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

Table H-3. Estimated Exposure Concentrations - Clapper Rail (*Rallus longirostris*)

COPC	Conc FC (mg/kg)	Fraction FC	Conc Insects (mg/kg)	Fraction Insects	Conc Mc (mg/kg)	Fraction Mc	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV (mg/kgBW/day)		Hazard Quotient	
																NOAEL	LOAEL	NOAEL HQ	LOAEL HQ
Methyl Mercury Locations																			
Reference																			
UCL95	0.03	0.85	0.02	0.10	0.10	0.05	0.025	0.0001	0.0025	1.00E-07	0.025	1.0	1.0	0.28	0.0032	0.02	0.06	0.16	0.05
Mean	0.03	0.85	0.02	0.10	0.08	0.05	0.025	0.0001	0.0025	5.00E-08	0.025	1.0	1.0	0.28	0.0026	0.02	0.06	0.13	0.04
Domain 1																			
UCL95	0.69	0.85	0.02	0.10	1.40	0.05	0.025	0.009	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0592	0.02	0.06	2.96	0.99
Mean	0.65	0.85	0.02	0.10	0.78	0.05	0.025	0.004	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0527	0.02	0.06	2.64	0.88
Domain 2																			
UCL95	0.21	0.85	0.02	0.10	0.32	0.05	0.025	0.005	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0176	0.02	0.06	0.88	0.29
Mean	0.19	0.85	0.02	0.10	0.26	0.05	0.025	0.003	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0158	0.02	0.06	0.79	0.26
Domain 3																			
UCL95	0.20	0.85	0.02	0.10	0.35	0.05	0.025	0.002	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0167	0.02	0.06	0.84	0.28
Mean	0.18	0.85	0.02	0.10	0.32	0.05	0.025	0.002	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0156	0.02	0.06	0.78	0.26
Domain 4																			
UCL95	0.16	0.85	0.02	0.10	0.22	0.05	0.025	0.001	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0135	0.02	0.06	0.68	0.23
Mean	0.15	0.85	0.02	0.10	0.18	0.05	0.025	0.001	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0123	0.02	0.06	0.62	0.21
Purvis Creek																			
UCL95	0.10	0.85	0.02	0.10	0.22	0.05	0.025	0.001	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0084	0.02	0.06	0.42	0.14
Mean	0.09	0.85	0.02	0.10	0.18	0.05	0.025	0.001	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0077	0.02	0.06	0.38	0.13
Main Canal																			
UCL95	0.41	0.85	0.02	0.10	0.70	0.05	0.025	0.007	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0348	0.02	0.06	1.74	0.58
Mean	0.39	0.85	0.02	0.10	0.52	0.05	0.025	0.006	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0320	0.02	0.06	1.60	0.53
Eastern Creek																			
UCL95	0.57	0.85	0.02	0.10	1.83	0.05	0.025	0.020	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0518	0.02	0.06	2.59	0.86
Mean	0.54	0.85	0.02	0.10	0.64	0.05	0.025	0.016	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0439	0.02	0.06	2.20	0.73
Western Creek Complex																			
UCL95	0.21	0.85	0.02	0.10	0.32	0.05	0.025	0.003	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0176	0.02	0.06	0.88	0.29
Mean	0.19	0.85	0.02	0.10	0.26	0.05	0.025	0.002	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0158	0.02	0.06	0.79	0.26
Area A																			
UCL95	0.57	0.85	0.02	0.10	1.40	0.05	0.025	0.011	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0499	0.02	0.06	2.49	0.83
Mean	0.54	0.85	0.02	0.10	0.78	0.05	0.025	0.010	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0445	0.02	0.06	2.23	0.74
Blythe Island																			
UCL95	0.14	0.85	0.02	0.10	0.15	0.05	0.025	0.0003	0.0025	9.60E-07	0.025	1.0	1.0	0.28	0.0117	0.02	0.06	0.58	0.19
Mean	0.13	0.85	0.02	0.10	0.14	0.05	0.025	0.0002	0.0025	7.00E-07	0.025	1.0	1.0	0.28	0.0106	0.02	0.06	0.53	0.18
Inorganic Mercury Location																			
Reference																			
UCL95	0.02	0.85	0.02	0.10	0.01	0.05	0.025	0.10	0.0025	0.000017	0.025	1.0	1.0	0.28	0.0023	0.45	0.90	0.01	0.003
Mean	0.01	0.85	0.02	0.10	0.01	0.05	0.025	0.08	0.0025	0.000008	0.025	1.0	1.0	0.28	0.0019	0.45	0.90	0.004	0.002
Domain 1																			
UCL95	0.33	0.85	0.02	0.10	0.16	0.05	0.025	11.501	0.0025	0.000057	0.025	1.0	1.0	0.28	0.1283	0.45	0.90	0.29	0.14
Mean	0.30	0.85	0.02	0.10	0.09	0.05	0.025	4.846	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0669	0.45	0.90	0.15	0.07
Domain 2																			
UCL95	0.10	0.85	0.02	0.10	0.04	0.05	0.025	5.839	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0600	0.45	0.90	0.13	0.07
Mean	0.09	0.85	0.02	0.10	0.03	0.05	0.025	3.850	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0415	0.45	0.90	0.09	0.05
Domain 3																			
UCL95	0.09	0.85	0.02	0.10	0.04	0.05	0.025	2.225	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0272	0.45	0.90	0.06	0.03
Mean	0.09	0.85	0.02	0.10	0.04	0.05	0.025	1.881	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0237	0.45	0.90	0.05	0.03
Domain 4																			
UCL95	0.08	0.85	0.02	0.10	0.02	0.05	0.025	1.067	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0156	0.45	0.90	0.03	0.02
Mean	0.07	0.85	0.02	0.10	0.02	0.05	0.025	0.631	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0113	0.45	0.90	0.03	0.01
Purvis Creek																			
UCL95	0.04	0.85	0.02	0.10	0.02	0.05	0.025	1.53	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0173	0.45	0.90	0.04	0.02
Mean	0.04	0.85	0.02	0.10	0.02	0.05	0.025	1.22	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0143	0.45	0.90	0.03	0.02
Main Canal																			
UCL95	0.20	0.85	0.02	0.10	0.08	0.05	0.025	8.72	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0932	0.45	0.90	0.21	0.10
Mean	0.18	0.85	0.02	0.10	0.06	0.05	0.025	7.39	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0803	0.45	0.90	0.18	0.09
Eastern Creek																			
UCL95	0.27	0.85	0.02	0.10	0.20	0.05	0.025	25.02	0.0025	0.000057	0.025	1.0	1.0	0.28	0.2449	0.45	0.90	0.54	0.27
Mean	0.25	0.85	0.02	0.10	0.070	0.05	0.025	20.26	0.0025	0.000044	0.025	1.0	1.0	0.28	0.2006	0.45	0.90	0.45	0.22
Western Creek Complex																			
UCL95	0.10	0.85	0.02	0.10	0.04	0.05	0.025	3.31	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0374	0.45	0.90	0.08	0.04
Mean	0.09	0.85	0.02	0.10	0.03	0.05	0.025	2.75	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0317	0.45	0.90	0.07	0.04
Area A																			
UCL95	0.27	0.85	0.02	0.10	0.16	0.05	0.025	14.04	0.0025	0.000057	0.025	1.0	1.0	0.28	0.1466	0.45	0.90	0.33	0.16
Mean	0.25	0.85	0.02	0.10	0.09	0.05	0.025	11.99	0.0025	0.000044	0.025	1.0	1.0	0.28	0.1268	0.45	0.90	0.28	0.14
Blythe Island																			
UCL95	0.07	0.85	0.02	0.10	0.02	0.05	0.025	0.39	0.0025	0.000057	0.025	1.0	1.0	0.28	0.0088	0.45	0.90	0.02	0.01
Mean	0.06	0.85	0.02	0.10	0.02	0.05	0.025	0.30	0.0025	0.000044	0.025	1.0	1.0	0.28	0.0075	0.45	0.90	0.02	0.01

Table H-3. Estimated Exposure Concentrations - Clapper Rail (*Rallus longirostris*)

COPC	Conc FC (mg/kg)	Fraction FC	Conc Insects (mg/kg)	Fraction Insects	Conc Mc (mg/kg)	Fraction Mc	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV (mg/kgBW/day)		Hazard Quotient	
																NOAEL	LOAEL	NOAEL HQ	LOAEL HQ
Aroclor 1268 **Location**																			
Reference																			
UCL95	0.38	0.85	0.08	0.10	0.22	0.05	0.025	0.08	0.0025	0.00060	0.025	1.0	1.0	0.28	0.0313	1.3	3.9	0.02	0.01
Mean	0.22	0.85	0.08	0.10	0.15	0.05	0.025	0.05	0.0025	0.00042	0.025	1.0	1.0	0.28	0.0186	1.3	3.9	0.01	0.005
Domain 1																			
UCL95	2.49	0.85	0.08	0.10	6.42	0.05	0.025	23.43	0.0025	0.00038	0.025	1.0	1.0	0.28	0.4276	1.3	3.9	0.33	0.11
Mean	2.22	0.85	0.08	0.10	5.58	0.05	0.025	11.45	0.0025	0.00030	0.025	1.0	1.0	0.28	0.2964	1.3	3.9	0.23	0.08
Domain 2																			
UCL95	1.15	0.85	0.08	0.10	2.13	0.05	0.025	5.05	0.0025	0.00038	0.025	1.0	1.0	0.28	0.1426	1.3	3.9	0.11	0.04
Mean	1.06	0.85	0.08	0.10	1.62	0.05	0.025	3.75	0.0025	0.00030	0.025	1.0	1.0	0.28	0.1219	1.3	3.9	0.09	0.03
Domain 3																			
UCL95	0.93	0.85	0.08	0.10	3.29	0.05	0.025	2.08	0.0025	0.00038	0.025	1.0	1.0	0.28	0.1046	1.3	3.9	0.08	0.03
Mean	0.81	0.85	0.08	0.10	2.87	0.05	0.025	1.67	0.0025	0.00030	0.025	1.0	1.0	0.28	0.0899	1.3	3.9	0.07	0.02
Domain 4																			
UCL95	0.71	0.85	0.08	0.10	1.22	0.05	0.025	1.36	0.0025	0.00038	0.025	1.0	1.0	0.28	0.0722	1.3	3.9	0.06	0.02
Mean	0.61	0.85	0.08	0.10	1.01	0.05	0.025	1.14	0.0025	0.00030	0.025	1.0	1.0	0.28	0.0617	1.3	3.9	0.05	0.02
Purvis Creek																			
UCL95	0.98	0.85	0.08	0.10	1.22	0.05	0.025	5.07	0.0025	0.00038	0.025	1.0	1.0	0.28	0.1259	1.3	3.9	0.10	0.03
Mean	0.73	0.85	0.08	0.10	1.01	0.05	0.025	3.78	0.0025	0.00030	0.025	1.0	1.0	0.28	0.0943	1.3	3.9	0.07	0.02
Main Canal																			
UCL95	3.26	0.85	0.08	0.10	5.06	0.05	0.025	41.71	0.0025	0.00038	0.025	1.0	1.0	0.28	0.6432	1.3	3.9	0.49	0.16
Mean	2.86	0.85	0.08	0.10	4.28	0.05	0.025	27.64	0.0025	0.00030	0.025	1.0	1.0	0.28	0.4837	1.3	3.9	0.37	0.12
Eastern Creek																			
UCL95	2.75	0.85	0.08	0.10	7.27	0.05	0.025	65.28	0.0025	0.00038	0.025	1.0	1.0	0.28	0.8248	1.3	3.9	0.63	0.21
Mean	2.49	0.85	0.08	0.10	6.06	0.05	0.025	49.57	0.0025	0.00030	0.025	1.0	1.0	0.28	0.6593	1.3	3.9	0.51	0.17
Western Creek Complex																			
UCL95	1.15	0.85	0.08	0.10	2.13	0.05	0.025	3.84	0.0025	0.00038	0.025	1.0	1.0	0.28	0.1318	1.3	3.9	0.10	0.03
Mean	1.06	0.85	0.08	0.10	1.62	0.05	0.025	3.18	0.0025	0.00030	0.025	1.0	1.0	0.28	0.1168	1.3	3.9	0.09	0.03
Area A																			
UCL95	2.75	0.85	0.08	0.10	6.42	0.05	0.025	40.14	0.0025	0.00038	0.025	1.0	1.0	0.28	0.5965	1.3	3.9	0.46	0.15
Mean	2.49	0.85	0.08	0.10	5.58	0.05	0.025	32.78	0.0025	0.00030	0.025	1.0	1.0	0.28	0.5073	1.3	3.9	0.39	0.13
Blythe Island																			
UCL95	0.24	0.85	0.08	0.10	0.84	0.05	0.025	0.25	0.0025	0.00038	0.025	1.0	1.0	0.28	0.0249	1.3	3.9	0.02	0.01
Mean	0.22	0.85	0.08	0.10	0.72	0.05	0.025	0.20	0.0025	0.00030	0.025	1.0	1.0	0.28	0.0224	1.3	3.9	0.02	0.01
Lead **Location**																			
Reference																			
UCL95	0.84	0.9	1.40	0.05	1.43	0.05	0.024	20.41	0.00048	0.0100	0.023	1.0	1.0	0.20	0.1578	3.85	11.3	0.04	0.01
Mean	0.71	0.9	1.40	0.05	0.87	0.05	0.024	17.64	0.00048	0.0057	0.023	1.0	1.0	0.20	0.1333	3.85	11.3	0.03	0.01
Domain 1																			
UCL95	10.85	0.9	1.40	0.05	0.76	0.05	0.024	40.73	0.00048	0.0016	0.023	1.0	1.0	0.20	1.2827	3.85	11.3	0.33	0.11
Mean	7.93	0.9	1.40	0.05	0.62	0.05	0.024	31.02	0.00048	0.0013	0.023	1.0	1.0	0.20	0.9432	3.85	11.3	0.24	0.08
Domain 2																			
UCL95	0.56	0.9	1.40	0.05	1.26	0.05	0.024	63.03	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2279	3.85	11.3	0.06	0.02
Mean	0.52	0.9	1.40	0.05	0.93	0.05	0.024	40.85	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1683	3.85	11.3	0.04	0.01
Domain 3																			
UCL95	3.34	0.9	1.40	0.05	30.7	0.05	0.024	132.5	0.00048	0.0016	0.023	1.0	1.0	0.20	0.8715	3.85	11.3	0.23	0.08
Mean	2.11	0.9	1.40	0.05	2.41	0.05	0.024	90.72	0.00048	0.0013	0.023	1.0	1.0	0.20	0.4686	3.85	11.3	0.12	0.04
Domain 4																			
UCL95	0.57	0.9	1.40	0.05	0.65	0.05	0.024	22.88	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1290	3.85	11.3	0.03	0.01
Mean	0.53	0.9	1.40	0.05	0.43	0.05	0.024	21.66	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1204	3.85	11.3	0.03	0.01
Purvis Creek																			
UCL95	1.07	0.9	1.40	0.05	0.65	0.05	0.024	23.08	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1834	3.85	11.3	0.05	0.02
Mean	0.92	0.9	1.40	0.05	0.43	0.05	0.024	17.41	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1523	3.85	11.3	0.04	0.01
Main Canal																			
UCL95	1.77	0.9	1.40	0.05	0.55	0.05	0.024	28.07	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2704	3.85	11.3	0.07	0.02
Mean	1.45	0.9	1.40	0.05	0.46	0.05	0.024	26.07	0.00048	0.0013	0.023	1.0	1.0	0.20	0.2305	3.85	11.3	0.06	0.02
Eastern Creek																			
UCL95	7.58	0.9	1.40	0.05	0.86	0.05	0.024	41.5	0.00048	0.0016	0.023	1.0	1.0	0.20	0.9320	3.85	11.3	0.24	0.08
Mean	5.21	0.9	1.40	0.05	0.68	0.05	0.024	35.71	0.00048	0.0013	0.023	1.0	1.0	0.20	0.6610	3.85	11.3	0.17	0.06
Western Creek Complex																			
UCL95	0.56	0.9	1.40	0.05	1.26	0.05	0.024	30.1	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1489	3.85	11.3	0.04	0.01
Mean	0.52	0.9	1.40	0.05	0.93	0.05	0.024	28.98	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1398	3.85	11.3	0.04	0.01
Area A																			
UCL95	7.58	0.9	1.40	0.05	0.76	0.05	0.024	34.05	0.00048	0.0016	0.023	1.0	1.0	0.20	0.9135	3.85	11.3	0.24	0.08
Mean	5.21	0.9	1.40	0.05	0.62	0.05	0.024	31	0.00048	0.0013	0.023	1.0	1.0	0.20	0.6494	3.85	11.3	0.17	0.06
Blythe Island																			
UCL95	0.54	0.9	1.40	0.05	0.29	0.05	0.024	18.26	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1125	3.85	11.3	0.03	0.01
Mean	0.504	0.9	1.40	0.05	0.25	0.05	0.024	16.50	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1041	3.85	11.3	0.03	0.009

Notes:
COPC - Chemical of Potential Concern
Conc - Concentration
FC - Fiddler Crab
Mc - Mummichog
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

Table H-4. Estimated Exposure Concentrations - Green Heron (*Butorides striatus*)

COPC	Conc Mc (mg/kg)	Fraction Mc	Conc BC (mg/kg)	Fraction BC	Conc FC (mg/kg)	Fraction FC	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV NOAEL (mg/kgBW/day)	TRV LOAEL (mg/kgBW/day)	Hazard Quotient NOAEL HQ	Hazard Quotient LOAEL HQ
Methyl Mercury Locations																			
Reference																			
UCL95	0.10	0.9	0.19	0.05	0.034	0.05	0.024	0.0001	0.00048	1.00E-07	0.023	1.0	1.0	0.20	0.0121	0.02	0.06	0.61	0.20
Mean	0.08	0.9	0.15	0.05	0.027	0.05	0.024	0.0001	0.00048	5.00E-08	0.023	1.0	1.0	0.20	0.0097	0.02	0.06	0.49	0.16
Domain 1																			
UCL95	1.40	0.9	1.78	0.05	0.69	0.05	0.024	0.009	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.1660	0.02	0.06	8.30	2.77
Mean	0.78	0.9	1.59	0.05	0.65	0.05	0.024	0.004	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0977	0.02	0.06	4.88	1.63
Domain 2																			
UCL95	0.32	0.9	1.78	0.05	0.21	0.05	0.024	0.005	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0465	0.02	0.06	2.33	0.78
Mean	0.26	0.9	1.59	0.05	0.19	0.05	0.024	0.003	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0388	0.02	0.06	1.94	0.65
Domain 3																			
UCL95	0.35	0.9	1.78	0.05	0.20	0.05	0.024	0.002	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0497	0.02	0.06	2.48	0.83
Mean	0.32	0.9	1.59	0.05	0.18	0.05	0.024	0.002	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0452	0.02	0.06	2.26	0.75
Domain 4																			
UCL95	0.22	0.9	1.78	0.05	0.16	0.05	0.024	0.001	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0354	0.02	0.06	1.77	0.59
Mean	0.18	0.9	1.59	0.05	0.15	0.05	0.024	0.001	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0299	0.02	0.06	1.49	0.50
Purvis Creek																			
UCL95	0.22	0.9	1.78	0.05	0.10	0.05	0.024	0.001	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0350	0.02	0.06	1.75	0.58
Mean	0.18	0.9	1.59	0.05	0.09	0.05	0.024	0.001	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0295	0.02	0.06	1.48	0.49
Main Canal																			
UCL95	0.70	0.9	1.78	0.05	0.41	0.05	0.024	0.007	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0888	0.02	0.06	4.44	1.48
Mean	0.52	0.9	1.59	0.05	0.39	0.05	0.024	0.006	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0681	0.02	0.06	3.40	1.13
Eastern Creek																			
UCL95	1.83	0.9	1.78	0.05	0.57	0.05	0.024	0.020	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.2118	0.02	0.06	10.59	3.53
Mean	0.64	0.9	1.59	0.05	0.54	0.05	0.024	0.016	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0819	0.02	0.06	4.10	1.37
Western Creek Complex																			
UCL95	0.32	0.9	1.78	0.05	0.21	0.05	0.024	0.003	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0465	0.02	0.06	2.33	0.78
Mean	0.26	0.9	1.59	0.05	0.19	0.05	0.024	0.002	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0388	0.02	0.06	1.94	0.65
Area A																			
UCL95	1.40	0.9	1.78	0.05	0.57	0.05	0.024	0.011	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.1653	0.02	0.06	8.27	2.76
Mean	0.78	0.9	1.59	0.05	0.54	0.05	0.024	0.010	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0970	0.02	0.06	4.85	1.62
Blythe Island																			
UCL95	0.15	0.9	1.78	0.05	0.14	0.05	0.024	0.0003	0.00048	9.60E-07	0.023	1.0	1.0	0.20	0.0277	0.02	0.06	1.39	0.46
Mean	0.14	0.9	1.59	0.05	0.13	0.05	0.024	0.0002	0.00048	7.00E-07	0.023	1.0	1.0	0.20	0.0254	0.02	0.06	1.27	0.42
Inorganic Mercury Location																			
Reference																			
UCL95	0.01	0.9	0.00	0.05	0.02	0.05	0.024	0.10	0.00048	0.000017	0.023	1.0	1.0	0.20	0.0016	0.45	0.90	0.003	0.002
Mean	0.01	0.9	0.00	0.05	0.01	0.05	0.024	0.08	0.00048	0.000008	0.023	1.0	1.0	0.20	0.0013	0.45	0.90	0.003	0.001
Domain 1																			
UCL95	0.16	0.9	0.00	0.05	0.33	0.05	0.024	11.501	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0464	0.45	0.90	0.10	0.05
Mean	0.09	0.9	0.00	0.05	0.30	0.05	0.024	4.846	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0228	0.45	0.90	0.05	0.03
Domain 2																			
UCL95	0.04	0.9	0.00	0.05	0.10	0.05	0.024	5.839	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0189	0.45	0.90	0.04	0.02
Mean	0.03	0.9	0.00	0.05	0.09	0.05	0.024	3.850	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0130	0.45	0.90	0.03	0.01
Domain 3																			
UCL95	0.04	0.9	0.00	0.05	0.09	0.05	0.024	2.225	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0098	0.45	0.90	0.02	0.01
Mean	0.04	0.9	0.00	0.05	0.09	0.05	0.024	1.881	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0093	0.45	0.90	0.02	0.01
Domain 4																			
UCL95	0.02	0.9	0.00	0.05	0.08	0.05	0.024	1.067	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0052	0.45	0.90	0.01	0.006
Mean	0.02	0.9	0.00	0.05	0.07	0.05	0.024	0.631	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0045	0.45	0.90	0.01	0.005
Purvis Creek																			
UCL95	0.02	0.9	0.00	0.05	0.04	0.05	0.024	1.53	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0061	0.45	0.90	0.01	0.01
Mean	0.02	0.9	0.00	0.05	0.04	0.05	0.024	1.22	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0058	0.45	0.90	0.01	0.01
Main Canal																			
UCL95	0.08	0.9	0.00	0.05	0.20	0.05	0.024	8.72	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0308	0.45	0.90	0.07	0.03
Mean	0.06	0.9	0.00	0.05	0.18	0.05	0.024	7.39	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0253	0.45	0.90	0.06	0.03
Eastern Creek																			
UCL95	0.20	0.9	0.00	0.05	0.27	0.05	0.024	25.02	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0833	0.45	0.90	0.19	0.09
Mean	0.070	0.9	0.00	0.05	0.25	0.05	0.024	20.26	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0577	0.45	0.90	0.13	0.06
Western Creek Complex																			
UCL95	0.04	0.9	0.00	0.05	0.10	0.05	0.024	3.31	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0129	0.45	0.90	0.03	0.01
Mean	0.03	0.9	0.00	0.05	0.09	0.05	0.024	2.75	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0104	0.45	0.90	0.02	0.01
Area A																			
UCL95	0.16	0.9	0.00	0.05	0.27	0.05	0.024	14.04	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0526	0.45	0.90	0.12	0.06
Mean	0.09	0.9	0.00	0.05	0.25	0.05	0.024	11.99	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0400	0.45	0.90	0.09	0.04
Blythe Island																			
UCL95	0.02	0.9	0.00	0.05	0.07	0.05	0.024	0.39	0.00048	0.000057	0.023	1.0	1.0	0.20	0.0030	0.45	0.90	0.01	0.003
Mean	0.02	0.9	0.00	0.05	0.06	0.05	0.024	0.30	0.00048	0.000044	0.023	1.0	1.0	0.20	0.0029	0.45	0.90	0.01	0.003

Table H-4. Estimated Exposure Concentrations - Green Heron (*Butorides striatus*)

COPC	Conc Mc (mg/kg)	Fraction Mc	Conc BC (mg/kg)	Fraction BC	Conc FC (mg/kg)	Fraction FC	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV		Hazard Quotient	
																NOAEL (mg/kgBW/day)	LOAEL	NOAEL HQ	LOAEL HQ
Aroclor 1268 **Location**																			
Reference																			
UCL95	0.22	0.9	0.30	0.05	0.38	0.05	0.024	0.08	0.00048	0.00060	0.023	1.0	1.0	0.20	0.0281	1.3	3.9	0.02	0.007
Mean	0.15	0.9	0.13	0.05	0.22	0.05	0.024	0.05	0.00048	0.00042	0.023	1.0	1.0	0.20	0.0185	1.3	3.9	0.01	0.005
Domain 1																			
UCL95	6.42	0.9	1.88	0.05	2.49	0.05	0.024	23.43	0.00048	0.00038	0.023	1.0	1.0	0.20	0.7759	1.3	3.9	0.60	0.20
Mean	5.58	0.9	1.61	0.05	2.22	0.05	0.024	11.45	0.00048	0.00030	0.023	1.0	1.0	0.20	0.6531	1.3	3.9	0.50	0.17
Domain 2																			
UCL95	2.13	0.9	1.88	0.05	1.15	0.05	0.024	5.05	0.00048	0.00038	0.023	1.0	1.0	0.20	0.2604	1.3	3.9	0.20	0.07
Mean	1.62	0.9	1.61	0.05	1.06	0.05	0.024	3.75	0.00048	0.00030	0.023	1.0	1.0	0.20	0.2000	1.3	3.9	0.15	0.05
Domain 3																			
UCL95	3.29	0.9	1.88	0.05	0.93	0.05	0.024	2.08	0.00048	0.00038	0.023	1.0	1.0	0.20	0.3772	1.3	3.9	0.29	0.10
Mean	2.87	0.9	1.61	0.05	0.81	0.05	0.024	1.67	0.00048	0.00030	0.023	1.0	1.0	0.20	0.3285	1.3	3.9	0.25	0.08
Domain 4																			
UCL95	1.22	0.9	1.88	0.05	0.71	0.05	0.024	1.36	0.00048	0.00038	0.023	1.0	1.0	0.20	0.1506	1.3	3.9	0.12	0.04
Mean	1.01	0.9	1.61	0.05	0.61	0.05	0.024	1.14	0.00048	0.00030	0.023	1.0	1.0	0.20	0.1252	1.3	3.9	0.10	0.03
Purvis Creek																			
UCL95	1.22	0.9	1.88	0.05	0.98	0.05	0.024	5.07	0.00048	0.00038	0.023	1.0	1.0	0.20	0.1611	1.3	3.9	0.12	0.04
Mean	1.01	0.9	1.61	0.05	0.73	0.05	0.024	3.78	0.00048	0.00030	0.023	1.0	1.0	0.20	0.1322	1.3	3.9	0.10	0.03
Main Canal																			
UCL95	5.06	0.9	1.88	0.05	3.26	0.05	0.024	41.71	0.00048	0.00038	0.023	1.0	1.0	0.20	0.6775	1.3	3.9	0.52	0.17
Mean	4.28	0.9	1.61	0.05	2.86	0.05	0.024	27.64	0.00048	0.00030	0.023	1.0	1.0	0.20	0.5554	1.3	3.9	0.43	0.14
Eastern Creek																			
UCL95	7.27	0.9	1.88	0.05	2.75	0.05	0.024	65.28	0.00048	0.00038	0.023	1.0	1.0	0.20	0.9697	1.3	3.9	0.75	0.25
Mean	6.06	0.9	1.61	0.05	2.49	0.05	0.024	49.57	0.00048	0.00030	0.023	1.0	1.0	0.20	0.7981	1.3	3.9	0.61	0.20
Western Creek Complex																			
UCL95	2.13	0.9	1.88	0.05	1.15	0.05	0.024	3.84	0.00048	0.00038	0.023	1.0	1.0	0.20	0.2575	1.3	3.9	0.20	0.07
Mean	1.62	0.9	1.61	0.05	1.06	0.05	0.024	3.18	0.00048	0.00030	0.023	1.0	1.0	0.20	0.1986	1.3	3.9	0.15	0.05
Area A																			
UCL95	6.42	0.9	1.88	0.05	2.75	0.05	0.024	40.14	0.00048	0.00038	0.023	1.0	1.0	0.20	0.8175	1.3	3.9	0.63	0.21
Mean	5.58	0.9	1.61	0.05	2.49	0.05	0.024	32.78	0.00048	0.00030	0.023	1.0	1.0	0.20	0.7059	1.3	3.9	0.54	0.18
Blythe Island																			
UCL95	0.84	0.9	1.88	0.05	0.24	0.05	0.024	0.25	0.00048	0.00038	0.023	1.0	1.0	0.20	0.1041	1.3	3.9	0.08	0.03
Mean	0.72	0.9	1.61	0.05	0.22	0.05	0.024	0.20	0.00048	0.00030	0.023	1.0	1.0	0.20	0.0893	1.3	3.9	0.07	0.02
Lead **Location**																			
Reference																			
UCL95	1.43	0.9	4.21	0.05	0.84	0.05	0.024	20.41	0.00048	0.0100	0.023	1.0	1.0	0.20	0.2349	3.85	11.3	0.06	0.02
Mean	0.87	0.9	0.73	0.05	0.71	0.05	0.024	17.64	0.00048	0.0057	0.023	1.0	1.0	0.20	0.1456	3.85	11.3	0.04	0.01
Domain 1																			
UCL95	0.76	0.9	1.21	0.05	10.85	0.05	0.024	40.73	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2524	3.85	11.3	0.07	0.02
Mean	0.62	0.9	0.82	0.05	7.93	0.05	0.024	31.02	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1941	3.85	11.3	0.05	0.02
Domain 2																			
UCL95	1.26	0.9	1.21	0.05	0.56	0.05	0.024	63.03	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2982	3.85	11.3	0.08	0.03
Mean	0.93	0.9	0.82	0.05	0.52	0.05	0.024	40.85	0.00048	0.0013	0.023	1.0	1.0	0.20	0.2067	3.85	11.3	0.05	0.02
Domain 3																			
UCL95	30.7	0.9	1.21	0.05	3.34	0.05	0.024	132.5	0.00048	0.0016	0.023	1.0	1.0	0.20	3.6611	3.85	11.3	0.95	0.32
Mean	2.41	0.9	0.82	0.05	2.11	0.05	0.024	90.72	0.00048	0.0013	0.023	1.0	1.0	0.20	0.4957	3.85	11.3	0.13	0.04
Domain 4																			
UCL95	0.65	0.9	1.21	0.05	0.57	0.05	0.024	22.88	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1360	3.85	11.3	0.04	0.01
Mean	0.43	0.9	0.82	0.05	0.53	0.05	0.024	21.66	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1067	3.85	11.3	0.03	0.009
Purvis Creek																			
UCL95	0.65	0.9	1.21	0.05	1.07	0.05	0.024	23.08	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1395	3.85	11.3	0.04	0.01
Mean	0.43	0.9	0.82	0.05	0.92	0.05	0.024	17.41	0.00048	0.0013	0.023	1.0	1.0	0.20	0.0988	3.85	11.3	0.03	0.01
Main Canal																			
UCL95	0.55	0.9	1.21	0.05	1.77	0.05	0.024	28.07	0.00048	0.0016	0.023	1.0	1.0	0.20	0.1448	3.85	11.3	0.04	0.01
Mean	0.46	0.9	0.82	0.05	1.45	0.05	0.024	26.07	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1260	3.85	11.3	0.03	0.01
Eastern Creek																			
UCL95	0.86	0.9	1.21	0.05	7.58	0.05	0.024	41.5	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2454	3.85	11.3	0.06	0.02
Mean	0.68	0.9	0.82	0.05	5.21	0.05	0.024	35.71	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1955	3.85	11.3	0.05	0.02
Western Creek Complex																			
UCL95	1.26	0.9	1.21	0.05	0.56	0.05	0.024	30.1	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2191	3.85	11.3	0.06	0.02
Mean	0.93	0.9	0.82	0.05	0.52	0.05	0.024	28.98	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1782	3.85	11.3	0.05	0.02
Area A																			
UCL95	0.76	0.9	1.21	0.05	7.58	0.05	0.024	34.05	0.00048	0.0016	0.023	1.0	1.0	0.20	0.2167	3.85	11.3	0.06	0.02
Mean	0.62	0.9	0.82	0.05	5.21	0.05	0.024	31	0.00048	0.0013	0.023	1.0	1.0	0.20	0.1777	3.85	11.3	0.05	0.02
Blythe Island																			
UCL95	0.29	0.9	1.21	0.05	0.54	0.05	0.024	18.26	0.00048	0.0016	0.023	1.0	1.0	0.20	0.0858	3.85	11.3	0.02	0.008
Mean	0.25	0.9	0.82	0.05	0.50	0.05	0.024	16.50	0.00048	0.0013	0.023	1.0	1.0	0.20	0.0747	3.85	11.3	0.02	0.007

Notes:
COPC - Chemical of Potential Concern
Conc - Concentration
Mc - Mummichog
BC - Blue Crab
FC - Fiddler Crab
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

Table H-5. Estimated Exposure Concentrations - Marsh rabbit (*Sylvilagus palustris*)

	Conc	Fraction	Food	Conc	Sed	Conc	Water	Time	Area	Body	Estimated	TRV		Hazard Quotient	
	Cordgrass	Cordgrass	IR	Sed	IR	Water	IR	UF	UF	Weight	Exposure	NOAEL	LOAEL	NOAEL	LOAEL
COPC	(mg/kg)		(kg/day)	(mg/kg)	(kg/day)	(mg/L)	(L/day)			(kg)	(mg/kgBW/day)	(mg/kgBW/day)		HQ	HQ
Methyl Mercury Locations															
Reference															
UCL95	0.001	1	0.088	0.0001	0.0018	1.00E-07	0.099	1.0	1.0	1.00	0.00005	0.075	0.15	0.001	0.0004
Mean	0.0005	1	0.088	0.0001	0.0018	5.00E-08	0.099	1.0	1.0	1.00	0.00004	0.075	0.15	0.001	0.0003
Domain 1															
UCL95	0.02	1	0.088	0.009	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00189	0.075	0.15	0.03	0.01
Mean	0.01	1	0.088	0.004	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00085	0.075	0.15	0.01	0.006
Domain 2															
UCL95	0.01	1	0.088	0.005	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00079	0.075	0.15	0.01	0.005
Mean	0.005	1	0.088	0.003	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00043	0.075	0.15	0.006	0.003
Domain 3															
UCL95	0.004	1	0.088	0.002	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00038	0.075	0.15	0.005	0.003
Mean	0.004	1	0.088	0.002	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00033	0.075	0.15	0.004	0.002
Domain 4															
UCL95	0.003	1	0.088	0.001	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00030	0.075	0.15	0.004	0.002
Mean	0.003	1	0.088	0.001	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00025	0.075	0.15	0.003	0.002
Purvis Creek															
UCL95	0.002	1	0.088	0.001	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00022	0.075	0.15	0.003	0.001
Mean	0.002	1	0.088	0.001	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00019	0.075	0.15	0.003	0.001
Main Canal															
UCL95	0.075	1	0.088	0.007	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00665	0.075	0.15	0.09	0.04
Mean	0.015	1	0.088	0.006	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00130	0.075	0.15	0.02	0.009
Eastern Creek															
UCL95	0.014	1	0.088	0.020	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00130	0.075	0.15	0.02	0.009
Mean	0.008	1	0.088	0.016	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00075	0.075	0.15	0.01	0.005
Western Creek Complex															
UCL95	0.01	1	0.088	0.003	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00078	0.075	0.15	0.01	0.005
Mean	0.005	1	0.088	0.002	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00043	0.075	0.15	0.01	0.003
Area A															
UCL95	0.014	1	0.088	0.011	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00129	0.075	0.15	0.02	0.009
Mean	0.008	1	0.088	0.010	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00074	0.075	0.15	0.01	0.005
Blythe Island															
UCL95	0.003	1	0.088	0.0003	0.0018	9.60E-07	0.099	1.0	1.0	1.00	0.00026	0.075	0.15	0.003	0.002
Mean	0.002	1	0.088	0.0002	0.0018	7.00E-07	0.099	1.0	1.0	1.00	0.00020	0.075	0.15	0.003	0.001
Inorganic Mercury Location															
Reference															
UCL95	0.006	1	0.088	0.10	0.0018	0.000017	0.099	1.0	1.0	1.00	0.00067	0.05	0.5	0.01	0.001
Mean	0.004	1	0.088	0.08	0.0018	0.000008	0.099	1.0	1.0	1.00	0.00051	0.05	0.5	0.01	0.001
Domain 1															
UCL95	0.19	1	0.088	11.501	0.0018	0.000057	0.099	1.0	1.0	1.00	0.03767	0.05	0.5	0.75	0.08
Mean	0.09	1	0.088	4.846	0.0018	0.000044	0.099	1.0	1.0	1.00	0.01638	0.05	0.5	0.33	0.03
Domain 2															
UCL95	0.08	1	0.088	5.839	0.0018	0.000057	0.099	1.0	1.0	1.00	0.01759	0.05	0.5	0.35	0.04
Mean	0.04	1	0.088	3.850	0.0018	0.000044	0.099	1.0	1.0	1.00	0.01079	0.05	0.5	0.22	0.02
Domain 3															
UCL95	0.04	1	0.088	2.225	0.0018	0.000057	0.099	1.0	1.0	1.00	0.00747	0.05	0.5	0.15	0.01
Mean	0.03	1	0.088	1.881	0.0018	0.000044	0.099	1.0	1.0	1.00	0.00640	0.05	0.5	0.13	0.01
Domain 4															
UCL95	0.031	1	0.088	1.067	0.0018	0.000057	0.099	1.0	1.0	1.00	0.00462	0.05	0.5	0.09	0.009
Mean	0.025	1	0.088	0.631	0.0018	0.000044	0.099	1.0	1.0	1.00	0.00338	0.05	0.5	0.07	0.007
Purvis Creek															
UCL95	0.022	1	0.088	1.53	0.0018	0.000057	0.099	1.0	1.0	1.00	0.00474	0.05	0.5	0.09	0.009
Mean	0.019	1	0.088	1.22	0.0018	0.000044	0.099	1.0	1.0	1.00	0.00389	0.05	0.5	0.08	0.008
Main Canal															
UCL95	0.684	1	0.088	8.72	0.0018	0.000057	0.099	1.0	1.0	1.00	0.07585	0.05	0.5	1.52	0.15
Mean	0.132	1	0.088	7.39	0.0018	0.000044	0.099	1.0	1.0	1.00	0.02497	0.05	0.5	0.50	0.05
Eastern Creek															
UCL95	0.131	1	0.088	25.02	0.0018	0.000057	0.099	1.0	1.0	1.00	0.05653	0.05	0.5	1.13	0.11
Mean	0.074	1	0.088	20.26	0.0018	0.000044	0.099	1.0	1.0	1.00	0.04303	0.05	0.5	0.86	0.09
Western Creek Complex															
UCL95	0.08	1	0.088	3.31	0.0018	0.000057	0.099	1.0	1.0	1.00	0.01303	0.05	0.5	0.26	0.03
Mean	0.04	1	0.088	2.75	0.0018	0.000044	0.099	1.0	1.0	1.00	0.00882	0.05	0.5	0.18	0.02
Area A															
UCL95	0.131	1	0.088	14.04	0.0018	0.000057	0.099	1.0	1.0	1.00	0.03677	0.05	0.5	0.74	0.07
Mean	0.074	1	0.088	11.99	0.0018	0.000044	0.099	1.0	1.0	1.00	0.02814	0.05	0.5	0.56	0.06
Blythe Island															
UCL95	0.027	1	0.088	0.39	0.0018	0.000057	0.099	1.0	1.0	1.00	0.00305	0.05	0.5	0.06	0.006
Mean	0.021	1	0.088	0.30	0.0018	0.000044	0.099	1.0	1.0	1.00	0.00238	0.05	0.5	0.05	0.005

Table H-5. Estimated Exposure Concentrations - Marsh rabbit (*Sylvilagus palustris*)

COPC	Conc Cordgrass (mg/kg)	Fraction Cordgrass	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV		Hazard Quotient	
												NOAEL (mg/kgBW/day)	LOAEL (mg/kgBW/day)	NOAEL HQ	LOAEL HQ
Aroclor 1268 **Location**															
Reference															
UCL95	0.20	1	0.088	0.08	0.0018	0.00060	0.099	1.0	1.0	1.00	0.01806	0.03	0.3	0.60	0.06
Mean	0.13	1	0.088	0.05	0.0018	0.00042	0.099	1.0	1.0	1.00	0.01193	0.03	0.3	0.40	0.04
Domain 1															
UCL95	0.55	1	0.088	23.43	0.0018	0.00038	0.099	1.0	1.0	1.00	0.09044	0.03	0.3	3.01	0.30
Mean	0.26	1	0.088	11.45	0.0018	0.00030	0.099	1.0	1.0	1.00	0.04361	0.03	0.3	1.45	0.15
Domain 2															
UCL95	0.20	1	0.088	5.05	0.0018	0.00038	0.099	1.0	1.0	1.00	0.02655	0.03	0.3	0.89	0.09
Mean	0.15	1	0.088	3.75	0.0018	0.00030	0.099	1.0	1.0	1.00	0.02016	0.03	0.3	0.67	0.07
Domain 3															
UCL95	0.12	1	0.088	2.08	0.0018	0.00038	0.099	1.0	1.0	1.00	0.01452	0.03	0.3	0.48	0.05
Mean	0.09	1	0.088	1.67	0.0018	0.00030	0.099	1.0	1.0	1.00	0.01103	0.03	0.3	0.37	0.04
Domain 4															
UCL95	0.15	1	0.088	1.36	0.0018	0.00038	0.099	1.0	1.0	1.00	0.01578	0.03	0.3	0.53	0.05
Mean	0.1	1	0.088	1.14	0.0018	0.00030	0.099	1.0	1.0	1.00	0.01055	0.03	0.3	0.35	0.04
Purvis Creek															
UCL95	0.22	1	0.088	5.07	0.0018	0.00038	0.099	1.0	1.0	1.00	0.02827	0.03	0.3	0.94	0.09
Mean	0.11	1	0.088	3.78	0.0018	0.00030	0.099	1.0	1.0	1.00	0.01677	0.03	0.3	0.56	0.06
Main Canal															
UCL95	0.24	1	0.088	41.71	0.0018	0.00038	0.099	1.0	1.0	1.00	0.09588	0.03	0.3	3.20	0.32
Mean	0.14	1	0.088	27.64	0.0018	0.00030	0.099	1.0	1.0	1.00	0.06237	0.03	0.3	2.08	0.21
Eastern Creek															
UCL95	0.31	1	0.088	65.28	0.0018	0.00038	0.099	1.0	1.0	1.00	0.14465	0.03	0.3	4.82	0.48
Mean	0.18	1	0.088	49.57	0.0018	0.00030	0.099	1.0	1.0	1.00	0.10536	0.03	0.3	3.51	0.35
Western Creek Complex															
UCL95	0.20	1	0.088	3.84	0.0018	0.00038	0.099	1.0	1.0	1.00	0.02436	0.03	0.3	0.81	0.08
Mean	0.15	1	0.088	3.18	0.0018	0.00030	0.099	1.0	1.0	1.00	0.01912	0.03	0.3	0.64	0.06
Area A															
UCL95	0.31	1	0.088	40.14	0.0018	0.00038	0.099	1.0	1.0	1.00	0.09939	0.03	0.3	3.31	0.33
Mean	0.18	1	0.088	32.78	0.0018	0.00030	0.099	1.0	1.0	1.00	0.07514	0.03	0.3	2.50	0.25
Blythe Island															
UCL95	0.04	1	0.088	0.25	0.0018	0.00038	0.099	1.0	1.0	1.00	0.00393	0.03	0.3	0.13	0.01
Mean	0.03	1	0.088	0.20	0.0018	0.00030	0.099	1.0	1.0	1.00	0.00283	0.03	0.3	0.09	0.009
Lead **Location**															
Reference															
UCL95	2.15	1	0.088	20.41	0.0018	0.0100	0.099	1.0	1.0	1.00	0.22693	8	80	0.03	0.003
Mean	1.60	1	0.088	17.64	0.0018	0.0057	0.099	1.0	1.0	1.00	0.17276	8	80	0.02	0.002
Domain 1															
UCL95	2.88	1	0.088	40.73	0.0018	0.0016	0.099	1.0	1.0	1.00	0.32726	8	80	0.04	0.004
Mean	2.50	1	0.088	31.02	0.0018	0.0013	0.099	1.0	1.0	1.00	0.27570	8	80	0.03	0.003
Domain 2															
UCL95	2.74	1	0.088	63.03	0.0018	0.0016	0.099	1.0	1.0	1.00	0.35438	8	80	0.04	0.004
Mean	1.95	1	0.088	40.85	0.0018	0.0013	0.099	1.0	1.0	1.00	0.24553	8	80	0.03	0.003
Domain 3															
UCL95	5.12	1	0.088	132.5	0.0018	0.0016	0.099	1.0	1.0	1.00	0.68878	8	80	0.09	0.009
Mean	3.51	1	0.088	90.72	0.0018	0.0013	0.099	1.0	1.0	1.00	0.47257	8	80	0.06	0.006
Domain 4															
UCL95	3.12	1	0.088	22.88	0.0018	0.0016	0.099	1.0	1.0	1.00	0.31608	8	80	0.04	0.004
Mean	1.98	1	0.088	21.66	0.0018	0.0013	0.099	1.0	1.0	1.00	0.21362	8	80	0.03	0.003
Purvis Creek															
UCL95	3.07	1	0.088	23.08	0.0018	0.0016	0.099	1.0	1.0	1.00	0.31186	8	80	0.04	0.004
Mean	2.02	1	0.088	17.41	0.0018	0.0013	0.099	1.0	1.0	1.00	0.20914	8	80	0.03	0.003
Main Canal															
UCL95	4.16	1	0.088	28.07	0.0018	0.0016	0.099	1.0	1.0	1.0	0.41703	8	80	0.05	0.005
Mean	3.33	1	0.088	26.07	0.0018	0.0013	0.099	1.0	1.0	1.0	0.33992	8	80	0.04	0.004
Eastern Creek															
UCL95	2.97	1	0.088	41.5	0.0018	0.0016	0.099	1.0	1.0	1.0	0.33648	8	80	0.04	0.004
Mean	2.47	1	0.088	35.71	0.0018	0.0013	0.099	1.0	1.0	1.0	0.28212	8	80	0.04	0.004
Western Creek Complex															
UCL95	2.74	1	0.088	30.1	0.0018	0.0016	0.099	1.0	1.0	1.0	0.29511	8	80	0.04	0.004
Mean	1.95	1	0.088	28.98	0.0018	0.0013	0.099	1.0	1.0	1.0	0.22416	8	80	0.03	0.003
Area A															
UCL95	2.97	1	0.088	34.05	0.0018	0.0016	0.099	1.0	1.0	1.0	0.32307	8	80	0.04	0.004
Mean	2.47	1	0.088	31	0.0018	0.0013	0.099	1.0	1.0	1.0	0.27364	8	80	0.03	0.003
Blythe Island															
UCL95	1.56	1	0.088	18.26	0.0018	0.0016	0.099	1.0	1.0	1.0	0.17031	8	80	0.02	0.002
Mean	1.08	1	0.088	16.50	0.0018	0.0013	0.099	1.0	1.0	1.0	0.12487	8	80	0.02	0.002

Notes:
COPC - Chemical of Potential Concern
Conc - Concentration
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

Table H-6. Estimated Exposure Concentrations - Raccoon (*Procyon lotor*)

COPC	Conc FC (mg/kg)	Fraction FC	Conc BC (mg/kg)	Fraction BC	Conc Mc (mg/kg)	Fraction Mc	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV		Hazard Quotient	
																NOAEL	LOAEL (mg/kgBW/day)	NOAEL HQ	LOAEL HQ
Methyl Mercury Locations																			
Reference																			
UCL95	0.034	0.45	0.19	0.45	0.10	0.10	0.20	0.0001	0.019	1.00E-07	0.320	1.0	0.3	3.70	0.0018	0.075	0.15	0.02	0.012
Mean	0.027	0.45	0.15	0.45	0.08	0.10	0.20	0.0001	0.019	5.00E-08	0.320	1.0	0.3	3.70	0.0014	0.075	0.15	0.02	0.009
Domain 1																			
UCL95	0.69	0.45	1.78	0.45	1.40	0.10	0.20	0.009	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0203	0.075	0.15	0.27	0.135
Mean	0.65	0.45	1.59	0.45	0.78	0.10	0.20	0.004	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0176	0.075	0.15	0.23	0.117
Domain 2																			
UCL95	0.21	0.45	1.78	0.45	0.32	0.10	0.20	0.005	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0150	0.075	0.15	0.20	0.10
Mean	0.19	0.45	1.59	0.45	0.26	0.10	0.20	0.003	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0134	0.075	0.15	0.18	0.09
Domain 3																			
UCL95	0.20	0.45	1.78	0.45	0.35	0.10	0.20	0.002	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0150	0.075	0.15	0.20	0.10
Mean	0.18	0.45	1.59	0.45	0.32	0.10	0.20	0.002	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0134	0.075	0.15	0.18	0.09
Domain 4																			
UCL95	0.16	0.45	1.78	0.45	0.22	0.10	0.20	0.001	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0145	0.075	0.15	0.19	0.10
Mean	0.15	0.45	1.59	0.45	0.18	0.10	0.20	0.001	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0130	0.075	0.15	0.17	0.09
Purvis Creek																			
UCL95	0.10	0.45	1.78	0.45	0.22	0.10	0.20	0.001	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0141	0.075	0.15	0.19	0.09
Mean	0.09	0.45	1.59	0.45	0.18	0.10	0.20	0.001	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0126	0.075	0.15	0.17	0.08
Main Canal																			
UCL95	0.41	0.45	1.78	0.45	0.70	0.10	0.20	0.007	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0171	0.075	0.15	0.23	0.11
Mean	0.39	0.45	1.59	0.45	0.52	0.10	0.20	0.006	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0153	0.075	0.15	0.20	0.10
Eastern Creek																			
UCL95	0.57	0.45	1.78	0.45	1.83	0.10	0.20	0.020	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0201	0.075	0.15	0.27	0.13
Mean	0.54	0.45	1.59	0.45	0.64	0.10	0.20	0.016	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0166	0.075	0.15	0.22	0.11
Western Creek Complex																			
UCL95	0.21	0.45	1.78	0.45	0.32	0.10	0.20	0.003	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0150	0.075	0.15	0.20	0.10
Mean	0.19	0.45	1.59	0.45	0.26	0.10	0.20	0.002	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0134	0.075	0.15	0.18	0.09
Area A																			
UCL95	0.57	0.45	1.78	0.45	1.40	0.10	0.20	0.011	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0194	0.075	0.15	0.26	0.13
Mean	0.54	0.45	1.59	0.45	0.78	0.10	0.20	0.010	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0168	0.075	0.15	0.22	0.11
Blythe Island																			
UCL95	0.14	0.45	1.78	0.45	0.15	0.10	0.20	0.0003	0.019	9.60E-07	0.320	1.0	0.3	3.70	0.0143	0.075	0.15	0.19	0.10
Mean	0.13	0.45	1.59	0.45	0.14	0.10	0.20	0.0002	0.019	7.00E-07	0.320	1.0	0.3	3.70	0.0128	0.075	0.15	0.17	0.09
Inorganic Mercury Location																			
Reference																			
UCL95	0.02	0.45	0.00	0.45	0.01	0.10	0.20	0.10	0.019	0.000017	0.320	1.0	0.3	3.70	0.0003	0.05	0.5	0.01	0.001
Mean	0.01	0.45	0.00	0.45	0.01	0.10	0.20	0.08	0.019	0.000008	0.320	1.0	0.3	3.70	0.0002	0.05	0.5	0.004	0.0004
Domain 1																			
UCL95	0.33	0.45	0.00	0.45	0.16	0.10	0.20	11.501	0.019	0.000057	0.320	1.0	0.3	3.70	0.0204	0.05	0.5	0.41	0.04
Mean	0.30	0.45	0.00	0.45	0.09	0.10	0.20	4.846	0.019	0.000044	0.320	1.0	0.3	3.70	0.0098	0.05	0.5	0.20	0.02
Domain 2																			
UCL95	0.10	0.45	0.00	0.45	0.04	0.10	0.20	5.839	0.019	0.000057	0.320	1.0	0.3	3.70	0.0098	0.05	0.5	0.20	0.02
Mean	0.09	0.45	0.00	0.45	0.03	0.10	0.20	3.850	0.019	0.000044	0.320	1.0	0.3	3.70	0.0066	0.05	0.5	0.13	0.01
Domain 3																			
UCL95	0.09	0.45	0.00	0.45	0.04	0.10	0.20	2.225	0.019	0.000057	0.320	1.0	0.3	3.70	0.0041	0.05	0.5	0.08	0.008
Mean	0.09	0.45	0.00	0.45	0.04	0.10	0.20	1.881	0.019	0.000044	0.320	1.0	0.3	3.70	0.0036	0.05	0.5	0.07	0.007
Domain 4																			
UCL95	0.08	0.45	0.00	0.45	0.02	0.10	0.20	1.067	0.019	0.000057	0.320	1.0	0.3	3.70	0.0023	0.05	0.5	0.05	0.005
Mean	0.07	0.45	0.00	0.45	0.02	0.10	0.20	0.631	0.019	0.000044	0.320	1.0	0.3	3.70	0.0015	0.05	0.5	0.03	0.003
Purvis Creek																			
UCL95	0.04	0.45	0.00	0.45	0.02	0.10	0.20	1.53	0.019	0.000057	0.320	1.0	0.3	3.70	0.0027	0.05	0.5	0.05	0.005
Mean	0.04	0.45	0.00	0.45	0.02	0.10	0.20	1.22	0.019	0.000044	0.320	1.0	0.3	3.70	0.0022	0.05	0.5	0.04	0.004
Main Canal																			
UCL95	0.20	0.45	0.00	0.45	0.08	0.10	0.20	8.72	0.019	0.000057	0.320	1.0	0.3	3.70	0.0150	0.05	0.5	0.30	0.03
Mean	0.18	0.45	0.00	0.45	0.06	0.10	0.20	7.39	0.019	0.000044	0.320	1.0	0.3	3.70	0.0128	0.05	0.5	0.26	0.03
Eastern Creek																			
UCL95	0.27	0.45	0.00	0.45	0.20	0.10	0.20	25.02	0.019	0.000057	0.320	1.0	0.3	3.70	0.0408	0.05	0.5	0.82	0.08
Mean	0.25	0.45	0.00	0.45	0.070	0.10	0.20	20.26	0.019	0.000044	0.320	1.0	0.3	3.70	0.0332	0.05	0.5	0.66	0.07
Western Creek Complex																			
UCL95	0.10	0.45	0.00	0.45	0.04	0.10	0.20	3.31	0.019	0.000057	0.320	1.0	0.3	3.70	0.0059	0.05	0.5	0.12	0.01
Mean	0.09	0.45	0.00	0.45	0.03	0.10	0.20	2.75	0.019	0.000044	0.320	1.0	0.3	3.70	0.0049	0.05	0.5	0.10	0.01
Area A																			
UCL95	0.27	0.45	0.00	0.45	0.16	0.10	0.20	14.04	0.019	0.000057	0.320	1.0	0.3	3.70	0.0239	0.05	0.5	0.48	0.05
Mean	0.25	0.45	0.00	0.45	0.09	0.10	0.20	11.99	0.019	0.000044	0.320	1.0	0.3	3.70	0.0204	0.05	0.5	0.41	0.04
Blythe Island																			
UCL95	0.07	0.45	0.00	0.45	0.02	0.10	0.20	0.39	0.019	0.000057	0.320	1.0	0.3	3.70	0.0011	0.05	0.5	0.02	0.002
Mean	0.06	0.45	0.00	0.45	0.02	0.10	0.20	0.30	0.019	0.000044	0.320	1.0	0.3	3.70	0.0009	0.05	0.5	0.02	0.002

Table H-6. Estimated Exposure Concentrations - Raccoon (*Procyon lotor*)

COPC	Conc FC (mg/kg)	Fraction FC	Conc BC (mg/kg)	Fraction BC	Conc Mc (mg/kg)	Fraction Mc	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV NOAEL (mg/kgBW/day)	TRV LOAEL (mg/kgBW/day)	Hazard Quotient NOAEL HQ	Hazard Quotient LOAEL HQ
Aroclor 1268 Location																			
Reference																			
UCL95	0.38	0.45	0.30	0.45	0.22	0.10	0.20	0.08	0.019	0.00060	0.320	1.0	0.3	3.70	0.0055	0.03	0.3	0.18	0.018
Mean	0.22	0.45	0.13	0.45	0.15	0.10	0.20	0.05	0.019	0.00042	0.320	1.0	0.3	3.70	0.0029	0.03	0.3	0.10	0.01
Domain 1																			
UCL95	2.49	0.45	1.88	0.45	6.42	0.10	0.20	23.43	0.019	0.00038	0.320	1.0	0.3	3.70	0.0784	0.03	0.3	2.61	0.26
Mean	2.22	0.45	1.61	0.45	5.58	0.10	0.20	11.45	0.019	0.00030	0.320	1.0	0.3	3.70	0.0546	0.03	0.3	1.82	0.18
Domain 2																			
UCL95	1.15	0.45	1.88	0.45	2.13	0.10	0.20	5.05	0.019	0.00038	0.320	1.0	0.3	3.70	0.0334	0.03	0.3	1.11	0.11
Mean	1.06	0.45	1.61	0.45	1.62	0.10	0.20	3.75	0.019	0.00030	0.320	1.0	0.3	3.70	0.0279	0.03	0.3	0.93	0.09
Domain 3																			
UCL95	0.93	0.45	1.88	0.45	3.29	0.10	0.20	2.08	0.019	0.00038	0.320	1.0	0.3	3.70	0.0291	0.03	0.3	0.97	0.10
Mean	0.81	0.45	1.61	0.45	2.87	0.10	0.20	1.67	0.019	0.00030	0.320	1.0	0.3	3.70	0.0249	0.03	0.3	0.83	0.08
Domain 4																			
UCL95	0.71	0.45	1.88	0.45	1.22	0.10	0.20	1.36	0.019	0.00038	0.320	1.0	0.3	3.70	0.0230	0.03	0.3	0.77	0.08
Mean	0.61	0.45	1.61	0.45	1.01	0.10	0.20	1.14	0.019	0.00030	0.320	1.0	0.3	3.70	0.0196	0.03	0.3	0.65	0.07
Purvis Creek																			
UCL95	0.98	0.45	1.88	0.45	1.22	0.10	0.20	5.07	0.019	0.00038	0.320	1.0	0.3	3.70	0.0307	0.03	0.3	1.02	0.10
Mean	0.73	0.45	1.61	0.45	1.01	0.10	0.20	3.78	0.019	0.00030	0.320	1.0	0.3	3.70	0.0245	0.03	0.3	0.82	0.08
Main Canal																			
UCL95	3.26	0.45	1.88	0.45	5.06	0.10	0.20	41.71	0.019	0.00038	0.320	1.0	0.3	3.70	0.1100	0.03	0.3	3.67	0.37
Mean	2.86	0.45	1.61	0.45	4.28	0.10	0.20	27.64	0.019	0.00030	0.320	1.0	0.3	3.70	0.0821	0.03	0.3	2.74	0.27
Eastern Creek																			
UCL95	2.75	0.45	1.88	0.45	7.27	0.10	0.20	65.28	0.019	0.00038	0.320	1.0	0.3	3.70	0.1462	0.03	0.3	4.87	0.49
Mean	2.49	0.45	1.61	0.45	6.06	0.10	0.20	49.57	0.019	0.00030	0.320	1.0	0.3	3.70	0.1161	0.03	0.3	3.87	0.39
Western Creek Complex																			
UCL95	1.15	0.45	1.88	0.45	2.13	0.10	0.20	3.84	0.019	0.00038	0.320	1.0	0.3	3.70	0.0315	0.03	0.3	1.05	0.10
Mean	1.06	0.45	1.61	0.45	1.62	0.10	0.20	3.18	0.019	0.00030	0.320	1.0	0.3	3.70	0.0270	0.03	0.3	0.90	0.09
Area A																			
UCL95	2.75	0.45	1.88	0.45	6.42	0.10	0.20	40.14	0.019	0.00038	0.320	1.0	0.3	3.70	0.1060	0.03	0.3	3.53	0.35
Mean	2.49	0.45	1.61	0.45	5.58	0.10	0.20	32.78	0.019	0.00030	0.320	1.0	0.3	3.70	0.0895	0.03	0.3	2.98	0.30
Blythe Island																			
UCL95	0.24	0.45	1.88	0.45	0.84	0.10	0.20	0.25	0.019	0.00038	0.320	1.0	0.3	3.70	0.0172	0.03	0.3	0.57	0.06
Mean	0.22	0.45	1.61	0.45	0.72	0.10	0.20	0.20	0.019	0.00030	0.320	1.0	0.3	3.70	0.0148	0.03	0.3	0.49	0.05
Lead Location																			
Reference																			
UCL95	0.84	0.45	4.21	0.45	1.43	0.10	0.20	20.41	0.019	0.0100	0.320	1.0	0.3	3.70	0.0709	8	80	0.009	0.001
Mean	0.71	0.45	0.73	0.45	0.87	0.10	0.20	17.64	0.019	0.0057	0.320	1.0	0.3	3.70	0.0392	8	80	0.005	0.0005
Domain 1																			
UCL95	10.85	0.45	1.21	0.45	0.76	0.10	0.20	40.73	0.019	0.0016	0.320	1.0	0.3	3.70	0.1520	8	80	0.02	0.002
Mean	7.93	0.45	0.82	0.45	0.62	0.10	0.20	31.02	0.019	0.0013	0.320	1.0	0.3	3.70	0.1127	8	80	0.01	0.001
Domain 2																			
UCL95	0.56	0.45	1.21	0.45	1.26	0.10	0.20	63.03	0.019	0.0016	0.320	1.0	0.3	3.70	0.1121	8	80	0.01	0.001
Mean	0.52	0.45	0.82	0.45	0.93	0.10	0.20	40.85	0.019	0.0013	0.320	1.0	0.3	3.70	0.0743	8	80	0.009	0.001
Domain 3																			
UCL95	3.34	0.45	1.21	0.45	30.7	0.10	0.20	132.5	0.019	0.0016	0.320	1.0	0.3	3.70	0.2871	8	80	0.04	0.004
Mean	2.11	0.45	0.82	0.45	2.41	0.10	0.20	90.72	0.019	0.0013	0.320	1.0	0.3	3.70	0.1651	8	80	0.02	0.002
Domain 4																			
UCL95	0.57	0.45	1.21	0.45	0.65	0.10	0.20	22.88	0.019	0.0016	0.320	1.0	0.3	3.70	0.0493	8	80	0.006	0.001
Mean	0.53	0.45	0.82	0.45	0.43	0.10	0.20	21.66	0.019	0.0013	0.320	1.0	0.3	3.70	0.0440	8	80	0.005	0.001
Purvis Creek																			
UCL95	1.07	0.45	1.21	0.45	0.65	0.10	0.20	23.08	0.019	0.0016	0.320	1.0	0.3	3.70	0.0533	8	80	0.007	0.001
Mean	0.92	0.45	0.82	0.45	0.43	0.10	0.20	17.41	0.019	0.0013	0.320	1.0	0.3	3.70	0.0402	8	80	0.005	0.001
Main Canal																			
UCL95	1.77	0.45	1.21	0.45	0.55	0.10	0.20	28.07	0.019	0.0016	0.320	1.0	0.3	3.70	0.0659	8	80	0.008	0.001
Mean	1.45	0.45	0.82	0.45	0.46	0.10	0.20	26.07	0.019	0.0013	0.320	1.0	0.3	3.70	0.0575	8	80	0.007	0.001
Eastern Creek																			
UCL95	7.58	0.45	1.21	0.45	0.86	0.10	0.20	41.5	0.019	0.0016	0.320	1.0	0.3	3.70	0.1295	8	80	0.02	0.002
Mean	5.21	0.45	0.82	0.45	0.68	0.10	0.20	35.71	0.019	0.0013	0.320	1.0	0.3	3.70	0.1002	8	80	0.01	0.001
Western Creek Complex																			
UCL95	0.56	0.45	1.21	0.45	1.26	0.10	0.20	30.1	0.019	0.0016	0.320	1.0	0.3	3.70	0.0614	8	80	0.008	0.001
Mean	0.52	0.45	0.82	0.45	0.93	0.10	0.20	28.98	0.019	0.0013	0.320	1.0	0.3	3.70	0.0560	8	80	0.007	0.001
Area A																			
UCL95	7.58	0.45	1.21	0.45	0.76	0.10	0.20	34.05	0.019	0.0016	0.320	1.0	0.3	3.70	0.1179	8	80	0.01	0.001
Mean	5.21	0.45	0.82	0.45	0.62	0.10	0.20	31	0.019	0.0013	0.320	1.0	0.3	3.70	0.0928	8	80	0.01	0.001
Blythe Island																			
UCL95	0.54	0.45	1.21	0.45	0.29	0.10	0.20	18.26	0.019	0.0016	0.320	1.0	0.3	3.70	0.0414	8	80	0.005	0.001
Mean	0.50	0.45	0.82	0.45	0.25	0.10	0.20	16.50	0.019	0.0013	0.320	1.0	0.3	3.70	0.0355	8	80	0.004	0.0004

Notes:
COPC - Chemical of Potential Concern
Conc - Concentration
FC - Fiddler Crab
BC - Blue Crab
Mc - Mummichog
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

Table H-7. Estimated Exposure Concentrations - River otter (*Lutra canadensis*)

COPC	Conc Mc (mg/kg)	Fraction Mc	Conc S Perch (mg/kg)	Fraction S Perch	Conc FC (mg/kg)	Fraction FC	Conc BC (mg/kg)	Fraction BC	Food IR (kg/day)	Conc Sed (mg/kg)	Sed IR (kg/day)	Conc Water (mg/L)	Water IR (L/day)	Time UF	Area UF	Body Weight (kg)	Estimated Exposure (mg/kgBW/day)	TRV (mg/kgBW/day)		Hazard Quotient	
																		NOAEL	LOAEL	NOAEL HQ	LOAEL HQ
Methyl Mercury Locations																					
Reference																					
UCL95	0.10	0.30	0.33	0.50	0.034	0.10	0.19	0.10	0.33	0.0001	0.015	1.00E-07	0.55	1.0	0.57	6.70	0.00610	0.075	0.15	0.08	0.04
Mean	0.08	0.30	0.29	0.50	0.027	0.10	0.15	0.10	0.33	0.0001	0.015	5.00E-08	0.55	1.0	0.57	6.70	0.00524	0.075	0.15	0.07	0.03
Domain 1																					
UCL95	1.40	0.30	1.85	0.50	0.69	0.10	1.78	0.10	0.33	0.009	0.015	9.60E-07	0.55	1.0	0.03	6.70	0.00235	0.075	0.15	0.03	0.02
Mean	0.78	0.30	1.60	0.50	0.65	0.10	1.59	0.10	0.33	0.004	0.015	7.00E-07	0.55	1.0	0.03	6.70	0.00186	0.075	0.15	0.02	0.01
Domain 2																					
UCL95	0.32	0.30	1.85	0.50	0.21	0.10	1.78	0.10	0.33	0.005	0.015	9.60E-07	0.55	1.0	0.18	6.70	0.01082	0.075	0.15	0.14	0.07
Mean	0.26	0.30	1.60	0.50	0.19	0.10	1.59	0.10	0.33	0.003	0.015	7.00E-07	0.55	1.0	0.18	6.70	0.00936	0.075	0.15	0.12	0.06
Domain 3																					
UCL95	0.35	0.30	1.85	0.50	0.20	0.10	1.78	0.10	0.33	0.002	0.015	9.60E-07	0.55	1.0	0.21	6.70	0.01270	0.075	0.15	0.17	0.08
Mean	0.32	0.30	1.60	0.50	0.18	0.10	1.59	0.10	0.33	0.002	0.015	7.00E-07	0.55	1.0	0.21	6.70	0.01110	0.075	0.15	0.15	0.07
Domain 4																					
UCL95	0.22	0.30	1.85	0.50	0.16	0.10	1.78	0.10	0.33	0.001	0.015	9.60E-07	0.55	1.0	0.57	6.70	0.03327	0.075	0.15	0.44	0.22
Mean	0.18	0.30	1.60	0.50	0.15	0.10	1.59	0.10	0.33	0.001	0.015	7.00E-07	0.55	1.0	0.57	6.70	0.02886	0.075	0.15	0.38	0.19
Purvis Creek																					
UCL95	0.22	0.30	1.85	0.50	0.10	0.10	1.78	0.10	0.33	0.001	0.015	9.60E-07	0.55	1.0	0.08	6.70	0.00465	0.075	0.15	0.06	0.03
Mean	0.18	0.30	1.60	0.50	0.09	0.10	1.59	0.10	0.33	0.001	0.015	7.00E-07	0.55	1.0	0.08	6.70	0.00403	0.075	0.15	0.05	0.03
Main Canal																					
UCL95	0.70	0.30	1.85	0.50	0.41	0.10	1.78	0.10	0.33	0.007	0.015	9.60E-07	0.55	1.0	0.002	6.70	0.00013	0.075	0.15	0.002	0.001
Mean	0.52	0.30	1.60	0.50	0.39	0.10	1.59	0.10	0.33	0.006	0.015	7.00E-07	0.55	1.0	0.002	6.70	0.00011	0.075	0.15	0.002	0.001
Eastern Creek																					
UCL95	1.83	0.30	1.85	0.50	0.57	0.10	1.78	0.10	0.33	0.020	0.015	9.60E-07	0.55	1.0	0.006	6.70	0.00051	0.075	0.15	0.007	0.003
Mean	0.64	0.30	1.60	0.50	0.54	0.10	1.59	0.10	0.33	0.016	0.015	7.00E-07	0.55	1.0	0.006	6.70	0.00036	0.075	0.15	0.005	0.002
Western Creek Complex																					
UCL95	0.32	0.30	1.85	0.50	0.21	0.10	1.78	0.10	0.33	0.003	0.015	9.60E-07	0.55	1.0	0.003	6.70	0.00018	0.075	0.15	0.002	0.001
Mean	0.26	0.30	1.60	0.50	0.19	0.10	1.59	0.10	0.33	0.002	0.015	7.00E-07	0.55	1.0	0.003	6.70	0.00016	0.075	0.15	0.002	0.001
Area A																					
UCL95	1.40	0.30	1.85	0.50	0.57	0.10	1.78	0.10	0.33	0.011	0.015	9.60E-07	0.55	1.0	0.011	6.70	0.00086	0.075	0.15	0.011	0.006
Mean	0.78	0.30	1.60	0.50	0.54	0.10	1.59	0.10	0.33	0.010	0.015	7.00E-07	0.55	1.0	0.011	6.70	0.00068	0.075	0.15	0.009	0.005
Blythe Island																					
UCL95	0.15	0.30	1.85	0.50	0.14	0.10	1.78	0.10	0.33	0.0003	0.015	9.60E-07	0.55	1.0	0.57	6.70	0.03262	0.075	0.15	0.43	0.22
Mean	0.14	0.30	1.60	0.50	0.13	0.10	1.59	0.10	0.33	0.0002	0.015	7.00E-07	0.55	1.0	0.57	6.70	0.02847	0.075	0.15	0.38	0.19
Inorganic Mercury Location																					
Reference																					
UCL95	0.01	0.30	0.33	0.50	0.02	0.10	0.00	0.10	0.33	0.10	0.015	0.000017	0.55	1.0	0.57	6.70	0.004913	0.05	0.5	0.10	0.01
Mean	0.01	0.30	0.29	0.50	0.01	0.10	0.00	0.10	0.33	0.08	0.015	0.000008	0.55	1.0	0.57	6.70	0.004288	0.05	0.5	0.09	0.009
Domain 1																					
UCL95	0.16	0.30	1.85	0.50	0.33	0.10	0.00	0.10	0.33	11.501	0.015	0.000057	0.55	1.0	0.03	6.70	0.00226	0.05	0.5	0.05	0.005
Mean	0.09	0.30	1.60	0.50	0.30	0.10	0.00	0.10	0.33	4.846	0.015	0.000044	0.55	1.0	0.03	6.70	0.00159	0.05	0.5	0.03	0.003
Domain 2																					
UCL95	0.04	0.30	1.85	0.50	0.10	0.10	0.00	0.10	0.33	5.839	0.015	0.000057	0.55	1.0	0.18	6.70	0.01075	0.05	0.5	0.21	0.021
Mean	0.03	0.30	1.60	0.50	0.09	0.10	0.00	0.10	0.33	3.850	0.015	0.000044	0.55	1.0	0.18	6.70	0.00880	0.05	0.5	0.18	0.018
Domain 3																					
UCL95	0.04	0.30	1.85	0.50	0.09	0.10	0.00	0.10	0.33	2.225	0.015	0.000057	0.55	1.0	0.21	6.70	0.01082	0.05	0.5	0.22	0.022
Mean	0.04	0.30	1.60	0.50	0.09	0.10	0.00	0.10	0.33	1.881	0.015	0.000044	0.55	1.0	0.21	6.70	0.00938	0.05	0.5	0.19	0.019
Domain 4																					
UCL95	0.02	0.30	1.85	0.50	0.08	0.10	0.00	0.10	0.33	1.067	0.015	0.000057	0.55	1.0	0.57	6.70	0.02773	0.05	0.5	0.55	0.055
Mean	0.02	0.30	1.60	0.50	0.07	0.10	0.00	0.10	0.33	0.631	0.015	0.000044	0.55	1.0	0.57	6.70	0.02367	0.05	0.5	0.47	0.047
Purvis Creek																					
UCL95	0.02	0.30	1.85	0.50	0.04	0.10	0.00	0.10	0.33	1.53	0.015	0.000057	0.55	1.0	0.08	6.70	0.00396	0.05	0.5	0.08	0.008
Mean	0.02	0.30	1.60	0.50	0.04	0.10	0.00	0.10	0.33	1.22	0.015	0.000044	0.55	1.0	0.08	6.70	0.00342	0.05	0.5	0.07	0.007
Main Canal																					
UCL95	0.08	0.30	1.85	0.50	0.20	0.10	0.00	0.10	0.33	8.72	0.015	0.000057	0.55	1.0	0.002	6.70	0.00013	0.05	0.5	0.003	0.0003
Mean	0.06	0.30	1.60	0.50	0.18	0.10	0.00	0.10	0.33	7.39	0.015	0.000044	0.55	1.0	0.002	6.70	0.00012	0.05	0.5	0.002	0.0002
Eastern Creek																					
UCL95	0.20	0.30	1.85	0.50	0.27	0.10	0.00	0.10	0.33	25.02	0.015	0.000057	0.55	1.0	0.006	6.70	0.00064	0.05	0.5	0.01	0.001
Mean	0.070	0.30	1.60	0.50	0.25	0.10	0.00	0.10	0.33	20.26	0.015	0.000044	0.55	1.0	0.006	6.70	0.00052	0.05	0.5	0.01	0.001
Western Creek Complex																					
UCL95	0.04	0.30	1.85	0.50	0.10	0.10	0.00	0.10	0.33	3.31	0.015	0.000057	0.55	1.0	0.003	6.70	0.00016	0.05	0.5	0.003	0.0003
Mean	0.03	0.30	1.60	0.50	0.09	0.10	0.00	0.10	0.33	2.75	0.015	0.000044	0.55	1.0	0.003	6.70	0.00014	0.05	0.5	0.003	0.0003
Area A																					
UCL95	0.16	0.30	1.85	0.50	0.27	0.10	0.00	0.10	0.33	14.04	0.015	0.000057	0.55	1.0	0.011	6.70	0.00089	0.05	0.5	0.018	0.0018
Mean	0.09	0.30	1.60	0.50	0.25	0.10	0.00	0.10	0.33	11.99	0.015	0.000044	0.55	1.0	0.011	6.70	0.00076	0.05	0.5	0.015	0.0015
Blythe Island																					
UCL95	0.02	0.30	1.85	0.50	0.07	0.10	0.00	0.10	0.33	0.39	0.015	0.000057	0.55	1.0	0.57	6.70	0.02680	0.05	0.5	0.5359	0.05359
Mean	0.02	0.30	1.60	0.50	0.06	0.10	0.00	0.10	0.33	0.30	0.015	0.000044	0.55	1.0	0.57	6.70	0.02316	0.05	0.5	0.4631	0.04631

Table H-7. Estimated Exposure Concentrations - River otter (*Lutra canadensis*)

	Conc	Fraction	Conc	Fraction	Conc	Fraction	Conc	Fraction	Food	Conc	Sed	Conc	Water	Time	Area	Body	Estimated	TRV		Hazard Quotient	
	Mc	Mc	S Perch	S Perch	FC	FC	BC	BC	IR	Sed	IR	Water	IR	UF	UF	Weight	Exposure	NOAEL	LOAEL	NOAEL	LOAEL
COPC	(mg/kg)		(mg/kg)		(mg/kg)		(mg/kg)		(kg/day)	(mg/kg)	(kg/day)	(mg/L)	(L/day)			(kg)	(mg/kgBW/day)	(mg/kgBW/day)		HQ	HQ
Aroclor 1268 **Location**																					
Reference																					
UCL95	0.22	0.30	0.23	0.50	0.38	0.10	0.30	0.10	0.33	0.08	0.015	0.00060	0.55	1.0	0.57	6.70	0.00712	0.03	0.3	0.237	0.0237
Mean	0.15	0.30	0.19	0.50	0.22	0.10	0.13	0.10	0.33	0.05	0.015	0.00042	0.55	1.0	0.57	6.70	0.00500	0.03	0.3	0.167	0.0167
Domain 1																					
UCL95	6.42	0.30	7.05	0.50	2.49	0.10	1.88	0.10	0.33	23.43	0.015	0.00038	0.55	1.0	0.03	6.70	0.01027	0.03	0.3	0.34	0.034
Mean	5.58	0.30	5.67	0.50	2.22	0.10	1.61	0.10	0.33	11.45	0.015	0.00030	0.55	1.0	0.03	6.70	0.00800	0.03	0.3	0.27	0.027
Domain 2																					
UCL95	2.13	0.30	7.05	0.50	1.15	0.10	1.88	0.10	0.33	5.05	0.015	0.00038	0.55	1.0	0.18	6.70	0.04164	0.03	0.3	1.39	0.139
Mean	1.62	0.30	5.67	0.50	1.06	0.10	1.61	0.10	0.33	3.75	0.015	0.00030	0.55	1.0	0.18	6.70	0.03333	0.03	0.3	1.11	0.111
Domain 3																					
UCL95	3.29	0.30	7.05	0.50	0.93	0.10	1.88	0.10	0.33	2.08	0.015	0.00038	0.55	1.0	0.21	6.70	0.05056	0.03	0.3	1.69	0.169
Mean	2.87	0.30	5.67	0.50	0.81	0.10	1.61	0.10	0.33	1.67	0.015	0.00030	0.55	1.0	0.21	6.70	0.04152	0.03	0.3	1.38	0.138
Domain 4																					
UCL95	1.22	0.30	7.05	0.50	0.71	0.10	1.88	0.10	0.33	1.36	0.015	0.00038	0.55	1.0	0.57	6.70	0.11827	0.03	0.3	3.94	0.39
Mean	1.01	0.30	5.67	0.50	0.61	0.10	1.61	0.10	0.33	1.14	0.015	0.00030	0.55	1.0	0.57	6.70	0.09580	0.03	0.3	3.19	0.319
Purvis Creek																					
UCL95	1.22	0.30	7.05	0.50	0.98	0.10	1.88	0.10	0.33	5.07	0.015	0.00038	0.55	1.0	0.08	6.70	0.01737	0.03	0.3	0.58	0.058
Mean	1.01	0.30	5.67	0.50	0.73	0.10	1.61	0.10	0.33	3.78	0.015	0.00030	0.55	1.0	0.08	6.70	0.01396	0.03	0.3	0.47	0.047
Main Canal																					
UCL95	5.06	0.30	7.05	0.50	3.26	0.10	1.88	0.10	0.33	41.71	0.015	0.00038	0.55	1.0	0.002	6.70	0.00073	0.03	0.3	0.02	0.002
Mean	4.28	0.30	5.67	0.50	2.86	0.10	1.61	0.10	0.33	27.64	0.015	0.00030	0.55	1.0	0.002	6.70	0.00057	0.03	0.3	0.02	0.002
Eastern Creek																					
UCL95	7.27	0.30	7.05	0.50	2.75	0.10	1.88	0.10	0.33	65.28	0.015	0.00038	0.55	1.0	0.006	6.70	0.00270	0.03	0.3	0.09	0.009
Mean	6.06	0.30	5.67	0.50	2.49	0.10	1.61	0.10	0.33	49.57	0.015	0.00030	0.55	1.0	0.006	6.70	0.00216	0.03	0.3	0.07	0.007
Western Creek Complex																					
UCL95	2.13	0.30	7.05	0.50	1.15	0.10	1.88	0.10	0.33	3.84	0.015	0.00038	0.55	1.0	0.003	6.70	0.00069	0.03	0.3	0.02	0.002
Mean	1.62	0.30	5.67	0.50	1.06	0.10	1.61	0.10	0.33	3.18	0.015	0.00030	0.55	1.0	0.003	6.70	0.00055	0.03	0.3	0.02	0.002
Area A																					
UCL95	6.42	0.30	7.05	0.50	2.75	0.10	1.88	0.10	0.33	40.14	0.015	0.00038	0.55	1.0	0.011	6.70	0.00419	0.03	0.3	0.14	0.014
Mean	5.58	0.30	5.67	0.50	2.49	0.10	1.61	0.10	0.33	32.78	0.015	0.00030	0.55	1.0	0.011	6.70	0.00347	0.03	0.3	0.12	0.012
Blythe Island																					
UCL95	0.84	0.30	7.05	0.50	0.24	0.10	1.88	0.10	0.33	0.25	0.015	0.00038	0.55	1.0	0.57	6.70	0.11232	0.03	0.3	3.74	0.374
Mean	0.72	0.30	5.67	0.50	0.22	0.10	1.61	0.10	0.33	0.20	0.015	0.00030	0.55	1.0	0.57	6.70	0.09106	0.03	0.3	3.04	0.304
Lead **Location**																					
Reference																					
UCL95	1.43	0.30	0.23	0.50	0.84	0.10	4.21	0.10	0.33	20.41	0.015	0.0100	0.55	1.0	0.57	6.70	0.05596	8	80	0.007	0.0007
Mean	0.87	0.30	0.22	0.50	0.71	0.10	0.73	0.10	0.33	17.64	0.015	0.0057	0.55	1.0	0.57	6.70	0.03723	8	80	0.005	0.0005
Domain 1																					
UCL95	0.76	0.30	0.50	0.50	10.85	0.10	1.21	0.10	0.33	40.73	0.015	0.0016	0.55	1.0	0.03	6.70	0.00523	8	80	0.0007	0.00007
Mean	0.62	0.30	0.40	0.50	7.93	0.10	0.82	0.10	0.33	31.02	0.015	0.0013	0.55	1.0	0.03	6.70	0.00395	8	80	0.0005	0.00005
Domain 2																					
UCL95	1.26	0.30	0.50	0.50	0.56	0.10	1.21	0.10	0.33	63.03	0.015	0.0016	0.55	1.0	0.18	6.70	0.03256	8	80	0.004	0.0004
Mean	0.93	0.30	0.40	0.50	0.52	0.10	0.82	0.10	0.33	40.85	0.015	0.0013	0.55	1.0	0.18	6.70	0.02192	8	80	0.003	0.0003
Domain 3																					
UCL95	30.7	0.30	0.50	0.50	3.34	0.10	1.21	0.10	0.33	132.5	0.015	0.0016	0.55	1.0	0.21	6.70	0.16488	8	80	0.02	0.002
Mean	2.41	0.30	0.40	0.50	2.11	0.10	0.82	0.10	0.33	90.72	0.015	0.0013	0.55	1.0	0.21	6.70	0.05525	8	80	0.007	0.001
Domain 4																					
UCL95	0.65	0.30	0.50	0.50	0.57	0.10	1.21	0.10	0.33	22.88	0.015	0.0016	0.55	1.0	0.57	6.70	0.04676	8	80	0.006	0.0006
Mean	0.43	0.30	0.40	0.50	0.53	0.10	0.82	0.10	0.33	21.66	0.015	0.0013	0.55	1.0	0.57	6.70	0.04073	8	80	0.005	0.0005
Purvis Creek																					
UCL95	0.65	0.30	0.50	0.50	1.07	0.10	1.21	0.10	0.33	23.08	0.015	0.0016	0.55	1.0	0.08	6.70	0.00680	8	80	0.0008	0.00008
Mean	0.43	0.30	0.40	0.50	0.92	0.10	0.82	0.10	0.33	17.41	0.015	0.0013	0.55	1.0	0.08	6.70	0.00511	8	80	0.0006	0.00006
Main Canal																					
UCL95	0.55	0.30	0.50	0.50	1.77	0.10	1.21	0.10	0.33	28.07	0.015	0.0016	0.55	1.0	0.002	6.70	0.00020	8	80	0.00002	0.000002
Mean	0.46	0.30	0.40	0.50	1.45	0.10	0.82	0.10	0.33	26.07	0.015	0.0013	0.55	1.0	0.002	6.70	0.00017	8	80	0.00002	0.000002
Eastern Creek																					
UCL95	0.86	0.30	0.50	0.50	7.58	0.10	1.21	0.10	0.33	41.5	0.015	0.0016	0.55	1.0	0.006	6.70	0.00097	8	80	0.0001	0.00001
Mean	0.68	0.30	0.40	0.50	5.21	0.10	0.82	0.10	0.33	35.71	0.015	0.0013	0.55	1.0	0.006	6.70	0.00078	8	80	0.0001	0.00001
Western Creek Complex																					
UCL95	1.26	0.30	0.50	0.50	0.56	0.10	1.21	0.10	0.33	30.1	0.015	0.0016	0.55	1.0	0.003	6.70	0.00032	8	80	0.00004	0.000004
Mean	0.93	0.30	0.40	0.50	0.52	0.10	0.82	0.10	0.33	28.98	0.015	0.0013	0.55	1.0	0.003	6.70	0.00029	8	80	0.00004	0.000004
Area A																					
UCL95	0.76	0.30	0.50	0.50	7.58	0.10	1.21	0.10	0.33	34.05	0.015	0.0016	0.55	1.0	0.011	6.70	0.00158	8	80	0.0002	0.00002
Mean	0.62	0.30	0.40	0.50	5.21	0.10	0.82	0.10	0.33	31	0.015	0.0013	0.55	1.0	0.011	6.70	0.00130	8	80	0.0002	0.00002
Blythe Island																					
UCL95	0.29	0.30	0.50	0.50	0.54	0.10	1.21	0.10	0.33	18.26	0.015	0.0016	0.55	1.0	0.57	6.70	0.03775	8	80	0.005	0.0005
Mean	0.25	0.30	0.40	0.50	0.50	0.10	0.82	0.10	0.33	16.50	0.015	0.0013	0.55	1.0	0.57	6.70	0.03254	8	80	0.004	0.0004

Notes:
COPC - Chemical of Potential Concern
Conc - Concentration
Mc - Mummichog
S Perch - Silver Perch
FC - Fiddler Crab
BC - Blue Crab
IR - Ingestion Rate
Sed - Sediment
UF - Use Factor
NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard Quotient
UCL95 - 95th Upper Confidence of the Mean

B. Finfish Worksheet

The viability of finfish utilizing the estuarine system was evaluated using food-web exposure models available from the scientific literature (Evans and Engel, 1994; Gobas, 1993). The only COPC evaluated with these models were methylmercury and Aroclor 1268, since these are the only COPC with the potential to significantly bioaccumulate in the aquatic food-web.

Methylmercury exposure and bioaccumulation in higher trophic level finfish were evaluated using the "Lavaca Bay model" (Evans and Engel, 1994). Aroclor 1268 exposure and bioaccumulation were evaluated using the "Gobas Model" (Gobas, 1993). Both models were originally intended to "sub-model" transfer of chemicals from abiotic media (i.e., sediment and surface water) to trophic levels of the aquatic food web. Because more detailed site-specific data were available for the LCP estuary, such as concentrations of COPC in prey items, both models were modified from their original form in order to make use of measured rather than "sub-modeled" data. A brief discussion of each model is provided below. Both models are based on environmental data generated from 2000 to 2006.

Lavaca Bay Methylmercury Model

The Lavaca Bay model is described in detail in *Mercury bioaccumulation in finfish and shellfish from Lavaca Bay, Texas: Descriptive models and annotated bibliography* (Evans and Engel, 1994)[1]. The primary pathway for methylmercury exposure in the Lavaca Bay model is the transfer and bioaccumulation of chemicals through the aquatic food web. Uptake of methylmercury via ingestion of contaminated sediment and through the skin and gills is assumed to be insignificant. The uncertainties associated with this assumption are discussed in detail in the Evans and Engel report.

The original Lavaca Bay model provides estimates of tissue concentrations of methylmercury in red drum based on total mercury concentrations in sediment. For application to the LCP estuary, the original model was based on measured concentrations (dry weight) of methylmercury in mummichogs, fiddler crabs, and blue

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[1] **A spreadsheet containing the model calculations was provided to Honeywell Consultants by Dr. Tom Dillon of NOAA.**

crabs. These measured tissue concentrations were converted to wet weight using conversion factors of 25% for mummichogs and 30% for fiddler crabs and blue crabs.

Another modification applied to the original model was the incorporation of a growth term, as suggested by Evans and Engel (1994). When Evans and Engel compared modeled tissue concentrations of methylmercury from their model to actual biomonitoring data from the Lavaca Bay system, the modeled concentrations were considerably higher than the highest measured concentrations in red drum. As a result, the authors suggested the incorporation of a term to represent growth of fish in the model. The inputs and equations used in application of the Lavaca Bay model to the LCP estuary are provided on Table 1.

The Lavaca Bay model (as modified) calculates a bioaccumulation factor (BAF) that is the ratio of the uptake of methylmercury from food and its reduction via excretion and growth. This BAF is multiplied by the total methyl mercury concentration in the diet of red drum to yield a wet weight concentration of methylmercury in the fish. It should be noted that the incorporation of the previously mentioned growth term for modeled tissue concentrations of the red drum results in an approximate 10-fold reduction in the BAF (45.71 without the growth term, 4.78 with the growth term). This has a similar impact on resulting HQs.

The results (output) of the LCP model are presented in Table 1. Mean and 95UCL estimated tissue concentrations of methylmercury in higher trophic level fish feeding on mummichogs (40% of diet), fiddler crabs (30%), and blue crabs (30%) in the LCP estuary are (expressed in terms of wet wt): 0.87 mg/kg and 0.98 mg/kg, respectively, when a growth term is incorporated in the model. Without the growth term, mean and 95UCL tissue concentrations are approximately 10-fold higher.

At the Troup Creek reference location, mean and 95UCL methylmercury tissue concentrations are estimated to be 0.11 and 0.14 mg/kg (wet wt), respectively, when a growth term is included in the model.

Gobas Aroclor 1268 Model

The Gobas model is described in detail in *A model for predicting the bioaccumulation of hydrophobic organic chemicals in aquatic food-webs: Application to Lake Ontario* (Gobas, 1993). An executable file containing this model is available online at http://www.rem.sfu.ca/toxicology/models.htm. The primary pathways for chemical exposure in the model are transfer and bioaccumulation of chemical concentrations through the food web and uptake from water via the gills. Elimination of chemicals occurs via metabolism, excretion, and growth. As with the Lavaca Bay model, ingestion of contaminated sediment and uptake through the skin are assumed to be insignificant.

The original Gobas model, which was originally developed for fish in the Great Lakes ecosystem, has been modified for use with the red drum in one major way. The original Gobas model provides for estimates of tissue concentrations of chemicals in some prey of fishes (benthic invertebrates) to be based on chemical characteristics of sediment. For application in the LCP estuary, the original model was modified to employ measured concentrations (dry weight) of Aroclor 1268 in all prey of higher trophic level fish: mummichogs, fiddler crabs, and blue crabs. These measured tissue concentrations were converted to wet weight using conversion factors of 25% for mummichogs and 30% for fiddler crabs and blue crabs.

This finfish model directly reflects the original Gobas model by evaluating uptake of Aroclor 1268 from water via gills of the fish, as well as by uptake from prey. Water-related uptake is based on the percentage of total Aroclor 1268 in water (C_{WT}) that occurs in the bioavailable form of dissolved chemical (C_{WD}). C_{WD} is classically estimated (Clark et al., 1990) through use of K_{PW} (a coefficient that describes partitioning of organic chemicals between water and its suspended solids). K_{PW}, in turn, is predicated on an estimate of the percent of organic carbon that is characteristic of suspended solids ($\%OC_{SS}$). Because $\%OC_{SS}$ was not measured in the LCP estuary, three different modeling approaches were employed to estimate C_{WD}. In Approach 1 (Table 2), percent (%) organic carbon in sediment from the estuary was employed as a substitute for $\%OC_{SS}$. In Approach 2 (Table 3), use of $\%OC_{SS}$ was avoided by employing an equation (Bergen et al., 1993) for directly estimating K_{PW}. In Approach 3 (Table 4), an even more direct procedure was employed, in which C_{WD} was estimated by a simple relationship reported by Gobas (1993).

Approaches 1 and 2 (Tables 2 and 3) generate similar model output (C_{RD}) for both site and reference conditions, which serves to validate use of site-specific sediment data, in lieu of suspended solids data, for addressing organic content in Approach 1.

Approach 3 (Table 4) generates substantially higher values for C_{RD} from the LCP estuary than the other approaches. This may be because the relationship reported by Gobas (1993) – $C_{WD} = (C_{WT})\ (0.5)$ – is based on C_{WT} being derived for centrifuged water (Oliver and Nilmi, 1988), in which a substantial amount of solids would be removed. C_{WT} for the LCP model was based on un-centrifuged water, which would likely generate a correction value lower than 0.5 and a lower estimate of C_{WD}. Any bias associated with water-related uptake of Aroclor 1268 in Approach 3 is limited because of the dominant role of food-related uptake in fishes, as has been noted for organic chemicals by Clark et al. (1990) and Oliver and Nilmi (1988).

In all three approaches, C_{RD} values for reference conditions may be artifacts associated with the use of high input values for Aroclor 1268 in water and prey of red drum – i. e., use of the 1/2 detection-limit protocol in the many cases when Aroclor 1268 was not detected in these media.

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Table 1.__ Parameters and calculations employed in Lavaca Bay mercury model applied to bioaccumulation of methylmercury in higher trophic level finfish from the LCP estuary

Symbol	Description	Units	Formula/rationale	Source	LCP Estuary		Troup Creek Reference	
					Mean	95UCL	Mean	95UCL
Chemical Inputs for Model								
CF_{1D}	Conc. in mummichogs	mg/kg (dry wt)	Site-specific value	2000 - 2007 sampling (MeHg = 90% of tHg)[a]	0.23	0.29	0.08	0.10
CF_{1W}	----------	mg/kg (wet wt)	25% of CF_1	Assumption	0.058	0.073	0.020	0.025
$\%P_1$	Percent mummichogs in diet	%	40%	Assumption	0.40			
CF_{2D}	Conc. in fiddler crabs	mg/kg (dry wt)	Site-specific value	2000 - 2007 sampling (MeHg = 67% of tHg)[b]	0.17	0.18	0.027	0.032
CF_{2W}	----------	mg/kg (wet wt)	30% of CF_2	Assumption	0.051	0.054	0.0081	0.010
$\%P_2$	Percent fiddler crabs in diet	%	30%	Assumption	0.30			
CF_{3D}	Conc. in blue crabs	mg/kg (dry wt)	Site-specific value	2000 - 2007 sampling (MeKg = 100% of tHg)[c]	1.59	1.78	0.15	0.19
CF_{3W}	----------	mg/kg (wet wt)	30% of CF_3	Assumption	0.477	0.534	0.045	0.057
$\%P_3$	Percent blue crabs in diet	%	30%	Assumption	0.30			
CF_T	Total conc. in diet	mg/kg (wet wt)	$CF_T = ([CF_{1W}] [\%P_1]) + ([CF_{2W}] [\%P_2]) + ([CF_W] [\%P_3])$	Site-specific calculation	0.181	0.205	0.024	0.030
Metabolic Assumptions and Constants for Model								
BW	Weight of red drum	g	Assumption	Evans and Engel (1994)	2,000			
FIR	Food ingestion rate	g diet/g red drum/day	Assumption	Evans and Engel (1994)	0.02			
a	Food assimilation efficiency	unitless	Assumption	Evans and Engel (1994)	0.8			
K	Fecal excretion rate (MeHg)	g diet/g red drum/day	Assumption	Evans and Engel (1994)	0.00035			
G	Growth rate	g diet/g red drum/day	Assumption	Evans and Engel (1994)	0.003			
BAF_{NG}	Bioaccumulation factor w/o growth		$BAF_{NG} = (FIR) (a) / K$	Evans and Engel (1994)	45.71			
BAF_G	Bioaccumulation factor w growth		$BAF_G = (FIR) (a) / K + G$	Evans and Engel (1994)	4.78			
Output for Model								
C_{RDNG}	Conc. in red drum w/o growth	mg/kg MeHg (wet wt)	$C_{RDNG} = (BAF_{NG}) (CF_T)$	Evans and Engel (1994)	8.3	9.4	1.1	1.4
C_{RDG}	Conc. in red drum w growth	mg/kg MeHg (wet wt)	$C_{RDG} = (BAF_G) (CF_T)$	Evans and Engel (1994)	0.87	0.98	0.11	0.14

[a] Sources of body burdens (concentrations) of methylmercury in mummichogs (CF_{1D}) are derived from:

- LCP estuary mean and 95UCLs from Table 4-10a in main report.

[b] Sources of body burdens (concentrations) of methylmercury in fiddler crabs (CF_{2D}) are derived from:

- LCP estuary mean value: Table 4-8a in main report.

[c] Sources of body burdens (concentrations) of methylmercury in blue crabs (CF_{3D}) are derived from:

- LCP estuary mean value: Table 4-9a in main report.

Table 2.__ Parameters and calculations employed in Gobas PCB Model applied to bioaccumulation of Aroclor 1268 in higher trophic level finfish from the LCP estuary -- Approach 1

					LCP estuary		Troup Creek Reference	
Symbol	Description	Units	Formula/rationale	Source	Mean	95UCL	Mean	95UCL
			Chemical/Physical Inputs for Model					
CF_{1D}	Conc. in mummichogs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[a]	1,570	1,880	150	220
CF_{1W}	----------	µg/kg (wet wt)	25% of CF_1	----------	393	470	38	55
$\%P_1$	Percent mummichogs in diet	%	40%	Assumption	0.40			
CF_{2D}	Conc. in fiddler crabs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[b]	770	890	220	380
CPF_W	----------	µg/kg (wet wt)	30% of CF_2	----------	231	267	66	114
$\%P_2$	Percent fiddler crabs in diet	%	30%	Assumption	0.30			
CF_{3D}	Conc. in blue crabs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[c]	1,610	1,880	130	300
CF_{3W}	----------	µg/kg (wet wt)	30% of CF_3	----------	483	564	39	90
$\%P_3$	Percent blue crabs in diet	%	30%	Assumption	0.30			
CF_T	Total conc. in diet	µg/kg (wet wt)	$CF_T = ([CF_{1W}]\ [\%P_1]) + ([CF_{2W}]\ [\%P_2]) + ([CF_W]\ [\%P_3])$	Site-specific calculation	371	437	46.5	83.2
C_{WT}	Total conc. in water	µg/L	Site-specific value	2000 - 2007 sampling[d]	0.26	0.26	0.0018	0.0018
C_{WD}	Dissolved conc. in water	µg/L	$C_{WD} = C_{WT} / 1 + (K_{PW})\ (SS)$	Clark et al. (1990)	0.020	0.008	0.00019	0.00016
SS	Suspended solids	kg/L	Site-specific value	2000 sampling[e]	0.000039	0.00010	0.000037	0.000037
$\%OC_{SS}$	% organic carbon in SS	%	Site-specific estimate	2000 - 2007 sampling[f]	0.0484	0.0531	0.0359	0.0440
K_{PW}	SS/water partition coeff.	L/kg	$K_{PW} = (\%OC_{SS})\ (K_{OW})$	Clark et al. (1990)	300,000	330,000	230,000	280,000
K_{OW}	Octanol/water partition coeff.	L/kg	Value for Aroclor 1260	Veith et al. (1979)	6,300,000			
			Metabolic Assumptions for Model					
G_V	Gill ventilation rate	L/day	Value for rainbow trout	Gobas and Mackay (1987)	143			
E_D	Uptake efficiency -- gut diffusion	unitless	Assumption	Gobas (1993)	0.50			
E_W	Uptake efficiency -- gill diffusion	unitless	Assumption	Morrison et al. (1997)	0.75			
V_F (BW)	Wet weight of red drum	kg	Assumption	Evans and Engal (1994)	2			
V_L	Lipid content of red drum	kg	10% of BW (value for trout/perch)	Morrison et al. (1997)	0.2			
F_D (FIR)	Food ingestion rate	kg food/day	2% of BW/day	Evans and Engal (1994)	0.040			
			Rate Constants for Model					
k_1	Gill uptake rate	L/kg red drum/day	3	Gobas (1993)	53.625			
k_2	Gill elimination rate	L/day	$k_2 = 1 / ([V_L / Q_W]\ [K_{OW}]) + (V_L / Q_L)$	Gobas (1993)	0.000106			
k_D	Dietary uptake rate	kg food/kg red drum/day	$k_D = (E_D)\ (FIR) / BW$	Gobas (1993)	0.010			
k_E	Fecal excretion rate	kg faeces/kg red drum/day	$k_E = (0.25)\ (k_D)$	Gobas (1993)	0.00375			
k_M	Metabolic transformation rate	L/day	Estimation	Gobas (1993)	0			
k_G	Growth	kg	$k_G = (0.00251)\ (BW^{-0.2})$, at 25°C	Gobas (1993)	0.00219			
Q_w	Transport parameter (aqueous phase of red drum)	L/day	$Q_W = (88.3)\ (BW^{0.6})$	Gobas (1993)	133.8			
Q_L	Transport parameter (lipid phase of red drum)	L/day	~100x smaller than Q_W	Gobas (1993)	1.34			
			Output for Model					
C_{RD}	Conc. in red drum	µg/kg (wet wt)	$C_{RD} = ([k_1]\ [C_{WD}]) + ([k_D]\ [CF_T]) / k_2 + k_E + k_M + k_G$	Gobas (1993)	796	791	79	139

[a] Sources of body burdens (concentrations) of Aroclor 1268 in mummichogs (CF_{1D}) are as follows:

- LCP estuary grand mean value and 95UCL: Table 4-10a in main report.

[b] Sources of body burdens (concentrations) of Aroclor 1268 in fiddler crabs (CF_{2D}) are as follows:

- LCP estuary grand mean and 95UCL value: Table 4-8a in main report.

[c] Sources of body burdens (concentrations) of Aroclor 1268 in blue crabs (CF_{3D}) are as follows:

- LCP estuary grand mean and 95UCLvalue: Table 4-9a in main report.

[d] Sources of total concentrations of Aroclor 1268 in water (C_{WT}) are as follows:

- LCP estuary grand mean and 95UCL value: Table4-2a in main report.

[e] Sources of suspended solids (SS) content of water are as follows (CDR Environmental Specialists and GeoSyntec Consultants, 2001):

- LCP estuary mean value: mean of 49 values (outlier of 0.0076 excluded)
- LCP estuary maximum value: maximum of 49 values (outlier of 0.0076 excluded)
- Troup Creek mean and maximum value: only one value reported

[f] The values for $\%OC_{SS}$ are estimates derived from values for sediment:

- LCP estuary grand mean and 95UCL value: Table 7a in main report.

Table 3.__ Parameters and calculations employed in Gobas PCB Model applied to bioaccumulation of Aroclor 1268 in higher trophic level finfish from the LCP estuary -- Approach 2

Symbol	Description	Units	Formula/rationale	Source	LCP estuary		Troup Creek Reference	
					Mean	95UCL	Mean	95UCL
			Chemical/Physical Inputs for Model					
CF_{1D}	Conc. in mummichogs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[a]	1,570	1,880	150	220
CF_{1W}	----------	µg/kg (wet wt)	25% of CF_1	----------	393	470	38	55
$\%P_1$	Percent mummichogs in diet	%	40%	Assumption	0.40			
CF_{2D}	Conc. in fiddler crabs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[b]	770	890	220	380
CPF_W	----------	µg/kg (wet wt)	30% of CF_2	----------	231	267	66	114
$\%P_2$	Percent fiddler crabs in diet	%	30%	Assumption	0.30			
CF_{3D}	Conc. in blue crabs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[c]	1,610	1,880	130	300
CF_{3W}	----------	µg/kg (wet wt)	30% of CF_3	----------	483	564	39	90
$\%P_3$	Percent blue crabs in diet	%	30%	Assumption	0.30			
CF_T	Total conc. in diet	µg/kg (wet wt)	$CF_T = ([CF_{1W}]\ [\%P_1]) + ([CF_{2W}]\ [\%P_2]) + ([CF_W]\ [\%P_3])$	Site-specific calculation	371	437	46.5	83.2
C_{WT}	Total conc. in water	µg/L	Site-specific value	2000 - 2007 sampling[d]	0.26	0.26	0.0018	0.0018
C_{WD}	Dissolved conc. in water	µg/L	$C_{WD} = C_{WT} / 1 + (K_{PW})\ (SS)$	Clark et al. (1990)	0.011	0.005	0.00008	0.00008
SS	Suspended solids	kg/L	Site-specific value	2000 sampling[e]	0.000039	0.00010	0.000037	0.000037
K_{PW}	SS/water partition coeff.	L/kg	$\log K_{PW} = (0.688)\ (\log K_{OW}) +1.074$; antilog determined	Bergen et al. (1993)[f]	565,000			
K_{OW}	Octanol/water partition coeff.	L/kg	Value for Aroclor 1260	Veith et al. (1979)	6,300,000			
			Metabolic Assumptions for Model					
G_V	Gill ventilation rate	L/day	Value for rainbow trout	Gobas and Mackay (1987)	143			
E_D	Uptake efficiency -- gut diffusion	unitless	Assumption	Gobas (1993)	0.50			
E_W	Uptake efficiency -- gill diffusion	unitless	Assumption	Morrison et al. (1997)	0.75			
V_F (BW)	Wet weight of red drum	kg	Assumption	Evans and Engal (1994)	2			
V_L	Lipid content of red drum	kg	10% of BW (value for trout/perch)	Morrison et al. (1997)	0.2			
F_D (FIR)	Food ingestion rate	kg food/day	2% of BW/day	Evans and Engal (1994)	0.040			
			Rate Constants for Model					
k_1	Gill uptake rate	L/kg red drum/day	$k_1 = (E_W)\ (G_V) / BW$	Gobas (1993)	53.625			
k_2	Gill elimination rate	L/day	$k_2 = 1 / ([V_L / Q_W]\ [K_{OW}]) + (V_L / Q_L)$	Gobas (1993)	0.000106			
k_D	Dietary uptake rate	kg food/kg red drum/day	$k_D = (E_D)\ (FIR) / BW$	Gobas (1993)	0.010			
k_E	Fecal excretion rate	kg faeces/kg red drum/day	$k_E = (0.25)\ (k_D)$	Gobas (1993)	0.00375			
k_M	Metabolic transformation rate	L/day	Estimation	Gobas (1993)	0			
k_G	Growth	kg	$k_G = (0.00251)\ (BW^{-0.2})$, at 25°C	Gobas (1993)	0.00219			
Q_w	Transport parameter (aqueous phase of red drum)	L/day	$Q_W = (88.3)\ (BW^{0.6})$	Gobas (1993)	133.8			
Q_L	Transport parameter (lipid phase of red drum)	L/day	~100x smaller than Q_W	Gobas (1993)	1.34			
			Output for Model					
C_{RD}	Conc. in red drum	µg/kg (wet wt)	$C_{RD} = ([k_1]\ [C_{WD}]) + ([k_D]\ [CF_T]) / k_2 + k_E + k_M + k_G$	Gobas (1993)	714	763	78	138

[a] Sources of body burdens (concentrations) of Aroclor 1268 in mummichogs (CF_{1D}) are as follows:

- LCP estuary grand mean and 95UCL value: Table 4-10a in main report.

[b] Sources of body burdens (concentrations) of Aroclor 1268 in fiddler crabs (CF_{2D}) are as follows:

- LCP estuary grand mean and 95UCL value: Table 4-8a in main report.

[c] Sources of body burdens (concentrations) of Aroclor 1268 in blue crabs (CF_{3D}) are as follows:

- LCP estuary grand mean and 95UCL value: Table 4-9a in main report.

[d] Sources of total concentrations of Aroclor 1268 in water (C_{WT}) are as follows:

- LCP estuary grand mean and 95UCL value: Table 4-2a in main report.

[e] Sources of suspended solids (SS) content of water are as follows

(CDR Environmental Specialists and GeoSyntec Consultants, 2001):

- LCP estuary mean value: mean of 49 values (outlier of 0.0076 excluded)
- LCP estuary maximum value: maximum of 49 values (outlier of 0.0076 excluded)
- Troup Creek mean and maximum value: only one value reported

[f] The value for K_{PW} is based the equation derived by Bergen et al. (1993) for several PCB congeners (including CD118) evaluated in seawater of New Bedford Harbor, Massachusetts.

Table 4.__ Parameters and calculations employed in Gobas PCB Model applied to bioaccumulation of Aroclor 1268 in higher trophic level finfish from the LCP estuary -- Approach 3

					LCP estuary		Troup Creek Reference	
Symbol	Description	Units	Formula/rationale	Source	Mean	95UCL	Mean	95UCL
			Chemical/Physical Inputs for Model					
CF_{1D}	Conc. in mummichogs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[a]	1,570	1,880	150	220
CF_{1W}	----------	µg/kg (wet wt)	25% of CF_1	----------	393	470	38	55
$\%P_1$	Percent mummichogs in diet	%	40%	Assumption	0.40			
CF_{2D}	Conc. in fiddler crabs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[b]	770	890	220	380
CPF_W	----------	µg/kg (wet wt)	30% of CF_2	----------	231	267	66	114
$\%P_2$	Percent fiddler crabs in diet	%	30%	Assumption	0.30			
CF_{3D}	Conc. in blue crabs	µg/kg (dry wt)	Site-specific value	2000 - 2007 sampling[c]	1,610	1,880	130	300
CF_{3W}	----------	µg/kg (wet wt)	30% of CF_3	----------	483	564	39	90
$\%P_3$	Percent blue crabs in diet	%	30%	Assumption	0.30			
CF_T	Total conc. in diet	µg/kg (wet wt)	$CF_T = ([CF_{1W}] [\%P_1]) + ([CF_{2W}] [\%P_2]) + ([CF_W] [\%P_3])$	Site-specific calculation	371	437	46.5	83.2
C_{WT}	Total conc. in water	µg/L	Site-specific value	2000 - 2007 sampling[d]	0.26	0.26	0.0018	0.0018
C_{WD}	Dissolved conc. in water	µg/L	Assumption -- (C_{WT}) (0.5)	Gobas (1993)[e]	0.13	0.13	0.0009	0.0009
K_{OW}	Octanol/water partition coeff.	L/kg	Value for Aroclor 1260	Veith et al. (1979)	6,300,000			
			Metabolic Assumptions for Model					
G_V	Gill ventilation rate	L/day	Value for rainbow trout	Gobas and Mackay (1987)	143			
E_D	Uptake efficiency -- gut diffusion	unitless	Assumption	Gobas (1993)	0.50			
E_W	Uptake efficiency -- gill diffusion	unitless	Assumption	Morrison et al. (1997)	0.75			
V_F (BW)	Wet weight of red drum	kg	Assumption	Evans and Engal (1994)	2			
V_L	Lipid content of red drum	kg	10% of BW (value for trout/perch)	Morrison et al. (1997)	0.2			
F_D (FIR)	Food ingestion rate	kg food/day	2% of BW/day	Evans and Engal (1994)	0.040			
			Rate Constants for Model					
k_1	Gill uptake rate	L/kg red drum/day	$k_1 = (E_W) (G_V) / BW$	Gobas (1993)	53.625			
k_2	Gill elimination rate	L/day	$k_2 = 1 / ([V_L / Q_W] [K_{OW}]) + (V_L / Q_L)$	Gobas (1993)	0.000106			
k_D	Dietary uptake rate	kg food/kg red drum/day	$k_D = (E_D) (FIR) / BW$	Gobas (1993)	0.010			
k_E	Fecal excretion rate	kg faeces/kg red drum/day	$k_E = (0.25) (k_D)$	Gobas (1993)	0.00375			
k_M	Metabolic transformation rate	L/day	Estimation	Gobas (1993)	0			
k_G	Growth	kg	$k_G = (0.00251) (BW^{-0.2})$, at 25°C	Gobas (1993)	0.00219			
Q_w	Transport parameter (aqueous phase of red drum)	L/day	$Q_W = (88.3) (BW^{0.6})$	Gobas (1993)	133.8			
Q_L	Transport parameter (lipid phase of red drum)	L/day	~100x smaller than Q_W	Gobas (1993)	1.34			
			Output for Model					
C_{RD}	Conc. in red drum	µg/kg (wet wt)	$C_{RD} = ([k_1] [C_{WD}]) + ([k_D] [CF_T]) / k_2 + k_E + k_M + k_G$	Gobas (1993)	1,767	1,876	85	146

[a] Sources of body burdens (concentrations) of Aroclor 1268 in mummichogs (CF_{1D}) are as follows:
- LCP estuary grand mean and 95UCL value: Table 4-10a in main report

[b] Sources of body burdens (concentrations) of Aroclor 1268 in fiddler crabs (CF_{2D}) are as follows:
- LCP estuary grand mean and 95UCL value: Table 4-8a in main report.

[c] Sources of body burdens (concentrations) of Aroclor 1268 in blue crabs (CF_{3D}) are as follows:
- LCP estuary grand mean and 95UCL value: Table 4-9a in main report.

[d] Sources of total concentrations of Aroclor 1268 in water (C_{WT}) are as follows:
- LCP estuary grand mean and 95UCL value: Table 4-2a in main report.

[f] The values for K_{PW} are based on the relationship identified and used by Gobas (1993) for water in Lake Ontario and a K_{OW} value (log K_{OW}) of 6.6.

APPENDIX I

SPECIAL SEDIMENT STUDIES FOR ESTUARY AT LCP SITE

I.1 Apparent Effects Threshold (AET) Study
I.2 Purvis Creek and Domain 4 Study

Appendix I

SPECIAL SEDIMENT STUDIES FOR ESTUARY AT LCP SITE

Two studies designed to address specific issues are described in this appendix.

I.1 Apparent Effects Threshold (AET) Study

The first of these studies was conducted in 2006 to develop site-specific apparent effects thresholds (AETs) and sediment effect concentrations (SECs) for chemicals of potential concern (COPC) and selected metals in surface sediment of the estuary. Interpreted results of this study are presented in Section 4.5 of this document. This appendix illustrates locations of sediment sampling stations employed in the study – locations in the Main Canal (Figure 5), Eastern Creek (Figure 6), and Western Creek Complex (Figure 7) – and presents resulting chemical data in a format that facilitates an understanding of chemical characteristics along the headwater-to-mouth gradient of these water bodies (Table 1).

The highest concentrations of total mercury and Aroclor 1268 in the Main Canal are characteristic of the upper and middle stretches of the canal (down to about Station 20, located near the mouth of the Eastern Creek). However, relatively low levels of the two chemicals occurred at the extreme headwaters of the canal (Stations 48- 50). For the Eastern Creek, highest concentrations of total mercury and Aroclor 1268 also tended to occur in the upper and middle parts of the creek (down to perhaps Station 32), although relatively high levels of Aroclor 1268 occurred at more downstream locations (Stations 26, 23, and 19). In the Western Creek Complex (the most western branch), concentrations of total mercury and Aroclor 1268 were substantially lower than in the Main Canal and Eastern Creek, and a headwater-to-mouth gradient was not apparent. Concentrations of total PAHs in all three water bodies were generally less than 1 mg/kg, with higher levels occasionally present in all three bodies.

I.2 Purvis Creek and Domain 4 Study

This study was conducted in 2005 to evaluate the extent to which North Purvis Creek could be distinguished from the southern stretch of the creek in terms of concentrations of COPC in surface sediment; and, also, if the western part of Domain 4 (primarily flooded by water from the Turtle River) exhibited lower levels of COPC in surface sediment than the eastern part of the domain (primarily flooded by water from Purvis Creek).

Sediment sampling stations for North and South Purvis Creek are illustrated in, respectively, Figures 5a and 5b. Mean concentrations of all COPC were higher in North Purvis Creek (Table 2); and, in the cases of total mercury and lead, the 95% confidence interval (CI) for the two stretches of creek did not overlap. These distribution patterns for COPC may reflect a net "up-creek" transport of the chemicals in the creek.

For Domain 4, sediment sampling stations are illustrated in Figure 6. Mean concentrations of all COPC were, as expected, lower in the western domain than in the eastern domain. In the case of Aroclor 1268, the 95% CI for the two parts of the domain did not overlap.

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Table 1.__ Chemical data generated in selected areas of LCP estuary during 2006 to generate apparent effects thresholds (AETs) and sediment effect concentrations (SECs) for surface sediment[a,b]

Sampling location (From headwaters to mouth)	Chemical concentration in sediment (mg/kg, dry wt)								
	Total Mercury	Aroclor 1268	Lead	Total PAHs	Cadmium	Copper	Nickel	Silver	Zinc
MAIN CANAL									
MC50	0.37	1.5	3.9	0.229	0.032	1.29	1.26	0.016	8
MC49	0.40	1.5	4.4	0.429	0.037	1.58	1.31	0.016	9
MC48	0.20	1.0	5.8	0.104	0.036	1.76	1.85	0.015	9.9
MC47	29	54	42	0.714	0.233	28.2	20.2	0.291	106
MC46	35	280	42	0.955	0.296	20	20.2	0.22	88.5
MC45	29	140	29	0.744	0.182	15.9	12.9	0.206	71.4
MC44	6.2	55	41	0.454	0.244	18.8	21	0.188	76.9
MC43	1.2	8.1	68	16.683	0.137	11.2	12.7	0.079	58
MC42	13	18	31	0.396	0.2	20.1	15.8	0.323	93
MC41	22	9.2	32	0.420	0.201	19.4	16	0.256	95
MC40	8.9	19	33	0.371	0.21	14.3	14.1	0.246	84.8
MC39	5.3	37	31	0.517	0.219	13.1	13.1	0.199	79.6
MC38	4.3	21	29	0.435	0.184	12.7	14.5	0.169	84.3
MC37	5.3	76	31	0.769	0.228	13.9	15.3	0.16	79.3
MC36	6.7	150	40	0.849	0.28	16.2	17.7	0.134	36.3
MC35	8.3	11	30	0.457	0.199	18.8	16.7	0.245	56.3
MC34	8.0	10	30	0.405	0.193	14.8	17.1	0.218	81.3
MC33	11	12	31	0.541	0.197	18.5	15.1	0.275	79
MC32	5.8	16	34	0.657	0.202	13.6	14	0.172	90
MC31	5.6	23	29	0.633	0.218	14.6	14.6	0.233	87
MC30	40	32	24	0.394	0.168	10.1	10.2	0.125	91.4
MC29	1.5	4.8	12	0.184	0.095	5.63	6.57	0.064	77.1
MC28	12	20	28	0.630	0.193	14	13.2	0.297	74.5
MC27	9.4	34	35	0.642	0.248	17.3	17.8	0.354	66.8
MC26	7.6	68	33	0.858	0.222	13.8	15.5	0.202	71.6
MC25	6.3	18	41	0.729	0.218	13.9	14.4	0.178	80.5
MC24	22	570	34	3.764	0.255	14.8	10.7	0.229	67.6
MC23	4.7	28	28	0.501	0.206	12.4	13.6	0.179	75.3
MC22	10	110	32	0.658	0.246	14.3	15.9	0.188	75.3
MC21	3.0	18	24	0.589	0.203	11.3	11.9	0.127	71.1
MC20	18	360	38	2.238	0.266	16.4	12.5	0.215	76.4
MC19	24	33	29	0.569	0.237	20.7	13.5	0.309	78.9
MC18	4.6	30	14	0.719	0.107	5.45	5.32	0.071	31.8
MC17	8.4	14	14	0.391	0.099	5.82	7.09	0.066	35.1
MC16	3.0	19	13	0.433	0.078	5.06	6.12	0.065	32.4
MC15	3.1	26	25	0.599	0.211	10.4	12.3	0.133	59.1
MC14	9.0	39	27	0.363	0.251	12.4	11.6	0.238	70.3
MC13	13	32	41	0.648	0.156	11.6	10.8	0.183	57.4
MC12	3.6	13	29	0.525	0.246	14.6	16.4	0.274	77
MC11	28	15	30	0.612	0.224	19.1	15.7	0.277	78.3
MC10	1.3	4.1	21	0.389	0.198	12.1	13.3	0.142	85.5
MC9	2.6	11	22	0.516	0.179	10.9	12.1	0.147	75
MC8	3.0	11	23	0.859	0.2	12	12.8	0.15	78.7
MC7	3.6	21	24	0.761	0.207	11.7	12.4	0.143	80.8
MC6	0.77	1.8	25	0.343	0.21	12.8	15.1	0.146	97.1
MC5	2.1	8.3	23	0.479	0.212	12	12.2	0.141	77.2
MC4	2.8	20	22	1.010	0.168	9.29	8.64	0.105	59.2
MC3	1.7	8.2	42	0.490	0.181	10.7	11.9	0.118	73.5
MC2	2.6	15	25	0.682	0.175	10.5	10.6	0.122	67.1
MC1	3.4	20	27	0.761	0.189	10.6	10.4	0.131	71.2
Range:	**0.20-40**	**1.0-570**	**3.9-68**	**0.104-16.683**	**0.032-0.296**	**1.29-28.2**	**1.26-21**	**0.015-0.354**	**8-106**
Mean:	**9.21**	**50.95**	**28.4**	**0.982**	**0.192**	**13.01**	**12.72**	**0.176**	**69.74**
95% CI:	**6.47-11.95**	**22.54-79.36**	**25.3-31.5**	**0.320-1.644**	**0.175-0.209**	**11.54-14.48**	**11.47-13.97**	**0.153-0.199**	**63.49-75.99**

Table 1.__ Continued

Sampling location (From headwaters to mouth)	Chemical concentration in sediment (mg/kg, dry wt)								
	Total Mercury	Aroclor 1268	Lead	Total PAHs	Cadmium	Copper	Nickel	Silver	Zinc
				EASTERN CREEK					
EC50	2.5	1.7	5.7	0.126	0.054	2.38	2.85	0.027	14.5
EC49	5.6	2.9	240	38	0.16	17.3	14.8	0.095	79.5
EC48	28	26	100	1.100	0.304	18.9	17.6	0.184	75.5
EC47	4.5	4.0	25	0.728	0.17	10	11.1	0.12	51.4
EC13	11	3.7	34	0.318	0.178	11.5	10.6	0.125	51.2
EC46	0.26	0.27	16	0.060	0.114	6.01	11.5	0.066	47.1
EC12	0.044	0.0074	14	0.0065	0.141	5.64	10.2	0.046	33
EC45	0.28	0.15	13	0.037	0.103	4.71	8.6	0.054	38.7
EC11	1.5	1.9	16	0.986	0.121	5.52	8.25	0.053	30.8
EC44	13	43	27	0.351	0.183	11.6	8.74	0.262	64.6
EC10	26	120	40	0.588	0.255	16.3	13.4	0.257	81.3
EC43	2.4	9.5	9.1	0.240	0.074	3.28	3.14	0.052	22.5
EC9	13	26	43	0.626	0.182	15	16.6	0.233	90.1
EC8	61	59	39	0.648	0.22	25.3	17	0.387	96.3
EC42	11	28	27	2.534	0.164	9.92	10.4	0.137	56.1
EC7	76	150	33	0.575	0.196	20.1	14.3	0.338	86.5
EC41	17	38	27	0.608	0.187	13.8	9.35	0.299	71.7
EC6	110	420	45	1.243	0.285	19.9	18	0.463	98.7
EC5	42	380	48	3.735	0.28	21.8	16.1	0.412	92.8
EC40	140	24	37	0.538	0.239	17	13.9	0.364	71.3
EC4	6.5	19	25	0.616	0.198	11.9	11.5	0.152	79.2
EC3	19	17	28	0.473	0.183	13.1	13.5	0.193	90.5
EC39	6.8	28	27	0.359	0.184	12.2	12.2	0.158	67
EC2	74	16	23	0.566	0.143	9.66	10.3	0.164	58.6
EC38	6.2	15	21	0.474	0.136	9.16	10.1	0.1	50.5
EC37	110	44	38	0.715	0.221	16.8	14.4	0.413	73.3
EC36	4.3	39	23	0.809	0.151	9.02	10.2	0.143	56
EC35	20	30	34	0.420	0.243	17	13.3	0.357	89.9
EC1	21	90	49	0.997	0.263	19	17.7	0.154	61.1
EC34	50	11	52	0.750	0.177	13.6	11.7	0.202	63
EC33	14	120	36	0.636	0.253	15.6	14.8	0.306	85
EC32	30	330	32	0.883	0.226	14.9	13.9	0.198	72
EC31	8.7	36	26	0.638	0.177	9.84	8.97	0.141	57.8
EC30	5.1	11	30	0.483	0.176	13.3	14.9	0.14	70.9
EC29	4.1	13	25	0.546	0.188	11.3	13.8	0.106	63.9
EC28	5.3	12	27	0.305	0.162	12.1	14	0.143	62.1
EC27	3.5	14	11	0.420	0.059	3.94	4.48	0.047	22.5
EC26	17	110	36	0.878	0.244	18.1	14.3	0.224	65.8
EC25	11	44	15	0.343	0.094	5.27	5.34	0.063	24.3
EC24	2.6	15	13	0.568	0.079	4.3	4.66	0.038	20.5
EC23	13	130	36	0.910	0.265	16	15.6	0.184	64.1
EC22	4.5	17	57	5.560	0.175	12.9	12.6	0.131	60.5
EC21	3.0	16	26	0.507	0.219	12.6	14.3	0.127	83.3
EC20	6.4	11	31	0.434	0.221	14.2	14.8	0.156	75.3
EC19	4.7	110	28	1.527	0.191	11.8	11.8	0.151	53.3
EC18	4.6	20	18	1.335	0.08	4.95	5.19	0.064	26.4
EC17	0.79	15	8.7	0.380	0.052	2.69	2.5	0.03	15.1
EC16	0.77	12	28	0.774	0.163	9.41	11.1	0.092	44.9
EC15	5.0	12	34	0.670	0.184	14.9	14.2	0.185	76.7
EC14	5.6	17	31	0.555	0.238	15.9	14.4	0.225	88.9
Range:	**0.044-140**	**0.0074-420**	**5.7-240**	**0.0065-38**	**0.052-0.304**	**2.38-25.3**	**2.5-18**	**0.027-0.463**	**14.5-98.7**
Mean:	**20.65**	**54.24**	**34.1**	**1.552**	**0.179**	**12.23**	**11.74**	**0.175**	**61.52**
95% CI:	**11.80-29.50**	**28.40-80.08**	**24.6-43.6**	**0.026-3.096**	**0.161-0.197**	**10.70-13.76**	**10.60-12.88**	**0.143-0.207**	**55.02-68.02**

Table 1.__ Continued

Sampling location (From headwaters to mouth)	Chemical concentration in sediment (mg/kg, dry wt)								
	Total Mercury	Aroclor 1268	Lead	Total PAHs	Cadmium	Copper	Nickel	Silver	Zinc
				WESTERN CREEK COMPLEX					
WC1	1.2	0.62	26	6.197	0.209	15.4	13.7	0.144	77.3
WC2	1.3	0.63	24	1.509	0.208	14.4	14.8	0.155	76
WC3	1.4	0.78	27	11	0.248	16	15.8	0.158	78.8
WC4	4.8	4.1	33	0.896	0.295	14.7	13.5	0.147	70.9
WC50	16	11	34	1.324	0.32	17.7	14.1	0.239	85.7
WC5	3.8	15	38	0.659	0.336	17.3	14.8	0.178	78.5
WC49	0.20	1.0	35	1.103	0.213	13.7	11.2	0.137	69.2
WC48	5.5	4.3	36	7.813	0.302	15	12.5	0.151	70.3
WC47	0.88	0.023	35	0.449	0.169	15.4	15.6	0.135	77.9
WC46	0.089	0.0079	52	0.878	0.148	15.2	16.1	0.118	72.4
WC45	7.8	2.2	34	0.428	0.255	18.8	18.4	0.287	88.7
WC44	0.35	0.16	39	0.525	0.157	15	16.1	0.119	79
WC43	15	13	34	0.629	0.251	17.8	15.6	0.26	78.9
WC42	3.8	5.5	36	0.230	0.376	18.2	18.5	0.192	93.8
WC41	12	4.2	33	0.354	0.245	16.5	15.4	0.21	81
WC40	0.50	2.5	45	0.400	0.277	19.1	21.9	0.13	70.7
WC39	1.7	2.5	42	0.151	0.288	19.9	25.6	0.174	79.5
WC38	13	0.33	37	0.414	0.236	18.4	22.1	0.171	65.9
WC37	5.2	0.35	38	0.428	0.201	18.7	21.8	0.158	69.3
WC36	2.3	2.4	37	0.242	0.261	17.5	23.2	0.175	83.2
WC35	13	4.9	32	0.586	0.259	16.6	17.8	0.192	68.8
WC34	12	0.76	40	0.413	0.294	18.8	17.9	0.179	61.2
WC33	1.8	1.7	27	0.162	0.208	15.6	18.4	0.182	88.3
WC32	1.1	1.0	25	0.183	0.17	15.4	18.2	0.146	77.9
WC31	2.6	2.4	34	0.253	0.3	17.8	19.6	0.22	72.1
WC30	4.0	4.3	24	0.242	0.196	12.2	12.5	0.195	77.6
WC29	1.5	2.0	28	0.138	0.213	15.3	16.6	0.17	79.7
WC28	2.1	3.5	29	0.289	0.252	14.5	15.7	0.223	79.7
WC27	1.6	2.1	30	0.207	0.201	15.2	17.2	0.172	83.8
WC26	2.0	1.7	29	0.515	0.2	13.4	15.2	0.191	71
WC25	1.8	3.1	26	0.318	0.22	13.1	13.4	0.192	74.7
WC24	3.3	4.5	27	0.404	0.264	13.7	12.7	0.272	70.9
WC23	2.0	3.8	32	0.424	0.266	14.4	16.2	0.17	75.6
WC22	1.9	6.9	31	0.400	0.251	13.5	15.1	0.141	69.1
WC21	1.7	4.8	47	0.340	0.359	18.4	19.9	0.16	63.4
WC20	1.5	2.4	30	0.268	0.242	13.1	14	0.181	67
WC19	1.5	1.8	27	0.287	0.255	13.2	13.3	0.28	73.1
WC18	1.1	2.1	30	0.294	0.239	15.5	18.4	0.158	77.1
WC17	6.7	25	52	0.314	0.363	22.4	25.1	0.142	74.2
WC16	2.8	20	40	0.396	0.279	16.6	19.9	0.17	76.4
WC15	1.8	2.5	36	0.317	0.262	16.8	20.3	0.294	87.9
WC14	1.5	5.2	25	0.310	0.153	11.8	14	0.176	59
WC13	0.92	2.2	31	0.246	0.238	15.2	18.9	0.155	79.6
WC12	1.6	2.4	28	0.360	0.229	13.9	16.5	0.295	77.3
WC11	0.52	0.75	25	0.276	0.209	13.1	16	0.155	84.6
WC10	1.2	1.4	24	0.272	0.211	11.9	13.3	0.141	72.1
WC9	1.3	1.7	26	0.318	0.223	12.9	15.1	0.164	85.3
WC8	1.0	7.0	34	0.360	0.362	14.5	15.2	0.142	80.5
WC6	2.1	1.9	27	0.323	0.229	13.9	16.4	0.237	81.6
WC7	0.95	1.8	27	0.365	0.195	13.7	16.3	0.157	82.1
Range:	**0.089-16**	**0.0079-25**	**24-52**	**0.138-11**	**0.148-0.376**	**11.8-22.4**	**11.2-25.6**	**0.118-0.295**	**59-93.8**
Mean:	**3.51**	**3.92**	**32.7**	**0.912**	**0.247**	**15.62**	**16.80**	**0.182**	**76.37**
95% CI:	**2.35-4.57**	**2.52-5.32**	**30.8-34.6**	**0.338-1.486**	**0.231-0.263**	**14.97-16.27**	**15.88-17.72**	**0.169-0.195**	**74.31-78.43**

[a] Selected areas of the LCP estuary are the Main Canal (MC), Eastern Creek (EC), and Western Creek Complex (WC). Surface sediment (0 - 15 cm in depth) from these areas was collected during the period of October 22 - 25, 2006.

[b] Non-detected concentrations of COPC (primarily PAHs) were assigned a value of 1/2 of detection limit.

- Yellow shaded cells represent values that exceed the Threshold Effect Concentrations (TEC) for each COPC (Lead: 41 mg/kg; Total PAHs: 0.8 mg/kg; Cadmium: 0.68 mg/kg; Copper: 18.7 mg/kg; Nickel: 15.9 mg/kg; Silver: 0.73 mg/kg; Zinc: 124 mg/kg; Mercury: 1.4 mg/kg; Aroclor-1268: 3.2 mg/kg) From Table 4-3b and MacDonald (2006).
- Red shaded cells represent values that exceed the Probable Effect Concentrations (PEC) for each COPC (Lead: 60 mg/kg; Total PAHs: 1.5 mg/kg; Cadmium: 4.21 mg/kg; Copper: 108 mg/kg; Nickel: 42.8 mg/kg; Zinc: 271 mg/kg; Mercury: 3.2 mg/kg; Aroclor-1268 12.8 mg/kg From Table 4-3b and MacDonald (2006).

Table 2.__Physical and chemical data for surface sediment in selected areas of LCP estuary during 2005 (all measurements in dry weight)[a,b]

Sampling location	Silt and clay (%)	Total organic carbon (%)	Total mercury (mg/kg)	Aroclor 1268 (mg/kg)	Lead (mg/kg)	Total PAHs (mg/kg)
			PURVIS CREEK			
North Purvis Creek						
1	84.3	3.6	0.12	0.0005	21	0.08
2	11.4	0.50	0.93	4.8	6.2	0.20
3	98.7	5.5	3	20	35	1.31
4	63.5	4.0	1.3	3.0	20	1.00
5	97.2	4.7	2.6	5.2	28	1.22
6	95.5	5.2	2.4	16	31	1.01
7	54.4	2.7	0.64	0.83	20	0.48
8	69.3	0.32	0.11	0.012	18	0.01
9	9.9	0.48	0.98	3.2	7.9	0.15
10	6.8	0.27	0.30	0.83	3.4	0.10
11	96.4	5.4	2.9	28	34	1.29
12	12.2	2.3	0.54	1.4	4.9	0.34
13	98.5	5.1	4.2	3.2	34	0.93
14	97.6	2.8	2.0	4.2	32	0.94
15	92.9	3.8	2.5	4.1	31	0.80
16	75.1	3.1	2.2	4.3	28	1.48
17	93.7	4.4	2.3	3.7	32	0.99
18	92.1	2.5	4.6	9.8	31	0.88
19	92.1	5.1	2.2	2.6	34	1.59
20	4.0	0.090	0.19	0.15	3.2	0.08
21	1.7	0.096	0.13	0.095	2.0	0.09
22	66.2	3.3	6.8	3.8	34	1.67
23	36.2	2.2	1.4	2.8	17	0.73
24	4.3	0.64	1.8	0.15	3.9	0.23
25	8.3	0.40	2.8	0.14	6.4	0.33
Range:	1.7 - 98.7	0.090 - 5.5	0.11 - 6.8	0.0005 - 28	2.0 - 35	0.01 - 1.67
Mean:	58.49	2.74	1.96	4.89	20.7	0.716
95% CI:	42.41-74.57	1.95-3.53	1.30-2.62	2.08-7.70	15.6-25.8	0.496 - 0.936
South Purvis Creek						
1	11.0	0.46	0.020	0.0005	3.6	0.01
2	40.0	1.9	1.9	13	16	0.60
3	56.3	2.5	0.043	0.028	12	0.04
4	81.0	2.5	2.6	18	29	1.09
5	97.9	4.6	0.10	0.17	17	7.21
6	15.5	0.57	3.4	9.2	9.8	0.97
7	11.6	0.73	0.0071	0.0005	3.2	0.02
8	88.8	5.3	0.79	2.1	22	1.58
9	33.0	2.2	1.1	9.0	11	1.49
10	54.2	3.8	1.9	13	21	0.88
11	79.3	3.5	1.1	4.8	18	1.26
12	49.4	2.9	1.3	9.9	18	0.97
13	13.5	0.61	0.31	3.0	5.4	0.22
14	16.7	0.37	0.013	0.0005	3.5	0.02
15	23.8	0.77	0.078	0.17	5.5	0.07
16	18.5	0.51	0.68	5.0	4.6	0.31
17	11.5	0.33	0.32	2.5	3.6	0.21
18	18.5	0.46	0.15	0.41	26	3.25
19	95.0	0.60	0.66	2.2	24	0.91
20	16.5	1.0	0.27	1.3	6.5	0.41
21	14.3	0.42	0.17	0.64	4.7	0.22
22	28.1	0.82	0.015	0.0005	6.1	0.02
23	9.0	0.24	0.14	0.51	3.2	0.14
24	8.9	3.8	0.24	1.7	3.4	0.31
25	95.7	1.6	0.39	1.0	24	1.05
Range:	8.9 - 97.9	0.24 - 5.3	0.0017 - 3.4	0.0005 - 18	3.2 - 29	0.01 - 7.21
Mean:	39.52	1.70	0.71	3.91	12.0	0.930
95% CI:	26.34-52.70	1.07-2.33	0.34-1.08	1.81-6.01	8.5-15.5	0.311 - 1.549
GRAND MEAN: (both parts of creek)	49.00	2.22	1.34	4.40	16.4	0.823

Table 2.__ Continued

Sampling station	Silt and clay (%)	Total organic carbon (%)	Total mercury (mg/kg)	Aroclor 1268 (mg/kg)	Lead (mg/kg)	Total PAHs (mg/kg)
DOMAIN 4						
Eastern domain (inundated by Purvis Creek)						
32	97.7	5.1	2.6	3.9	29	0.93
33	85.5	3.3	3.3	2.4	17	0.30
34	97.7	3.9	1.0	2.1	26	0.45
35	91.5	6.6	2.1	2.4	25	0.78
41	89.4	9.4	1.3	1.7	27	0.44
42	82.0	9.6	1.8	2.8	29	0.41
45	91.9	4.6	1.2	3.3	32	1.27
46	87.2	13	0.32	0.61	26	0.59
47	97.1	3.2	0.57	1.1	26	0.49
48	87.0	5.6	4.6	2.6	35	1.19
49	97.4	7.8	0.77	4.0	53	0.94
50	73.5	7.4	1.8	2.4	28	0.36
Range:	73.5 - 97.7	3.2 - 13	0.32 - 4.6	0.61 - 4.0	17 - 53	0.30 - 1.27
Mean:	89.83	6.62	1.78	2.44	29.4	0.679
95% CI:	85.13-94.53	4.74-8.50	0.99-2.57	1.80-3.08	23.9-34.9	0.467 - 0.891
Western domain (inundated by Turtle River)						
26	96.9	7.9	0.77	0.90	27	0.76
27	94.8	7.7	1.8	2.2	28	0.83
28	89.9	8.1	0.92	1.1	27	0.75
29	89.0	6.6	0.98	1.6	26	1.57
30	76.6	7.9	1.2	1.2	26	0.66
31	92.7	9.5	0.63	0.86	27	0.48
36	96.6	8.0	0.82	0.92	27	0.38
37	75.9	6.3	0.65	0.71	27	0.37
38	93.2	13	0.51	0.74	26	0.88
39	90.2	8.8	0.44	0.34	24	0.43
40	85.5	6.2	0.51	0.66	27	0.56
43	78.2	8.5	0.88	0.80	26	0.39
44	95.3	4.8	1.0	0.77	27	0.64
Range:	75.9 - 96.9	4.8 - 13	0.44 - 1.8	0.34 - 2.2	24 - 28	0.37 - 1.57
Mean:	88.83	7.95	0.85	0.98	26.5	0.669
95% CI:	84.28-93.38	6.76-9.14	0.63-1.07	0.69-1.27	25.9-27.1	0.473 - 0.865
GRAND MEAN: (both parts of domain)	89.33	7.28	1.32	1.71	28	0.674

[a] Surface sediment (0 - 15 cm in depth) in each evaluated area was collected during the period of October 20 - 24, 2005.

[b] Non-detected concentrations of COPC (primarily PAHs) were assigned a value of 1/2 of detection limit.

- Yellow shaded cells represent values that exceed the Threshold Effect Concentrations (TEL) for each COPC (Lead: 41 mg/kg; Total PAHs: 0.8 mg/kg; Mercury 1.4; Aroclor 1268: 3.2 mg/kg)

- Red shaded cells represent values that exceed the Probable Effect Concentrations (PEL) for each COPC (Lead: 60 mg/kg; Total PAHs: 1.5 mg/kg; Mercury: 3.2 mg/kg; and Aroclor: 12 mg/kg).

From Table 4-3b.

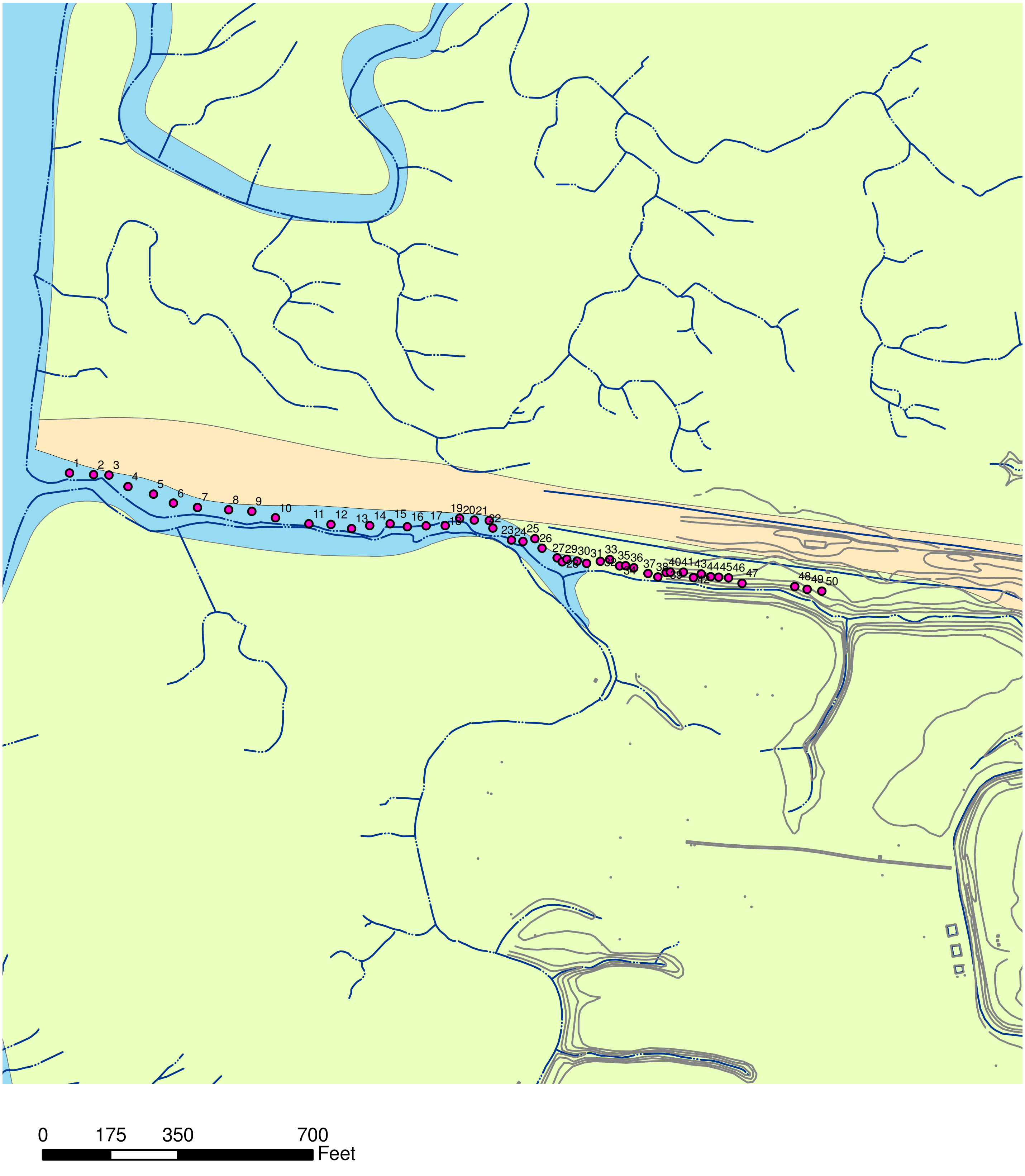

Figure 1._ Locations of sampling stations in Main Canal employed to derive apparent effects thresholds (AETs) for chemicals of potential concern (COPC) in surface sediment of estuary at LCP Site

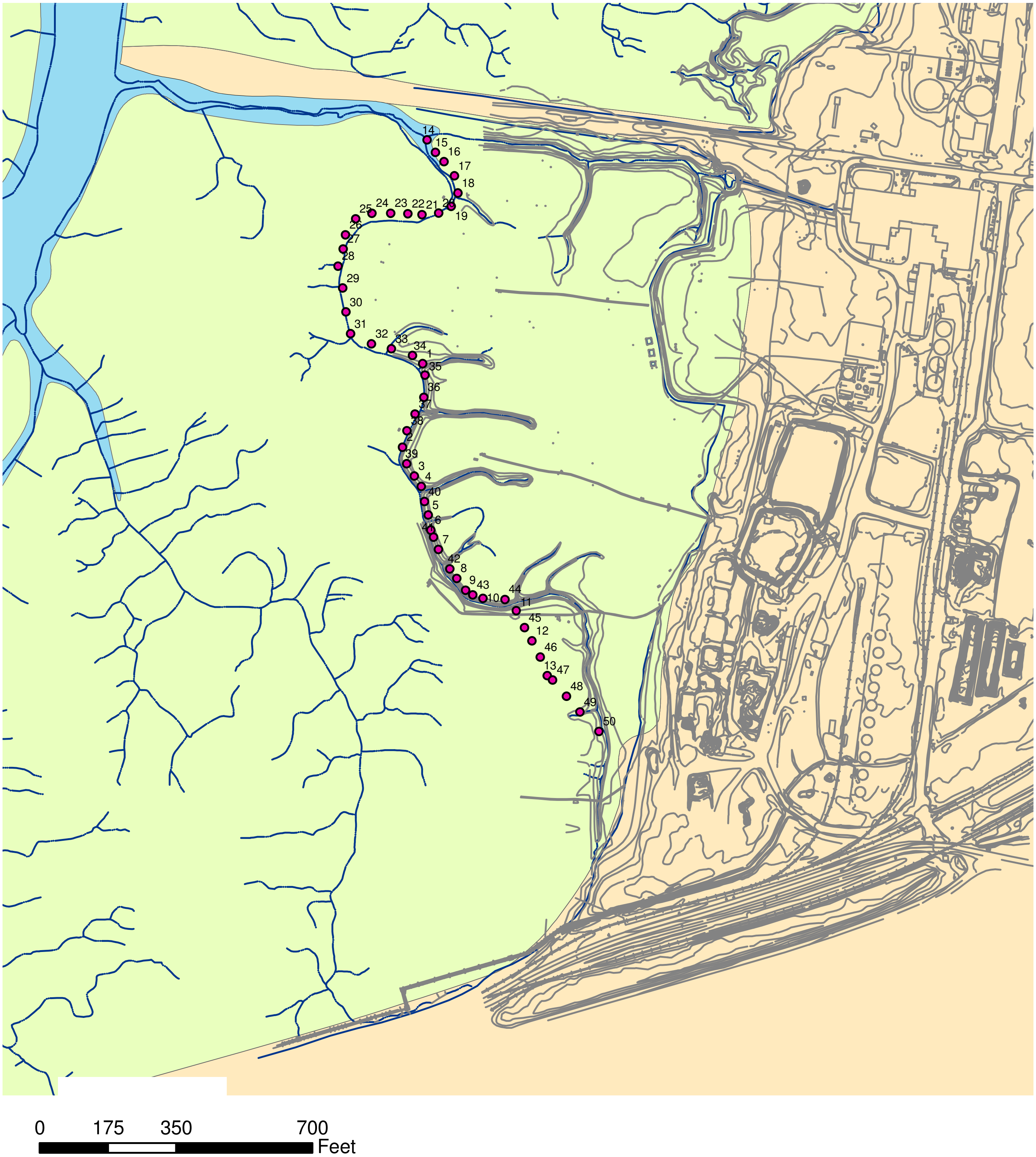

Figure 2._ Locations of sampling stations in Eastern Creek employed to derive apparent effects thresholds (AETs) for chemicals of potential concern (COPC) in surface sediment of estuary at LCP Site

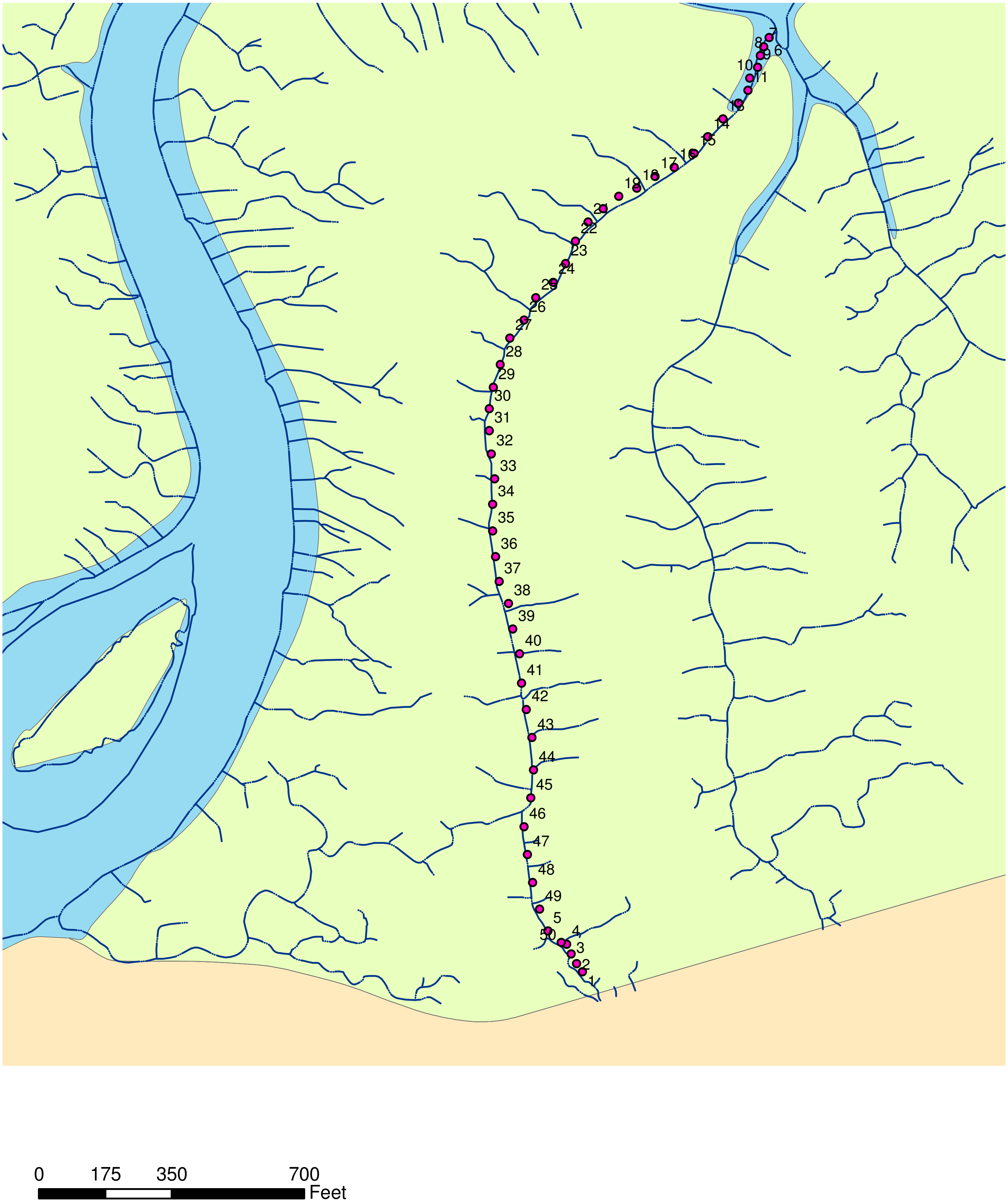

Figure 3_ Locations of sampling stations in Western Creek Complex employed to derive apparent effects thresholds (AETs) for chemicals of potential concern (COPC) in surface sediment of estuary at LCP Site

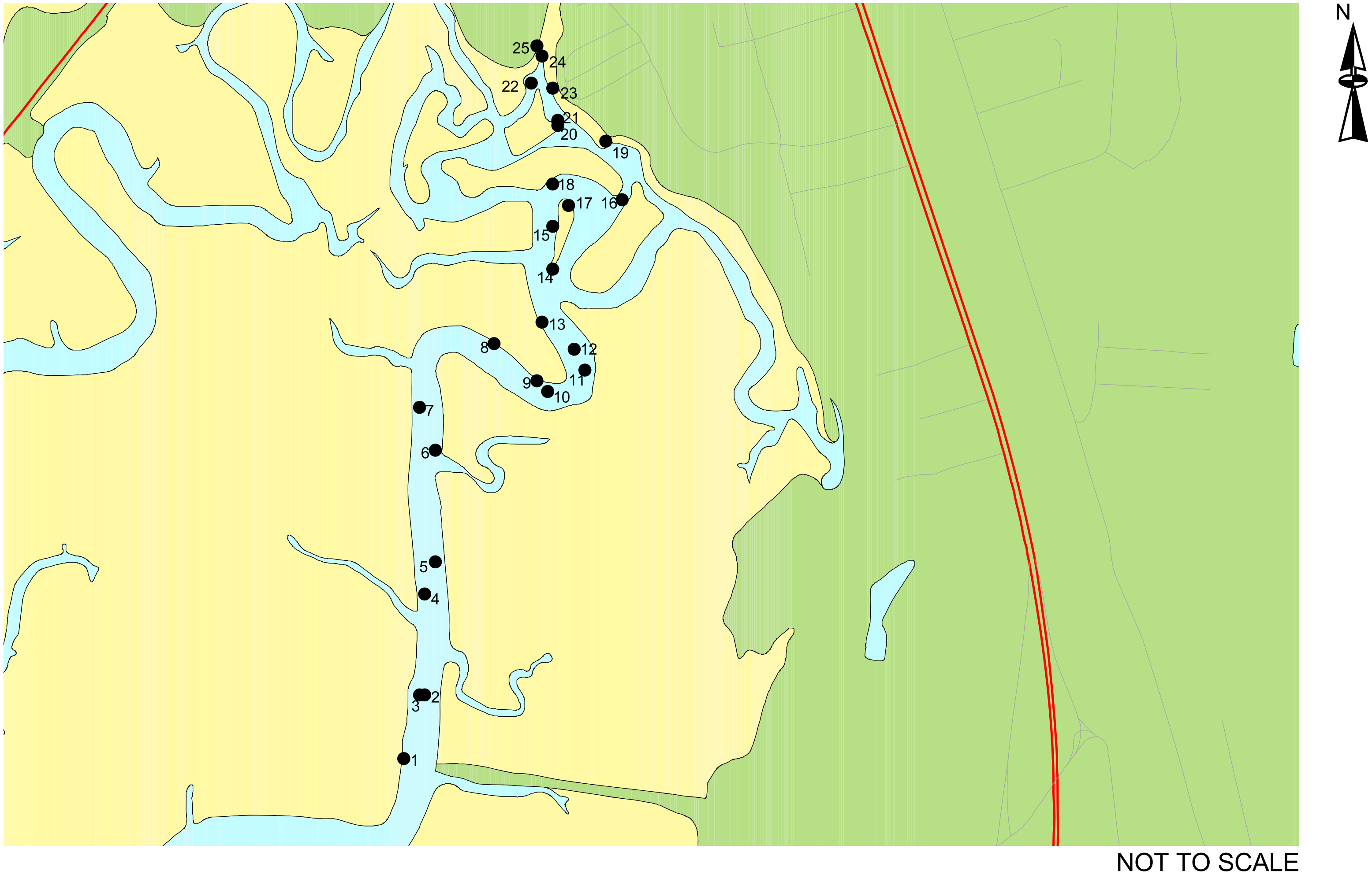

Figure 4 - **Locations of sampling stations in special statistically based study of surface sediment of Upper Purvis Creek at LCP Site**

Figure 5 – Locations of sampling stations in special statistically based study of surface sediment of Lower Purvis Creek at LCP Site

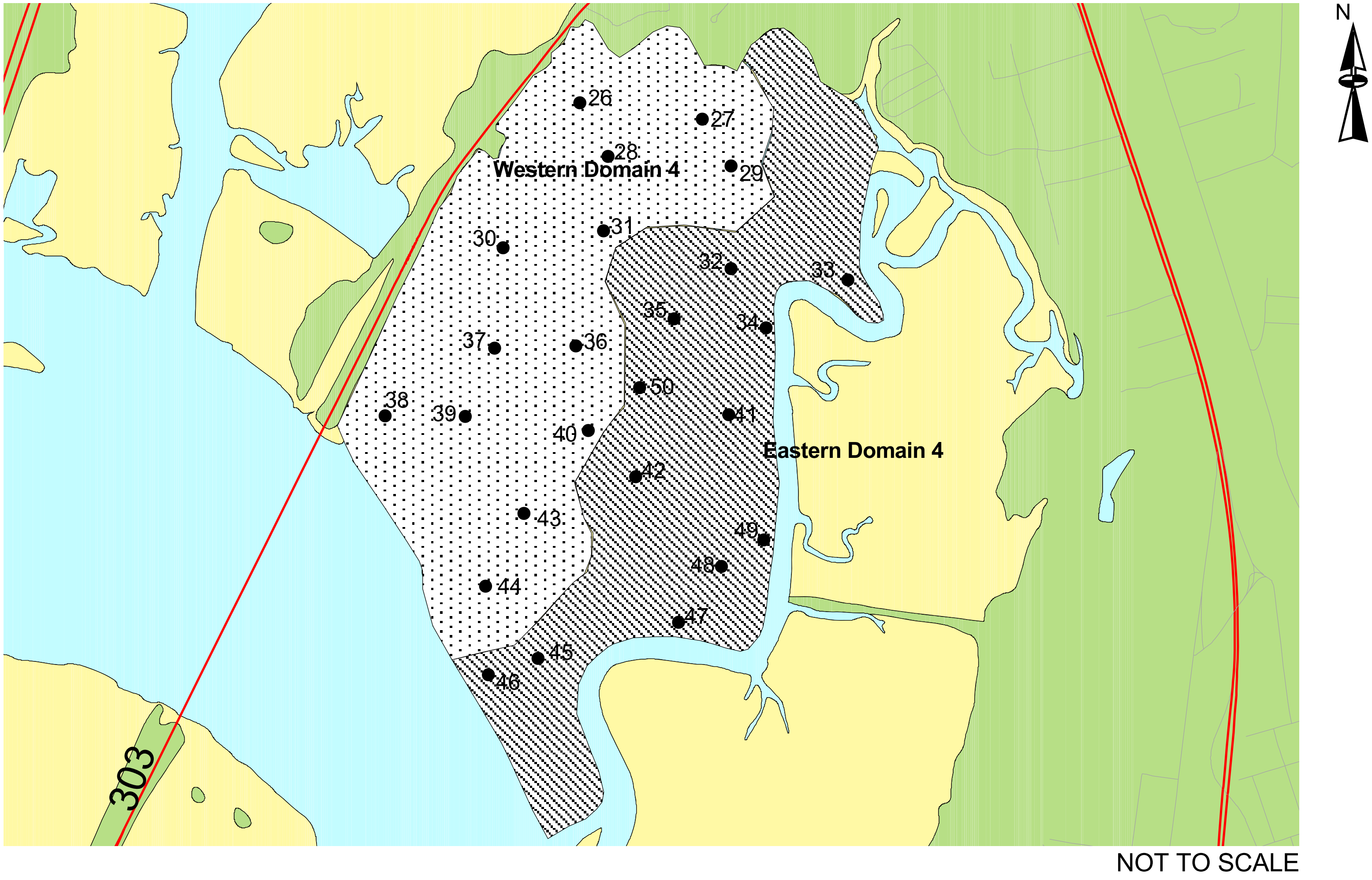

Figure 6._ Locations of sampling stations in special statistically based study of surface sediment of eastern and western Domain 4 at LCP Site

APPENDIX J

INDEPENDENT (OTHER) ECOLOGICAL INVESTIGATIONS OF ESTUARY AT LCP SITE

J.1 Reports
J.2 Scientific Papers

Appendix J

Independent (other) Ecological Investigations of Estuary at LCP Chemicals Superfund Site

Many of the following reports and scientific papers address ecological conditions in the estuary at the LCP Chemical Superfund Site (Site) before remediation occurred in the Marsh Grid and parts of the Main Canal and Eastern Creek during 1998 and 1999. Consequently, these early studies typically address ecological exposure to higher concentrations of chemicals of potential concern (COPC) than characterized under the present baseline.

J.1 Reports

The first three of these reports were prepared by the U. S. Environmental Protection Agency (EPA) and address environmental conditions and ecological exposure at the Site during 1995 (Sprenger *et al.*, 1997). The last report (PTI and CDR Environmental Specialists, 1998) addresses site conditions in 1996.

J.1.1 Acute Sediment Toxicity

Acute toxicity tests (10-day tests) were conducted with brown shrimp (*Penaeus vannamei*), amphipods (*Leptocheirus plumulosus*), and Japanese medaka (*Oryzias latipes*) embryos exposed to sediment collected during May and July 1995 at four locations near the Main Canal and Eastern Creek of the LCP Site. Maximum reported concentrations of mercury, Aroclor 1268, and lead in sediment were 230, 150, and 75 milligrams per kilogram (mg/kg) (dry weight [dw]), respectively. Tests with control and reference sediments were also performed.

Results of the brown shrimp test revealed no statistically significant differences ($P < 0.05$) in survival of shrimp exposed to test sediments (including control and reference sediments). Mean survival of shrimp exposed to sediment from the Site ranged from 97 to 100 percent, as contrasted to control and reference survival of 97 and 94 percent, respectively. In addition, no behavioral differences were observed for shrimp exposed to any of the test sediments.

Results of the amphipod test also indicated the absence of statistically significant differences ($P < 0.05$) in survival and the absence of behavioral differences in organisms exposed to test sediments. Mean survival of amphipods exposed to sediment from the Site ranged from 63 to 92 percent, as contrasted to control and reference survival of 90 and 78 percent, respectively.

The Japanese medaka embryo test documented slightly lower survival (89 to 90 percent) in organisms exposed to three of four sediments from the Site, as compared to 100 percent survival for the other site sediment, control sediment, and reference sediment. Hatching of embryos was delayed in all test sediments except the control. In addition, embryonic lesions occurred at a higher frequency in site sediments (2 to 8 lesions) vs. reference sediment (1 lesion) and control sediment (0 lesions). The authors (Sprenger *et al.*, 1997) noted that the observed lesions are "consistent" with lesions known to be associated with dioxins, furans, polychlorinated biphenyls (PCBs), and, possibly, mercury.

J.1.2 Chemical Body Burdens and Histopathology of Diamondback Terrapins

Eight mature diamondback terrapins (*M. terrapin*) were collected in the marsh at the Site during May and July 1995, when females were actively nesting. Food items found in the guts of the terrapins consisted of fiddler crabs and marsh periwinkles. Although body burdens (concentrations) of mercury and Aroclor 1268 were evaluated in the carcasses, brains, livers, eggs, and hatchlings of the terrapins, emphasis was directed at the eggs and hatchlings of three female terrapins.

These three female terrapins were characterized by the following mean concentrations of mercury and Aroclor 1268 in their eggs (expressed as dw):

- Female 1 (BD1): 0.87 mg/kg mercury and 29.7 mg/kg Aroclor 1268;
- Female 2 (DD4): 2.2 mg/kg mercury and 28.6 mg/kg Aroclor 1268; and
- Female 3 (DD5): 4.6 mg/kg mercury and 480 mg/kg Aroclor 1268.

Although eggs from Female 2 did not hatch, eggs from the other females – which contained higher concentrations of mercury (Female 3) and Aroclor 1268 (Females 1 and 3) – did hatch. In this same study, histopathological examinations of terrapins did not indicate any degeneration or abnormality known to be associated with COPC.

J.1.3 Chemical Body Burdens and Histopathology of Clapper Rails

Seven clapper rails (*R. longirostris*) averaging 276.6 grams (g) in wet weight (ww) were collected from the southern part of the Site during July 1995. Although body burdens (concentrations) of mercury and Aroclor 1268 were evaluated in the carcasses, livers, breast muscle, and feathers of the birds, only mercury in livers was associated with a level reported to be harmful to birds.

The mean mercury concentration in livers of the seven birds was 3.84 mg/kg (ww). (The mean concentration of Aroclor 1268 was 25.2 mg/kg [dw]). This body burden of mercury was reported to be orders-of-magnitude lower than liver concentrations referenced in the scientific literature for mortality of red-winged blackbirds (126.5 mg/kg) and grackles (54.5 mg/kg). However, in the case of white-tailed eagles, mortality was cited in the scientific literature at mercury thresholds in livers that ranged from 4.6 to 91 mg/kg. (All mercury levels in livers of birds are expressed in terms of wet weight.)

In this same study, histopathological examinations did not indicate specific toxicity or specific uniform degeneration of tissues of clapper rails. In particular, myelin sheath and axonal degeneration, characteristic of mercury toxicity, were not observed except in one case, which was reported to be a possible artifact. Also, liver necrosis and fatty change, typical of PCB toxicity, were not noted.

J.1.4 Wading Bird Survey

PTI and CDR Environmental Specialists (1998) conducted a wading bird study (consisting of 40 aerial flights) at the Site during the period of June through mid-December 1996. A parallel study was also conducted at a reference site (Hawkins Creek, located west of Cumberland Island in Camden County, Georgia).

Six species of wading birds were observed at both sites. Great egrets (*Casmerodius albus*), snowy egrets (*Egretta thula*), and wood storks were most commonly observed. Great blue herons (*Ardea herodia*) were consistently present, but in low numbers.

White ibis (*Eudocimous albus*) and little blue herons (*Egretta caerulea*) were occasionally observed in high numbers, but their presence during surveys was infrequent.

The three dominant wading bird species (great egrets, snowy egrets, and wood storks), and all six species combined, were present in significantly higher numbers during low tides than high tides at both sites. The birds used tidal creeks almost exclusively, with few observations recorded in the vegetated marsh. Wood storks were typically found in the smaller intertidal creeks, the confluence of those creeks with larger-order creeks, and mud flat openings at the origins of first-order creeks.

Most wading birds were observed at the extreme northern boundary of the Site (including tributaries of the Turtle River), far distant from the areas of greatest concentrations of COPC.

J.2 Scientific Papers

The scientific papers reviewed in this document pertain to the toxicological properties of Aroclor 1268, a generally uncommon PCB that is associated with the LCP Facility, and the toxicity of chemicals present at the Site (including COPC) to various types of aquatic biota.

J.2.1 General Toxicological Properties of Aroclor 1268

The dominant PCB at the Site is Aroclor 1268, whose toxicological properties have not been as extensively investigated as other Aroclors (in particular, Aroclor 1254). Aroclor 1268 is a highly chlorinated (68 percent chlorine), superhydrophobic PCB that is extremely stable and slow to degrade. Aroclor 1268 is one of only two Aroclors (the other being Aroclor 1270) to exist in its unaltered form as a solid, as contrasted to a viscous liquid (Aroclor 1254), mobile oil (Aroclors 1221, 1232, 1242, and 1248), or sticky resin (Aroclors 1260 and 1262). A general conclusion reached in the scientific literature is that ecological risk posed by mid-weight chlorinated Aroclors (1242, 1248, and 1254) is greater than the risk associated with extremely low- or high-weight chlorinated Aroclors (1221 and 1268).

The following embedded table (EPA, Region 4; 2008) reviews dioxin-like toxicity of Aroclor 1268 as compared to Aroclor 1254, an Aroclor on which PCB toxicity reference values (TRVs) presented in this document for fishes and mammals are based:

Relative Potency (REP) of Aroclor 1268 vs. Aroclor 1254
for Fishes, Birds, and Mammals Based on Dioxin-Like Total Toxic Equivalents (TEQs)
(EPA – Region 4, 2008; from Burkhard and Lukasewycz, 2008)

Aroclor 1254			***Aroclor 1268***			***Relative Potency (REP) of Aroclor 1268 vs. Aroclor 1254***		
Fishes	Birds	Mammals	Fishes	Birds	Mammals	Fishes	Birds	Mammals
4.18E-07	2.00E-05	7.87E-06	3.14E-07	2.5E-06	4.89E-07	0.75	0.125	0.06

The following table (from Villeneuve *et al*., 2001) presents results of *in vitro* bioassays conducted with Aroclors 1254 and 1268 in comparison to the dioxin 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD).

Relative Potency (REP) of Aroclor 1268 vs. Aroclor 1254 for Fishes and Mammals Based on Comparison to 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD) in *In Vitro* Bioassays
(from Villeneuve *et al*., 2001)

In Vitro Bioassay	***Aroclor 1254***	***Aroclor 1268***	***Relative Potency (REP) of Aroclor 1268 vs. Aroclor 1254***
Fishes			
Desert topminnow PLHC-1 hematoma cells	$<1.8 \times 10^{-4}$	$<5.3 \times 10^{-6}$	~0.029
Mammals			
Rat H4IIE-EROD hematoma cells	$<2.8 \times 10^{-5}$	$<8.3 \times 10^{-7}$	~0.030
Rat H4IIE-luc hematoma cells	$<4.6 \times 10^{-5}$	$<1.4 \times 10^{-6}$	~0.030
Rat H4IIE-wt hematoma cells	$<3.8 \times 10^{-5}$	$<1.1 \times 10^{-6}$	~0.029

Villeneuve *et al*. (2001) reported that the efficacy (magnitude of response) of the two Aroclors was insufficient to permit quantitative REP estimates. However, qualitative estimates of REP of the two Aroclors for mammals appear similar to those generated by

Burkhard and Lukasewycz (2008). For fishes the REP suggested by Villeneuve *et al*. (2001) for Aroclor 1268 vs. Aroclor 1254 is about 5 percent of the value derived by Burkhard and Lukasewycz (2008).

The REP factors referenced above indicate that Aroclor 1268 is substantially less toxic to biota than Aroclor 1254. However, dioxin-like toxicity is only a measure of the extent to which dioxin-like congeners (non-ortho and mono-ortho coplanar PCBs) bind with and disrupt the aryl hydrocarbon (Ah) receptor in cells of organisms, resulting in toxicological responses that include dermal toxicity, immunotoxicity, carcinogenicity, and adverse effects on endocrine, development, and reproduction functions.

Modes of toxicity other than that affecting the Ah receptor include effects on calcium (Ca^{2+}) homeostasis and subsequent neurotoxic effects caused by congeners such as di-*ortho* non-coplanar PCBs, which have the potential to be evaluated by a Neurotoxic Equivalent (NEQ) scheme being developed by Simon *et al.* (2007). These authors noted that the congeners present in Aroclor 1268, in addition to possessing a low Ah receptor binding affinity, have a limited ability to interfere with Ca^{2+}– dependent intracellular signaling pathways. The authors also stated that reduced PCB toxicity to fishes, birds, and mammals has been observed at the extremes of mean mixtures of chlorination (i.e., lowly and highly chlorinated Aroclors). They specifically concluded that Aroclor 1268 is approximately 22x less toxic than Aroclor 1254 in terms of NEQs.

Several uncertainties characterize the degree to which Aroclor 1268 is less toxic than Aroclor 1254 to biota. Chlorinated naphthalenes have been identified in PCBs (Ruzo *et al*., 1976) and can affect the Ah receptor. However, the World Health Organization (WHO) has not established TEQ factors for these chemicals. Also, the relative potency of the two Aroclors after weathering in the environment is uncertain. In particular, the octa-, nona- and deca-PCB congeners in Aroclor 1268 are especially resistant to weathering. Some of these congeners, in particular di-*ortho* congeners, have relatively little affinity for the Ah receptor, but may have non-dioxin-like toxicity (Sajwan *et al.* 2008).

J.2.2 Toxicity Studies of Site Chemicals to Aquatic Biota Prior to Remediation of Parts of the Estuary

The following studies were conducted before remediation of parts of the estuary during 1998 and 1999. Consequently, results of these studies could be considered to represent "worst case" environmental conditions in the estuary that no longer characterize the present baseline for the estuary.

A. Effects of Mercury and PCBs on Lower-Trophic-Level Biota

This paper (Wall *et al.*, 2001) addressed the health of cordgrass (*Spartina alterniflora*), microbes (primarily fungal standing crop), and grass shrimp (*Palaemonetes pugio*) sampled in the LCP estuary during June 1997. Sediment, cord grass, and microbes were collected along two transects reflecting low and high marsh elevations, as well as low and high concentrations of chemicals. Sediment was analyzed for total mercury, methylmercury, and PCBs. Primary production of cord grass was assessed by a variety of methods including measurement of peroxidase (POD) activity, and fungal biomass was determined by ergosterol analysis. Grass shrimp were collected at three stations along a tidal creek at the Site and evaluated for length, female weight, brood size (number of eggs), brood mass, individual egg mass, and mean egg area. In addition to samples of sediment and biota collected from the site, samples were obtained from a reference location at Cross River (CR).

Results of this study caused the authors to conclude that "*despite high levels of contamination at the LCP Site [the] results provided only suggestive evidence for impacts on organisms at lower trophic levels*." The authors additionally reported that "*despite high contaminant levels, [there were] few biological differences between the LCP and CR Sites, with the exception of a possible alteration in [grass shrimp] reproduction*." The authors suggested that only "subtle" indications of toxicity were observed because of limited bioavailability of pollutants in sediment (due to low redox levels and high levels of sulfides and organic carbon).

The authors' reference to possible alteration in reproduction of grass shrimp is based on results of six measurements reported for shrimp, which are presented in the following embedded table:

The importance of fungi to the health of estuaries and their good health in the LCP estuary were also addressed by Newall *et al.* (2000), who noted the value of ascomycetous fungi in the decomposition of shoots of smooth cordgrass (*S. alterniflora*), which subsequently are the base of important estuarine food webs. These fungi were reported as appearing as resistant to potentially toxic pollutants at the Site as the cordgrass itself. The authors speculated that unless fungal and plant resistance mechanisms have the potential to degrade any assimilated toxins, the toxins may have the potential to be transferred into estuarine food webs.

Measurement Endpoints for Grass Shrimp in LCP Estuary and Reference Location (Wall *et al.*, 2001)

Grass Shrimp Measurement	***LCP Estuary***	***Reference (CR) Location***	***Statistical Significance (P Value)***
	Sediment concentration (mg/kg, dw; mean and standard deviation) -- Hg:18.4 ± 21.9 sd ; PCBs: 46.0 ± 52.7	Sediment concentration (mg/kg, dw; mean and standard deviation) -- (Hg:0.49 ± 0.08; PCBs: 0.32 ± 0.07)	
Length (mm)	35.2	32.7	0.0003
Female mass (g)	0.087	0.065	0.0001
Brood size (# eggs)	302.7	289.0	>0.05
Brood mass (mg)	16.3	16.3	>0.05
Individual egg mass (mg)	0.054	0.056	>0.05
Mean egg area (mm^2)	0.37	0.34	>0.05

Note: Four of the differences between the two areas are not statistically significant and both of the remaining differences (length of shrimp and female mass) appear to be advantageous to shrimp from the LCP Site

B. Effects of Mercury and PCBs on the Benthic Invertebrate Community

This paper (Horne *et al.*, 1999) addressed the effects of total mercury, PCBs (primarily Aroclor 1268), and other COPC on the benthic invertebrate community of the LCP estuary. Sediment and benthos sampling was performed in May 1995 at four locations at the Site and at an off-site reference location (Troup Creek). The four site locations consisted of a station adjacent to the LCP Outfall (Station 4), a station in a tributary draining the outfall lagoon area (Station 3; in or by the LCP Ditch), a station approximately 50 meters (m) west of the outfall lagoon area (Station 2; also, in or by the LCP Ditch), and a station about 330 m west of the lagoon area (Station 1; in or by the Eastern Creek). Sediment was collected with either a trowel or a 10-centimeter (cm) hand bucket auger (the latter device employed when sampling under water). Benthos (macrofauna) were collected with a 3-cm-diameter core sampler inserted into about 5 cm of sediment, with 10 replicate samples taken at each of the five locations (including the reference location) within a 1-m^2 area.

Sediment obtained from the above-referenced locations, in addition to being analyzed for total mercury and Aroclor 1268, was evaluated for toxicity to amphipods (*L. plumulosus*) in 14-day exposures during which survival, sediment avoidance, and other behavioral abnormalities were monitored. Finally, fiddler crabs (*Uca*. spp.) collected from the reference location and Stations 1, 2, and 3, as well as marsh periwinkles (*Littorina* sp.) obtained from the reference location and Station 2, were evaluated for body burdens of total mercury and Aroclor 1268.

Mean body burdens of total mercury and Aroclor 1268 in fiddler crabs and marsh periwinkles indigenous to the Site were always greater than body burdens of reference organisms. Maximum mean concentration of mercury in fiddler crabs was 2.6 mg/kg dw, while highest mean level of Aroclor 1268 was 43 mg/kg dw.

The sediment toxicity tests were reported as indicating no acute toxicity to amphipods across sampling stations. Specifically, mean survival of amphipods exposed to reference sediment was 78 percent; while survival at site stations was 92 percent (Station 1), 83 percent (Station 2), 68 percent (Station 3), and 63 percent (Station 4). These differences were not statistically significant at P = 0.05; and there was no statistically significant correlation (r values) between survival of organisms and concentrations of contaminants in sediment (P = 0.05). In addition, behavioral abnormalities of amphipods were not observed for any station.

In the major study of the benthic invertebrate community, the authors reported that "*density estimates of individual species between sampling locations showed no consistent patterns in response to pollutants* [in sediment]." However, they also reported contamination-related shifts in percentage representation of macrobenthos at higher taxonomic levels – i.e., in annelid and nematode species – as indicated in the following embedded table (abstracted from Figure 2 in Horne *et al.*, 1999).

The authors interpreted the above-presented data as reflecting dominance by oligochaetes and nematodes in uncontaminated areas, shifting to dominance by polychaetes in moderately to highly contaminated areas. The authors also reported the following statistically significant associations: 1) mercury concentration in sediment negatively related to oligochaete ($P < 0.05$) and nematode ($P < 0.001$) abundance, but positively related to polychaete abundance ($P < 0.001$); 2) Aroclor 1268 concentration in sediment negatively related to nematode abundance ($P < 0.001$), but positively related to polychaete abundance ($P < 0.001$); and 3) total organic carbon (TOC) content of sediment negatively related to nematode abundance ($P < 0.001$), but positively related to oligochaete abundance ($P < 0.005$).

Taxonomic Characteristics of Macrobenthos in LCP Estuary and Reference Location (Horne *et al.*, 1999)

Macrobenthos Taxonomic Group	***Reference Location – Troup Creek*** (total Hg: 0.1 mg/kg; A1268: 0.1 mg/kg; TOC: 3.6%; all dw)	**Stations in LCP Estuary** (chemicals in sediment; dw) ***Station 1 -- Eastern Creek*** (total Hg: 34 mg/kg; A1268: 2.3 mg/kg; TOC: 4.2%)	***Station 2 -- LCP Ditch; 50 m from outfall lagoon*** (total Hg: 15 mg/kg; A1268: 56 mg/kg; TOC: 1.3%)	***Station 3 -- LCP Ditch; near outfall lagoon*** (total Hg: 90 mg/kg; A1268: 70 mg/kg; TOC: 1.7%)	***Station 4 -- LCP Outfall*** (total Hg: 170 mg/kg; A1268: 150 mg/kg; TOC: 0.78%)
Oligochaete	45.50%	25.98%	12.19%	36.05%	18.72%
Polychaete	32.90%	22.29%	85.15%	56.15%	77.14%
Nematode	12.34%	51.07%	1.57%	5.98%	3.42%
Insect	5.14%	0.37%	0.24%	-----	0.18%
Crustacea	2.57%	0.30%	0.85%	1.63%	0.54%
Gastropod	1.54%	-----	-----	0.18%	-----

<u>Note</u>: A1268 refers to Aroclor 1268. TOC refers to total organic carbon.

In addition to reported contamination-related shifts in percentage representation of macrobenthos at higher taxonomic levels, the percentage of benthos surface feeders was positively associated with mercury and Aroclor 1268 concentrations in sediment

($P < 0.001$ in both cases), while the percentage of subsurface feeders was positively related to TOC content of sediment ($P < 0.01$). Percentage of surface and subsurface feeders in sediment at the various stations are provided in the following embedded table.

In conclusion, the authors stated "*Based on the results of this study, it can be concluded that shifts in community composition and trophic structure are observed in the study marsh, and that these shifts appear to increase with increasing PCB and mercury loading.*"

Feeding Habits of Macrobenthos in LCP Estuary and Reference Location (Horne *et al.*, 1999)

Feeding Habits of Macrobenthos	**Reference Location – Troup Creek**	**Stations in LCP Estuary**			
		Station 1 Eastern Creek	**Station 2 LCP Ditch; 50 m from outfall lagoon**	**Station 3 LCP Ditch; near outfall lagoon**	**Station 4 -- LCP Outfall**
Subsurface Feeder	56.30%	63.25%	16.75%	51.92%	22.60%
Surface Feeder	42.90%	36.14%	83.13%	48.08%	77.21%

C. Toxicity of Sediment and Pore Water

This paper (Winger *et al.*, 1993) addressed the toxicity of sediment and pore water collected from the LCP estuary during 1990. Twelve (12) sampling stations were initially evaluated in the study. Sediment and pore water obtained from two (2) of these stations (Stations 6 and 7; located within 10 m of each other near the mouth of the drainage canal from the Site) were judged from reconnaissance toxicity screening to be highly toxic. Sediment and pore water from these two (2) stations were then evaluated for acute (10-day) toxicity to amphipods (*Hyallella azteca*); and pore water was assessed for toxicity to photoluminescent bacteria (*Photobacterium phosphoreum*).

Amphipods were reported to have experienced no mortality when exposed to sediment, but a significantly lower feeding rate (leaf consumption) at $P < 0.05$, as compared to a "control reference." Differences in feeding rates were illustrated in a figure from which exact differences could not be determined, but rates appear to have ranged from about

0.7 to 0.8 milligrams (mg)/animal/day for site sediment to 1.1 mg/animal/day for the “control reference.”

Amphipods exposed to pore water from site sediment experienced mortality ranging from about 50 to 75 percent, as contrasted to approximately 5 percent for the “control reference,” a difference that was statistically significant ($P < 0.05$). In addition, leaf feeding rates were significantly lower ($P < 0.05$) for site sediment (~0.4 – 0.6 mg/animal/day), as compared to the “control reference” (0.9 mg/animal/day). In the case of the bacterial tests with pore water of sediment from Stations 6 and 7, median effective concentrations (EC50s) ranged from slightly greater than 0 percent to about 15 percent of pore water sample. No control (or reference) tests were performed; however, EC50 values associated with pore waters evaluated in the reconnaissance screening ranged as high as 100 percent.

Chemical concentrations in evaluated sediment (Stations 6 and 7) were: total mercury: 17.8 – 24.7 mg/kg (dw), PCBs: 67 – 95 mg/kg, lead: 45.0 – 63.0 mg/kg, and total Polycyclic Aromatic Hydrocarbons (PAHs): 1.4 – 3.0 mg/kg. Cadmium, chromium, copper, nickel and zinc were present at concentrations of 0.4-0.5, 87-118, 14-18, 13-17, and 63-78.6 mg/kg, respectively. The authors attributed toxicity of sediment to PCBs and, possibly, methylmercury, because acid-volatile sulfide (AVS) concentrations in sediment (21 – 45 µmol/g) exceeded comparable levels of total metals, rendering them biologically unavailable.

D. Bioaccumulation of Aroclor 1268 (First Paper)

This paper (Kannan *et al.*, 1998) addressed bioaccumulation of congeners of Aroclor 1268 by blue crabs (*Callinectes sapidus*), fishes, terrapins (*M. terrapin*), and birds collected from the LCP estuary during 1995 (terrapins and birds) and 1997 (blue crabs and fishes). Fishes evaluated were silver perch (*Bairdiella chrysoura*), spotted seatrout (*Cynoscion nebulosus*), and striped mullet (*Mugil cephalus*). Birds assessed were mottled ducks (*Anas fulvigula*), boat-tailed grackles (*Quiscalus major*), red-winged blackbirds (*A. phoeniceus*), and clapper rails (*R. longirostrus*).

Mean, lipid-normalized concentrations of total PCBs in biota (presented in order of increasing concentrations, ww) followed by coefficients of determination (r^2) for relative proportion of major PCB congeners in Aroclor 1268 vs. biota were:

- Clapper rail (liver): 9.4 micrograms per gram (µg/g) ($r^2 = 0.86$),
- Diamondback terrapin (liver): 13 µg/g ($r^2 = 0.98$),
- Spotted seatrout (muscle): 56.4 µg/g ($r^2 = 0.89$),
- Boat-tailed grackle (liver): 75.5 µg/g ($r^2 = 0.95$),
- Mottled duck breast (muscle): 135 µg/g ($r^2 = 0.91$),
- Blue crab (hepatopancreas): 197 µg/g ($r^2 = 0.68$),
- Silver perch (muscle): 203 µg/g ($r^2 = 0.80$),
- Striped mullet (muscle): 283 µg/g ($r^2 = 0.95$), and
- Red-winged blackbird (carcass): 387 µg/g ($r^2 = 0.87$).

The authors reported that bioaccumulation was less than would be predicted based on the octanol-water partition coefficient (K_{OW}) relationship, supporting the hypothesis that these congeners have restricted membrane permeability. They also noted that concentrations of non-ortho coplanar congeners in the hepatopancreas of blue crabs were 7 to 8 orders-of-magnitude less than total PCB concentrations. The authors concluded that, despite notable concentrations of total PCBs in biota, the toxic equivalents (TEQs) for dioxin-like non- and mono-ortho coplanar PCBs in biota were minimal.

E. Bioaccumulation of Aroclor 1268 (Second Paper)

This paper (Maruya and Lee, 1998) addressed bioaccumulation of congeners of Aroclor 1268 in three trophic levels of the local food web – grass shrimp (*P. pugio*), spotted seatrout (*C. nebulosus*), and striped mullet (*M. cephalus*) – collected from Purvis Creek during 1996.

Mean, lipid-normalized concentrations of total PCBs in biota were (in order of increasing concentrations, ww) – grass shrimp (whole body): 17 µg/g; spotted seatrout (muscle): 41 µg/g; and striped mullet (whole body): 160 µg/g.

Mean biota-sediment accumulation factors (BSAFs) for all PCBs were 0.28, 0.81, and 3.1 for grass shrimp, spotted seatrout, and striped mullet, respectively. BSAFs were negatively correlated ($P \leq 0.05$) with K_{OW} for all three species. This correlation was believed to be characteristic of extremely hydrophobic PCBs, such as Aroclor 1268, which have been demonstrated to exhibit declining bioavailability with increasing hydrophobicity for $Cl_7 – Cl_{10}$ homologs.

Mean trophic transfer factors (TTF_{lipid}) decreased with increased trophic level, being 12 for the shrimp – mullet coupling, 2.9 for the shrimp – seatrout coupling, and 0.26 for the mullet – seatrout combination. Individual TTF_{lipid} were two to three times higher for Cl_7 and Cl_8 homologs that were substituted at all four *ortho* positions, suggesting a difference in PCB retention by biota based on chlorine substitution patterns.

F. Food/Foraging Habits and Mercury Concentrations in Wood Storks

This paper (Gariboldi *et al.*, 2001) documented mercury concentrations in wood stork nestlings (*Mycteria americana*) from one colony in South Carolina and four colonies in Georgia during the years of 1997, 1998, and 1999. The colony in South Carolina (Buckfield Colony) is located in eastern South Carolina and is surrounded (< 5 kilometers [km]) by a variety of freshwater and saltwater foraging wetlands. The colonies in

Georgia included two inland colonies (Chew Mill Pond Colony in east-central Georgia and Blackwater Colony in south central Georgia), in which foraging of parent storks is restricted to freshwater sites. The remaining Georgia colonies are coastal colonies in which both freshwater and brackish/marine habitats are available for foraging. One of these colonies is the Harris Neck Colony, which is located on the Harris Neck National Wildlife Refuge in a low industrial area in McIntosh County. The other coastal colony is the St. Simons colony, which is located near the industrialized city of Brunswick, Georgia.

The embedded table on the following page presents concentrations of mercury in tissues of wood stork nestlings from the various colonies during 1997 to 1999:

Mean Mercury Concentrations in Tissues of Wood Stork Nestlings (Gariboldi *et al.*, 2001)

Year	***Colony (region)***	***Mercury Concentrations***		
		Blood (µg/g ww)	***Down (µg/g dw)***	***Feathers (µg/g dw)***
1997	Blackwater (inland)	0.35	3.87	3.53
	Chew Mill (inland)	0.47	4.64	5.67
	Harris Neck (coastal)	0.13	2.05	1.51
	Buckfield (coastal)	0.53	3.49	4.59
1998	Chew Mill (inland)	0.51	5.13	5.25
	Harris Neck (coastal)	0.29	3.61	3.54
	St. Simons (coastal)	**0.46**	**4.92**	**5.64**
1999	Blackwater (inland)	0.34	3.68	4.37
	Chew Mill (inland)	0.47	4.40	4.46
	Harris Neck (coastal)	0.10	1.16	1.23

The next embedded table documents reproductive success in several of the wood stork colonies during 1997 to 1999:

Reproductive Success of Wood Storks (Gariboldi *et al.*, 2001)

	Chew Mill (inland)			*Harris Neck (coastal)*			*St. Simons (coastal)*		
Year	No. nests monitor-ed	Mean no. of fledglings/ nest	Stand. dev.	No. nests monitor-ed	Mean no. of fledglings/ nest	Stand. dev.	No. nests monitor-ed	Mean no. of fledglings/ nest	Stand. dev.
1997	24	1.4	0.8	166	0.7	0.8	37	1.1	1.0
1998	26	1.4	1.1	110	2.3	1.1	39	**2.7**	0.6
1999	26	1.5	1.1	55	1.0	1.0	----	----	----

Note: The freshwater wetlands of the wood stork colony at St. Simons "dried" in 1999 and the colony was not inhabited by wood storks.

The authors of this paper noted that prey in freshwater systems typically have higher body burdens of mercury than prey in marine systems, which explains the generally greater concentrations of mercury (sometimes almost all methylmercury) observed in nestlings from inland colonies. They speculated that the "somewhat" higher levels of mercury found at the St. Simons' colony in 1998 could be related to mercury pollution associated with the LCP Site and utilization of freshwater wetlands as foraging habitats. The authors also noted that wood storks typically forage within 10 to 15 km (6.2 – 9.3 miles) of their colony. (The St. Simons' colony is located in the northern part of St. Simons Island in a freshwater impoundment containing four islands and is at least 20 km [12.4 miles] from the Site.) The authors commented that, at the colonies that they evaluated, forage items were a more important source of mercury to nestling storks than maternal transfer. Finally, the authors emphasized that the reproductive success data (the greatest success for all evaluated colonies during all evaluated years occurred at the St. Simons colony in 1998) suggest that the benefits of a greater prey base (from freshwater wetlands utilized in wet years) may outweigh the potential adverse effects of increased mercury exposure.

J.2.2.2 Studies Conducted after Remediation of Estuary. The following two studies address the effects of mercury and Aroclor 1268 on mummichogs (*Fundulus heteroclitus*) and effects of the same COPC on mineral chemistry of bones of clapper rails (*R. longirostris*). The former study was a laboratory-based toxicity study in which mummichogs obtained from an uncontaminated location were fed contaminated food. Consequently, results of this study (body burdens of mercury and Aroclor 1268 in fish) are relevant to body burdens of fish both before and after remediation at the Site. The latter study was a field-based study conducted in 2000 and pertains primarily to the post-remediation ecological baseline.

A. Reproductive and Transgenerational Effects of Methylmercury and Aroclor 1268 on Mummichogs

This paper (Matta *et al.*, 2001) addressed the toxicological effects of mercury (methylmercury) and Aroclor 1268 in contaminated food fed to adult mummichogs (*F. heteroclitus*) on those fish (the F_0 generation) and succeeding F_1 and F_2 generations of fish. A total of 13 possible toxicological responses of fish were measured for fish exposed to methylmercury and for fish exposed to Aroclor 1268 – for F_0 fish: survival, weight, fecundity, and fertilization success; for F_1 fish: hatching success, larval survival, weight, sex ratio, abnormal gonads, fecundity, and fertilization success; and for F_2 fish: hatching success and larval survival. Of these 26 toxicological measurements, only 5 measurements were characterized by a statistically significant difference (P = 0.05) as compared to control fish.

Aroclor 1268 in food was generally highly bioavailable and high whole body burdens (up to 15 mg/kg) were accumulated in F_0 fish. However, the only statistically significant difference between treatment and control fish was an increase in growth of the F_1 generation beginning at whole body burdens in parent (F_0) fish between 0.34 and 1.3 mg/kg (which equates to a maximum acceptable toxicant concentration [MATC] or geometric mean of 0.66 mg/kg).

Exposure of fish to methylmercury (up to body burdens of 12 mg/kg) caused the following statistically significant effects between treatment and control fish:

- Increased mortality of male F_0 fish at methylmercury body burdens between 0.20 and 0.47 mg/kg (MATC = 0.30 mg/kg), possibly occurring as a result of behavioral alterations,
- Increased weight of F_1 fish at egg concentration of < 0.02 mg/kg, which corresponds to a body burden for parent (F_0) fish between 0.20 and 0.47 mg/kg (MATC = 0.31 mg/kg),
- Altered sex ratios of F_1 fish (fewer females at moderate body burdens and fewer males at highest body burdens) at egg concentration of 0.01 mg/kg, which corresponds to a body burden for parent (F_0) fish between 0.44 and 1.1 mg/kg (MATC = 0.70 mg/kg), and
- Reduced fertilization success of F_1 fish at egg concentration of 0.63 mg/kg, or body burden of parent (F_0) fish between 1.0 to 12 mg/kg (MATC = 3.5 mg/kg).

No statistically significant toxicological effects attributable to mercury occurred in F_2 fish.

The authors of this paper did not specify whether concentrations of methylmercury and Aroclor 1268 in eggs and whole bodies of fish are expressed in terms of dry weight or wet weight; however, wet-weight measurements are more likely. If this is the case, the lowest MATCs for methylmercury and Aroclor 1268 in bodies of parent (F_0) fish are, respectively, 0.30 and 0.66 mg/kg wet weight. If it is additionally assumed that the solids content of mummichogs is 25 percent, these wet-weight MATC values convert to

1.2 mg/kg (dry weigh) methylmercury and 2.6 mg/kg (dw) Aroclor 1268. Reference to a later table presented in this document (Table 14) indicates that the highest mean body burden of total mercury measured in mummichogs from the LCP estuary over the 2000-2006 time period was only 0.94 mg/kg (dw). In the case of Aroclor 1268, mean body burdens of mummichogs exceeded the MATC value of 2.6 mg/kg (dw) in the Main Canal (4.14 mg/kg) and Eastern Creek (5.53 mg/kg). However, it is doubtful if increased growth of mummichogs (the only toxicological effect documented for Aroclor 1268 in this paper) is a serious and reproducible toxicological phenomenon.

B. Effects on Mineral Chemistry of Clapper Rail Bones from *In Ova* Exposure to Mercury and PCBs

This paper (Rodriguez-Navarro *et al.*, 2006) addressed mineral chemistry of bones of clapper rail hatchlings (*R. longirostris*) that developed from eggs collected from the marsh at the LCP Site and at a reference location on Blythe Island during 2000. This study was a logical “follow up” of a previous study that identified reduced shell thickness and anomalous microstructure of egg shells of clapper rails from the LCP marsh (Rodriguez-Navarro *et al.*, 2002). The authors of that study speculated that the effects on egg shells may be related to concentrations of specific metals (e. g., magnesium, copper, zinc, lead, and mercury).

In the latest study, exposure to contaminants in the LCP marsh did not affect the length or weight of leg bones of clapper rails. However, bone maturation was accelerated as evidenced by a higher calcium/phosphorous ratio and lower carbonate and acid-phosphate content. The authors noted the difficulty in determining the specific toxicant(s) that caused these effects, although they specifically referenced organochlorides other than PCBs (e. g., dioxins) and heavy metals including mercury.

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APPENDIX K

SUPPORTING DATA FOR DEVELOPMENT OF BIOACCUMULATION FACTORS

K.1 Raw Data Mercury and Aroclor 1268 in Fiddler Crab and Sediment
K.2 Mummichog Data for Each Polygon
K.3 Bioaccumulation Factor for Blue Crab Data
K.4 Bioaccumulation Factor for Finfish
K.5 Bioaccumulation Factor for Cordgrass Data

Appendix K-1

Raw Data Mercury and Aroclor 1268 in Fiddler Crab and Sediment

Raw Data Mercury in Fiddler Crab
5NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
5-NOAA-G	04294-FC-NOAA5-1	2004	Fiddler Crab	Mercury	0.33000
5-NOAA-G	04294-FC-NOAA5-2	2004	Fiddler Crab	Mercury	0.45000
5-NOAA-G	04294-FC-NOAA5-3	2004	Fiddler Crab	Mercury	0.30000
5-NOAA-G	04296-FC-NOAA5-4	2004	Fiddler Crab	Mercury	0.47000
5-NOAA-G	04296-FC-NOAA5-5	2004	Fiddler Crab	Mercury	0.34000
5-NOAA-G	04296-FC-NOAA5-6	2004	Fiddler Crab	Mercury	0.35000
5-NOAA-G	04296-FC-NOAA5-7	2004	Fiddler Crab	Mercury	0.48000
M-102	04301-FC-M102-1	2004	Fiddler Crab	Mercury	0.34000
M-102	04301-FC-M102-2	2004	Fiddler Crab	Mercury	0.36000
M-102	04301-FC-M102-3	2004	Fiddler Crab	Mercury	0.47000
M-102	04301-FC-M102-4	2004	Fiddler Crab	Mercury	0.32000
M-102	04301-FC-M102-5	2004	Fiddler Crab	Mercury	0.40000
M-102	04301-FC-M102-6	2004	Fiddler Crab	Mercury	0.33000
M-102	04301-FC-M102-7	2004	Fiddler Crab	Mercury	0.26000
5-NOAA-G	05298-FC-NOAA-5-R1	2005	Fiddler crab	Mercury	0.22654
5-NOAA-G	05298-FC-NOAA-5-R2	2005	Fiddler crab	Mercury	0.19608
5-NOAA-G	05298-FC-NOAA-5-R3	2005	Fiddler crab	Mercury	0.32787
5-NOAA-G	05298-FC-NOAA-5-R4	2005	Fiddler crab	Mercury	0.27027
5-NOAA-G	05298-FC-NOAA-5-R5	2005	Fiddler crab	Mercury	0.22727
5-NOAA-G	05298-FC-NOAA-5-R6	2005	Fiddler crab	Mercury	0.27972
5-NOAA-G	05298-FC-NOAA-5-R7	2005	Fiddler crab	Mercury	0.21472
M-102	05299-FC-M-102-R1	2005	Fiddler crab	Mercury	0.18293
M-102	05299-FC-M-102-R2	2005	Fiddler crab	Mercury	0.15152
M-102	05299-FC-M-102-R3	2005	Fiddler crab	Mercury	0.14925
M-102	05299-FC-M-102-R4	2005	Fiddler crab	Mercury	0.17857
M-102	05299-FC-M-102-R5	2005	Fiddler crab	Mercury	0.15291
M-102	05299-FC-M-102-R6	2005	Fiddler crab	Mercury	0.18237
M-102	05299-FC-M-102-R7	2005	Fiddler crab	Mercury	0.19355
5-NOAA-G	06291-NOAA-5-G-FC-R1	2006	Fiddler Crab	Mercury	0.33815
5-NOAA-G	06291-NOAA-5-G-FC-R2	2006	Fiddler Crab	Mercury	0.27485
5-NOAA-G	06291-NOAA-5-G-FC-R3	2006	Fiddler Crab	Mercury	0.27994
5-NOAA-G	06291-NOAA-5-G-FC-R4	2006	Fiddler Crab	Mercury	0.32733
5-NOAA-G	06291-NOAA-5-G-FC-R5	2006	Fiddler Crab	Mercury	0.30291
5-NOAA-G	06291-NOAA-5-G-FC-R6	2006	Fiddler Crab	Mercury	0.36691
5-NOAA-G	06291-NOAA-5-G-FC-R7	2006	Fiddler Crab	Mercury	0.41844
5-NOAA-G	07289-NOAA-5-FC-R1	2007	Fiddler Crab	Mercury	0.15587
5-NOAA-G	07289-NOAA-5-FC-R2	2007	Fiddler Crab	Mercury	0.18698
5-NOAA-G	07289-NOAA-5-FC-R3	2007	Fiddler Crab	Mercury	0.34627
				Average	**0.29293**

Raw Data Mercury in Sediment
5NOAAG polygon

Location	Year	Matrix	Parameter	res05
5-NOAA-G	2004	sediment	Mercury	0.9800
5-NOAA-G	2005	sediment	Mercury	1.9400
5-NOAA-G	2006	sediment	Mercury	1.9000
5-NOAA-G	2007	sediment	Mercury	0.3560
C-4	2000	sediment	Mercury	2.7200
C-4	2002	sediment	Mercury	4.2000
C-4	2003	sediment	Mercury	4.0000
C-4	2004	sediment	Mercury	1.7000
C-5	2000	sediment	Mercury	11.5000
C-5	2002	sediment	Mercury	11.0000
C-5	2003	sediment	Mercury	10.0000
C-5	2004	sediment	Mercury	2.1000
C-5	2005	sediment	Mercury	1.1000
C-5	2006	sediment	Mercury	7.0300
C-5	2007	sediment	Mercury	2.6700
M-102	2004	sediment	Mercury	0.4000
M-102	2005	sediment	Mercury	0.7360
M-26	2000	sediment	Mercury	1.6600
SD-01	2003	sediment	Mercury	3.9000
SD-02	2003	sediment	Mercury	1.7000
SD-03	2003	sediment	Mercury	5.3000
SD-04	2003	sediment	Mercury	1.7000
SD-05	2003	sediment	Mercury	3.2000
SD-06	2003	sediment	Mercury	5.5000
SD3M-2	2004	sediment	Mercury	0.7100
SDMC-AET-1	2006	sediment	Mercury	3.4100
SDMC-AET-10	2006	sediment	Mercury	1.2900
SDMC-AET-2	2006	sediment	Mercury	2.5700
SDMC-AET-3	2006	sediment	Mercury	1.7400
SDMC-AET-4	2006	sediment	Mercury	2.7800
SDMC-AET-5	2006	sediment	Mercury	2.1400
SDMC-AET-6	2006	sediment	Mercury	0.7720
SDMC-AET-7	2006	sediment	Mercury	3.6100
SDMC-AET-8	2006	sediment	Mercury	3.0000
SDMC-AET-9	2006	sediment	Mercury	2.6400
			Average	**3.1987**

Raw Data Aroclor 1268 in Fiddler Crab
5NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
5-NOAA-G	04294-FC-NOAA5-1	2004	Fiddler Crab	Aroclor-1268	3.00000	
5-NOAA-G	04294-FC-NOAA5-2	2004	Fiddler Crab	Aroclor-1268	7.41935	
5-NOAA-G	04294-FC-NOAA5-3	2004	Fiddler Crab	Aroclor-1268	17.00000	
5-NOAA-G	04296-FC-NOAA5-4	2004	Fiddler Crab	Aroclor-1268	1.81250	
5-NOAA-G	04296-FC-NOAA5-5	2004	Fiddler Crab	Aroclor-1268	4.82759	
5-NOAA-G	04296-FC-NOAA5-6	2004	Fiddler Crab	Aroclor-1268	1.33333	
5-NOAA-G	04296-FC-NOAA5-7	2004	Fiddler Crab	Aroclor-1268	1.21212	
M-102	04301-FC-M102-1	2004	Fiddler Crab	Aroclor-1268	0.17241	U
M-102	04301-FC-M102-2	2004	Fiddler Crab	Aroclor-1268	0.29310	U
M-102	04301-FC-M102-3	2004	Fiddler Crab	Aroclor-1268	0.20000	U
M-102	04301-FC-M102-4	2004	Fiddler Crab	Aroclor-1268	0.24138	U
M-102	04301-FC-M102-5	2004	Fiddler Crab	Aroclor-1268	0.20690	U
M-102	04301-FC-M102-6	2004	Fiddler Crab	Aroclor-1268	0.25000	U
M-102	04301-FC-M102-7	2004	Fiddler Crab	Aroclor-1268	0.32258	U
5-NOAA-G	05298-FC-NOAA-5-R1	2005	Fiddler crab	Aroclor-1268	0.90615	
5-NOAA-G	05298-FC-NOAA-5-R2	2005	Fiddler crab	Aroclor-1268	0.58824	
5-NOAA-G	05298-FC-NOAA-5-R3	2005	Fiddler crab	Aroclor-1268	1.04918	
5-NOAA-G	05298-FC-NOAA-5-R4	2005	Fiddler crab	Aroclor-1268	1.72297	
5-NOAA-G	05298-FC-NOAA-5-R5	2005	Fiddler crab	Aroclor-1268	0.97403	
5-NOAA-G	05298-FC-NOAA-5-R6	2005	Fiddler crab	Aroclor-1268	1.67832	
5-NOAA-G	05298-FC-NOAA-5-R7	2005	Fiddler crab	Aroclor-1268	3.37423	
M-102	05299-FC-M-102-R1	2005	Fiddler crab	Aroclor-1268	0.57927	
M-102	05299-FC-M-102-R2	2005	Fiddler crab	Aroclor-1268	0.39394	J
M-102	05299-FC-M-102-R3	2005	Fiddler crab	Aroclor-1268	0.56716	
M-102	05299-FC-M-102-R4	2005	Fiddler crab	Aroclor-1268	0.59524	
M-102	05299-FC-M-102-R5	2005	Fiddler crab	Aroclor-1268	0.33639	
M-102	05299-FC-M-102-R6	2005	Fiddler crab	Aroclor-1268	0.66869	
M-102	05299-FC-M-102-R7	2005	Fiddler crab	Aroclor-1268	0.45161	
5-NOAA-G	06291-NOAA-5-G-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.75145	
5-NOAA-G	06291-NOAA-5-G-FC-R2	2006	Fiddler Crab	Aroclor-1268	1.04790	
5-NOAA-G	06291-NOAA-5-G-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.76696	
5-NOAA-G	06291-NOAA-5-G-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.81081	
5-NOAA-G	06291-NOAA-5-G-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.71197	
5-NOAA-G	06291-NOAA-5-G-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.75540	
5-NOAA-G	06291-NOAA-5-G-FC-R7	2006	Fiddler Crab	Aroclor-1268	1.24113	
5-NOAA-G	07289-NOAA-5-FC-R1	2007	Fiddler Crab	Aroclor-1268	0.54441	
5-NOAA-G	07289-NOAA-5-FC-R2	2007	Fiddler Crab	Aroclor-1268	0.44321	
5-NOAA-G	07289-NOAA-5-FC-R3	2007	Fiddler Crab	Aroclor-1268	0.50746	
				Average	**1.57256**	

Raw Data Aroclor 1268 in Sediment
5NOAAG polygon

Location	Year	Matrix	Parameter	res05
C-4	2002	sediment	Mercury	21.0000
C-5	2002	sediment	Mercury	19.0000
C-4	2003	sediment	Mercury	9.9000
C-5	2003	sediment	Mercury	24.0000
SD-01	2003	sediment	Mercury	6.4000
SD-02	2003	sediment	Mercury	6.6000
SD-03	2003	sediment	Mercury	6.2000
SD-04	2003	sediment	Mercury	3.0000
SD-05	2003	sediment	Mercury	5.1000
SD-06	2003	sediment	Mercury	1.3000
C-4	2004	sediment	Mercury	4.0000
C-5	2004	sediment	Mercury	12.0000
5-NOAA-G	2004	sediment	Mercury	4.7000
SD3M-2	2004	sediment	Mercury	0.9500
M-102	2004	sediment	Mercury	1.1000
M-102	2005	sediment	Mercury	1.9000
5-NOAA-G	2005	sediment	Mercury	18.0000
C-5	2005	sediment	Mercury	4.2000
C-5	2006	sediment	Mercury	31.0000
5-NOAA-G	2006	sediment	Mercury	18.0000
SDMC-AET-1	2006	sediment	Mercury	20.0000
SDMC-AET-10	2006	sediment	Mercury	4.1000
SDMC-AET-2	2006	sediment	Mercury	15.0000
SDMC-AET-3	2006	sediment	Mercury	8.2000
SDMC-AET-4	2006	sediment	Mercury	20.0000
SDMC-AET-5	2006	sediment	Mercury	8.3000
SDMC-AET-6	2006	sediment	Mercury	1.8000
SDMC-AET-7	2006	sediment	Mercury	21.0000
SDMC-AET-8	2006	sediment	Mercury	11.0000
SDMC-AET-9	2006	sediment	Mercury	11.0000
C-5	2007	sediment	Mercury	10.0000
5-NOAA-G	2007	sediment	Mercury	0.6200
C-4	2000	sediment	Mercury	2.4000
C-5	2000	sediment	Mercury	3.7000
M-26	2000	sediment	Mercury	1.9000
			Average	**9.6391**

Raw Data Mercury in Fiddler Crab
6NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
6-NOAA-G	04293-FC-NOAA6-1	2004	Fiddler Crab	Mercury	0.22000
6-NOAA-G	04293-FC-NOAA6-2	2004	Fiddler Crab	Mercury	0.30000
6-NOAA-G	04293-FC-NOAA6-3	2004	Fiddler Crab	Mercury	0.30000
6-NOAA-G	04293-FC-NOAA6-4	2004	Fiddler Crab	Mercury	0.28000
6-NOAA-G	04293-FC-NOAA6-5	2004	Fiddler Crab	Mercury	0.22000
6-NOAA-G	04293-FC-NOAA6-6	2004	Fiddler Crab	Mercury	0.23000
6-NOAA-G	04293-FC-NOAA6-7	2004	Fiddler Crab	Mercury	0.31000
6-NOAA-G	05298-FC-NOAA-6-R1	2005	Fiddler crab	Mercury	0.17606
6-NOAA-G	05298-FC-NOAA-6-R2	2005	Fiddler crab	Mercury	0.17668
6-NOAA-G	05298-FC-NOAA-6-R3	2005	Fiddler crab	Mercury	0.19608
				Average	**0.24088**

Raw Data Mercury in Sediment
6NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
SD2M-16	04288-SD2M-16	2004	sediment	Mercury	0.63000
SD2M-5	04288-SD2M-5	2004	sediment	Mercury	0.27000
SD2M-3	04289-SD2M-3	2004	sediment	Mercury	0.83000
6-NOAA-G	04294-NOAA6	2004	sediment	Mercury	0.84000
6-NOAA-G	05292-NOAA-6-G	2005	sediment	Mercury	0.70700
6-NOAA-G	06292-NOAA-6-G	2006	SEDIMENT	Mercury	0.41200
6-NOAA-G	07289-NOAA-6	2007	sediment	Mercury	0.85300
				Average	**0.64886**

Raw Data Aroclor 1268 in Fiddler Crab
6NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
6-NOAA-G	04293-FC-NOAA6-1	2004	Fiddler Crab	Aroclor-1268	0.2500
6-NOAA-G	04293-FC-NOAA6-2	2004	Fiddler Crab	Aroclor-1268	0.3036
6-NOAA-G	04293-FC-NOAA6-3	2004	Fiddler Crab	Aroclor-1268	0.2593
6-NOAA-G	04293-FC-NOAA6-4	2004	Fiddler Crab	Aroclor-1268	0.1897
6-NOAA-G	04293-FC-NOAA6-5	2004	Fiddler Crab	Aroclor-1268	0.3036
6-NOAA-G	04293-FC-NOAA6-6	2004	Fiddler Crab	Aroclor-1268	0.2931
6-NOAA-G	04293-FC-NOAA6-7	2004	Fiddler Crab	Aroclor-1268	0.2593
6-NOAA-G	05298-FC-NOAA-6-R1	2005	Fiddler crab	Aroclor-1268	0.3873
6-NOAA-G	05298-FC-NOAA-6-R2	2005	Fiddler crab	Aroclor-1268	0.5654
6-NOAA-G	05298-FC-NOAA-6-R3	2005	Fiddler crab	Aroclor-1268	0.7843
				Average	**0.3595**

Raw Data Aroclor 1268 in Sediment
6NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
SD2M-16	04288-SD2M-16	2004	Sediment	Aroclor-1268	2.5000
SD2M-5	04288-SD2M-5	2004	Sediment	Aroclor-1268	0.6800
SD2M-3	04289-SD2M-3	2004	Sediment	Aroclor-1268	0.9100
6-NOAA-G	04294-NOAA6	2004	Sediment	Aroclor-1268	0.8600
6-NOAA-G	05292-NOAA-6-G	2005	Sediment	Aroclor-1268	1.2000
6-NOAA-G	06292-NOAA-6-G	2006	Sediment	Aroclor-1268	0.6500
6-NOAA-G	07289-NOAA-6	2007	Sediment	Aroclor-1268	1.2000
				Average	**1.1429**

Raw Data Mercury in Fiddler Crab
7NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
7-NOAA-G	04293-FC-NOAA7-1	2004	Fiddler Crab	Mercury	0.71000
7-NOAA-G	04293-FC-NOAA7-2	2004	Fiddler Crab	Mercury	0.52000
7-NOAA-G	04293-FC-NOAA7-3	2004	Fiddler Crab	Mercury	0.74000
7-NOAA-G	04293-FC-NOAA7-4	2004	Fiddler Crab	Mercury	0.85000
7-NOAA-G	04293-FC-NOAA7-5	2004	Fiddler Crab	Mercury	0.58000
7-NOAA-G	04293-FC-NOAA7-6	2004	Fiddler Crab	Mercury	0.73000
7-NOAA-G	04293-FC-NOAA7-7	2004	Fiddler Crab	Mercury	0.82000
7-NOAA-G	05298-FC-NOAA-7-R1	2005	Fiddler crab	Mercury	0.21605
7-NOAA-G	05298-FC-NOAA-7-R2	2005	Fiddler crab	Mercury	0.16129
7-NOAA-G	05298-FC-NOAA-7-R3	2005	Fiddler crab	Mercury	0.21341
7-NOAA-G	05298-FC-NOAA-7-R4	2005	Fiddler crab	Mercury	0.23952
7-NOAA-G	05298-FC-NOAA-7-R5	2005	Fiddler crab	Mercury	0.21807
7-NOAA-G	05298-FC-NOAA-7-R6	2005	Fiddler crab	Mercury	0.22293
7-NOAA-G	05298-FC-NOAA-7-R7	2005	Fiddler crab	Mercury	0.15873
8-NOAA-G	04294-FC-NOAA8-1	2004	Fiddler Crab	Mercury	0.19000
8-NOAA-G	04294-FC-NOAA8-2	2004	Fiddler Crab	Mercury	0.20000
8-NOAA-G	04294-FC-NOAA8-3	2004	Fiddler Crab	Mercury	0.24000
8-NOAA-G	04294-FC-NOAA8-4	2004	Fiddler Crab	Mercury	0.19000
8-NOAA-G	04294-FC-NOAA8-5	2004	Fiddler Crab	Mercury	0.17000
8-NOAA-G	04294-FC-NOAA8-6	2004	Fiddler Crab	Mercury	0.15000
8-NOAA-G	04294-FC-NOAA8-7	2004	Fiddler Crab	Mercury	0.15000
8-NOAA-G	05298-FC-NOAA-8-R1	2005	Fiddler crab	Mercury	0.09804
8-NOAA-G	05298-FC-NOAA-8-R2	2005	Fiddler crab	Mercury	0.12821
8-NOAA-G	05298-FC-NOAA-8-R3	2005	Fiddler crab	Mercury	0.09772
8-NOAA-G	05298-FC-NOAA-8-R4	2005	Fiddler crab	Mercury	0.12862
8-NOAA-G	05298-FC-NOAA-8-R5	2005	Fiddler crab	Mercury	0.09585
8-NOAA-G	05298-FC-NOAA-8-R6	2005	Fiddler crab	Mercury	0.13652
8-NOAA-G	05298-FC-NOAA-8-R7	2005	Fiddler crab	Mercury	0.13559
8-NOAA-G	06292-NOAA-8-G-FC-R1	2006	Fiddler Crab	Mercury	0.20881
8-NOAA-G	06292-NOAA-8-G-FC-R2	2006	Fiddler Crab	Mercury	0.25510
8-NOAA-G	06292-NOAA-8-G-FC-R3	2006	Fiddler Crab	Mercury	0.26384
8-NOAA-G	06292-NOAA-8-G-FC-R4	2006	Fiddler Crab	Mercury	0.28212
8-NOAA-G	06292-NOAA-8-G-FC-R5	2006	Fiddler Crab	Mercury	0.28814
8-NOAA-G	06292-NOAA-8-G-FC-R6	2006	Fiddler Crab	Mercury	0.25488
8-NOAA-G	07289-NOAA-8-FC-R1	2007	Fiddler Crab	Mercury	0.13503
8-NOAA-G	07289-NOAA-8-FC-R2	2007	Fiddler Crab	Mercury	0.12287
8-NOAA-G	07289-NOAA-8-FC-R3	2007	Fiddler Crab	Mercury	0.17713
				Average	**0.28320**

Raw Data Mercury in Sediment
7NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
7-NOAA-G	04294-NOAA7	2004	sediment	Mercury	0.8200
7-NOAA-G	05292-NOAA-7-G	2005	sediment	Mercury	0.6750
7-NOAA-G	06292-NOAA-7-G	2006	sediment	Mercury	0.5670
7-NOAA-G	07289-NOAA-7	2007	sediment	Mercury	0.7080
8-NOAA-G	04294-NOAA8	2004	sediment	Mercury	0.8600
8-NOAA-G	05292-NOAA-8-G	2005	sediment	Mercury	0.8660
8-NOAA-G	06292-NOAA-8-G	2006	sediment	Mercury	0.7430
8-NOAA-G	07289-NOAA-8	2007	sediment	Mercury	1.0200
C-12	C-12(S)	2000	sediment	Mercury	5.3400
C-12	05292-C-12	2005	sediment	Mercury	1.0300
C-13	C-13(S)	2000	sediment	Mercury	7.0000
C-13	02236-C-13	2002	sediment	Mercury	1.5000
C-13	03287-C-13	2003	sediment	Mercury	0.4800
C-13	04294-C-13	2004	sediment	Mercury	1.7000
C-13	05292-C-13	2005	sediment	Mercury	1.4300
C-14	C-14(S)	2000	sediment	Mercury	5.3600
C-14	05293-C-14	2005	sediment	Mercury	1.8000
M-27	M-27(S)	2000	sediment	Mercury	3.3000
M-27	02236-M-27	2002	sediment	Mercury	2.1000
M-27	03288-M-27	2003	sediment	Mercury	0.6400
M-27	04296-M-27	2004	sediment	Mercury	0.7600
SD2C-10	04286-SD2C-10	2004	sediment	Mercury	7.6000
SD2C-11	04287-SD2C-11	2004	sediment	Mercury	3.6000
SD2C-12	04287-SD2C-12	2004	sediment	Mercury	5.7000
SD2C-19	04287-SD2C-19	2004	sediment	Mercury	0.6200
SD2C-6	04286-SD2C-6	2004	sediment	Mercury	2.1000
SD2C-7	04286-SD2C-7	2004	sediment	Mercury	0.5800
SD2C-9	04286-SD2C-9	2004	sediment	Mercury	1.0000
SD2M-1	04288-SD2M-1	2004	sediment	Mercury	0.3900
SD2M-12	04288-SD2M-12	2004	sediment	Mercury	0.3800
SD2M-2	04288-SD2M-2	2004	sediment	Mercury	0.3600
SDWC-AET-10	06297-SDWC-AET-10	2006	sediment	Mercury	1.2200
SDWC-AET-11	06297-SDWC-AET-11	2006	sediment	Mercury	0.5180
SDWC-AET-12	06297-SDWC-AET-12	2006	sediment	Mercury	1.5900
SDWC-AET-13	06297-SDWC-AET-13	2006	sediment	Mercury	0.9210
SDWC-AET-14	06297-SDWC-AET-14	2006	sediment	Mercury	1.5000
SDWC-AET-15	06297-SDWC-AET-15	2006	sediment	Mercury	1.8500
SDWC-AET-16	06297-SDWC-AET-16	2006	sediment	Mercury	2.7600
SDWC-AET-17	06297-SDWC-AET-17	2006	sediment	Mercury	6.7200
SDWC-AET-18	06297-SDWC-AET-18	2006	sediment	Mercury	1.1400
SDWC-AET-19	06297-SDWC-AET-19	2006	sediment	Mercury	1.4900
SDWC-AET-20	06297-SDWC-AET-20	2006	sediment	Mercury	1.5300
SDWC-AET-21	06297-SDWC-AET-21	2006	sediment	Mercury	1.7100
SDWC-AET-7	06297-SDWC-AET-7	2006	sediment	Mercury	0.9540
SDWC-AET-8	06297-SDWC-AET-8	2006	sediment	Mercury	1.0200
SDWC-AET-9	06297-SDWC-AET-9	2006	sediment	Mercury	1.2900
				Average	**1.8966**

Raw Data Aroclor 1268 in Fiddler Crab
7NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
7-NOAA-G	04293-FC-NOAA7-1	2004	Fiddler Crab	Aroclor-1268	0.17857	U
7-NOAA-G	04293-FC-NOAA7-2	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	04293-FC-NOAA7-3	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	04293-FC-NOAA7-4	2004	Fiddler Crab	Aroclor-1268	0.16667	U
7-NOAA-G	04293-FC-NOAA7-5	2004	Fiddler Crab	Aroclor-1268	0.17857	U
7-NOAA-G	04293-FC-NOAA7-6	2004	Fiddler Crab	Aroclor-1268	0.16667	U
7-NOAA-G	04293-FC-NOAA7-7	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	05298-FC-NOAA-7-R1	2005	Fiddler crab	Aroclor-1268	0.98765	
7-NOAA-G	05298-FC-NOAA-7-R2	2005	Fiddler crab	Aroclor-1268	0.83871	
7-NOAA-G	05298-FC-NOAA-7-R3	2005	Fiddler crab	Aroclor-1268	0.85366	
7-NOAA-G	05298-FC-NOAA-7-R4	2005	Fiddler crab	Aroclor-1268	0.89820	
7-NOAA-G	05298-FC-NOAA-7-R5	2005	Fiddler crab	Aroclor-1268	0.90343	
7-NOAA-G	05298-FC-NOAA-7-R6	2005	Fiddler crab	Aroclor-1268	0.92357	
7-NOAA-G	05298-FC-NOAA-7-R7	2005	Fiddler crab	Aroclor-1268	0.73016	
8-NOAA-G	04294-FC-NOAA8-1	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-2	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	04294-FC-NOAA8-3	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-4	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-5	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	04294-FC-NOAA8-6	2004	Fiddler Crab	Aroclor-1268	0.31250	U
8-NOAA-G	04294-FC-NOAA8-7	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	05298-FC-NOAA-8-R1	2005	Fiddler crab	Aroclor-1268	1.20915	
8-NOAA-G	05298-FC-NOAA-8-R2	2005	Fiddler crab	Aroclor-1268	1.12180	
8-NOAA-G	05298-FC-NOAA-8-R3	2005	Fiddler crab	Aroclor-1268	1.30293	
8-NOAA-G	05298-FC-NOAA-8-R4	2005	Fiddler crab	Aroclor-1268	1.06109	
8-NOAA-G	05298-FC-NOAA-8-R5	2005	Fiddler crab	Aroclor-1268	1.21406	
8-NOAA-G	05298-FC-NOAA-8-R6	2005	Fiddler crab	Aroclor-1268	1.29693	
8-NOAA-G	05298-FC-NOAA-8-R7	2005	Fiddler crab	Aroclor-1268	1.38983	
8-NOAA-G	06292-NOAA-8-G-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.32881	
8-NOAA-G	06292-NOAA-8-G-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.24522	
8-NOAA-G	06292-NOAA-8-G-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.42345	
8-NOAA-G	06292-NOAA-8-G-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.62044	
8-NOAA-G	06292-NOAA-8-G-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.63241	
8-NOAA-G	06292-NOAA-8-G-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.48780	
8-NOAA-G	07289-NOAA-8-FC-R1	2007	Fiddler Crab	Aroclor-1268	0.41916	
8-NOAA-G	07289-NOAA-8-FC-R2	2007	Fiddler Crab	Aroclor-1268	0.51829	
8-NOAA-G	07289-NOAA-8-FC-R3	2007	Fiddler Crab	Aroclor-1268	0.54878	
				Average	**0.60658**	

Raw Data Aroclor 1268 in Sediment
7NOAAG polygon

Location	Year	Sample ID	Matrix	Parameter	res05	R Mod
7-NOAA-G	2004	04294-NOAA7	sediment	Aroclor-1268	0.8400	
7-NOAA-G	2005	05292-NOAA-7-G	sediment	Aroclor-1268	1.0000	
7-NOAA-G	2006	06292-NOAA-7-G	SEDIMENT	Aroclor-1268	1.2000	D
7-NOAA-G	2007	07289-NOAA-7	sediment	Aroclor-1268	1.2000	D
8-NOAA-G	2004	04294-NOAA8	sediment	Aroclor-1268	0.5000	
8-NOAA-G	2005	05292-NOAA-8-G	sediment	Aroclor-1268	0.6100	
8-NOAA-G	2006	06292-NOAA-8-G	SEDIMENT	Aroclor-1268	0.4000	
8-NOAA-G	2007	07289-NOAA-8	sediment	Aroclor-1268	0.5100	
C-12	2000	C-12(S)	sediment	Aroclor-1268	0.4800	
C-12	2005	05292-C-12	sediment	Aroclor-1268	4.8000	
C-13	2000	C-13(S)	sediment	Aroclor-1268	0.7500	
C-13	2002	02236-C-13	sediment	Aroclor-1268	2.1000	
C-13	2003	03287-C-13	sediment	Aroclor-1268	1.3000	
C-13	2004	04294-C-13	sediment	Aroclor-1268	2.4000	
C-13	2005	05292-C-13	sediment	Aroclor-1268	1.3000	
C-14	2000	C-14(S)	sediment	Aroclor-1268	0.3000	
C-14	2005	05293-C-14	sediment	Aroclor-1268	7.3000	
M-27	2000	M-27(S)	sediment	Aroclor-1268	0.4700	
M-27	2002	02236-M-27	sediment	Aroclor-1268	2.6000	
M-27	2003	03288-M-27	sediment	Aroclor-1268	0.8700	
M-27	2004	04296-M-27	sediment	Aroclor-1268	1.3000	
SD2C-10	2004	04286-SD2C-10	sediment	Aroclor-1268	8.0000	
SD2C-11	2004	04287-SD2C-11	sediment	Aroclor-1268	1.3000	
SD2C-12	2004	04287-SD2C-12	sediment	Aroclor-1268	14.0000	
SD2C-19	2004	04287-SD2C-19	sediment	Aroclor-1268	1.4000	
SD2C-6	2004	04286-SD2C-6	sediment	Aroclor-1268	5.2000	
SD2C-7	2004	04286-SD2C-7	sediment	Aroclor-1268	1.1000	
SD2C-9	2004	04286-SD2C-9	sediment	Aroclor-1268	3.5000	
SD2M-1	2004	04288-SD2M-1	sediment	Aroclor-1268	0.5400	
SD2M-12	2004	04288-SD2M-12	sediment	Aroclor-1268	0.4200	
SD2M-2	2004	04288-SD2M-2	sediment	Aroclor-1268	0.3800	
SDWC-AET-10	2006	06297-SDWC-AET-10	SEDIMENT	Aroclor-1268	1.4000	D
SDWC-AET-11	2006	06297-SDWC-AET-11	SEDIMENT	Aroclor-1268	0.7500	D
SDWC-AET-12	2006	06297-SDWC-AET-12	SEDIMENT	Aroclor-1268	2.4000	D
SDWC-AET-13	2006	06297-SDWC-AET-13	SEDIMENT	Aroclor-1268	2.2000	D
SDWC-AET-14	2006	06297-SDWC-AET-14	SEDIMENT	Aroclor-1268	5.2000	D
SDWC-AET-15	2006	06297-SDWC-AET-15	SEDIMENT	Aroclor-1268	2.5000	D
SDWC-AET-16	2006	06297-SDWC-AET-16	SEDIMENT	Aroclor-1268	20.0000	D
SDWC-AET-17	2006	06297-SDWC-AET-17	SEDIMENT	Aroclor-1268	25.0000	D
SDWC-AET-18	2006	06297-SDWC-AET-18	SEDIMENT	Aroclor-1268	2.1000	D
SDWC-AET-19	2006	06297-SDWC-AET-19	SEDIMENT	Aroclor-1268	1.8000	D
SDWC-AET-20	2006	06297-SDWC-AET-20	SEDIMENT	Aroclor-1268	2.4000	D
SDWC-AET-21	2006	06297-SDWC-AET-21	SEDIMENT	Aroclor-1268	4.8000	D
SDWC-AET-7	2006	06297-SDWC-AET-7	SEDIMENT	Aroclor-1268	1.8000	D
SDWC-AET-8	2006	06297-SDWC-AET-8	SEDIMENT	Aroclor-1268	7.0000	D
SDWC-AET-9	2006	06297-SDWC-AET-9	SEDIMENT	Aroclor-1268	1.7000	D
				Average	**3.2417**	

Raw Data Mercury in Fiddler Crab
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
9-NOAA-G	04294-FC-NOAA9-1	2004	Fiddler Crab	Mercury	0.19000
9-NOAA-G	04294-FC-NOAA9-2	2004	Fiddler Crab	Mercury	0.17000
9-NOAA-G	04294-FC-NOAA9-3	2004	Fiddler Crab	Mercury	0.18000
9-NOAA-G	04294-FC-NOAA9-4	2004	Fiddler Crab	Mercury	0.22000
9-NOAA-G	04294-FC-NOAA9-5	2004	Fiddler Crab	Mercury	0.30000
9-NOAA-G	04294-FC-NOAA9-6	2004	Fiddler Crab	Mercury	0.16000
9-NOAA-G	04294-FC-NOAA9-7	2004	Fiddler Crab	Mercury	0.27000
9-NOAA-G	05298-FC-NOAA-9-R1	2005	Fiddler crab	Mercury	0.19934
9-NOAA-G	05298-FC-NOAA-9-R2	2005	Fiddler crab	Mercury	0.16502
9-NOAA-G	05298-FC-NOAA-9-R3	2005	Fiddler crab	Mercury	0.13158
9-NOAA-G	05298-FC-NOAA-9-R4	2005	Fiddler crab	Mercury	0.16447
9-NOAA-G	05298-FC-NOAA-9-R5	2005	Fiddler crab	Mercury	0.17668
9-NOAA-G	05298-FC-NOAA-9-R6	2005	Fiddler crab	Mercury	0.12698
9-NOAA-G	05298-FC-NOAA-9-R7	2005	Fiddler crab	Mercury	0.17606
6-NOAA-G	04293-FC-NOAA6-1	2004	Fiddler Crab	Mercury	0.22000
6-NOAA-G	04293-FC-NOAA6-2	2004	Fiddler Crab	Mercury	0.30000
6-NOAA-G	04293-FC-NOAA6-3	2004	Fiddler Crab	Mercury	0.30000
6-NOAA-G	04293-FC-NOAA6-4	2004	Fiddler Crab	Mercury	0.28000
6-NOAA-G	04293-FC-NOAA6-5	2004	Fiddler Crab	Mercury	0.22000
6-NOAA-G	04293-FC-NOAA6-6	2004	Fiddler Crab	Mercury	0.23000
6-NOAA-G	04293-FC-NOAA6-7	2004	Fiddler Crab	Mercury	0.31000
6-NOAA-G	05298-FC-NOAA-6-R1	2005	Fiddler crab	Mercury	0.17606
6-NOAA-G	05298-FC-NOAA-6-R2	2005	Fiddler crab	Mercury	0.17668
6-NOAA-G	05298-FC-NOAA-6-R3	2005	Fiddler crab	Mercury	0.19608
7-NOAA-G	04293-FC-NOAA7-1	2004	Fiddler Crab	Mercury	0.71000
7-NOAA-G	04293-FC-NOAA7-2	2004	Fiddler Crab	Mercury	0.52000
7-NOAA-G	04293-FC-NOAA7-3	2004	Fiddler Crab	Mercury	0.74000
7-NOAA-G	04293-FC-NOAA7-4	2004	Fiddler Crab	Mercury	0.85000
7-NOAA-G	04293-FC-NOAA7-5	2004	Fiddler Crab	Mercury	0.58000
7-NOAA-G	04293-FC-NOAA7-6	2004	Fiddler Crab	Mercury	0.73000
7-NOAA-G	04293-FC-NOAA7-7	2004	Fiddler Crab	Mercury	0.82000
7-NOAA-G	05298-FC-NOAA-7-R1	2005	Fiddler crab	Mercury	0.21605
7-NOAA-G	05298-FC-NOAA-7-R2	2005	Fiddler crab	Mercury	0.16129
7-NOAA-G	05298-FC-NOAA-7-R3	2005	Fiddler crab	Mercury	0.21341

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Raw Data Mercury in Fiddler Crab (Cont'd.)
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
7-NOAA-G	05298-FC-NOAA-7-R4	2005	Fiddler crab	Mercury	0.23952
7-NOAA-G	05298-FC-NOAA-7-R5	2005	Fiddler crab	Mercury	0.21807
7-NOAA-G	05298-FC-NOAA-7-R6	2005	Fiddler crab	Mercury	0.22293
7-NOAA-G	05298-FC-NOAA-7-R7	2005	Fiddler crab	Mercury	0.15873
8-NOAA-G	04294-FC-NOAA8-1	2004	Fiddler Crab	Mercury	0.19000
8-NOAA-G	04294-FC-NOAA8-2	2004	Fiddler Crab	Mercury	0.20000
8-NOAA-G	04294-FC-NOAA8-3	2004	Fiddler Crab	Mercury	0.24000
8-NOAA-G	04294-FC-NOAA8-4	2004	Fiddler Crab	Mercury	0.19000
8-NOAA-G	04294-FC-NOAA8-5	2004	Fiddler Crab	Mercury	0.17000
8-NOAA-G	04294-FC-NOAA8-6	2004	Fiddler Crab	Mercury	0.15000
8-NOAA-G	04294-FC-NOAA8-7	2004	Fiddler Crab	Mercury	0.15000
8-NOAA-G	05298-FC-NOAA-8-R1	2005	Fiddler crab	Mercury	0.09804
8-NOAA-G	05298-FC-NOAA-8-R2	2005	Fiddler crab	Mercury	0.12821
8-NOAA-G	05298-FC-NOAA-8-R3	2005	Fiddler crab	Mercury	0.09772
8-NOAA-G	05298-FC-NOAA-8-R4	2005	Fiddler crab	Mercury	0.12862
8-NOAA-G	05298-FC-NOAA-8-R5	2005	Fiddler crab	Mercury	0.09585
8-NOAA-G	05298-FC-NOAA-8-R6	2005	Fiddler crab	Mercury	0.13652
8-NOAA-G	05298-FC-NOAA-8-R7	2005	Fiddler crab	Mercury	0.13559
8-NOAA-G	06292-NOAA-8-G-FC-R1	2006	Fiddler Crab	Mercury	0.20881
8-NOAA-G	06292-NOAA-8-G-FC-R2	2006	Fiddler Crab	Mercury	0.25510
8-NOAA-G	06292-NOAA-8-G-FC-R3	2006	Fiddler Crab	Mercury	0.26384
8-NOAA-G	06292-NOAA-8-G-FC-R4	2006	Fiddler Crab	Mercury	0.28212
8-NOAA-G	06292-NOAA-8-G-FC-R5	2006	Fiddler Crab	Mercury	0.28814
8-NOAA-G	06292-NOAA-8-G-FC-R6	2006	Fiddler Crab	Mercury	0.25488
8-NOAA-G	07289-NOAA-8-FC-R1	2007	Fiddler Crab	Mercury	0.13503
8-NOAA-G	07289-NOAA-8-FC-R2	2007	Fiddler Crab	Mercury	0.12287
8-NOAA-G	07289-NOAA-8-FC-R3	2007	Fiddler Crab	Mercury	0.17713
				Average	**0.25438**

Raw Data Mercury in Sediment
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05
6-NOAA-G	04294-NOAA6	2004	sediment	Mercury	0.8400
6-NOAA-G	05292-NOAA-6-G	2005	sediment	Mercury	0.7070
6-NOAA-G	06292-NOAA-6-G	2006	sediment	Mercury	0.4120
6-NOAA-G	07289-NOAA-6	2007	sediment	Mercury	0.8530
7-NOAA-G	04294-NOAA7	2004	sediment	Mercury	0.8200
7-NOAA-G	05292-NOAA-7-G	2005	sediment	Mercury	0.6750
7-NOAA-G	06292-NOAA-7-G	2006	sediment	Mercury	0.5670
7-NOAA-G	07289-NOAA-7	2007	sediment	Mercury	0.7080
8-NOAA-G	04294-NOAA8	2004	sediment	Mercury	0.8600
8-NOAA-G	05292-NOAA-8-G	2005	sediment	Mercury	0.8660
8-NOAA-G	06292-NOAA-8-G	2006	sediment	Mercury	0.7430
8-NOAA-G	07289-NOAA-8	2007	sediment	Mercury	1.0200
9-NOAA-G	04294-NOAA9	2004	sediment	Mercury	0.5600
9-NOAA-G	05291-NOAA-9-G	2005	sediment	Mercury	0.9350
9-NOAA-G	06290-NOAA-9-G	2006	sediment	Mercury	0.4030
9-NOAA-G	07289-NOAA-9	2007	sediment	Mercury	0.8620
C-12	C-12(S)	2000	sediment	Mercury	5.3400
C-12	05292-C-12	2005	sediment	Mercury	1.0300
C-13	C-13(S)	2000	sediment	Mercury	7.0000
C-13	02236-C-13	2002	sediment	Mercury	1.5000
C-13	03287-C-13	2003	sediment	Mercury	0.4800
C-13	04294-C-13	2004	sediment	Mercury	1.7000
C-13	05292-C-13	2005	sediment	Mercury	1.4300
C-15	C-15(S)	2000	sediment	Mercury	3.3600
C-15	02236-C-15	2002	sediment	Mercury	1.3000
C-15	03287-C-15	2003	sediment	Mercury	2.4000
C-15	03288-C-15	2003	sediment	Mercury	2.8000
C-15	04294-C-15	2004	sediment	Mercury	1.2000
C-15	05297-C-15	2005	sediment	Mercury	2.1100
C-15	06290-C-15	2006	sediment	Mercury	0.4560
C-15	07289-C-15	2007	sediment	Mercury	1.8200
M-27	M-27(S)	2000	sediment	Mercury	3.3000
M-27	02236-M-27	2002	sediment	Mercury	2.1000
M-27	03288-M-27	2003	sediment	Mercury	0.6400
M-27	04296-M-27	2004	sediment	Mercury	0.7600
SD2C-6	04286-SD2C-6	2004	sediment	Mercury	2.1000
SD2C-7	04286-SD2C-7	2004	sediment	Mercury	0.5800
SD2C-8	04286-SD2C-8	2004	sediment	Mercury	0.3800
SD2M-16	04288-SD2M-16	2004	sediment	Mercury	0.6300
SD2M-2	04288-SD2M-2	2004	sediment	Mercury	0.3600
SD2M-3	04289-SD2M-3	2004	sediment	Mercury	0.8300
SD2M-5	04288-SD2M-5	2004	sediment	Mercury	0.2700
SDWC-AET-10	06297-SDWC-AET-10	2006	sediment	Mercury	1.2200
SDWC-AET-6	06297-SDWC-AET-6	2006	sediment	Mercury	2.1000
SDWC-AET-7	06297-SDWC-AET-7	2006	sediment	Mercury	0.9540
SDWC-AET-8	06297-SDWC-AET-8	2006	sediment	Mercury	1.0200
SDWC-AET-9	06297-SDWC-AET-9	2006	sediment	Mercury	1.2900
				Average	**1.3679**

Raw Data Aroclor 1268 in Fiddler Crab
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
9-NOAA-G	04294-FC-NOAA9-1	2004	Fiddler Crab	Aroclor-1268	1.62069	
9-NOAA-G	04294-FC-NOAA9-2	2004	Fiddler Crab	Aroclor-1268	1.17857	
9-NOAA-G	04294-FC-NOAA9-3	2004	Fiddler Crab	Aroclor-1268	1.60000	
9-NOAA-G	04294-FC-NOAA9-4	2004	Fiddler Crab	Aroclor-1268	1.79310	
9-NOAA-G	04294-FC-NOAA9-5	2004	Fiddler Crab	Aroclor-1268	0.96429	
9-NOAA-G	04294-FC-NOAA9-6	2004	Fiddler Crab	Aroclor-1268	0.73333	
9-NOAA-G	04294-FC-NOAA9-7	2004	Fiddler Crab	Aroclor-1268	0.83333	
9-NOAA-G	05298-FC-NOAA-9-R1	2005	Fiddler crab	Aroclor-1268	0.99668	
9-NOAA-G	05298-FC-NOAA-9-R2	2005	Fiddler crab	Aroclor-1268	1.28713	
9-NOAA-G	05298-FC-NOAA-9-R3	2005	Fiddler crab	Aroclor-1268	0.52632	
9-NOAA-G	05298-FC-NOAA-9-R4	2005	Fiddler crab	Aroclor-1268	0.88816	
9-NOAA-G	05298-FC-NOAA-9-R5	2005	Fiddler crab	Aroclor-1268	0.81272	
9-NOAA-G	05298-FC-NOAA-9-R6	2005	Fiddler crab	Aroclor-1268	1.49206	
9-NOAA-G	05298-FC-NOAA-9-R7	2005	Fiddler crab	Aroclor-1268	1.05634	
6-NOAA-G	04293-FC-NOAA6-1	2004	Fiddler Crab	Aroclor-1268	0.25000	U
6-NOAA-G	04293-FC-NOAA6-2	2004	Fiddler Crab	Aroclor-1268	0.30357	U
6-NOAA-G	04293-FC-NOAA6-3	2004	Fiddler Crab	Aroclor-1268	0.25926	U
6-NOAA-G	04293-FC-NOAA6-4	2004	Fiddler Crab	Aroclor-1268	0.18966	U
6-NOAA-G	04293-FC-NOAA6-5	2004	Fiddler Crab	Aroclor-1268	0.30357	U
6-NOAA-G	04293-FC-NOAA6-6	2004	Fiddler Crab	Aroclor-1268	0.29310	U
6-NOAA-G	04293-FC-NOAA6-7	2004	Fiddler Crab	Aroclor-1268	0.25926	U
6-NOAA-G	05298-FC-NOAA-6-R1	2005	Fiddler crab	Aroclor-1268	0.38732	
6-NOAA-G	05298-FC-NOAA-6-R2	2005	Fiddler crab	Aroclor-1268	0.56537	J
6-NOAA-G	05298-FC-NOAA-6-R3	2005	Fiddler crab	Aroclor-1268	0.78431	
7-NOAA-G	04293-FC-NOAA7-1	2004	Fiddler Crab	Aroclor-1268	0.17857	U
7-NOAA-G	04293-FC-NOAA7-2	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	04293-FC-NOAA7-3	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	04293-FC-NOAA7-4	2004	Fiddler Crab	Aroclor-1268	0.16667	U
7-NOAA-G	04293-FC-NOAA7-5	2004	Fiddler Crab	Aroclor-1268	0.17857	U
7-NOAA-G	04293-FC-NOAA7-6	2004	Fiddler Crab	Aroclor-1268	0.16667	U
7-NOAA-G	04293-FC-NOAA7-7	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	05298-FC-NOAA-7-R1	2005	Fiddler crab	Aroclor-1268	0.98765	
7-NOAA-G	05298-FC-NOAA-7-R2	2005	Fiddler crab	Aroclor-1268	0.83871	
7-NOAA-G	05298-FC-NOAA-7-R3	2005	Fiddler crab	Aroclor-1268	0.85366	
7-NOAA-G	05298-FC-NOAA-7-R4	2005	Fiddler crab	Aroclor-1268	0.89820	
7-NOAA-G	05298-FC-NOAA-7-R5	2005	Fiddler crab	Aroclor-1268	0.90343	
7-NOAA-G	05298-FC-NOAA-7-R6	2005	Fiddler crab	Aroclor-1268	0.92357	
7-NOAA-G	05298-FC-NOAA-7-R7	2005	Fiddler crab	Aroclor-1268	0.73016	
8-NOAA-G	04294-FC-NOAA8-1	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-2	2004	Fiddler Crab	Aroclor-1268	0.32258	U

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Raw Data Aroclor 1268 in Fiddler Crab (Cont'd.)
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
8-NOAA-G	04294-FC-NOAA8-3	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-4	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-5	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	04294-FC-NOAA8-6	2004	Fiddler Crab	Aroclor-1268	0.31250	U
8-NOAA-G	04294-FC-NOAA8-7	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	05298-FC-NOAA-8-R1	2005	Fiddler crab	Aroclor-1268	1.20915	
8-NOAA-G	05298-FC-NOAA-8-R2	2005	Fiddler crab	Aroclor-1268	1.12180	
8-NOAA-G	05298-FC-NOAA-8-R3	2005	Fiddler crab	Aroclor-1268	1.30293	
8-NOAA-G	05298-FC-NOAA-8-R4	2005	Fiddler crab	Aroclor-1268	1.06109	
8-NOAA-G	05298-FC-NOAA-8-R5	2005	Fiddler crab	Aroclor-1268	1.21406	
8-NOAA-G	05298-FC-NOAA-8-R6	2005	Fiddler crab	Aroclor-1268	1.29693	
8-NOAA-G	05298-FC-NOAA-8-R7	2005	Fiddler crab	Aroclor-1268	1.38983	
8-NOAA-G	06292-NOAA-8-G-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.32881	
8-NOAA-G	06292-NOAA-8-G-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.24522	
8-NOAA-G	06292-NOAA-8-G-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.42345	
8-NOAA-G	06292-NOAA-8-G-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.62044	
8-NOAA-G	06292-NOAA-8-G-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.63241	
8-NOAA-G	06292-NOAA-8-G-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.48780	
8-NOAA-G	07289-NOAA-8-FC-R1	2007	Fiddler Crab	Aroclor-1268	0.41916	
8-NOAA-G	07289-NOAA-8-FC-R2	2007	Fiddler Crab	Aroclor-1268	0.51829	
8-NOAA-G	07289-NOAA-8-FC-R3	2007	Fiddler Crab	Aroclor-1268	0.54878	
				Average	**0.68560**	

Raw Data Aroclor 1268 in Sediment
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
6-NOAA-G	04294-NOAA6	2004	sediment	Aroclor-1268	0.8600	
6-NOAA-G	05292-NOAA-6-G	2005	sediment	Aroclor-1268	1.2000	
6-NOAA-G	06292-NOAA-6-G	2006	sediment	Aroclor-1268	0.6500	
6-NOAA-G	07289-NOAA-6	2007	sediment	Aroclor-1268	1.2000	D
7-NOAA-G	04294-NOAA7	2004	sediment	Aroclor-1268	0.8400	
7-NOAA-G	05292-NOAA-7-G	2005	sediment	Aroclor-1268	1.0000	
7-NOAA-G	06292-NOAA-7-G	2006	sediment	Aroclor-1268	1.2000	D
7-NOAA-G	07289-NOAA-7	2007	sediment	Aroclor-1268	1.2000	D
8-NOAA-G	04294-NOAA8	2004	sediment	Aroclor-1268	0.5000	
8-NOAA-G	05292-NOAA-8-G	2005	sediment	Aroclor-1268	0.6100	
8-NOAA-G	06292-NOAA-8-G	2006	sediment	Aroclor-1268	0.4000	
8-NOAA-G	07289-NOAA-8	2007	sediment	Aroclor-1268	0.5100	
9-NOAA-G	04294-NOAA9	2004	sediment	Aroclor-1268	1.3000	
9-NOAA-G	05291-NOAA-9-G	2005	sediment	Aroclor-1268	3.3000	
9-NOAA-G	06290-NOAA-9-G	2006	sediment	Aroclor-1268	0.6200	
9-NOAA-G	07289-NOAA-9	2007	sediment	Aroclor-1268	2.7000	D
C-12	C-12(S)	2000	sediment	Aroclor-1268	0.4800	
C-12	05292-C-12	2005	sediment	Aroclor-1268	4.8000	
C-13	C-13(S)	2000	sediment	Aroclor-1268	0.7500	
C-13	02236-C-13	2002	sediment	Aroclor-1268	2.1000	
C-13	03287-C-13	2003	sediment	Aroclor-1268	1.3000	
C-13	04294-C-13	2004	sediment	Aroclor-1268	2.4000	
C-13	05292-C-13	2005	sediment	Aroclor-1268	1.3000	
C-15	C-15(S)	2000	sediment	Aroclor-1268	0.0990	J
C-15	02236-C-15	2002	sediment	Aroclor-1268	2.8000	
C-15	03287-C-15	2003	sediment	Aroclor-1268	2.8000	
C-15	03288-C-15	2003	sediment	Aroclor-1268	0.7900	
C-15	04294-C-15	2004	sediment	Aroclor-1268	2.8000	
C-15	05297-C-15	2005	sediment	Aroclor-1268	6.8000	
C-15	06290-C-15	2006	sediment	Aroclor-1268	1.0000	D
C-15	07289-C-15	2007	sediment	Aroclor-1268	2.5000	D
M-27	M-27(S)	2000	sediment	Aroclor-1268	0.4700	
M-27	02236-M-27	2002	sediment	Aroclor-1268	2.6000	
M-27	03288-M-27	2003	sediment	Aroclor-1268	0.8700	
M-27	04296-M-27	2004	sediment	Aroclor-1268	1.3000	
SD2C-6	04286-SD2C-6	2004	sediment	Aroclor-1268	5.2000	
SD2C-7	04286-SD2C-7	2004	sediment	Aroclor-1268	1.1000	
SD2C-8	04286-SD2C-8	2004	sediment	Aroclor-1268	0.5700	
SD2M-16	04288-SD2M-16	2004	sediment	Aroclor-1268	2.5000	
SD2M-2	04288-SD2M-2	2004	sediment	Aroclor-1268	0.3800	
SD2M-3	04289-SD2M-3	2004	sediment	Aroclor-1268	0.9100	
SD2M-5	04288-SD2M-5	2004	sediment	Aroclor-1268	0.6800	
SDWC-AET-10	06297-SDWC-AET-10	2006	sediment	Aroclor-1268	1.4000	D
SDWC-AET-6	06297-SDWC-AET-6	2006	sediment	Aroclor-1268	1.9000	D
SDWC-AET-7	06297-SDWC-AET-7	2006	sediment	Aroclor-1268	1.8000	D
SDWC-AET-8	06297-SDWC-AET-8	2006	sediment	Aroclor-1268	7.0000	D
SDWC-AET-9	06297-SDWC-AET-9	2006	sediment	Aroclor-1268	1.7000	D
				Average	**1.7274**	

Raw Data Aroclor 1268 in Fiddler Crab
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
9-NOAA-G	04294-FC-NOAA9-1	2004	Fiddler Crab	Aroclor-1268	1.62069	
9-NOAA-G	04294-FC-NOAA9-2	2004	Fiddler Crab	Aroclor-1268	1.17857	
9-NOAA-G	04294-FC-NOAA9-3	2004	Fiddler Crab	Aroclor-1268	1.60000	
9-NOAA-G	04294-FC-NOAA9-4	2004	Fiddler Crab	Aroclor-1268	1.79310	
9-NOAA-G	04294-FC-NOAA9-5	2004	Fiddler Crab	Aroclor-1268	0.96429	
9-NOAA-G	04294-FC-NOAA9-6	2004	Fiddler Crab	Aroclor-1268	0.73333	
9-NOAA-G	04294-FC-NOAA9-7	2004	Fiddler Crab	Aroclor-1268	0.83333	
9-NOAA-G	05298-FC-NOAA-9-R1	2005	Fiddler crab	Aroclor-1268	0.99668	
9-NOAA-G	05298-FC-NOAA-9-R2	2005	Fiddler crab	Aroclor-1268	1.28713	
9-NOAA-G	05298-FC-NOAA-9-R3	2005	Fiddler crab	Aroclor-1268	0.52632	
9-NOAA-G	05298-FC-NOAA-9-R4	2005	Fiddler crab	Aroclor-1268	0.88816	
9-NOAA-G	05298-FC-NOAA-9-R5	2005	Fiddler crab	Aroclor-1268	0.81272	
9-NOAA-G	05298-FC-NOAA-9-R6	2005	Fiddler crab	Aroclor-1268	1.49206	
9-NOAA-G	05298-FC-NOAA-9-R7	2005	Fiddler crab	Aroclor-1268	1.05634	
6-NOAA-G	04293-FC-NOAA6-1	2004	Fiddler Crab	Aroclor-1268	0.25000	U
6-NOAA-G	04293-FC-NOAA6-2	2004	Fiddler Crab	Aroclor-1268	0.30357	U
6-NOAA-G	04293-FC-NOAA6-3	2004	Fiddler Crab	Aroclor-1268	0.25926	U
6-NOAA-G	04293-FC-NOAA6-4	2004	Fiddler Crab	Aroclor-1268	0.18966	U
6-NOAA-G	04293-FC-NOAA6-5	2004	Fiddler Crab	Aroclor-1268	0.30357	U
6-NOAA-G	04293-FC-NOAA6-6	2004	Fiddler Crab	Aroclor-1268	0.29310	U
6-NOAA-G	04293-FC-NOAA6-7	2004	Fiddler Crab	Aroclor-1268	0.25926	U
6-NOAA-G	05298-FC-NOAA-6-R1	2005	Fiddler crab	Aroclor-1268	0.38732	
6-NOAA-G	05298-FC-NOAA-6-R2	2005	Fiddler crab	Aroclor-1268	0.56537	J
6-NOAA-G	05298-FC-NOAA-6-R3	2005	Fiddler crab	Aroclor-1268	0.78431	
7-NOAA-G	04293-FC-NOAA7-1	2004	Fiddler Crab	Aroclor-1268	0.17857	U
7-NOAA-G	04293-FC-NOAA7-2	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	04293-FC-NOAA7-3	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	04293-FC-NOAA7-4	2004	Fiddler Crab	Aroclor-1268	0.16667	U
7-NOAA-G	04293-FC-NOAA7-5	2004	Fiddler Crab	Aroclor-1268	0.17857	U
7-NOAA-G	04293-FC-NOAA7-6	2004	Fiddler Crab	Aroclor-1268	0.16667	U
7-NOAA-G	04293-FC-NOAA7-7	2004	Fiddler Crab	Aroclor-1268	0.17241	U
7-NOAA-G	05298-FC-NOAA-7-R1	2005	Fiddler crab	Aroclor-1268	0.98765	
7-NOAA-G	05298-FC-NOAA-7-R2	2005	Fiddler crab	Aroclor-1268	0.83871	
7-NOAA-G	05298-FC-NOAA-7-R3	2005	Fiddler crab	Aroclor-1268	0.85366	
7-NOAA-G	05298-FC-NOAA-7-R4	2005	Fiddler crab	Aroclor-1268	0.89820	
7-NOAA-G	05298-FC-NOAA-7-R5	2005	Fiddler crab	Aroclor-1268	0.90343	
7-NOAA-G	05298-FC-NOAA-7-R6	2005	Fiddler crab	Aroclor-1268	0.92357	
7-NOAA-G	05298-FC-NOAA-7-R7	2005	Fiddler crab	Aroclor-1268	0.73016	
8-NOAA-G	04294-FC-NOAA8-1	2004	Fiddler Crab	Aroclor-1268	0.33333	U

Continued on next page

Raw Data Aroclor 1268 in Fiddler Crab (Cont'd.)
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
8-NOAA-G	04294-FC-NOAA8-2	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	04294-FC-NOAA8-3	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-4	2004	Fiddler Crab	Aroclor-1268	0.33333	U
8-NOAA-G	04294-FC-NOAA8-5	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	04294-FC-NOAA8-6	2004	Fiddler Crab	Aroclor-1268	0.31250	U
8-NOAA-G	04294-FC-NOAA8-7	2004	Fiddler Crab	Aroclor-1268	0.32258	U
8-NOAA-G	05298-FC-NOAA-8-R1	2005	Fiddler crab	Aroclor-1268	1.20915	
8-NOAA-G	05298-FC-NOAA-8-R2	2005	Fiddler crab	Aroclor-1268	1.12180	
8-NOAA-G	05298-FC-NOAA-8-R3	2005	Fiddler crab	Aroclor-1268	1.30293	
8-NOAA-G	05298-FC-NOAA-8-R4	2005	Fiddler crab	Aroclor-1268	1.06109	
8-NOAA-G	05298-FC-NOAA-8-R5	2005	Fiddler crab	Aroclor-1268	1.21406	
8-NOAA-G	05298-FC-NOAA-8-R6	2005	Fiddler crab	Aroclor-1268	1.29693	
8-NOAA-G	05298-FC-NOAA-8-R7	2005	Fiddler crab	Aroclor-1268	1.38983	
8-NOAA-G	06292-NOAA-8-G-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.32881	
8-NOAA-G	06292-NOAA-8-G-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.24522	
8-NOAA-G	06292-NOAA-8-G-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.42345	
8-NOAA-G	06292-NOAA-8-G-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.62044	
8-NOAA-G	06292-NOAA-8-G-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.63241	
8-NOAA-G	06292-NOAA-8-G-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.48780	
8-NOAA-G	07289-NOAA-8-FC-R1	2007	Fiddler Crab	Aroclor-1268	0.41916	
8-NOAA-G	07289-NOAA-8-FC-R2	2007	Fiddler Crab	Aroclor-1268	0.51829	
8-NOAA-G	07289-NOAA-8-FC-R3	2007	Fiddler Crab	Aroclor-1268	0.54878	
				Average	**0.68560**	

Raw Data Aroclor 1268 in Sediment
9NOAAG polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
6-NOAA-G	04294-NOAA6	2004	sediment	Aroclor-1268	0.8600	
6-NOAA-G	05292-NOAA-6-G	2005	sediment	Aroclor-1268	1.2000	
6-NOAA-G	06292-NOAA-6-G	2006	SEDIMENT	Aroclor-1268	0.6500	
6-NOAA-G	07289-NOAA-6	2007	sediment	Aroclor-1268	1.2000	D
7-NOAA-G	04294-NOAA7	2004	sediment	Aroclor-1268	0.8400	
7-NOAA-G	05292-NOAA-7-G	2005	sediment	Aroclor-1268	1.0000	
7-NOAA-G	06292-NOAA-7-G	2006	SEDIMENT	Aroclor-1268	1.2000	D
7-NOAA-G	07289-NOAA-7	2007	sediment	Aroclor-1268	1.2000	D
8-NOAA-G	04294-NOAA8	2004	sediment	Aroclor-1268	0.5000	
8-NOAA-G	05292-NOAA-8-G	2005	sediment	Aroclor-1268	0.6100	
8-NOAA-G	06292-NOAA-8-G	2006	SEDIMENT	Aroclor-1268	0.4000	
8-NOAA-G	07289-NOAA-8	2007	sediment	Aroclor-1268	0.5100	
9-NOAA-G	04294-NOAA9	2004	sediment	Aroclor-1268	1.3000	
9-NOAA-G	05291-NOAA-9-G	2005	sediment	Aroclor-1268	3.3000	
9-NOAA-G	06290-NOAA-9-G	2006	SEDIMENT	Aroclor-1268	0.6200	
9-NOAA-G	07289-NOAA-9	2007	sediment	Aroclor-1268	2.7000	D
C-12	C-12(S)	2000	sediment	Aroclor-1268	0.4800	
C-12	05292-C-12	2005	sediment	Aroclor-1268	4.8000	
C-13	C-13(S)	2000	sediment	Aroclor-1268	0.7500	
C-13	02236-C-13	2002	sediment	Aroclor-1268	2.1000	
C-13	03287-C-13	2003	sediment	Aroclor-1268	1.3000	
C-13	04294-C-13	2004	sediment	Aroclor-1268	2.4000	
C-13	05292-C-13	2005	sediment	Aroclor-1268	1.3000	
C-15	C-15(S)	2000	sediment	Aroclor-1268	0.0990	J
C-15	02236-C-15	2002	sediment	Aroclor-1268	2.8000	
C-15	03287-C-15	2003	sediment	Aroclor-1268	2.8000	
C-15	03288-C-15	2003	sediment	Aroclor-1268	0.7900	
C-15	04294-C-15	2004	sediment	Aroclor-1268	2.8000	
C-15	05297-C-15	2005	sediment	Aroclor-1268	6.8000	
C-15	06290-C-15	2006	SEDIMENT	Aroclor-1268	1.0000	D
C-15	07289-C-15	2007	sediment	Aroclor-1268	2.5000	D
M-27	M-27(S)	2000	sediment	Aroclor-1268	0.4700	
M-27	02236-M-27	2002	sediment	Aroclor-1268	2.6000	
M-27	03288-M-27	2003	sediment	Aroclor-1268	0.8700	
M-27	04296-M-27	2004	sediment	Aroclor-1268	1.3000	
SD2C-6	04286-SD2C-6	2004	sediment	Aroclor-1268	5.2000	
SD2C-7	04286-SD2C-7	2004	sediment	Aroclor-1268	1.1000	
SD2C-8	04286-SD2C-8	2004	sediment	Aroclor-1268	0.5700	
SD2M-16	04288-SD2M-16	2004	sediment	Aroclor-1268	2.5000	
SD2M-2	04288-SD2M-2	2004	sediment	Aroclor-1268	0.3800	
SD2M-3	04289-SD2M-3	2004	sediment	Aroclor-1268	0.9100	
SD2M-5	04288-SD2M-5	2004	sediment	Aroclor-1268	0.6800	
SDWC-AET-10	06297-SDWC-AET-10	2006	SEDIMENT	Aroclor-1268	1.4000	D
SDWC-AET-6	06297-SDWC-AET-6	2006	SEDIMENT	Aroclor-1268	1.9000	D
SDWC-AET-7	06297-SDWC-AET-7	2006	SEDIMENT	Aroclor-1268	1.8000	D
SDWC-AET-8	06297-SDWC-AET-8	2006	SEDIMENT	Aroclor-1268	7.0000	D
SDWC-AET-9	06297-SDWC-AET-9	2006	SEDIMENT	Aroclor-1268	1.7000	D
				Average	**1.7274**	

Raw Data Aroclor 1268 in Fiddler Crab
M-25 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-25	03323-FC-M25-R1	2003	Fiddler Crab	Aroclor-1268	1.40000	
M-25	03323-FC-M25-R2	2003	Fiddler Crab	Aroclor-1268	2.20000	
M-25	03323-FC-M25-R3	2003	Fiddler Crab	Aroclor-1268	1.10000	
M-25	03323-FC-M25-R4	2003	Fiddler Crab	Aroclor-1268	1.90000	
M-25	03323-FC-M25-R5	2003	Fiddler Crab	Aroclor-1268	2.10000	
M-25	03323-FC-M25-R6	2003	Fiddler Crab	Aroclor-1268	1.80000	
M-25	03323-FC-M25-R7	2003	Fiddler Crab	Aroclor-1268	2.30000	
M-25	04293-FC-M25-1	2004	Fiddler Crab	Aroclor-1268	1.53333	
M-25	04293-FC-M25-2	2004	Fiddler Crab	Aroclor-1268	1.33333	
M-25	04293-FC-M25-3	2004	Fiddler Crab	Aroclor-1268	1.62500	
M-25	04293-FC-M25-4	2004	Fiddler Crab	Aroclor-1268	2.29630	
M-25	04295-FC-M25-5	2004	Fiddler Crab	Aroclor-1268	1.12903	
M-25	04295-FC-M25-6	2004	Fiddler Crab	Aroclor-1268	1.51613	
M-25	04295-FC-M25-7	2004	Fiddler Crab	Aroclor-1268	2.06452	
M-25	05295-M-25-FC-R1	2005	Fiddler crab	Aroclor-1268	4.26829	
M-25	05295-M-25-FC-R2	2005	Fiddler crab	Aroclor-1268	3.30330	
M-25	05295-M-25-FC-R3	2005	Fiddler crab	Aroclor-1268	2.81250	
M-25	05295-M-25-FC-R4	2005	Fiddler crab	Aroclor-1268	4.45104	
M-25	05295-M-25-FC-R5	2005	Fiddler crab	Aroclor-1268	4.12088	
M-25	05295-M-25-FC-R6	2005	Fiddler crab	Aroclor-1268	4.57143	
M-25	05295-M-25-FC-R7	2005	Fiddler crab	Aroclor-1268	4.26829	
M-25	06291-M-25-FC-R1	2006	Fiddler Crab	Aroclor-1268	2.41042	
M-25	06291-M-25-FC-R2	2006	Fiddler Crab	Aroclor-1268	4.37500	D
M-25	06291-M-25-FC-R3	2006	Fiddler Crab	Aroclor-1268	4.34783	D
M-25	06291-M-25-FC-R4	2006	Fiddler Crab	Aroclor-1268	5.50459	D
M-25	06291-M-25-FC-R5	2006	Fiddler Crab	Aroclor-1268	4.83384	D
M-25	06291-M-25-FC-R6	2006	Fiddler Crab	Aroclor-1268	5.28053	D
M-25	06291-M-25-FC-R7	2006	Fiddler Crab	Aroclor-1268	7.39437	D
M-25	07290-M-25-FC-R1	2007	Fiddler Crab	Aroclor-1268	1.58055	
M-25	07290-M-25-FC-R2	2007	Fiddler Crab	Aroclor-1268	2.18354	
M-25	07290-M-25-FC-R3	2007	Fiddler Crab	Aroclor-1268	2.35119	
M-25	25-FC R1	2002	Fiddler Crab	Aroclor-1268	2.60000	
M-25	25-FC R2	2002	Fiddler Crab	Aroclor-1268	2.90000	
M-25	25-FC R3	2002	Fiddler Crab	Aroclor-1268	2.80000	
M-25	25-FC R4	2002	Fiddler Crab	Aroclor-1268	3.10000	
M-25	M-25(M)_10/10/2000_Fiddler Crab-R1	2000	Fiddler Crab	Aroclor-1268	2.10000	
M-25	M-25(M)_10/10/2000_Fiddler Crab-R2	2000	Fiddler Crab	Aroclor-1268	2.20000	
M-25	M-25(M)_10/10/2000_Fiddler Crab-R3	2000	Fiddler Crab	Aroclor-1268	1.80000	
M-25	M-25(M)_10/10/2000_Fiddler Crab-R4	2000	Fiddler Crab	Aroclor-1268	2.00000	
				Average	**2.86808**	

Raw Data Aroclor 1268 in Sediment
M-25 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-25	M-25(S)	2000	sediment	Aroclor-1268	0.6600	
M-25	02234-M-25	2002	sediment	Aroclor-1268	39.0000	
M-25	03287-M-25	2003	sediment	Aroclor-1268	3.3000	
M-25	04295-M-25	2004	sediment	Aroclor-1268	1.7000	
M-25	05291-M-25	2005	sediment	Aroclor-1268	88.0000	
M-25	06291-M-25	2006	sediment	Aroclor-1268	1.2000	D
M-25	07290-M-25	2007	sediment	Aroclor-1268	1.1000	D
SD-19	03293-SD-19	2003	sediment	Aroclor-1268	0.2800	
SD-20	03293-SD-20	2003	sediment	Aroclor-1268	0.2600	
SD-21	03293-SD-21	2003	sediment	Aroclor-1268	1.4000	
SDMC-AET-47	06295-SDMC-AET-47	2006	sediment	Aroclor-1268	54.0000	D
SDMC-AET-48	06295-SDMC-AET-48	2006	sediment	Aroclor-1268	1.0000	D
SDMC-AET-49	06295-SDMC-AET-49	2006	sediment	Aroclor-1268	1.5000	D
SDMC-AET-50	06295-SDMC-AET-50	2006	sediment	Aroclor-1268	1.5000	D
				Average	**13.9214**	

Raw Data Mercury in Fiddler Crab
M-100 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
M-103	0290-M-103-FC-R1	2006	Fiddler Crab	Mercury	0.15615
M-103	0290-M-103-FC-R2	2006	Fiddler Crab	Mercury	0.19302
M-103	0290-M-103-FC-R3	2006	Fiddler Crab	Mercury	0.16084
M-103	0290-M-103-FC-R4	2006	Fiddler Crab	Mercury	0.33506
M-103	0290-M-103-FC-R5	2006	Fiddler Crab	Mercury	0.21201
M-100	04299-FC-M100-1	2004	Fiddler Crab	Mercury	0.22000
M-100	04299-FC-M100-2	2004	Fiddler Crab	Mercury	0.23000
M-100	04299-FC-M100-3	2004	Fiddler Crab	Mercury	0.20000
M-100	04299-FC-M100-4	2004	Fiddler Crab	Mercury	0.19000
M-100	04299-FC-M100-5	2004	Fiddler Crab	Mercury	0.24000
M-100	04299-FC-M100-6	2004	Fiddler Crab	Mercury	0.23000
M-100	04299-FC-M100-7	2004	Fiddler Crab	Mercury	0.29000
M-103	04301-FC-M103-1	2004	Fiddler Crab	Mercury	0.23000
M-103	04301-FC-M103-2	2004	Fiddler Crab	Mercury	0.41000
M-103	04301-FC-M103-3	2004	Fiddler Crab	Mercury	0.20000
M-103	04301-FC-M103-4	2004	Fiddler Crab	Mercury	0.24000
M-103	04301-FC-M103-5	2004	Fiddler Crab	Mercury	0.19000
M-103	04301-FC-M103-6	2004	Fiddler Crab	Mercury	0.35000
M-103	04301-FC-M103-7	2004	Fiddler Crab	Mercury	0.24000
M-100	05299-FC-M-100-R1	2005	Fiddler crab	Mercury	0.25316
M-100	05299-FC-M-100-R2	2005	Fiddler crab	Mercury	0.18519
M-100	05299-FC-M-100-R3	2005	Fiddler crab	Mercury	0.21084
M-100	05299-FC-M-100-R4	2005	Fiddler crab	Mercury	0.24691
M-100	05299-FC-M-100-R5	2005	Fiddler crab	Mercury	0.21605
M-100	05299-FC-M-100-R6	2005	Fiddler crab	Mercury	0.25641
M-100	05299-FC-M-100-R7	2005	Fiddler crab	Mercury	0.26667
M-103	05299-FC-M-103-R1	2005	Fiddler crab	Mercury	0.20588
M-103	05299-FC-M-103-R2	2005	Fiddler crab	Mercury	0.21875
M-103	05299-FC-M-103-R3	2005	Fiddler crab	Mercury	0.19802
M-103	05299-FC-M-103-R4	2005	Fiddler crab	Mercury	0.21084
M-100	06290-M-100-FC-R1	2006	Fiddler Crab	Mercury	0.29590
M-100	06290-M-100-FC-R2	2006	Fiddler Crab	Mercury	0.45768
M-100	06290-M-100-FC-R3	2006	Fiddler Crab	Mercury	0.35216
M-100	06290-M-100-FC-R4	2006	Fiddler Crab	Mercury	0.33584
M-100	06290-M-100-FC-R5	2006	Fiddler Crab	Mercury	0.44444
				Average	**0.25348**

Raw Data Mercury in Sediment
M-100 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
C-14	C-14(S)	2000	sediment	Mercury	5.3600
C-14	05293-C-14	2005	sediment	Mercury	1.8000
C-36	C-36(S)	2000	sediment	Mercury	0.9320
C-36	05297-C-36	2005	sediment	Mercury	1.9200
C-36	06290-C-36	2006	sediment	Mercury	1.0900
M-100	04299-M-100	2004	sediment	Mercury	1.0000
M-100	05292-M-100	2005	sediment	Mercury	6.8200
M-100	06290-M-100	2006	sediment	Mercury	1.4900
M-103	04301-M-103	2004	sediment	Mercury	0.6500
M-103	05291-M-103	2005	sediment	Mercury	0.1320
M-103	06290-M-103	2006	sediment	Mercury	1.0700
M-44	M-44(S)	2000	sediment	Mercury	1.5100
M-44	05292-M-44	2005	sediment	Mercury	1.2000
SD3M-12	04297-SD3M-12	2004	sediment	Mercury	3.8000
SD3M-15	04297-SD3M-15	2004	sediment	Mercury	1.7000
SD3M-21	04295-SD3M-21	2004	sediment	Mercury	0.5800
SD-UPC-C10	05295-SD-UPC-C10	2005	sediment	Mercury	0.3000
SD-UPC-C11	05295-SD-UPC-C11	2005	sediment	Mercury	2.9300
SD-UPC-C12	05295-SD-UPC-C12	2005	sediment	Mercury	0.5430
SD-UPC-C13	05297-SD-UPC-C13	2005	sediment	Mercury	4.2500
SD-UPC-C8	05295-SD-UPC-C8	2005	sediment	Mercury	0.1090
SD-UPC-C9	05295-SD-UPC-C9	2005	sediment	Mercury	0.9820
				Average	**1.8258**

Raw Data Aroclor 1268 in Fiddler Crab
M-100 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-103	0290-M-103-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.73090	
M-103	0290-M-103-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.76190	
M-103	0290-M-103-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.80906	
M-103	0290-M-103-FC-R4	2006	Fiddler Crab	Aroclor-1268	1.27490	
M-103	0290-M-103-FC-R5	2006	Fiddler Crab	Aroclor-1268	1.09541	
M-100	04299-FC-M100-1	2004	Fiddler Crab	Aroclor-1268	0.32258	U
M-100	04299-FC-M100-2	2004	Fiddler Crab	Aroclor-1268	0.28333	U
M-100	04299-FC-M100-3	2004	Fiddler Crab	Aroclor-1268	0.33333	U
M-100	04299-FC-M100-4	2004	Fiddler Crab	Aroclor-1268	0.31250	U
M-100	04299-FC-M100-5	2004	Fiddler Crab	Aroclor-1268	0.33333	U
M-100	04299-FC-M100-6	2004	Fiddler Crab	Aroclor-1268	0.33333	U
M-100	04299-FC-M100-7	2004	Fiddler Crab	Aroclor-1268	0.28333	U
M-103	04301-FC-M103-1	2004	Fiddler Crab	Aroclor-1268	0.31250	U
M-103	04301-FC-M103-2	2004	Fiddler Crab	Aroclor-1268	0.37037	U
M-103	04301-FC-M103-3	2004	Fiddler Crab	Aroclor-1268	0.66667	
M-103	04301-FC-M103-4	2004	Fiddler Crab	Aroclor-1268	0.91429	
M-103	04301-FC-M103-5	2004	Fiddler Crab	Aroclor-1268	0.61538	
M-103	04301-FC-M103-6	2004	Fiddler Crab	Aroclor-1268	1.29167	
M-103	04301-FC-M103-7	2004	Fiddler Crab	Aroclor-1268	1.03333	
M-100	05299-FC-M-100-R1	2005	Fiddler crab	Aroclor-1268	1.36076	
M-100	05299-FC-M-100-R2	2005	Fiddler crab	Aroclor-1268	1.79012	
M-100	05299-FC-M-100-R3	2005	Fiddler crab	Aroclor-1268	1.65663	
M-100	05299-FC-M-100-R4	2005	Fiddler crab	Aroclor-1268	1.85185	
M-100	05299-FC-M-100-R5	2005	Fiddler crab	Aroclor-1268	1.94444	
M-100	05299-FC-M-100-R6	2005	Fiddler crab	Aroclor-1268	2.69231	
M-100	05299-FC-M-100-R7	2005	Fiddler crab	Aroclor-1268	2.93333	
M-103	05299-FC-M-103-R1	2005	Fiddler crab	Aroclor-1268	0.91176	
M-103	05299-FC-M-103-R2	2005	Fiddler crab	Aroclor-1268	0.75000	
M-103	05299-FC-M-103-R3	2005	Fiddler crab	Aroclor-1268	1.18812	
M-103	05299-FC-M-103-R4	2005	Fiddler crab	Aroclor-1268	1.65663	
M-100	06290-M-100-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.63091	
M-100	06290-M-100-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.84639	
M-100	06290-M-100-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.96346	
M-100	06290-M-100-FC-R4	2006	Fiddler Crab	Aroclor-1268	1.29693	
M-100	06290-M-100-FC-R5	2006	Fiddler Crab	Aroclor-1268	1.95402	
				Average	**1.04302**	

Raw Data Aroclor 1268 in Sediment
M-100 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
C-14	C-14(S)	2000	sediment	Aroclor-1268	0.3000	
C-14	05293-C-14	2005	sediment	Aroclor-1268	7.3000	
C-36	C-36(S)	2000	sediment	Aroclor-1268	0.5900	
C-36	05297-C-36	2005	sediment	Aroclor-1268	3.7000	
C-36	06290-C-36	2006	sediment	Aroclor-1268	1.4000	D
M-100	04299-M-100	2004	sediment	Aroclor-1268	1.2000	
M-100	05292-M-100	2005	sediment	Aroclor-1268	8.4000	
M-100	06290-M-100	2006	sediment	Aroclor-1268	1.4000	D
M-103	04301-M-103	2004	sediment	Aroclor-1268	1.0000	
M-103	05291-M-103	2005	sediment	Aroclor-1268	0.1500	
M-103	06290-M-103	2006	sediment	Aroclor-1268	0.5900	
M-44	M-44(S)	2000	sediment	Aroclor-1268	0.5700	
M-44	05292-M-44	2005	sediment	Aroclor-1268	1.9000	
SD3M-12	04297-SD3M-12	2004	sediment	Aroclor-1268	2.4000	
SD3M-15	04297-SD3M-15	2004	sediment	Aroclor-1268	3.9000	
SD3M-21	04295-SD3M-21	2004	sediment	Aroclor-1268	0.6400	
SD-UPC-C10	05295-SD-UPC-C10	2005	sediment	Aroclor-1268	0.8300	
SD-UPC-C11	05295-SD-UPC-C11	2005	sediment	Aroclor-1268	28.0000	
SD-UPC-C12	05295-SD-UPC-C12	2005	sediment	Aroclor-1268	1.4000	
SD-UPC-C13	05297-SD-UPC-C13	2005	sediment	Aroclor-1268	3.2000	
SD-UPC-C8	05295-SD-UPC-C8	2005	sediment	Aroclor-1268	0.0120	J
SD-UPC-C9	05295-SD-UPC-C9	2005	sediment	Aroclor-1268	3.2000	
				Average	**3.2765**	

Raw Data Mercury in Fiddler Crab
M-104 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
M-101	04299-FC-M101-1	2004	Fiddler Crab	Mercury	0.34000
M-101	04299-FC-M101-2	2004	Fiddler Crab	Mercury	0.49000
M-101	04299-FC-M101-3	2004	Fiddler Crab	Mercury	0.36000
M-101	04299-FC-M101-4	2004	Fiddler Crab	Mercury	0.41000
M-101	04299-FC-M101-5	2004	Fiddler Crab	Mercury	0.46000
M-101	04299-FC-M101-6	2004	Fiddler Crab	Mercury	0.40000
M-101	04299-FC-M101-7	2004	Fiddler Crab	Mercury	0.41000
M-104	04301-FC-M104-1	2004	Fiddler Crab	Mercury	0.27000
M-104	04301-FC-M104-2	2004	Fiddler Crab	Mercury	0.29000
M-104	04301-FC-M104-3	2004	Fiddler Crab	Mercury	0.30000
M-104	04301-FC-M104-4	2004	Fiddler Crab	Mercury	0.25000
M-104	04301-FC-M104-5	2004	Fiddler Crab	Mercury	0.39000
M-104	04301-FC-M104-6	2004	Fiddler Crab	Mercury	0.39000
M-104	04301-FC-M104-7	2004	Fiddler Crab	Mercury	0.26000
M-101	05299-FC-M-101-R1	2005	Fiddler crab	Mercury	0.15723
M-101	05299-FC-M-101-R2	2005	Fiddler crab	Mercury	0.15337
M-101	05299-FC-M-101-R3	2005	Fiddler crab	Mercury	0.19108
M-101	05299-FC-M-101-R4	2005	Fiddler crab	Mercury	0.18987
M-101	05299-FC-M-101-R5	2005	Fiddler crab	Mercury	0.16393
M-101	05299-FC-M-101-R6	2005	Fiddler crab	Mercury	0.18519
M-101	05299-FC-M-101-R7	2005	Fiddler crab	Mercury	0.20761
M-104	05299-FC-M-104-R1	2005	Fiddler crab	Mercury	0.12500
M-104	05299-FC-M-104-R2	2005	Fiddler crab	Mercury	0.13029
M-104	05299-FC-M-104-R3	2005	Fiddler crab	Mercury	0.09524
M-104	05299-FC-M-104-R4	2005	Fiddler crab	Mercury	0.09967
M-104	05299-FC-M-104-R5	2005	Fiddler crab	Mercury	0.11194
M-104	05299-FC-M-104-R6	2005	Fiddler crab	Mercury	0.10724
M-104	05299-FC-M-104-R7	2005	Fiddler crab	Mercury	0.12658
M-104	06290-M-104-FC-R1	2006	Fiddler Crab	Mercury	0.31684
M-104	06290-M-104-FC-R2	2006	Fiddler Crab	Mercury	0.21797
M-104	06290-M-104-FC-R3	2006	Fiddler Crab	Mercury	0.31503
M-104	06290-M-104-FC-R4	2006	Fiddler Crab	Mercury	0.26792
M-104	06290-M-104-FC-R5	2006	Fiddler Crab	Mercury	0.26190
M-104	06290-M-104-FC-R6	2006	Fiddler Crab	Mercury	0.29595
M-104	06290-M-104-FC-R7	2006	Fiddler Crab	Mercury	0.36103
				Average	**0.26003**

Raw Data Mercury in Sediment
M-104 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
A-C	02235-A-C	2002	sediment	Mercury	2.6000
A-C	03288-A-C	2003	sediment	Mercury	3.4000
A-C	04295-A-C	2004	sediment	Mercury	0.7900
A-M	02235-A-M	2002	sediment	Mercury	0.6100
A-M	03288-A-M	2003	sediment	Mercury	2.1000
A-M	04295-A-M	2004	sediment	Mercury	1.1000
C-101	04299-C-101	2004	sediment	Mercury	0.5300
C-32	C-32(S)	2000	sediment	Mercury	1.2900
C-32	05292-C-32	2005	sediment	Mercury	0.4760
M-101	04299-M-101	2004	sediment	Mercury	0.5500
M-101	05291-M-101	2005	sediment	Mercury	4.7200
M-104	04301-M-104	2004	sediment	Mercury	0.6900
M-104	05291-M-104	2005	sediment	Mercury	1.6500
M-104	06290-M-104	2006	SEDIMENT	Mercury	0.5970
M-39	M-39(S)	2000	sediment	Mercury	0.6070
M-46	M-46(S)	2000	sediment	Mercury	0.6880
M-46	02236-M-46	2002	sediment	Mercury	0.6100
M-46	03287-M-46	2003	sediment	Mercury	0.5900
M-46	04295-M-46	2004	sediment	Mercury	0.3800
SD3M-14	04296-SD3M-14	2004	sediment	Mercury	0.7800
SD3M-16	04295-SD3M-16	2004	sediment	Mercury	0.5700
SD3M-22	04296-SD3M-22	2004	sediment	Mercury	0.7500
SD3M-25	04296-SD3M-25	2004	sediment	Mercury	0.8800
SD-UPC-C2	05295-SD-UPC-C2	2005	sediment	Mercury	0.9270
SD-UPC-C3	05295-SD-UPC-C3	2005	sediment	Mercury	2.9600
SD-UPC-C4	05295-SD-UPC-C4	2005	sediment	Mercury	1.2800
SD-UPC-C5	05295-SD-UPC-C5	2005	sediment	Mercury	2.6200
				Average	**1.2869**

Raw Data Aroclor 1268 in Fiddler Crab
M-104 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-101	04299-FC-M101-1	2004	Fiddler Crab	Aroclor-1268	0.33333	U
M-101	04299-FC-M101-2	2004	Fiddler Crab	Aroclor-1268	0.17241	U
M-101	04299-FC-M101-3	2004	Fiddler Crab	Aroclor-1268	0.18519	U
M-101	04299-FC-M101-4	2004	Fiddler Crab	Aroclor-1268	0.17241	U
M-101	04299-FC-M101-5	2004	Fiddler Crab	Aroclor-1268	0.17857	U
M-101	04299-FC-M101-6	2004	Fiddler Crab	Aroclor-1268	0.16667	U
M-101	04299-FC-M101-7	2004	Fiddler Crab	Aroclor-1268	0.37037	U
M-104	04301-FC-M104-1	2004	Fiddler Crab	Aroclor-1268	0.17241	U
M-104	04301-FC-M104-2	2004	Fiddler Crab	Aroclor-1268	0.16129	U
M-104	04301-FC-M104-3	2004	Fiddler Crab	Aroclor-1268	0.17857	U
M-104	04301-FC-M104-4	2004	Fiddler Crab	Aroclor-1268	0.18519	U
M-104	04301-FC-M104-5	2004	Fiddler Crab	Aroclor-1268	0.18519	U
M-104	04301-FC-M104-6	2004	Fiddler Crab	Aroclor-1268	0.22727	U
M-104	04301-FC-M104-7	2004	Fiddler Crab	Aroclor-1268	0.34483	U
M-101	05299-FC-M-101-R1	2005	Fiddler crab	Aroclor-1268	0.34591	
M-101	05299-FC-M-101-R2	2005	Fiddler crab	Aroclor-1268	0.49080	J
M-101	05299-FC-M-101-R3	2005	Fiddler crab	Aroclor-1268	0.28025	
M-101	05299-FC-M-101-R4	2005	Fiddler crab	Aroclor-1268	0.34810	
M-101	05299-FC-M-101-R5	2005	Fiddler crab	Aroclor-1268	0.45902	
M-101	05299-FC-M-101-R6	2005	Fiddler crab	Aroclor-1268	0.46296	
M-101	05299-FC-M-101-R7	2005	Fiddler crab	Aroclor-1268	0.76125	
M-104	05299-FC-M-104-R1	2005	Fiddler crab	Aroclor-1268	0.87500	
M-104	05299-FC-M-104-R2	2005	Fiddler crab	Aroclor-1268	0.61889	
M-104	05299-FC-M-104-R3	2005	Fiddler crab	Aroclor-1268	1.07937	
M-104	05299-FC-M-104-R4	2005	Fiddler crab	Aroclor-1268	0.36545	
M-104	05299-FC-M-104-R5	2005	Fiddler crab	Aroclor-1268	1.19403	
M-104	05299-FC-M-104-R6	2005	Fiddler crab	Aroclor-1268	0.67024	
M-104	05299-FC-M-104-R7	2005	Fiddler crab	Aroclor-1268	0.47468	
M-104	06290-M-104-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.25253	
M-104	06290-M-104-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.24837	
M-104	06290-M-104-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.49020	
M-104	06290-M-104-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.29693	
M-104	06290-M-104-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.53968	
M-104	06290-M-104-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.64189	
M-104	06290-M-104-FC-R7	2006	Fiddler Crab	Aroclor-1268	0.84559	
				Average	**0.42214**	

Raw Data Aroclor 1268 in Sediment
M-104 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
A-C	02235-A-C	2002	sediment	Aroclor-1268	4.1000
A-C	03288-A-C	2003	sediment	Aroclor-1268	0.7300
A-C	04295-A-C	2004	sediment	Aroclor-1268	1.3000
A-M	02235-A-M	2002	sediment	Aroclor-1268	0.6100
A-M	03288-A-M	2003	sediment	Aroclor-1268	0.8400
A-M	04295-A-M	2004	sediment	Aroclor-1268	1.1000
C-101	04299-C-101	2004	sediment	Aroclor-1268	0.9700
C-32	C-32(S)	2000	sediment	Aroclor-1268	0.6300
C-32	05292-C-32	2005	sediment	Aroclor-1268	0.9500
M-101	04299-M-101	2004	sediment	Aroclor-1268	2.0000
M-101	05291-M-101	2005	sediment	Aroclor-1268	8.6000
M-104	04301-M-104	2004	sediment	Aroclor-1268	1.4000
M-104	05291-M-104	2005	sediment	Aroclor-1268	1.7000
M-104	06290-M-104	2006	sediment	Aroclor-1268	0.7400
M-39	M-39(S)	2000	sediment	Aroclor-1268	0.2700
M-46	M-46(S)	2000	sediment	Aroclor-1268	0.1700
M-46	02236-M-46	2002	sediment	Aroclor-1268	0.7000
M-46	03287-M-46	2003	sediment	Aroclor-1268	0.6600
M-46	04295-M-46	2004	sediment	Aroclor-1268	0.6600
SD3M-14	04296-SD3M-14	2004	sediment	Aroclor-1268	0.5400
SD3M-16	04295-SD3M-16	2004	sediment	Aroclor-1268	0.8000
SD3M-22	04296-SD3M-22	2004	sediment	Aroclor-1268	0.8500
SD3M-25	04296-SD3M-25	2004	sediment	Aroclor-1268	0.5800
SD-UPC-C2	05295-SD-UPC-C2	2005	sediment	Aroclor-1268	4.8000
SD-UPC-C3	05295-SD-UPC-C3	2005	sediment	Aroclor-1268	20.0000
SD-UPC-C4	05295-SD-UPC-C4	2005	sediment	Aroclor-1268	3.0000
SD-UPC-C5	05295-SD-UPC-C5	2005	sediment	Aroclor-1268	5.2000
				Average	**2.3667**

Raw Data Mercury in Fiddler Crab
M-108 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-108	04300-FC-M108-1	2004	Fiddler Crab	Mercury	0.48000	
M-108	04300-FC-M108-2	2004	Fiddler Crab	Mercury	0.36000	
M-108	04300-FC-M108-3	2004	Fiddler Crab	Mercury	0.37000	
M-108	04300-FC-M108-4	2004	Fiddler Crab	Mercury	0.26000	
M-108	04300-FC-M108-5	2004	Fiddler Crab	Mercury	0.32000	
M-108	04300-FC-M108-6	2004	Fiddler Crab	Mercury	0.28000	
M-108	04300-FC-M108-7	2004	Fiddler Crab	Mercury	0.36000	
M-108	05300-FC-M-108-R1	2005	Fiddler crab	Mercury	0.05917	
M-108	05300-FC-M-108-R2	2005	Fiddler crab	Mercury	0.06154	
M-108	05300-FC-M-108-R3	2005	Fiddler crab	Mercury	0.08876	
M-108	05300-FC-M-108-R4	2005	Fiddler crab	Mercury	0.08523	
M-108	05300-FC-M-108-R5	2005	Fiddler crab	Mercury	0.14493	
M-108	05300-FC-M-108-R6	2005	Fiddler crab	Mercury	0.14706	
M-108	05300-FC-M-108-R7	2005	Fiddler crab	Mercury	0.11834	
M-108	06292-M-108-FC-R1	2006	Fiddler Crab	Mercury	0.21806	
M-108	06292-M-108-FC-R2	2006	Fiddler Crab	Mercury	0.24396	
M-108	06292-M-108-FC-R3	2006	Fiddler Crab	Mercury	0.22508	
M-108	06292-M-108-FC-R4	2006	Fiddler Crab	Mercury	0.19610	
M-108	06292-M-108-FC-R5	2006	Fiddler Crab	Mercury	0.24803	
M-108	06292-M-108-FC-R6	2006	Fiddler Crab	Mercury	0.22915	
M-108	06292-M-108-FC-R7	2006	Fiddler Crab	Mercury	0.22098	
				Average	**0.22459**	

Raw Data Mercury in Sediment
M-108 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
C-104	04299-C-104	2004	sediment	Mercury	0.5100	
C-104	05299-C-104	2005	sediment	Mercury	1.9000	
C-104	06289-C-104	2006	sediment	Mercury	0.2760	
M-108	04300-M-108	2004	sediment	Mercury	0.0100	U
M-108	05299-M-108	2005	sediment	Mercury	0.3700	
M-108	06289-M-108	2006	sediment	Mercury	0.4570	
SD5M-12	04294-SD5M-12	2004	sediment	Mercury	0.3300	
SD5M-27	04294-SD5M-27	2004	sediment	Mercury	0.2200	
SD5M-5	04295-SD5M-5	2004	sediment	Mercury	0.3000	
				Average	**0.4859**	

Raw Data Aroclor 1268 in Fiddler Crab
M-108 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-108	04300-FC-M108-1	2004	Fiddler Crab	Aroclor-1268	0.16129	U
M-108	04300-FC-M108-2	2004	Fiddler Crab	Aroclor-1268	0.16667	U
M-108	04300-FC-M108-3	2004	Fiddler Crab	Aroclor-1268	0.16129	U
M-108	04300-FC-M108-4	2004	Fiddler Crab	Aroclor-1268	0.15625	U
M-108	04300-FC-M108-5	2004	Fiddler Crab	Aroclor-1268	0.15152	U
M-108	04300-FC-M108-6	2004	Fiddler Crab	Aroclor-1268	0.15625	U
M-108	04300-FC-M108-7	2004	Fiddler Crab	Aroclor-1268	0.16129	U
M-108	05300-FC-M-108-R1	2005	Fiddler crab	Aroclor-1268	0.26923	
M-108	05300-FC-M-108-R2	2005	Fiddler crab	Aroclor-1268	0.22462	
M-108	05300-FC-M-108-R3	2005	Fiddler crab	Aroclor-1268	0.24260	
M-108	05300-FC-M-108-R4	2005	Fiddler crab	Aroclor-1268	0.31250	
M-108	05300-FC-M-108-R5	2005	Fiddler crab	Aroclor-1268	0.22899	
M-108	05300-FC-M-108-R6	2005	Fiddler crab	Aroclor-1268	0.32353	
M-108	05300-FC-M-108-R7	2005	Fiddler crab	Aroclor-1268	0.32544	
M-108	06292-M-108-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.11037	
M-108	06292-M-108-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.10403	
M-108	06292-M-108-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.12871	
M-108	06292-M-108-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.14286	
M-108	06292-M-108-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.12500	
M-108	06292-M-108-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.13220	
M-108	06292-M-108-FC-R7	2006	Fiddler Crab	Aroclor-1268	0.18182	
				Average	**0.18888**	

Raw Data Aroclor 1268 in Sediment
M-108 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
C-104	04299-C-104	2004	sediment	Aroclor-1268	0.6700	
C-104	05299-C-104	2005	sediment	Aroclor-1268	0.0440	J
C-104	06289-C-104	2006	sediment	Aroclor-1268	0.2100	
M-108	04300-M-108	2004	sediment	Aroclor-1268	0.0275	U
M-108	05299-M-108	2005	sediment	Aroclor-1268	0.4100	
M-108	06289-M-108	2006	sediment	Aroclor-1268	0.1500	
SD5M-12	04294-SD5M-12	2004	sediment	Aroclor-1268	0.1200	
SD5M-27	04294-SD5M-27	2004	sediment	Aroclor-1268	0.4200	
SD5M-5	04295-SD5M-5	2004	sediment	Aroclor-1268	0.2500	
				Average	**0.2557**	

Raw Data Mercury in Fiddler Crab
M-204 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
M-204	05301-FC-M-204-R1	2005	Fiddler Crab	Mercury	0.25237
M-204	05301-FC-M-204-R2	2005	Fiddler Crab	Mercury	0.28391
M-204	05301-FC-M-204-R3	2005	Fiddler Crab	Mercury	0.24922
M-204	05301-FC-M-204-R4	2005	Fiddler Crab	Mercury	0.27607
M-204	05301-FC-M-204-R5	2005	Fiddler Crab	Mercury	0.30211
M-204	05301-FC-M-204-R6	2005	Fiddler Crab	Mercury	0.26946
M-204	05301-FC-M-204-R7	2005	Fiddler Crab	Mercury	0.30100
M-204	06290-M-204-FC-R1	2006	Fiddler Crab	Mercury	0.39726
M-204	06290-M-204-FC-R2	2006	Fiddler Crab	Mercury	0.31212
M-204	06290-M-204-FC-R3	2006	Fiddler Crab	Mercury	0.30382
M-204	06290-M-204-FC-R4	2006	Fiddler Crab	Mercury	0.27716
M-204	06290-M-204-FC-R5	2006	Fiddler Crab	Mercury	0.41993
M-204	06290-M-204-FC-R6	2006	Fiddler Crab	Mercury	0.38361
M-204	06290-M-204-FC-R7	2006	Fiddler Crab	Mercury	0.45645
				Average	**0.32032**

Raw Data Mercury in Sediment
M-204 polygon

Location	Sample ID	Year	Matrix	Parameter	res05
C-200	05304-C-200	2005	sediment	Mercury	4.4300
C-34	C-34(S)	2000	sediment	Mercury	1.5500
C-34	05292-C-34	2005	sediment	Mercury	2.4500
C-34	06290-C-34	2006	sediment	Mercury	8.3700
C-34	07289-C-34	2007	sediment	Mercury	7.7200
FS-AREA1	05302-FS-AREA1	2005	sediment	Mercury	0.6860
FS-AREA1	06289-FS-AREA-1	2006	sediment	Mercury	1.0700
FS-AREA1	07290-FS-AREA-1	2007	sediment	Mercury	1.1000
M-204	05301-M-204	2005	sediment	Mercury	1.3900
M-204	06290-M-204	2006	sediment	Mercury	0.9330
M-41	M-41(S)	2000	sediment	Mercury	3.1700
M-41	05292-M-41	2005	sediment	Mercury	2.8600
M-41	06290-M-41	2006	sediment	Mercury	1.7600
				Average	**2.8838**

Raw Data Aroclor 1268 in Fiddler Crab
M-204 polgon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
M-204	05301-FC-M-204-R1	2005	Fiddler Crab	Aroclor-1268	0.69401	
M-204	05301-FC-M-204-R2	2005	Fiddler Crab	Aroclor-1268	0.72555	
M-204	05301-FC-M-204-R3	2005	Fiddler Crab	Aroclor-1268	0.77882	
M-204	05301-FC-M-204-R4	2005	Fiddler Crab	Aroclor-1268	0.67485	
M-204	05301-FC-M-204-R5	2005	Fiddler Crab	Aroclor-1268	0.78550	
M-204	05301-FC-M-204-R6	2005	Fiddler Crab	Aroclor-1268	0.77844	
M-204	05301-FC-M-204-R7	2005	Fiddler Crab	Aroclor-1268	0.96990	
M-204	06290-M-204-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.33219	
M-204	06290-M-204-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.37037	
M-204	06290-M-204-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.57325	
M-204	06290-M-204-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.27336	
M-204	06290-M-204-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.60498	
M-204	06290-M-204-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.59016	
M-204	06290-M-204-FC-R7	2006	Fiddler Crab	Aroclor-1268	1.35889	
				Average	**0.67930**	

Raw Data Aroclor 1268 in Sediment
M-204 polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
C-200	05304-C-200	2005	sediment	Aroclor-1268	8.2000	
C-34	C-34(S)	2000	sediment	Aroclor-1268	0.0590	J
C-34	05292-C-34	2005	sediment	Aroclor-1268	2.7000	
C-34	06290-C-34	2006	sediment	Aroclor-1268	9.0000	D
C-34	07289-C-34	2007	sediment	Aroclor-1268	6.5000	D
FS-AREA1	05302-FS-AREA1	2005	sediment	Aroclor-1268	1.3000	
FS-AREA1	06289-FS-AREA-1	2006	sediment	Aroclor-1268	0.9200	
FS-AREA1	07290-FS-AREA-1	2007	sediment	Aroclor-1268	0.6300	
M-204	05301-M-204	2005	sediment	Aroclor-1268	2.7000	
M-204	06290-M-204	2006	sediment	Aroclor-1268	0.8100	
M-41	M-41(S)	2000	sediment	Aroclor-1268	0.5200	
M-41	05292-M-41	2005	sediment	Aroclor-1268	2.8000	
M-41	06290-M-41	2006	sediment	Aroclor-1268	1.5000	D
				Average	**2.8953**	

Raw Data Mercury in Fiddler Crab
TC polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
TC-M	03289-FC-M-TC-1	2003	Fiddler Crab	Mercury	0.0430	
TC-M	03289-FC-M-TC-5	2003	Fiddler Crab	Mercury	0.0250	
TC-M	03290-FC-M-TC-2	2003	Fiddler Crab	Mercury	0.0320	
TC-M	03290-FC-M-TC-3	2003	Fiddler Crab	Mercury	0.0350	
TC-M	03290-FC-M-TC-4	2003	Fiddler Crab	Mercury	0.0330	
TC-M	04295-FC-TC-1	2004	Fiddler Crab	Mercury	0.0330	
TC-M	04295-FC-TC-2	2004	Fiddler Crab	Mercury	0.0330	
TC-M	04295-FC-TC-3	2004	Fiddler Crab	Mercury	0.0240	
TC-M	04295-FC-TC-4	2004	Fiddler Crab	Mercury	0.0250	
TC-M	04295-FC-TC-5	2004	Fiddler Crab	Mercury	0.0270	
TC-M	04295-FC-TC-6	2004	Fiddler Crab	Mercury	0.0380	
TC-M	04295-FC-TC-7	2004	Fiddler Crab	Mercury	0.0220	
TC-C	05300-FC-TC-R1	2005	Fiddler crab	Mercury	0.0619	
TC-C	05300-FC-TC-R2	2005	Fiddler crab	Mercury	0.0299	
TC-C	05300-FC-TC-R3	2005	Fiddler crab	Mercury	0.0296	
TC-C	05300-FC-TC-R4	2005	Fiddler crab	Mercury	0.0294	
TC-C	05300-FC-TC-R5	2005	Fiddler crab	Mercury	0.0560	
TC-C	05300-FC-TC-R6	2005	Fiddler crab	Mercury	0.0595	
TC-C	05300-FC-TC-R7	2005	Fiddler crab	Mercury	0.0683	
TC-M	06292-TC-M-FC-R1	2006	Fiddler Crab	Mercury	0.0851	
TC-M	06292-TC-M-FC-R2	2006	Fiddler Crab	Mercury	0.0893	
TC-M	06292-TC-M-FC-R3	2006	Fiddler Crab	Mercury	0.0930	
TC-M	06292-TC-M-FC-R4	2006	Fiddler Crab	Mercury	0.0980	
TC-M	06292-TC-M-FC-R5	2006	Fiddler Crab	Mercury	0.1281	
TC-M	06292-TC-M-FC-R6	2006	Fiddler Crab	Mercury	0.0925	
TC-M	06292-TC-M-FC-R7	2006	Fiddler Crab	Mercury	0.1151	
TC-M	07291-TC-M-FC-R1	2007	Fiddler Crab	Mercury	0.0562	
TC-M	07291-TC-M-FC-R2	2007	Fiddler Crab	Mercury	0.0783	
TC-M	07291-TC-M-FC-R3	2007	Fiddler Crab	Mercury	0.0386	
TC-C	TC-FC R1	2002	Fiddler Crab	Mercury	0.0100	U
TC-C	TC-FC R2	2002	Fiddler Crab	Mercury	0.0270	
TC-C	TC-FC R3	2002	Fiddler Crab	Mercury	0.0320	
TC-C	TC-FC R4	2002	Fiddler Crab	Mercury	0.0300	
TC-C	TC-FC R5	2002	Fiddler Crab	Mercury	0.0350	
				Average	**0.0504**	

Raw Data Mercury in Sediment
TC polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
TC-C	02235-TC-C	2002	sediment	Mercury	0.0380	
TC-C	03289-TC-C	2003	sediment	Mercury	0.0440	
TC-C	04295-TC-C	2004	sediment	Mercury	0.0260	
TC-C	05300-TC-C	2005	sediment	Mercury	0.0921	
TC-C	06291-TC-C	2006	sediment	Mercury	0.0742	
TC-C	07291-TC-C	2007	sediment	Mercury	0.1180	
TC-C(S)	TC-C(S)_10/13/2000_sediment	2000	sediment	Mercury	0.0520	B*
TC-M	02235-TC-M	2002	sediment	Mercury	0.0940	
TC-M	03289-TC-M	2003	sediment	Mercury	0.0760	
TC-M	04295-TC-M	2004	sediment	Mercury	0.0480	
TC-M	05300-TC-M	2005	sediment	Mercury	0.1970	
TC-M	06291-TC-M	2006	sediment	Mercury	0.0889	
TC-M	07291-TC-M	2007	sediment	Mercury	0.0814	
TC-M(S)	TC-M(S)	2000	sediment	Mercury	0.1200	*
				Average	**0.0821**	

Raw Data Aroclor 1268 in Fiddler Crab
TC polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
TC-M	03289-FC-M-TC-1	2003	Fiddler Crab	Aroclor-1268	0.34500	U
TC-M	03289-FC-M-TC-5	2003	Fiddler Crab	Aroclor-1268	1.20000	
TC-M	03290-FC-M-TC-2	2003	Fiddler Crab	Aroclor-1268	0.30500	U
TC-M	03290-FC-M-TC-3	2003	Fiddler Crab	Aroclor-1268	1.80000	
TC-M	03290-FC-M-TC-4	2003	Fiddler Crab	Aroclor-1268	1.30000	
TC-M	04295-FC-TC-1	2004	Fiddler Crab	Aroclor-1268	0.19355	U
TC-M	04295-FC-TC-2	2004	Fiddler Crab	Aroclor-1268	0.28333	U
TC-M	04295-FC-TC-3	2004	Fiddler Crab	Aroclor-1268	0.20000	U
TC-M	04295-FC-TC-4	2004	Fiddler Crab	Aroclor-1268	0.22581	U
TC-M	04295-FC-TC-5	2004	Fiddler Crab	Aroclor-1268	0.33333	U
TC-M	04295-FC-TC-6	2004	Fiddler Crab	Aroclor-1268	0.29310	U
TC-M	04295-FC-TC-7	2004	Fiddler Crab	Aroclor-1268	0.33333	U
TC-C	05300-FC-TC-R1	2005	Fiddler crab	Aroclor-1268	0.01703	U
TC-C	05300-FC-TC-R2	2005	Fiddler crab	Aroclor-1268	0.04940	U
TC-C	05300-FC-TC-R3	2005	Fiddler crab	Aroclor-1268	0.02515	U
TC-C	05300-FC-TC-R4	2005	Fiddler crab	Aroclor-1268	0.02500	U
TC-C	05300-FC-TC-R5	2005	Fiddler crab	Aroclor-1268	0.01681	U
TC-C	05300-FC-TC-R6	2005	Fiddler crab	Aroclor-1268	0.02530	U
TC-C	05300-FC-TC-R7	2005	Fiddler crab	Aroclor-1268	0.01655	U
TC-M	06292-TC-M-FC-R1	2006	Fiddler Crab	Aroclor-1268	0.02006	J
TC-M	06292-TC-M-FC-R2	2006	Fiddler Crab	Aroclor-1268	0.02240	J
TC-M	06292-TC-M-FC-R3	2006	Fiddler Crab	Aroclor-1268	0.01706	J
TC-M	06292-TC-M-FC-R4	2006	Fiddler Crab	Aroclor-1268	0.01871	J
TC-M	06292-TC-M-FC-R5	2006	Fiddler Crab	Aroclor-1268	0.01376	J
TC-M	06292-TC-M-FC-R6	2006	Fiddler Crab	Aroclor-1268	0.01993	J
TC-M	06292-TC-M-FC-R7	2006	Fiddler Crab	Aroclor-1268	0.01164	JP
TC-M	07291-TC-M-FC-R1	2007	Fiddler Crab	Aroclor-1268	0.00302	U
TC-M	07291-TC-M-FC-R2	2007	Fiddler Crab	Aroclor-1268	0.00302	U
TC-M	07291-TC-M-FC-R3	2007	Fiddler Crab	Aroclor-1268	0.01297	J
TC-C	TC-FC R1	2002	Fiddler Crab	Aroclor-1268	0.02500	U
TC-C	TC-FC R2	2002	Fiddler Crab	Aroclor-1268	0.02500	U
TC-C	TC-FC R3	2002	Fiddler Crab	Aroclor-1268	0.50000	
TC-C	TC-FC R4	2002	Fiddler Crab	Aroclor-1268	0.02500	U
TC-C	TC-FC R5	2002	Fiddler Crab	Aroclor-1268	0.17000	
				Average	**0.23163**	

Raw Data Aroclor 1268 in Sediment
TC polygon

Location	Sample ID	Year	Matrix	Parameter	res05	R Mod
TC-C	02235-TC-C	2002	sediment	Aroclor-1268	0.0250	U
TC-C	03289-TC-C	2003	sediment	Aroclor-1268	0.1000	U
TC-C	04295-TC-C	2004	sediment	Aroclor-1268	0.0320	U
TC-C	05300-TC-C	2005	sediment	Aroclor-1268	0.0150	U
TC-C	06291-TC-C	2006	sediment	Aroclor-1268	0.0260	
TC-C	07291-TC-C	2007	sediment	Aroclor-1268	0.0650	J,D
TC-C(S)	TC-C(S)_10/13/2000_sediment	2000	sediment	Aroclor-1268	0.0445	U
TC-M	02235-TC-M	2002	sediment	Aroclor-1268	0.0250	U
TC-M	03289-TC-M	2003	sediment	Aroclor-1268	0.1650	U
TC-M	04295-TC-M	2004	sediment	Aroclor-1268	0.0335	U
TC-M	05300-TC-M	2005	sediment	Aroclor-1268	0.0900	J
TC-M	06291-TC-M	2006	sediment	Aroclor-1268	0.0290	
TC-M	07291-TC-M	2007	sediment	Aroclor-1268	0.0290	
TC-M(S)	TC-M(S)	2000	sediment	Aroclor-1268	0.0315	U
				Average	**0.0508**	

Appendix K-2

Mummichog Data for Each Polygon

Appendix K-2a: Mummichog Tissue Data for Each Polygon

Appendix K-2b: Mummichog Sediment Data for Each Polygon

Appendix 2a.__Mummichog Tissue Data for Each Polygon

All data averages are listed in **Bold**

C-5

Mercury	Aroclor 1268	Lead	%Lipid
0.54000	5.70000	0.59000	12.30000
0.54000	9.10000	0.54999	12.70000
0.90999	2.78261	0.37000	
0.21097	3.03798	0.54852	
0.53941	3.56847	0.37551	
0.21367	2.43590	0.37393	
0.31396	3.37838	0.29279	
0.26508	2.54310	0.68534	
0.22478	5.55556	0.23504	
0.50205	4.52675	0.21810	
0.48192	6.02410	0.26907	
0.50607	4.85830	0.36842	
0.69999	4.00000	0.50000	
0.75000	3.90000	0.50000	
0.47999	3.90000	1.00000	
2.10000	3.10000	0.50000	
0.57987	**4.27570**	**0.46104**	**12.50000**

C-9

Mercury	Aroclor 1268	Lead	%Lipid
0.45000	3.50000	0.36000	14.70000
0.49000	4.30000	0.42999	12.70000
0.56000	2.90000	0.43999	24.50000
0.61999	5.65217	0.12500	
0.75999	1.90909	0.24999	
0.87999	3.00000	0.26999	
0.39682	4.76191	0.37500	
0.36585	6.09756	0.37601	
0.55147	8.45588	0.37500	
0.59523	5.95238	1.21429	
0.52083	2.41667	0.18333	
0.57851	2.39669	0.16528	
1.28854	4.34783	0.31620	
0.66917	8.64662	0.21428	
0.75697	6.37450	0.25099	
1.00000	2.30000	2.40000	
0.62000	18.00000	1.30000	
1.70000	2.10000	2.30000	
9.10000	12.00000	1.80000	
0.77999	2.60000	1.10000	
0.70999	0.94999	0.85000	
0.83999	1.20000	1.00000	
1.10152	**4.99370**	**0.73161**	**17.30000**

C-6

Mercury	Aroclor 1268	Lead	%Lipid
0.70999	6.80000	0.31000	10.00000
0.69000	11.00000	0.37999	20.40000
0.73000	6.10000	0.51999	
1.40000	2.91304	0.25999	
1.50000	3.31818	0.12499	
1.10000	4.16667	0.12499	
0.65573	6.96721	0.37499	
0.63197	5.94796	0.48760	
0.49808	8.04598	0.22727	
0.94214	20.24794	0.31250	
0.63636	5.37190	0.19921	
0.91666	5.83333	0.27667	
0.33984	12.50000	0.24150	
1.30040	9.09091	1.80000	
0.72075	12.83019	1.50000	
1.50000	8.10000	1.10000	
1.40000	8.00000	1.00000	
0.77999	7.70000	1.05000	
0.43000	1.40000	1.40000	
0.49000	3.00000		
0.37999	1.50000		
0.84533	**7.18254**	**0.61525**	**15.20000**

C-13

Mercury	Aroclor 1268	Lead	%Lipid
0.18999	0.99999	1.10000	12.30000
0.20000	1.40000	0.61999	9.80000
0.12999	1.50000	0.65000	12.40000
0.40999	1.66667	0.12499	
0.30999	1.43478	0.12500	
0.35999	1.54545	0.12499	
0.19762	0.83003	0.37549	
0.16949	3.26271	0.37500	
0.21367	0.81196	0.64102	
0.37999	2.10000	2.20000	
0.56000	3.30000	1.90000	
0.34000	3.00000	1.20000	
0.27000	0.37000	1.05000	
0.37000	1.10000	1.00000	
0.34000	0.98000	2.40000	
0.29605	**1.62011**	**0.92577**	**11.50000**

Appendix 2a.__Mummichog Tissue Data for Each Polygon

All data averages are listed in **Bold**

C-39

Mercury	Aroclor 1268	Lead	%Lipid
0.36585	6.50407	0.37499	9.50000
0.53278	3.27869	0.68067	11.90000
0.45081	2.90984	1.08299	10.80000
0.39621	2.26891	1.45106	10.40000
0.33402	1.45228	0.79600	
0.31319	2.59574	0.42187	
0.42400	2.28000	0.43089	
0.69531	3.90625	1.30000	
0.45121	3.29268	1.50000	
0.50999	1.60000	1.50000	
0.50999	8.25000	1.00000	
0.30999	1.10000	0.85999	
0.25999	1.52000	0.85999	
0.54999	2.47826	1.48760	
0.24999	1.50000	0.50420	
0.41322	3.59504	2.03659	
0.50420	1.80672	2.11618	
0.18008	1.86992	2.08871	
0.13817	1.57676	0.68595	
0.12499	1.41129	0.96943	
0.37809	2.80992	0.83673	
0.29694	3.10044	2.10000	
0.29591	2.28571	1.80000	
0.50999	0.43000	2.10000	
0.40000	4.10000	70.00000	
0.10000	2.10000	6.50000	
0.33000	1.10000	1.50000	
0.36000	0.69999	0.49382	
0.41999	0.57999	0.71548	
0.37613	3.00411	0.50826	
0.29707	2.92887	0.76587	
0.32479	2.31405	0.71146	
0.33412	2.50000	0.74693	
0.50592	2.84585		
0.26285	1.95918		
0.36874	**2.51299**	**3.36138**	**10.65000**

C-45

Mercury	Aroclor 1268	Lead	%Lipid
0.16000	0.97000	0.46000	8.00000
0.14999	1.10000	0.37000	7.00000
0.14999	1.20000	0.55999	9.10000
0.26000	1.33333	0.12499	
0.30999	1.50000	0.26000	
0.22999	1.13636	0.28999	
0.25531	0.68085	0.37499	
0.17543	1.18421	0.37499	
0.17543	0.74561	1.10000	
0.18000	0.21000		
0.20461	**1.00604**	**0.43499**	**8.03333**

C-100

Mercury	Aroclor 1268	Lead	%Lipid
0.41999	2.13636	0.29999	7.90000
0.36999	2.25000	0.12499	7.10000
0.37000	2.72000	0.12500	8.20000
0.24999	3.50000	0.37500	
0.25423	5.50848	0.37500	
0.25641	3.37607	0.37393	
0.29399	3.13305	0.27038	
0.23776	2.27468	0.36480	
0.25291	2.08333	0.37500	
0.30059	**2.99800**	**0.29823**	**7.73333**

C-102

Mercury	Aroclor 1268	Lead	%Lipid
0.25000	1.17391	0.29999	8.80000
0.20000	1.04348	0.12500	7.80000
0.15999	0.56818	0.39999	7.10000
0.25641	1.75214	0.37393	
0.17094	1.58120	0.37606	
0.22222	0.71111	0.44444	
0.20993	**1.13834**	**0.33657**	**7.90000**

C-103

Mercury	Aroclor 1268	Lead	%Lipid
0.16000	0.95833	0.27999	7.40000
0.17000	0.66666	0.12499	9.00000
0.17999	0.65384	0.12499	2.30000
0.12692	1.11111	0.21367	14.00000
0.09629	0.86419	0.37448	11.40000
0.10585	1.00418	0.37656	10.30000
0.09918	0.69672	0.13934	
0.09576	0.59322	0.19491	
0.11295	0.56680	0.40890	
0.31999	0.60000	0.12500	
0.21999	0.66666	0.12499	
0.28999	0.65217	0.12500	
0.12295	0.94262	0.16393	
0.12448	1.95021	0.16597	
0.12765	0.89361	0.17021	
0.11302	0.63025	0.28991	
0.11694	0.50847	0.47457	
0.14915	0.42372	0.22033	
0.15173	**0.79904**	**0.22765**	**9.06667**

Appendix 2a.__Mummichog Tissue Data for Each Polygon

All data averages are listed in **Bold**

C-204

Mercury	Aroclor 1268	Lead	%Lipid
0.43650	4.36508	0.37500	11.70000
0.32653	1.59184	0.37551	9.40000
0.32128	2.97189	0.37550	10.10000
0.36290	6.45161	0.37499	12.00000
0.48387	5.24194	0.37499	12.60000
0.36734	7.75510	0.37551	17.00000
0.38307	**4.72958**	**0.37525**	**12.13333**

T-C

Mercury	Aroclor 1268	Lead	%Lipid
0.04699	0.43500	0.49000	5.80000
0.09999	0.47499	0.48999	7.80000
0.08300	0.43500	0.62999	
0.18000	0.20833	0.12499	
0.14999	0.29166	0.12499	
0.11999	0.21739	0.12500	
0.09216	0.05529	0.25106	
0.13636	0.01659	0.12396	
0.16736	0.01652	0.19246	
0.04255	0.06382	0.19087	
0.05826	0.05371	0.16326	
0.06652	0.04016	0.19999	
0.12489	0.04564	5.90000	
0.08979	0.08979	1.15000	
0.08255	0.07659	1.30000	
0.03400	0.20500	1.60000	
0.04399	0.22500	1.20000	
0.04500	0.22500	1.80000	
0.10000	0.02500	0.50000	
0.14000	0.02500		
0.10999	0.02500		
0.11999	0.02500		
0.09697	**0.14889**	**0.87140**	**6.80000**

C-C

Mercury	Aroclor 1268	Lead	%Lipid
0.12999	1.10000	0.57999	6.60000
0.10999	1.40000	0.43999	8.30000
0.12999	1.10000	0.47999	
0.17999	0.63636	0.38999	
0.17000	0.85000	0.81000	
0.10999	0.47619	0.26999	
0.20161	1.20968	0.24193	
0.12875	1.03004	0.17167	
0.24896	1.70125	0.37551	
0.10299	0.89743	0.44017	
0.07442	0.77625	0.48401	
0.10886	0.59071	0.22362	
0.27000	2.40000	2.10000	
0.15120	**1.08984**	**0.53899**	**7.45000**

D-C

Mercury	Aroclor 1268	Lead	%Lipid
0.17316	1.42857	0.37445	6.20000
0.12820	1.41026	0.37393	7.20000
0.17167	1.41631	0.37553	6.70000
0.11794	0.89743	0.51709	
0.13417	0.80168	0.73417	
0.09346	0.73469	0.59999	
0.13643	**1.11482**	**0.49586**	**6.70000**

Appendix K-2b.__Mummichog Sediment Data for Each Polgon

Data averages are listed in **Bold**

C-5			
Mercury	**Aroclor 1268**	**Lead**	**TOC**
11.00000	19.00000	21.00000	4.4
10.00000	24.00000	24.00000	3.2
2.10000	12.00000	28.00000	4
1.10000	4.20000	25.80000	3.72
7.03000	31.00000	40.90000	4.72000
2.67000	10.00000	20.40000	4.92000
11.50000	3.70000	36.00000	6.5
4.20000	21.00000	24.00000	2.1
4.00000	9.90000	26.00000	3.4
1.70000	4.00000	29.00000	4.6
0.00005	2.40000	27.00000	4.7
2.72000	0.00050	0.00250	6.9
0.00001	0.36000	2.90000	4
0.03799	0.18000	4.80000	2.9
0.02999	0.08600	2.20000	3.3
0.02400	0.07900	1.10000	3.8
0.03200	1.90000	22.00000	2.8
1.66000	6.40000	26.60000	3.9
3.90000	6.60000	21.30000	2.8
1.70000	6.20000	30.50000	3.8
5.30000	3.00000	29.10000	3
1.70000	5.10000	40.90000	2.5
3.20000	1.30000	27.20000	3.8
5.50000	3.30000	24.80000	4
11.00000	1.10000	12.80000	4.4
3.40000	0.99000	13.70000	4.91
2.30000	1.30000	14.00000	3.80000
5.30000	9.80000	29.40000	3.79000
20.00000	10.00000	25.10000	
7.90000	20.00000	42.30000	
3.41000	4.10000	21.90000	
1.29000	15.00000	22.90000	
28.20000	13.00000	25.20000	
3.60000	32.00000	23.80000	
12.60000	39.00000	22.50000	
8.97000	26.00000	21.90000	
3.14000	19.00000	29.00000	
3.01000	14.00000	25.40000	
8.39000	30.00000	43.60000	
4.63000	33.00000	11.80000	
23.80000	15.00000		
2.57000	8.20000		
1.74000	20.00000		
2.78000	8.30000		
2.14000	1.80000		
0.77200	21.00000		
3.61000	11.00000		
3.00000	11.00000		
2.64000	4.70000		
0.98000	18.00000		
1.94000	18.00000		
1.90000	0.62000		
0.35600			
4.83910	**11.18491**	**23.02006**	**3.95214**

C-6			
Mercury	**Aroclor 1268**	**Lead**	**TOC**
48.000	19.00	20.00	2.70
80.000	19.00	47.00	3.70
11.000	41.00	27.00	5.20
86.600	69.00	42.10	4.58
8.750	25.00	31.90	6.56
9.890	26.00	34.70	6.46
8.510	17.00	27.40	5.15
4.300	2.90	29.00	6.80
7.560	7.00	30.00	6.30
14.400	20.00	36.00	5.40
109.000	0.05	45.00	6.70
80.800	15.00	27.00	5.50
7.140	3.40	28.00	5.00
9.700	4.70	33.00	8.50
11.500	20.00	34.00	5.30
29.000	2.20	25.00	3.70
13.000	65.00	20.00	6.30
32.000	25.00	42.00	4.90
3.200	5.20	29.00	5.40
62.900	2.20	46.00	5.70
46.000	92.00	27.00	3.80
22.000	24.00	26.00	3.30
3.000	10.00	46.00	3.30
3.100	0.33	47.00	4.20
5.680	16.00	29.50	3.44
2.360	4.60	30.00	4.42
4.500	3.50	29.00	5.00
30.000	78.00	48.60	4.30
9.600	1.60	39.90	3.90
140.000	410.00	16.50	4.60
17.000	57.00	13.90	4.10
24.000	45.00	33.60	4.10
17.000	33.00	23.30	4.60
0.420	2.10	27.90	2.40
31.000	71.00	20.60	5.70
5.300	3.40	26.70	3.30
0.069	0.33	25.40	2.80
20.600	90.00	37.30	
25.600	120.00	27.10	
1.460	1.90	26.90	
0.044	0.01	9.13	
11.300	3.70	26.90	
74.000	16.00	12.60	
19.000	17.00	15.90	
6.230	15.00	25.10	
6.810	28.00	48.20	
6.530	19.00	44.80	
145.000	240.00	32.60	
17.300	38.00	38.80	
11.200	28.00	42.90	
2.440	9.50		
12.600	43.00		
0.277	0.15		
0.257	0.27		
4.490	4.00		
41.600	380.00		
109.000	420.00		
75.700	150.00		
61.400	59.00		
12.700	26.00		
27.73028	**49.15063**	**31.06460**	**4.786756757**

Appendix K-2b.__Mummichog Sediment Data for Each Polgon

Data averages are listed in **Bold**

C-9

Mercury	Aroclor 1268	Lead	TOC
13.000	460.000	28.0	3.40
15.000	0.600	46.0	3.60
4.200	16.000	29.0	4.40
2.710	5.400	20.2	2.46
3.020	17.000	32.5	5.06
1.100	3.500	201.0	4.73
1.130	0.220	43.0	2.60
6.100	23.000	18.0	2.70
8.000	3.500	21.0	1.40
8.500	19.000	19.0	3.70
4.390	20.000	22.0	1.80
8.500	39.000	12.0	1.30
2.000	3.300	24.0	3.90
1.200	1.700	14.0	1.30
6.600	88.000	69.9	7.86
0.782	1.200	21.3	3.48
0.806	1.100	21.1	2.53
0.759	0.660	16.0	2.00
2.600	9.500	13.0	2.00
2.200	0.790	31.0	3.70
2.500	4.100	32.0	3.90
6.600	15.000	28.0	5.80
1.130	9.400	31.2	3.74
0.659	3.800	24.7	5.58
1.320	1.000	26.0	5.30
5.200	12.000	25.0	3.60
14.000	6.300	28.0	3.60
5.400	21.000	28.0	2.90
2.280	1.400	28.0	7.30
22.200	300.000	36.4	5.67
1.150	8.600	28.3	5.82
2.460	2.400	24.0	6.60
7.400	9.600	30.7	3.40
12.000	1.800	33.9	3.60
20.000	1.300	27.8	3.90
55.000	2.000	8.7	3.50
3.700	0.280	17.7	4.60
4.200	1.100	27.7	4.10
2.200	0.940	30.8	2.90
3.600	2.200	25.8	4.10
8.970	17.000	56.7	6.90
3.140	12.000	36.2	4.43
3.010	12.000	11.0	7.13
8.390	15.000	27.0	8.50
4.630	20.000	25.4	
23.800	110.000	29.5	
17.800	11.000	25.6	
2.990	16.000	31.9	
10.200	17.000	36.2	
4.660	130.000	51.8	
9.450	14.000	33.8	
12.400	12.000	23.3	
1.470	13.000	38.3	
39.600	11.000	20.6	
5.570	36.000	26.7	
5.790	330.000	37.3	
11.400	120.000	27.1	
7.950	11.000	26.9	
8.280	30.000	9.1	
6.740	39.000	26.9	
5.300	44.000	12.6	
4.260	15.000	15.9	
5.340	28.000	25.1	
8.940	240.000	28.0	
21.700	38.000	567.0	
13.400	28.000	31.6	
1.240	9.500	765.0	
6.170	43.000		
29.200	0.150		
35.100	0.270		
29.000	4.000		
2.900	1.500		
0.852	1.000		
2.600	1.500		
1.500	1.100		
8.39117	**33.98280**	**49.12313**	**4.108863636**

C-13

Mercury	Aroclor 1268	Lead	TOC
1.50000	2.1000	31.0	4.90
0.47999	1.3000	23.0	3.60
1.70000	2.4000	26.0	4.60
1.43000	1.3000	22.7	4.18
7.00000	0.7500	27.0	5.10
1.03000	4.8000	32.2	4.71
5.34000	0.4800	26.0	5.50
1.80000	7.3000	31.7	2.22
5.36000	0.3000	27.0	5.00
1.30000	2.8000	32.0	4.30
2.40000	2.8000	23.0	3.20
2.80000	0.7900	28.0	3.50
1.20000	2.8000	28.0	4.20
2.11000	6.8000	25.3	4.48
0.45600	1.0000	25.8	4.22
1.82000	2.5000	22.0	4.76
3.36000	0.0990	23.0	4.50
2.10000	2.6000	34.0	4.80
0.63999	0.8700	22.0	3.70
0.75999	1.3000	27.0	4.80
3.30000	0.4700	26.0	4.70
0.83999	0.8600	29.0	5.20
0.70700	1.2000	26.1	6.44
0.41200	0.6500	27.5	6.33
0.85300	1.2000	20.7	5.74
0.81999	0.8400	25.0	6.40
0.67500	1.0000	24.4	7.16
0.56700	1.2000	26.0	6.65
0.70800	1.2000	19.3	7.27
0.86000	0.5000	22.0	9.50
0.86599	0.6100	27.0	12.00
0.74300	0.4000	27.4	7.99
1.02000	0.5100	20.2	10.80
0.56000	1.3000	28.0	3.40
0.93500	3.3000	29.3	4.20
0.40300	0.6200	17.8	3.23
0.86200	2.7000	25.8	3.75
2.10000	5.2000	29.0	4.80
0.57999	1.1000	18.0	4.20
0.37999	0.5700	16.0	4.10
1.00000	3.5000	24.0	4.30
0.36000	0.2600	12.0	5.90
0.50999	0.2600	11.0	8.60
0.37999	0.4200	14.0	5.60
0.40000	0.7000	19.0	5.20
0.38999	0.5400	16.0	6.70
0.37999	0.4200	14.0	5.60
0.62999	2.5000	21.0	5.10
0.36000	0.3800	15.0	6.00
0.82999	0.9100	16.0	7.00
0.27000	0.6800	15.0	5.40
0.28999	0.0465	13.0	
1.22000	1.4000	24.3	
0.51800	0.7500	25.3	
1.59000	2.4000	27.7	
0.92100	2.2000	31.2	
1.50000	5.2000	25.3	
1.85000	2.5000	35.6	
2.76000	20.0000	40.3	
6.72000	25.0000	51.6	
1.14000	2.1000	29.6	
1.49000	1.8000	27.1	
2.10000	1.9000	27.0	
0.95400	1.8000	27.1	
1.02000	7.0000	34.2	
1.29000	1.7000	25.9	
1.41894	**2.37705**	**24.9**	**5.40254902**

Appendix K-2b.__Mummichog Sediment Data for Each Polgon

Data averages are listed in **Bold**

C-39

Mercury	Aroclor 1268	Lead	TOC
3.22000	3.50000	118.0	8.25
3.43000	3.00000	220.0	1.35
2.48000	0.54000	184.0	6.77
2.46000	1.10000	94.7	5.00
2.01000	1.20000	79.9	6.71
4.60000	1.50000	1100.0	9.10
2.20000	0.58000	27.0	5.70
2.10000	0.51000	30.0	6.70
1.52000	0.32000	49.0	6.70
0.77800	0.15000	46.0	5.60
0.04810	0.01800	14.0	5.00
0.61000	0.18000	24.0	5.00
2.36000	0.40000	57.0	6.00
1.56000	0.35000	39.0	5.70
6.36000	0.54000	97.0	7.00
0.10000	0.14000	16.0	0.91
0.34000	0.31999	50.0	0.94
0.04399	0.03050	8.9	0.48
0.24300	0.01300	419.0	4.33
0.09719	0.05900	27.8	1.63
0.27100	0.02300	1590.0	11.60
0.07869	0.01500	17.0	0.90
2.45000	2.70000	48.7	4.26
8.37000	9.00000	160.0	4.55
7.72000	6.50000	102.0	3.84
1.55000	0.05900	63.0	3.80
4.91000	2.00000	99.8	9.34
1.77000	0.82000	58.2	6.86
5.31000	2.70000	71.0	8.93
2.90000	0.32000	56.0	8.20
3.58000	1.20000	58.0	5.71
1.89000	0.62000	25.0	6.10
0.11800	0.04300	14.0	0.66
2.86000	2.80000	48.4	6.74
1.76000	1.50000	40.8	6.76
3.17000	0.52000	91.0	6.10
1.18000	1.60000	79.6	0.01
0.38999	0.44999	12.0	9.30
0.18999	0.18000	16.0	3.10
0.68999	0.40000	17.0	6.70
0.54000	0.82999	18.0	6.10
0.80000	0.85000	15.0	8.00
0.92000	1.60000	10.0	7.00
0.68599	1.30000	32.0	3.48
1.07000	0.92000	44.2	2.43
1.10000	0.63000	44.3	1.88
2.17000	2.30000	387.0	5.86
1.07000	0.85000	275.0	7.69
0.93200	1.20000	143.0	5.23
0.75999	0.52000	1190.0	3.85
3.57000	2.00000	177.0	7.71
3.53000	1.40000	106.0	7.39
2.01665	**1.19809**	**150.19808**	**5.364383846**

C-45

Mercury	Aroclor 1268	Lead	TOC
0.23999	1.90000	18.00000	4.40
0.62000	0.69999	17.00000	3.00
0.30000	0.95999	13.00000	4.30
0.24500	0.61000	20.30000	3.33
0.56600	0.79000	26.40000	4.92
0.14600	0.06100	15.00000	4.60
1.51000	0.57000	27.00000	5.70
0.54000	0.87000	22.00000	5.60
0.98600	0.76000	24.90000	7.95
0.40000	0.69999	19.00000	0.00
0.34000	0.21999	15.00000	6.40
0.46999	0.33000	15.00000	5.60
1.19000	0.33000	32.10000	4.65
0.57400	1.10000	26.10000	3.24
0.40000	0.07000	12.00000	8.40
1.88000	13.00000	21.40000	3.75
1.09000	4.80000	18.50000	3.51
1.89000	13.00000	15.80000	1.94
0.04289	0.02800	11.50000	2.53
2.60000	18.00000	29.20000	2.46
0.10199	0.17000	16.90000	4.61
3.35000	9.20000	9.80000	0.57
0.00711	0.00750	3.22000	0.73
0.78700	2.10000	22.40000	5.33
1.09000	9.00000	11.00000	2.16
0.85464	**3.17106**	**18.50080**	**3.987316**

C-100

Mercury	Aroclor 1268	Lead	TOC
3.30000	3.60000	23.00000	4.70
4.31000	5.60000	33.00000	2.99
2.51000	3.30000	33.40000	5.25
1.20000	1.90000	28.20000	4.89
1.51000	0.57000	27.00000	5.70
1.00000	1.20000	17.00000	6.30
6.82000	8.40000	36.20000	8.06
1.49000	1.40000	26.00000	7.84
3.80000	2.40000	29.00000	5.20
1.70000	3.90000	33.00000	5.50
1.60000	3.00000	32.00000	5.30
0.57999	0.63999	16.00000	6.20
0.77999	1.90000	30.00000	5.60
3.29000	2.40000	17.00000	0.00
0.30000	0.83000	3.44000	0.27
2.93000	28.00000	33.60000	5.41
0.54299	1.40000	4.87000	0.23
4.25000	3.20000	33.60000	5.08
1.99000	4.20000	32.30000	2.78
2.47000	4.10000	31.00000	3.85
2.18000	4.30000	27.70000	3.07
2.28000	3.70000	31.70000	4.38
0.10899	0.01200	18.10000	0.32
0.98199	3.20000	7.89000	0.48
2.16350	**3.88133**	**25.20833**	**4.1418625**

Appendix K-2b.__Mummichog Sediment Data for Each Polgon

Data averages are listed in **Bold**

C-102

Mercury	Aroclor 1268	Lead	TOC
0.73000	0.72000	15.00000	4.70
1.47000	3.10000	29.90000	4.06
0.61300	0.45000	25.60000	4.29
0.15999	0.18000	3.90000	8.50
1.99000	0.56000	24.20000	5.44
0.37200	0.19000	26.80000	5.48
0.99000	1.60000	20.00000	4.70
0.41999	0.05500	12.00000	6.80
1.82000	2.20000	27.50000	7.66
0.91699	1.10000	26.60000	8.12
0.97500	1.60000	26.40000	6.57
0.83999	1.90000	23.00000	6.70
0.63200	0.86000	27.30000	9.52
2.56000	3.90000	29.40000	5.13
0.66000	0.28000	15.00000	6.20
1.00993	**1.24633**	**22.17333**	**6.258**

C-C

Mercury	Aroclor 1268	Lead	TOC
0.41999	0.21000	14.00000	4.10
0.15000	0.14000	13.00000	3.60
0.62999	0.70999	29.00000	4.60
0.58799	1.20000	24.40000	6.23
0.52200	0.60000	26.80000	5.92
0.79000	1.50000	11.00000	6.00
0.62000	0.79000	28.00000	4.40
0.33000	0.54000	25.00000	5.70
0.54000	0.87000	22.00000	5.60
0.98600	0.76000	24.90000	7.95
0.37000	0.06500	13.00000	8.00
0.95499	0.77000	27.00000	4.77
1.19000	0.33000	32.10000	4.65
0.32100	0.61000	26.00000	12.60
0.60085	**0.64964**	**22.58571**	**6.008571429**

C-103

Mercury	Aroclor 1268	Lead	TOC
0.15999	0.18000	3.90000	8.50
1.99000	0.56000	24.20000	5.44
0.37200	0.19000	26.80000	5.48
0.50999	0.67000	23.00000	4.60
1.90000	0.04400	25.70000	3.68
0.27600	0.21000	17.30000	3.47
0.01000	0.02750	2.60000	0.34
0.37000	0.41000	21.60000	6.03
0.45700	0.15000	19.60000	6.90
0.07999	0.06500	13.00000	5.30
0.18000	0.23999	14.00000	7.30
0.23000	0.10999	10.00000	5.40
0.20000	0.14000	18.00000	5.10
0.04399	0.04000	10.00000	4.80
0.05200	0.03400	6.20000	1.80
0.20000	0.18000	18.00000	5.40
0.23000	0.18000	12.00000	7.70
0.21999	0.18999	20.00000	7.50
0.12999	0.10000	7.70000	14.00
0.40058	**0.19581**	**15.45263**	**5.723157895**

D-C

Mercury	Aroclor 1268	Lead	TOC
0.55000	1.20000	18.00000	5.00
0.56000	0.87000	22.00000	3.20
0.68000	0.87999	27.00000	4.30
1.87000	3.90000	35.50000	5.68
1.22000	0.64000	23.30000	5.21
0.02999	0.73000	13.00000	4.90
1.00000	0.81999	24.00000	3.80
0.30000	0.37999	24.00000	5.00
0.37000	0.06500	13.00000	8.00
0.25000	0.05500	12.00000	7.20
0.50999	0.30000	28.00000	5.30
0.82499	0.92000	27.30000	8.00
0.65100	0.71000	27.30000	6.28
0.50599	0.74000	25.70000	12.80
0.43900	0.34000	24.20000	8.83
0.50599	0.66000	26.60000	6.21
1.80000	2.80000	28.80000	9.64
0.88300	0.80000	26.00000	8.54
0.95499	0.77000	27.00000	4.77
0.40000	2.40000	12.00000	8.40
1.81000	0.06000	28.40000	7.37
0.18999	0.07000	16.00000	7.30
0.74113	**0.91409**	**23.14091**	**6.624090909**

Mercury	Aroclor 1268	Lead	TOC
2.20000	4.90000	31.60000	0.00
2.45000	2.70000	48.70000	4.26
8.37000	9.00000	160.00000	4.55
7.72000	6.50000	102.00000	3.84
1.55000	0.05900	63.00000	3.80
4.43000	8.20000	154.00000	0.02
2.86000	2.80000	48.40000	6.74
1.76000	1.50000	40.80000	6.76
3.17000	0.52000	91.00000	6.10
1.39000	2.70000	27.90000	4.30
0.93300	0.81000	26.40000	7.78
0.68599	1.30000	32.00000	3.48
1.07000	0.92000	44.20000	2.43
1.10000	0.63000	44.30000	1.88
2.83493	**3.03850**	**65.30714**	**3.995611429**

T-C

Mercury	Aroclor 1268	Lead	TOC
0.03799	0.02500	14.00000	2.60
0.04399	0.10000	9.40000	1.30
0.02600	0.03200	8.00000	1.80
0.09210	0.01500	16.60000	2.88
0.07419	0.02600	17.40000	3.00
0.11800	0.06500	17.70000	3.60
0.05200	0.04450	12.00000	0.00
0.09399	0.02500	24.00000	4.10
0.07599	0.16500	21.00000	4.20
0.04800	0.03350	13.00000	4.00
0.19699	0.09000	22.90000	6.03
0.08890	0.02900	27.10000	5.04
0.08140	0.02900	19.90000	4.72
0.11999	0.03150	24.00000	0.00
0.08211	**0.05075**	**17.64286**	**3.090971429**

Appendix K-3
Bioaccumulation Factors for Blue Crab Data
Appendix K-3a: Blue Crab Wholebody Mercury Data
Appendix K-3b: Blue Crab Wholebody A-1268 Data

Appendix K-3a.__Blue Crab Wholebody Murcury

Yearly Averages are listed in **Bold**

2000	**2002**	**2003**	**2004**	**2005**	**2006**
UPC	***UPC***	***UPC***	***UPC-F+C***	***UPC***	***UPC***
1.50	1.80	1.80	0.31	1.37	0.38
2.50	1.90	0.93	3.00	1.61	0.24
1.90	1.70	3.10	2.54	1.04	0.38
1.20	0.98	1.20	2.83	1.45	0.25
1.50	0.80	1.40	6.10	2.03	0.28
1.20	0.07	1.90	1.15	0.72	0.30
2.20	0.07	0.86	0.98	1.78	0.35
1.71	**1.05**	**1.60**	**2.42**	**1.43**	**0.31**

2007	**2000**	**2002**	**2003**	**2004**	**2005**
PC	***LPC***	***LPC***	***LPC***	***LPC-F+C***	***LPC***
1.69	1.60	0.64	2.50	1.38	0.48
1.88	0.96	0.97	0.74	4.10	0.91
1.17	1.30	1.30	3.60	1.59	1.39
3.00	2.00	0.78	0.59	3.50	1.28
0.71	2.20	0.99	0.84	6.30	1.17
2.09	2.20	1.40	1.30	4.20	0.85
1.23	1.80	0.74	0.76	2.98	1.14
1.68	**1.72**	**0.97**	**1.48**	**3.44**	**1.03**

2006	**2000**	**2002**	**2003**	**2004**	**2005**
LPC	***TC-C***	***TC-C***	***TC-C***	***TC-C***	***TC-C***
0.15	0.18	0.05	0.05	0.37	0.19
0.22	0.03	0.06	0.08	0.27	0.14
0.44	0.07	0.19	0.01	0.45	0.16
0.60	0.08	0.22	0.04	0.49	0.09
0.11	0.04	0.33	0.27	0.26	0.21
0.33	0.05	0.08	0.01	0.33	0.26
0.61	0.03	0.07	0.06		0.14
					0.17
0.35	**0.07**	**0.14**	**0.07**	**0.36**	**0.17**

2000	**2005**	**2006**	**2007**
CR-C	***CR-C***	***TC-C***	***TC-C***
0.10	0.12	0.18	0.13
0.05	0.28	0.12	0.15
0.08	0.12	0.11	0.17
0.05	0.19	0.09	0.05
0.07	0.18	0.33	0.11
0.16	0.17	0.07	0.18
0.04	0.12	0.15	0.25
0.09	**0.18**	**0.15**	**0.15**

All Tissue Data		
1.50	2.09	
2.50	1.23	
1.90	1.60	
1.20	0.96	
1.50	1.30	
1.20	2.00	
2.20	2.20	
1.80	2.20	
1.90	1.80	
1.70	0.64	
0.98	0.97	
0.80	1.30	
0.07	0.78	
0.07	0.99	
1.80	1.40	
0.93	0.74	
3.10	2.50	
1.20	0.74	
1.40	3.60	
1.90	0.59	
0.86	0.84	
0.31	1.30	
3.00	0.76	
2.54	1.38	
2.83	4.10	
6.10	1.59	
1.15	3.50	
0.98	6.30	
1.37	4.20	
1.61	2.98	
1.04	0.48	
1.45	0.91	
2.03	1.39	
0.72	1.28	
1.78	1.17	
0.38	0.85	
0.24	1.14	
0.38	0.15	
0.25	0.22	
0.28	0.44	
0.30	0.60	
0.35	0.11	
1.69	0.33	
1.88	0.61	
1.17		
3.00	**1.48**	**AVG**
0.71	**91**	**Count**

Appendix K-3b.__Blue Crab Wholebody A-1268 Data

Yearly Averages are listed in **Bold**

2000	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
UPC	***UPC***	***UPC***	***UPC-F+C***	***UPC***	***UPC***	***PC***
0.90	1.50	1.70	1.97	0.37	1.69	0.58
0.48	2.50	2.20	1.06	0.44	0.56	0.71
0.54	2.30	2.10	7.41	0.42	0.77	0.75
0.81	1.50	1.90	2.48	0.59	0.56	1.92
1.30	2.10	4.70	2.19	0.71	0.21	1.57
0.84	1.90	3.70	0.38	0.29	4.15	1.00
0.50	1.80	3.00	1.71	0.89	0.55	0.56
0.77	**1.94**	**2.76**	**2.46**	**0.53**	**1.21**	**1.01**

2000	**2002**	**2003**	**2004**	**2005**	**2006**
LPC	***LPC***	***LPC***	***LPC-F+C***	***LPC***	***LPC***
0.80	2.30	2.60	1.12	0.62	0.54
1.20	1.90	7.90	3.27	0.12	0.40
0.76	2.40	5.00	3.57	0.25	0.60
0.98	1.40	4.00	1.71	1.27	0.36
0.56	2.80	1.70	1.71	0.19	0.25
0.25	3.60	2.20	5.11	0.15	1.52
0.32	2.30	1.80	1.83	0.47	0.50
0.70	**2.39**	**3.60**	**2.62**	**0.44**	**0.60**

2000	**2002**	**2003**	**2004**	**2005**	**2006**
TC-C	***TC-C***	***TC-C***	***TC-C***	***TC-C***	***TC-C***
0.165	0.025	0.225	0.19	0.016	0.010
0.140	0.025	0.140	0.17	0.026	0.010
0.140	0.025	0.165	0.20	0.010	0.026
0.120	0.025	0.225	0.21	0.010	0.010
0.165	0.025	0.130	0.31	0.010	0.040
0.145	0.025	2.000	0.16	0.010	0.004
0.200	0.025	0.130		0.010	0.010
				0.010	
0.15	**0.03**	**0.43**	**0.21**	**0.01**	**0.02**

2007	**2000**	**2005**
TC-C	***CR-C***	***CR-C***
0.00264	0.145	0.017
0.00673	0.275	0.016
0.00318	0.130	0.016
0.00355	0.205	0.017
0.00277	0.190	0.017
0.00311	0.330	0.017
0.03039	0.205	0.017
0.01	**0.21**	**0.02**

All Tissue Data		
0.90	1.57	
0.48	1.00	
0.54	0.56	
0.81	0.80	
1.30	1.20	
0.84	0.76	
0.50	0.98	
1.50	0.56	
2.50	0.25	
2.30	0.32	
1.50	2.30	
2.10	1.90	
1.90	2.40	
1.80	1.40	
1.70	2.80	
2.20	3.60	
2.10	2.30	
1.90	2.60	
4.70	7.90	
3.70	5.00	
3.00	4.00	
1.97	1.70	
1.06	2.20	
7.41	1.80	
2.48	1.12	
2.19	3.27	
0.38	3.57	
1.71	1.71	
0.37	1.71	
0.44	5.11	
0.42	1.83	
0.59	0.62	
0.71	0.12	
0.29	0.25	
0.89	1.27	
1.69	0.19	
0.56	0.15	
0.77	0.47	
0.56	0.54	
0.21	0.40	
4.15	0.60	
0.55	0.36	
0.58	0.25	
0.71	1.52	
0.75	0.50	
1.92	**1.62**	**AVG**
	91	**Count**

Appendix K-4

Bioaccumulation Factors for Finfishes

Black Drum, Red Drum, Silver Perch, Spotted Seatrout, Striped Mullet

Appendix K-4:__Bioaccumulation Factors for Finfishes Black Drum, Red Drum, Silver Perch, Spotted Seatrout, Striped Mullet

Black Drum

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
03287-BD-PC-1	PC	10/17/2003	4.900	0.530
03287-BD-PC-4	PC	10/17/2003	4.200	0.670
03288-BD-PC-2	PC	10/17/2003	1.100	0.590
03288-BD-PC-3	PC	10/17/2003	3.600	0.530
03288-BD-PC-5	PC	10/17/2003	4.000	0.750
03288-BD-PC-6	PC	10/17/2003	1.800	0.420
03288-BD-PC-7	PC	10/17/2003	2.200	0.900
03288-BD-PC-8	PC	10/17/2003	1.200	0.510
		Mean	**2.88**	**0.61**
04293-BD-PC-1-C+F	PC	10/19/2004	3.677	2.280
04293-BD-PC-2-C+F	PC	10/19/2004	1.788	1.420
04293-BD-PC-3-C+F	PC	10/19/2004	1.836	0.820
04293-BD-PC-4-C+F	PC	10/19/2004	6.091	1.810
04293-BD-PC-5-C+F	PC	10/19/2004	2.550	1.420
04299-BD-PC-6-C+F	PC	10/25/2004	8.509	1.420
04299-BD-PC-7-C+F	PC	10/25/2004	6.361	1.490
04299-BD-PC-8-C+F	PC	10/25/2004	11.757	3.280
		Mean	**5.32**	**1.74**
05292-BD-PC-R1	PC	10/19/2005	12.698	0.913
05292-BD-PC-R2	PC	10/19/2005	10.266	0.875
05292-BD-PC-R3	PC	10/19/2005	6.400	0.880
05292-BD-PC-R4	PC	10/19/2005	5.702	1.535
05292-BD-PC-R5	PC	10/19/2005	6.224	0.705
05292-BD-PC-R6	PC	10/19/2005	6.773	0.717
05292-BD-PC-R7	PC	10/19/2005	7.874	0.669
05292-BD-PC-R8	PC	10/19/2005	6.198	0.620
		Mean	**7.77**	**0.86**
06290-PC-BD-R1	PC	10/17/2006	5.200	0.736
06290-PC-BD-R2	PC	10/17/2006	5.118	0.421
06290-PC-BD-R3	PC	10/17/2006	2.130	0.570
06290-PC-BD-R4	PC	10/17/2006	5.603	0.448
06290-PC-BD-R5	PC	10/17/2006	5.929	0.542
06290-PC-BD-R6	PC	10/17/2006	3.878	0.622
06290-PC-BD-R7	PC	10/17/2006	9.170	0.568
06290-PC-BD-R8	PC	10/17/2006	1.447	0.374
		Mean	**4.81**	**0.54**
07269-PC-BD-R2	PC	9/26/2007	9.353	1.241
07276-PC-BD-R1	PC	10/3/2007	6.691	0.807
07291-PC-BD-R3	PC	10/18/2007	2.033	0.606
07291-PC-BD-R4	PC	10/18/2007	4.851	0.937
07291-PC-BD-R5	PC	10/18/2007	2.421	0.618
07291-PC-BD-R6	PC	10/18/2007	10.359	1.159
07291-PC-BD-R7	PC	10/18/2007	5.243	0.906
07291-PC-BD-R8	PC	10/18/2007	1.679	0.706
		Mean	**5.33**	**0.87**
PC-BD-R1	PC	8/29/2002	2.600	0.440
PC-BD-R2	PC	8/30/2002	12.000	0.580
PC-BD-R3	PC	8/30/2002	7.600	0.350
PC-BD-R4	PC	8/30/2002	9.900	0.350
PC-BD-R5	PC	8/30/2002	2.500	0.390
PC-BD-R6	PC	8/30/2002	18.000	0.560
PC-BD-R7	PC	9/9/2002	2.800	0.310
PC-BD-R8	PC	9/9/2002	3.100	0.320
		Mean	**7.31**	**0.41**
Purvis	Purvis Creek	10/10/2000	5.500	1.100
Purvis	Purvis Creek	10/10/2000	2.800	0.750
		Mean	**4.150**	**0.925**

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
05295-BD-TC-R1	TC-C	10/22/2005	0.102	0.042
05295-BD-TC-R2	TC-C	10/22/2005	0.115	0.088
05295-BD-TC-R3	TC-C	10/22/2005	0.204	0.087
05295-BD-TC-R4	TC-C	10/22/2005	0.072	0.123
05295-BD-TC-R5	TC-C	10/22/2005	0.060	0.138
05295-BD-TC-R6	TC-C	10/22/2005	0.100	0.087
05295-BD-TC-R7	TC-C	10/22/2005	0.093	0.089
05295-BD-TC-R8	TC-C	10/22/2005	0.100	0.125
		Mean	**0.106**	**0.097**
06291-TC-BD-R1	TC-C	10/18/2006	0.127	0.091
06291-TC-BD-R2	TC-C	10/18/2006	0.146	0.177
06291-TC-BD-R3	TC-C	10/18/2006	0.106	0.147
06291-TC-BD-R4	TC-C	10/18/2006	0.085	0.146
06291-TC-BD-R5	TC-C	10/18/2006	0.098	0.056
06291-TC-BD-R6	TC-C	10/18/2006	0.070	0.087
06291-TC-BD-R7	TC-C	10/18/2006	0.012	0.101
06291-TC-BD-R8	TC-C	10/18/2006	0.069	0.109
		Mean	**0.089**	**0.114**
05298-BD-CR-R1	CR-C	10/25/2005	0.016	0.034
05298-BD-CR-R2	CR-C	10/25/2005	0.017	0.036
05298-BD-CR-R3	CR-C	10/25/2005	0.017	0.034
05298-BD-CR-R4	CR-C	10/25/2005	0.016	0.067
05298-BD-CR-R5	CR-C	10/25/2005	0.016	0.070
05298-BD-CR-R6	CR-C	10/25/2005	0.017	0.036
05298-BD-CR-R7	CR-C	10/25/2005	0.017	0.040
05298-BD-CR-R8	CR-C	10/25/2005	0.016	0.038
		Mean	**0.017**	**0.045**

Maximum Lead Conc	2.2

Appendix K-4:__Bioaccumulation Factors for Finfishes Black Drum, Red Drum, Silver Perch, Spotted Seatrout, Striped Mullet

Red Drum

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
03287-RD-PC-3	PC	10/17/2003	1.000	0.640
03287-RD-PC-4	PC	10/17/2003	1.100	0.590
03287-RD-PC-5	PC	10/17/2003	1.100	0.300
03288-RD-PC-1	PC	10/17/2003	0.970	1.300
03288-RD-PC-2	PC	10/17/2003	1.000	0.380
03288-RD-PC-6	PC	10/17/2003	1.000	1.200
03288-RD-PC-7	PC	10/17/2003	0.980	0.300
03288-RD-PC-8	PC	10/17/2003	0.980	0.680
		Mean	**1.016**	**0.674**
04293-RD-PC-1-C+F	PC	10/19/2004	0.372	0.890
04293-RD-PC-2-C+F	PC	10/19/2004	1.717	3.500
04293-RD-PC-3-C+F	PC	10/19/2004	1.300	2.210
04293-RD-PC-4-C+F	PC	10/19/2004	2.443	2.600
04293-RD-PC-5-C+F	PC	10/19/2004	1.232	2.600
04293-RD-PC-6-C+F	PC	10/19/2004	1.656	1.880
04293-RD-PC-7-C+F	PC	10/19/2004	0.913	1.840
04293-RD-PC-8-C+F	PC	10/19/2004	2.767	2.400
		Mean	**1.550**	**2.240**
05292-RD-PC-R1	PC	10/19/2005	1.000	0.704
05292-RD-PC-R2	PC	10/19/2005	0.360	0.252
05293-RD-PC-R3	PC	10/20/2005	0.162	0.332
05293-RD-PC-R4	PC	10/20/2005	1.046	1.799
05304-RD-PC-R5	PC	10/31/2005	0.220	0.386
05304-RD-PC-R6	PC	10/31/2005	0.307	0.272
05304-RD-PC-R7	PC	10/31/2005	1.364	0.871
05304-RD-PC-R8	PC	10/31/2005	1.075	0.358
		Mean	**0.692**	**0.622**
06290-PC-RD-R1	PC	10/17/2006	8.759	2.029
06290-PC-RD-R2	PC	10/17/2006	0.337	0.184
06290-PC-RD-R3	PC	10/17/2006	1.439	0.864
		Mean	**3.512**	**1.026**
07276-PC-RD-R1	PC	10/3/2007	5.654	2.661
07276-PC-RD-R2	PC	10/3/2007	1.692	1.612
07276-PC-RD-R3	PC	10/3/2007	1.089	1.152
07291-PC-RD-R4	PC	10/18/2007	1.585	1.321
		Mean	**2.505**	**1.686**
PC-RD-R1	PC	8/30/2002	0.180	0.220
PC-RD-R2	PC	9/16/2002	0.800	0.970
PC-RD-R3	PC	9/16/2002	0.720	0.890
PC-RD-R4	PC	9/17/2002	0.390	0.810
PC-RD-R5	PC	9/17/2002	1.700	0.920
PC-RD-R6	PC	9/17/2002	2.300	0.930
PC-RD-R7	PC	9/18/2002	1.800	1.200
PC-RD-R8	PC	9/19/2002	1.300	0.560
		Mean	**1.149**	**0.812**

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
05297-RD-TC-R1	TC-C	10/24/2005	0.105	0.544
05297-RD-TC-R2	TC-C	10/24/2005	0.172	0.234
05297-RD-TC-R3	TC-C	10/24/2005	0.061	0.866
05297-RD-TC-R4	TC-C	10/24/2005	0.191	0.239
05297-RD-TC-R5	TC-C	10/24/2005	0.082	0.661
		Mean	**0.122**	**0.509**
07296-TC-RD-R1	TC-C	10/23/2007	0.049	0.155
07296-TC-RD-R2	TC-C	10/23/2007	0.062	0.116
07296-TC-RD-R3	TC-C	10/23/2007	0.053	0.207
07296-TC-RD-R4	TC-C	10/23/2007	0.067	0.104
07296-TC-RD-R5	TC-C	10/23/2007	0.058	0.124
07296-TC-RD-R6	TC-C	10/23/2007	0.037	0.101
07296-TC-RD-R7	TC-C	10/23/2007	0.255	0.420
07296-TC-RD-R8	TC-C	10/23/2007	0.073	0.081
		Mean	**0.082**	**0.163**
05298-RD-CR-R1	CR-C	10/25/2005	**0.016**	**0.182**

Maximum Lead Conc 0.24

Appendix K-4:__Bioaccumulation Factors for Finfishes Black Drum, Red Drum, Silver Perch, Spotted Seatrout, Striped Mullet

Silver Perch

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
03287-SP-PC-1	PC	10/17/2003	3.9	1.4
03287-SP-PC-2	PC	10/17/2003	3.0	1.8
03287-SP-PC-3	PC	10/17/2003	2.8	1.0
03287-SP-PC-4	PC	10/17/2003	5.9	1.2
03287-SP-PC-5	PC	10/17/2003	2.8	1.4
03287-SP-PC-6	PC	10/17/2003	4.1	1.5
03287-SP-PC-7	PC	10/17/2003	4.3	2.4
03287-SP-PC-8	PC	10/17/2003	3.8	2.2
		Mean	**3.83**	**1.61**
04293-SP-PC-1-C+F	PC	10/19/2004	6.405	4.10
04293-SP-PC-2-C+F	PC	10/19/2004	0.864	1.90
04293-SP-PC-3-C+F	PC	10/19/2004	9.667	3.00
04293-SP-PC-4-C+F	PC	10/19/2004	4.941	4.70
04293-SP-PC-5-C+F	PC	10/19/2004	16.588	2.08
04293-SP-PC-6-C+F	PC	10/19/2004	6.717	2.13
04293-SP-PC-7-C+F	PC	10/19/2004	10.926	2.22
04293-SP-PC-8-C+F	PC	10/19/2004	1.037	0.62
		Mean	**7.14**	**2.59**
05292-SP-PC-R1	PC	10/19/2005	2.551	0.986
05292-SP-PC-R2	PC	10/19/2005	3.274	0.676
05292-SP-PC-R3	PC	10/19/2005	3.007	0.654
05292-SP-PC-R4	PC	10/19/2005	3.185	0.796
05292-SP-PC-R5	PC	10/19/2005	1.826	1.079
05292-SP-PC-R6	PC	10/19/2005	4.068	0.983
05292-SP-PC-R7	PC	10/19/2005	1.073	0.657
05292-SP-PC-R8	PC	10/19/2005	3.537	0.804
		Mean	**2.81**	**0.83**
06289-PC-SP-R1	PC	10/16/2006	3.846	1.369
06289-PC-SP-R2	PC	10/16/2006	1.522	0.493
06289-PC-SP-R3	PC	10/16/2006	0.603	0.521
06289-PC-SP-R4	PC	10/16/2006	8.865	4.007
06289-PC-SP-R5	PC	10/16/2006	1.179	0.923
06289-PC-SP-R6	PC	10/16/2006	4.833	1.420
06289-PC-SP-R7	PC	10/16/2006	4.641	2.308
06289-PC-SP-R8	PC	10/16/2006	3.745	0.929
		Mean	**3.65**	**1.50**
07291-PC-SP-R1	PC	10/18/2007	1.234	0.630
07291-PC-SP-R2	PC	10/18/2007	1.270	1.210
07291-PC-SP-R3	PC	10/18/2007	1.318	1.981
07291-PC-SP-R4	PC	10/18/2007	3.438	1.259
07291-PC-SP-R5	PC	10/18/2007	1.606	1.781
07291-PC-SP-R6	PC	10/18/2007	6.090	1.881
07291-PC-SP-R7	PC	10/18/2007	1.242	0.904
07291-PC-SP-R8	PC	10/18/2007	10.323	2.490
		Mean	**3.31**	**1.52**
PC-SP-R1	PC	8/29/2002	17.0	0.77
PC-SP-R2	PC	8/29/2002	20.0	0.50
PC-SP-R3	PC	8/29/2002	10.0	0.76
PC-SP-R4	PC	8/29/2002	22.0	1.20
PC-SP-R5	PC	8/29/2002	22.0	0.90
PC-SP-R6	PC	8/29/2002	18.0	1.80
PC-SP-R7	PC	8/29/2002	14.0	1.90
PC-SP-R8	PC	8/29/2002	5.3	1.10
		Mean	**16.04**	**1.12**

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
Purvis Creek_Silver Perch-R1	Purvis Creek	10/10/2000	3.60	NA
Purvis Creek_Silver Perch-R2	Purvis Creek	10/10/2000	3.20	2.40
Purvis Creek_Silver Perch-R3	Purvis Creek	10/10/2000	0.70	3.20
Purvis Creek_Silver Perch-R4	Purvis Creek	10/10/2000	5.30	3.20
Purvis Creek_Silver Perch-R5	Purvis Creek	10/10/2000	0.35	0.54
Purvis Creek_Silver Perch-R6	Purvis Creek	10/10/2000	6.30	2.90
Purvis Creek_Silver Perch-R7	Purvis Creek	10/10/2000	3.70	2.40
Purvis Creek_Silver Perch-R8	Purvis Creek	10/10/2000	0.09	0.18
		Mean	**2.91**	**2.12**
05295-SP-TC-R1	TC-C	10/22/2005	0.078	0.261
05295-SP-TC-R2	TC-C	10/22/2005	0.130	0.377
05295-SP-TC-R3	TC-C	10/22/2005	0.105	0.304
05295-SP-TC-R4	TC-C	10/22/2005	0.163	0.355
05295-SP-TC-R5	TC-C	10/22/2005	NA	0.331
05297-SP-TC-R6	TC-C	10/24/2005	0.174	0.249
05297-SP-TC-R7	TC-C	10/24/2005	0.199	0.295
05297-SP-TC-R8	TC-C	10/24/2005	0.211	0.394
		Mean	**0.152**	**0.321**
06291-TC-SP-R1	TC-C	10/18/2006	0.251	0.601
06291-TC-SP-R2	TC-C	10/18/2006	0.100	0.159
06291-TC-SP-R3	TC-C	10/18/2006	0.101	0.228
06291-TC-SP-R4	TC-C	10/18/2006	0.192	0.345
06291-TC-SP-R5	TC-C	10/18/2006	0.129	0.312
06291-TC-SP-R6	TC-C	10/18/2006	0.107	0.178
06291-TC-SP-R7	TC-C	10/18/2006	0.116	0.142
06291-TC-SP-R8	TC-C	10/18/2006	0.182	0.422
		Mean	**0.147**	**0.298**
07296-TC-SP-R1	TC-C	10/23/2007	0.084	0.339
07296-TC-SP-R2	TC-C	10/23/2007	0.131	0.185
07296-TC-SP-R3	TC-C	10/23/2007	0.109	0.385
07296-TC-SP-R4	TC-C	10/23/2007	0.236	0.498
07296-TC-SP-R5	TC-C	10/23/2007	0.067	0.279
07296-TC-SP-R6	TC-C	10/23/2007	0.118	0.412
07296-TC-SP-R7	TC-C	10/23/2007	0.174	0.322
07296-TC-SP-R8	TC-C	10/23/2007	0.080	0.581
		Mean	**0.125**	**0.375**
TC-C_10/10/2000_Silver Perch-R1	TC-C	10/10/2000	0.205	0.110
TC-C_10/10/2000_Silver Perch-R2	TC-C	10/10/2000	0.066	0.130
TC-C_10/10/2000_Silver Perch-R3	TC-C	10/10/2000	0.450	0.150
TC-C_10/10/2000_Silver Perch-R4	TC-C	10/10/2000	0.260	0.200
TC-C_10/10/2000_Silver Perch-R5	TC-C	10/10/2000	0.190	0.180
TC-C_10/10/2000_Silver Perch-R6	TC-C	10/10/2000	0.650	0.150
TC-C_10/10/2000_Silver Perch-R7	TC-C	10/10/2000	0.380	0.150
TC-C_10/10/2000_Silver Perch-R8	TC-C	10/10/2000	0.430	0.140
		Mean	**0.329**	**0.151**
05298-SP-CR-R1	CR-C	10/25/2005	0.046	0.131
05298-SP-CR-R2	CR-C	10/25/2005	0.016	0.172
05298-SP-CR-R3	CR-C	10/25/2005	0.016	0.126
05298-SP-CR-R4	CR-C	10/25/2005	0.017	0.187
05298-SP-CR-R5	CR-C	10/25/2005	0.016	0.168
05298-SP-CR-R6	CR-C	10/25/2005	0.016	0.192
05298-SP-CR-R7	CR-C	10/25/2005	0.051	0.181
05298-SP-CR-R8	CR-C	10/25/2005	0.016	0.132
		Mean	**0.024**	**0.161**

Maximum Lead Conc	2.0

Appendix K-4:__Bioaccumulation Factors for Finfishes Black Drum, Red Drum, Silver Perch, Spotted Seatrout, Striped Mullet

Spotted Seatrout

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
03287-SS-PC-1	PC	10/17/2003	2.3	1.5
03287-SS-PC-2	PC	10/17/2003	7.1	1.7
03287-SS-PC-3	PC	10/17/2003	2.6	1.4
03287-SS-PC-4	PC	10/17/2003	1.5	1.5
03287-SS-PC-5	PC	10/17/2003	1.4	1.3
03287-SS-PC-6	PC	10/17/2003	5.2	1.6
03287-SS-PC-7	PC	10/17/2003	4.8	1.2
03287-SS-PC-8	PC	10/17/2003	4.4	1.2
		Mean	**3.66**	**1.43**
04299-SS-PC-1-C+F	PC	10/25/2004	8.696	4.50
04299-SS-PC-2-C+F	PC	10/25/2004	8.973	4.10
04299-SS-PC-3-C+F	PC	10/25/2004	3.193	4.60
04299-SS-PC-4-C+F	PC	10/25/2004	5.560	3.60
04299-SS-PC-5-C+F	PC	10/25/2004	11.370	4.70
04299-SS-PC-6-C+F	PC	10/25/2004	9.076	3.75
04299-SS-PC-7-C+F	PC	10/25/2004	5.095	5.30
04299-SS-PC-8-C+F	PC	10/25/2004	5.263	1.62
		Mean	**7.15**	**4.02**
05292-SS-PC-R1	PC	10/19/2005	4.323	3.755
05292-SS-PC-R2	PC	10/19/2005	19.377	2.664
05292-SS-PC-R3	PC	10/19/2005	4.528	2.981
05292-SS-PC-R4	PC	10/19/2005	6.410	3.889
05292-SS-PC-R5	PC	10/19/2005	5.814	1.705
05292-SS-PC-R6	PC	10/19/2005	1.027	2.586
05292-SS-PC-R7	PC	10/19/2005	4.651	2.016
05292-SS-PC-R8	PC	10/19/2005	6.303	3.025
		Mean	**6.55**	**2.83**
06289-PC-SS-R1	PC	10/16/2006	0.788	0.639
06289-PC-SS-R2	PC	10/16/2006	1.551	2.008
06289-PC-SS-R3	PC	10/16/2006	8.796	3.509
06289-PC-SS-R4	PC	10/16/2006	2.716	2.099
06289-PC-SS-R5	PC	10/16/2006	3.274	2.601
06289-PC-SS-R6	PC	10/16/2006	0.909	0.900
06290-PC-SS-R7	PC	10/17/2006	3.172	0.978
06290-PC-SS-R8	PC	10/17/2006	1.617	0.911
		Mean	**2.85**	**1.71**
07276-PC-SS-R1	PC	10/3/2007	1.229	4.364
07276-PC-SS-R2	PC	10/3/2007	10.843	2.631
07276-PC-SS-R3	PC	10/3/2007	1.130	1.400
07276-PC-SS-R4	PC	10/3/2007	3.025	2.050
07276-PC-SS-R5	PC	10/3/2007	1.892	4.595
07276-PC-SS-R6	PC	10/3/2007	5.747	2.061
07276-PC-SS-R7	PC	10/3/2007	5.702	3.798
07276-PC-SS-R8	PC	10/3/2007	2.407	2.681
		Mean	**4.00**	**2.95**

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
PC-SS-R1	PC	8/29/2002	2.5	0.40
PC-SS-R2	PC	8/29/2002	16.0	0.82
PC-SS-R3	PC	8/29/2002	3.7	1.40
PC-SS-R4	PC	8/29/2002	10.0	1.00
PC-SS-R5	PC	8/29/2002	4.5	1.50
PC-SS-R6	PC	8/29/2002	3.7	1.10
PC-SS-R7	PC	8/29/2002	2.5	0.38
PC-SS-R8	PC	8/29/2002	3.6	0.61
		Mean	**5.81**	**0.90**
Purvis Creek_10/10/2000_ Spotted Seatrout-R1	Purvis	10/10/2000	**0.99**	**0.64**
05295-SS-TC-R1	TC-C	10/22/2005	0.183	0.342
05295-SS-TC-R2	TC-C	10/22/2005	0.206	0.257
05295-SS-TC-R3	TC-C	10/22/2005	0.123	0.287
05295-SS-TC-R4	TC-C	10/22/2005	0.118	0.447
05297-SS-TC-R5	TC-C	10/24/2005	0.130	0.344
05297-SS-TC-R6	TC-C	10/24/2005	0.171	0.266
05297-SS-TC-R7	TC-C	10/24/2005	0.118	0.332
05297-SS-TC-R8	TC-C	10/24/2005	0.472	0.512
		Mean	**0.190**	**0.348**
06291-TC-SS-R1	TC-C	10/18/2006	0.018	0.194
06291-TC-SS-R2	TC-C	10/18/2006	0.061	0.330
06291-TC-SS-R3	TC-C	10/18/2006	0.122	0.476
06291-TC-SS-R4	TC-C	10/18/2006	0.107	0.257
06291-TC-SS-R5	TC-C	10/18/2006	0.318	0.272
06291-TC-SS-R6	TC-C	10/18/2006	0.250	0.307
06291-TC-SS-R7	TC-C	10/18/2006	0.270	0.238
06291-TC-SS-R8	TC-C	10/18/2006	0.287	0.373
		Mean	**0.179**	**0.306**
07296-TC-SS-R1	TC-C	10/23/2007	0.118	0.249
07296-TC-SS-R2	TC-C	10/23/2007	0.072	0.352
07296-TC-SS-R3	TC-C	10/23/2007	0.074	0.344
07296-TC-SS-R4	TC-C	10/23/2007	0.040	0.478
07296-TC-SS-R5	TC-C	10/23/2007	0.091	0.530
		Mean	**0.079**	**0.391**
05298-SS-CR-R1	CR-C	10/25/2005	0.016	0.079
05298-SS-CR-R2	CR-C	10/25/2005	0.016	0.078
05298-SS-CR-R3	CR-C	10/25/2005	0.017	0.083
05298-SS-CR-R4	CR-C	10/25/2005	0.017	0.082
05298-SS-CR-R5	CR-C	10/25/2005	0.017	0.122
05298-SS-CR-R6	CR-C	10/25/2005	0.016	0.153
05298-SS-CR-R7	CR-C	10/25/2005	0.017	0.156
05298-SS-CR-R8	CR-C	10/25/2005	0.016	0.110
		Mean	**0.016**	**0.108**

Maximum Lead Conc 1.6

Appendix K-4:__Bioaccumulation Factors for Finfishes Black Drum, Red Drum, Silver Perch, Spotted Seatrout, Striped Mullet

Striped Mullet

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
04299-SM-PC-1-C+F	PC	10/25/2004	17.554	0.190
04299-SM-PC-2-C+F	PC	10/25/2004	12.960	0.170
04299-SM-PC-3-C+F	PC	10/25/2004	12.222	0.240
04299-SM-PC-4-C+F	PC	10/25/2004	14.896	0.150
04299-SM-PC-5-C+F	PC	10/25/2004	9.714	0.170
04299-SM-PC-6-C+F	PC	10/25/2004	21.417	0.140
04299-SM-PC-7-C+F	PC	10/25/2004	12.262	0.310
04299-SM-PC-8-C+F	PC	10/25/2004	47.046	0.300
		Mean	**18.51**	**0.21**
05292-SM-PC-R1	PC	10/19/2005	1.473	0.140
05292-SM-PC-R2	PC	10/19/2005	10.682	0.170
05292-SM-PC-R3	PC	10/19/2005	19.436	0.200
05292-SM-PC-R4	PC	10/19/2005	8.667	0.130
05292-SM-PC-R5	PC	10/19/2005	1.172	0.320
05292-SM-PC-R6	PC	10/19/2005	15.878	0.260
05292-SM-PC-R7	PC	10/19/2005	19.156	0.840
05292-SM-PC-R8	PC	10/19/2005	20.000	0.310
		Mean	**12.06**	**0.30**
06290-PC-SM-R1	PC	10/17/2006	0.036	0.125
06290-PC-SM-R2	PC	10/17/2006	10.289	0.208
06290-PC-SM-R3	PC	10/17/2006	8.824	0.282
06290-PC-SM-R4	PC	10/17/2006	6.769	0.200
06290-PC-SM-R5	PC	10/17/2006	15.339	0.207
06290-PC-SM-R6	PC	10/17/2006	16.529	0.236
06290-PC-SM-R7	PC	10/17/2006	15.169	0.195
06290-PC-SM-R8	PC	10/17/2006	1.588	0.242
		Mean	**9.32**	**0.21**
07291-PC-SM-R1	PC	10/18/2007	4.473	0.128
07291-PC-SM-R2	PC	10/18/2007	9.821	0.104
07297-PC-SM-R3	PC	10/24/2007	23.054	0.245
		Mean	**12.45**	**0.16**

Maximum Lead Conc 3.2

Sample ID	*Location*	*Date*	*A-1268*	*Mercury*
			mg/kg/dw	
05297-SM-TC-R1	TC-C	10/24/2005	0.010	0.167
05297-SM-TC-R2	TC-C	10/24/2005	0.010	0.113
05297-SM-TC-R3	TC-C	10/24/2005	0.053	0.033
05297-SM-TC-R4	TC-C	10/24/2005	0.010	0.082
05297-SM-TC-R5	TC-C	10/24/2005	0.202	0.042
05297-SM-TC-R6	TC-C	10/24/2005	0.061	0.047
		Mean	**0.058**	**0.081**
06291-TC-SM-R1	TC-C	10/18/2006	0.351	0.024
06291-TC-SM-R2	TC-C	10/18/2006	0.443	0.024
06291-TC-SM-R3	TC-C	10/18/2006	0.311	0.024
06291-TC-SM-R4	TC-C	10/18/2006	0.267	0.026
06292-TC-SM-R5	TC-C	10/19/2006	0.205	0.030
		Mean	**0.315**	**0.026**
07296-TC-SM-R1	TC-C	10/23/2007	0.130	0.013
07296-TC-SM-R2	TC-C	10/23/2007	0.302	0.025
		Mean	**0.216**	**0.019**
05298-SM-CR-R1	CR-C	10/25/2005	0.017	0.017
05298-SM-CR-R2	CR-C	10/25/2005	0.016	0.033
05298-SM-CR-R3	CR-C	10/25/2005	0.017	0.019
05298-SM-CR-R4	CR-C	10/25/2005	0.016	0.015
		Mean	**0.016**	**0.021**

Appendix K-5

Bioaccumulation Factors for Cordgrass Data

Appendix K-5.__Cordgrass Data for Bioaccumulation Factors

Station	***Date***	***Sediment Mercury***	***Cordgrass Mercury***	***Sediment A-1268***	***Cordgrass A-1268***	
M-201	10/25/2005	0.594	0.009	0.61	0.017	
3-NOAA-G	10/25/2005	0.852	0.041	1.00	0.070	
5-NOAA-G	10/25/2005	1.94	0.044	18.00	0.245	
6-NOAA-G	10/25/2005	0.707	0.024	1.20	0.059	
8-NOAA-G	10/25/2005	0.866	0.021	0.61	0.049	
9-NOAA-G	10/25/2005	0.935	0.022	3.30	0.047	
7-NOAA-G	10/25/2005	0.675	0.028	1.00	0.017	
M-25	10/26/2005	6.600	0.101	88.00	0.221	
M-AB	10/26/2005	29.300	0.453	8.40	0.614	
M-100	10/26/2005	6.820	0.040	8.40	0.071	
M-101	10/26/2005	4.720	0.054	8.60	0.073	
M-102	10/26/2005	0.736	0.041	1.90	0.075	
M-103	10/26/2005	0.132	0.050	0.15	0.100	
M-104	10/26/2005	1.650	0.024	1.70	0.063	
M-106	10/26/2005	0.342	0.030	0.34	0.016	
M-202	10/27/2005	0.586	0.009	0.48	0.017	
M-105	10/27/2005	0.986	0.014	0.76	0.016	
M-107	10/27/2005	0.425	0.027	0.51	0.051	
M-108	10/27/2005	0.370	0.013	0.41	0.016	
M-28	10/27/2005	0.964	0.018	2.00	0.016	
M-37	10/27/2005	4.910	0.047	2.00	0.091	
TC-M	10/27/2005	0.197	0.007	0.09	0.016	
M-203	10/28/2005	0.202	0.008	0.24	0.017	
CR-M	10/28/2005	0.031	0.004	0.03	0.016	
M-204	10/28/2005	1.390	0.029	2.70	0.058	
M-200	10/31/2005	1.180	0.027	1.60	0.025	
M-19	10/10/2000	0.213	0.037	0.14	0.143	
M-22	10/10/2000	16.800	0.121	2.00	0.223	
M-25	10/10/2000	0.759	0.158	0.66	0.117	
M-26	10/10/2000	1.660	0.031	1.90	0.209	
M-27	10/10/2000	3.300	0.018	0.47	0.167	
M-28	10/10/2000	0.534	0.022	0.31	0.145	
M-40	10/10/2000	0.118	0.044	0.04	0.109	
M-42	10/10/2000	0.681	0.032	0.24	0.124	
M-46	10/10/2000	0.688	0.028	0.17	0.137	
				4.57	**0.099**	**Mean**
					0.022	**BAF**