PART 2
Updated Ecological Risk Assessment

Operable Unit 2, McIntosh, Alabama

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EPA Preface

This preface presents the EPA perspective on the Updated Ecological Risk Assessment for Olin McIntosh OU-2, Revised November 14, 2011. Though uncertainty remains in some areas, EPA believes that the risk assessment adequately characterizes site risk to ecological receptors to allow for remedial decisions to be made for contaminants of concern (mercury, methylmercury, DDTR, and HCB) in abiotic and biotic media. Though chemicals other than the four mentioned above were detected above screening levels in the original ecological screening assessment, EPA concurs with the screening assessment on the reasons for elimination of COPCs other than mercury, methylmercury, DDTR, and HCB (see Appendix P-2 of the ecological risk assessment), and recognizes that the need for any remedial action will be driven by these four chemicals in sediment, surface water, flood plain soil, and/or biotic tissue.

All risk assessments contain uncertainty related to selection of appropriate assessment endpoints, measures of effect, organism exposure parameters, and chemical toxicity to selected endpoints. For the OU-2 Ecological Risk Assessment Update, EPA provided Olin with recommended assessment endpoints, measures of effect, exposure parameters, and toxicity reference values for aquatic and upper trophic level receptors in OU-2 Basin and the flood plain. Endpoints and exposure parameters were finalized after discussions between EPA and Olin. Agreed upon endpoints are shown in Table P-1.

Evaluation of risk to benthic communities, plant communities, and amphibian populations were limited to qualitative evaluations during the Screening Level Ecological Risk Assessment (SLERA). No benthic bioassays were proposed or conducted, and direct evaluation of effects to the benthos were limited to the 1993 analysis of benthic diversity, and observation of chaetal aberrations in oligochaetes collected from the sediment. Despite noted impacts to benthic diversity and the presence of chaetal aberrations, the 1993 ecological risk assessment concluded that these effects could not be correlated with concentrations of COPCs in sediment. While this represents an uncertainty in the risk assessment, EPA recognizes that the qualitative nature of the current evaluation of benthic communities, plant communities, and amphibian populations is adequate because remedial decisions are likely to be driven by risk to upper trophic level receptors, which were quantitatively evaluated in the updated ERA.

Certain biotic tissue inputs to the dose calculations were based on historical data due to the absence of recent data for those tissues. Concentrations of DDTR in mosquitofish were based on data collected in 2001, while concentrations of mercury, DDTR, and HCB in raccoon tissue, little blue heron tissue, bullfrog tissue and crayfish tissue were based on data collected in 1994. It is not known how the concentration of COCs in those organisms may have changed over the past 10 to 15 years. Mercury concentrations in fish tissue increased from 2006 to 2008, likely due to the drought that reduced water exchange between the Basin and the Tombigbee River during that time period. It is not known if concentrations of mercury in

aquatic invertebrate and amphibian tissue showed a similar increase during that time.

Three different receptors (belted kingfisher, little blue heron, great blue heron) were used to evaluate risk to piscivorous birds in OU-2. Olin evaluated belted kingfisher using two different diets and site use factors. The EPA preferred model used a diet of 100% forage fish, and a site use factor of 100%. The Olin preferred model used a mixed diet of forage fish, aquatic insects, amphibians, and crayfish, and a site use factor of 50%. Though Olin considers EPA's preferred model to be "highly conservative", EPA believes the model represents reasonable maximum exposure and is consistent with information presented in the Wildlife Exposure Factors Handbook (EPA, 1993). Olin suggests that suitable habitat for belted kingfisher to construct nesting burrows is not present in OU-2. However, belted kingfishers are only dependent upon nest burrows during the breeding season, and do not utilize burrows the remainder of the year. EPA agreed to consider the results of both models when making remedial decisions based on the piscivorous bird dose model. Risk conclusions for each assessment endpoint are shown in the last column of Table F-2. Risk was considered present to an assessment endpoint if the exposures for the associated measurement endpoint exceeded the No Observed Adverse Effects Level (NOAEL). Hazard indices based on NOAEL benchmarks exceeded 1 for all modeled aquatic receptors except river otter and American alligator. NOAEL - based HI values exceeded one for two terrestrial receptors (short-tailed shrew and Carolina wren). Lowest Observed Adverse Effects Levels (LOAEL) were also evaluated where both NOAEL and LOAELs were available. LOAELs are less conservative than NOAELs. LOAEL HI values exceeded 1 for mink, pied-billed grebe, belted kingfisher (EPA-preferred model), belted kingfisher (Olin-preferred model), little blue heron, great blue heron, and Carolina wren. EPA concurs that potential risk exists to all receptors whose NOAEL HI exceeds one, and that PRGs should be developed for those receptors in the Remedial Goal Option Report.

Table P-1. List of Assessment Endpoints and Measurement Endpoints Evaluated in the Updated Ecological Risk Assessment for Olin OU-2

Exposure Medium	Receptor	Exposures Routes	Assessment Endpoints	Measurement Endpoints	Risk Present?
Sediment	Benthic Invertebrates	Direct contact, ingestion	Protection of Long-term Health and Reproductive Success of Benthic Invertebrate Community	Comparison of COC concentrations in sediment and crayfish tissue to media-specific toxicity values protective of benthic invertebrates	Yes
Sediment, Surface Water	Fish	Direct contact, ingestion	Protection of Long-term Health and Reproductive Success of the Fish Community	Comparison of COC concentrations in sediment, surface water, and fish tissue to media-specific toxicity values protective of fish.	Yes
	Aquatic invertebrate feeding mammals	Ingestion	Protection of Long-term Health and Reproductive Success of Insectivorous Aquatic Mammals	Food chain dose modeling to little brown bat using COC concentrations in sediment, surface water, and emergent aquatic insect tissue	Yes
	Carnivorous aquatic	Ingestion	Protection of Long-term Health and	Food chain dose modeling to river otter and mink using COC concentrations in sediment,	Yes

Table P-1. List of Assessment Endpoints and Measurement Endpoints Evaluated in the Updated Ecological Risk Assessment for Olin OU-2

	mammals		Reproductive Success of Carnivorous Aquatic Mammals	surface water, forage fish tissue, and predatory fish tissue	
	Insectivorous aquatic birds	Ingestion	Protection of Long-term Health and Reproductive Success of Insectivorous Aquatic Birds	Food chain dose modeling to pied-billed grebe using COC concentrations in sediment, surface water, vertebrate tissue, frog tissue, crayfish tissue, aquatic insect tissue, crayfish tissue, and forage fish tissue	Yes
	Piscivorous aquatic birds	Ingestion	Protection of Long-term Health and Reproductive Success of Piscivorous Aquatic Birds	Food chain dose modeling to belted kingfisher using COC concentrations in sediment, surface water, forage fish tissue, aquatic insect tissue, crayfish tissue, and amphibian tissue; modeling to little blue heron using forage fish and aquatic insect tissue; modeling to great blue heron using sediment, surface water, aquatic insect tissue, amphibian tissue, forage fish tissue, and predatory fish tissue.	Yes
	Omnivorous aquatic birds	Ingestion	Protection of Long-term Health and Reproductive Success of Omnivorous Aquatic Birds	Food chain dose modeling to wood duck using COC concentrations in sediment, surface water, insect tissue, and terrestrial (floodplain) plant tissue	Yes
	Carnivorous aquatic reptiles	Ingestion	Protection of Long-term health and Reproductive Success of Carnivorous Aquatic Reptiles	Food chain dose modeling to American alligator using	No
Soil	Soil dwelling invertebrates	Direct Contact, Ingestion	Protection of Long-term Health and Reproductive Success of Soil Invertebrates in Floodplain Soil	Comparison of COC concentrations in soil to soil toxicity values protective of soil-dwelling invertebrates	No
	Insectivorous terrestrial mammals	Ingestion	Protection of Long-term Health and Reproductive Success of Insectivorous Terrestrial Mammals	Food chain dose modeling to short-tailed shrew using COC concentrations in floodplain soil and terrestrial insect and spider tissue	Yes
	Omnivorous terrestrial mammals	Ingestion	Protection of Long-term Health and Reproductive Success of Omnivorous Terrestrial Mammals	Food chain dose modeling to raccoon using COC concentrations in floodplain soil, terrestrial insect and spider tissue, vertebrate tissue, and terrestrial (floodplain) plant tissue	No
	Herbivorous terrestrial mammals	Ingestion	Protection of Long-term Health and Reproductive Success of Herbivorous Terrestrial Mammals	Food chain dose modeling to pine vole using COC concentrations in floodplain soil and terrestrial (floodplain) plant tissue	No
	Insectivorous terrestrial birds	Ingestion	Protection of Long-term Health and Reproductive Success of Insectivorous Terrestrial Birds	Food chain dose modeling to Carolina wren using COC concentrations in floodplain soil and terrestrial insect and spider tissue	Yes

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8.0 ECOLOGICAL RISK ASSESSMENT

The objective of this Updated Ecological Risk Assessment (ERA) is to estimate potential ecological risk associated with constituents detected in environmental media during the OU-2 RI using data collected since the 1995 ERA was prepared. Ecological risk is characterized for both the terrestrial and aquatic environments in OU-2. This document incorporates most of the original components of the 1995 ERA for OU-2 (WCC, 1995) with the inclusion of additional receptors. The assessment was updated to conform to current ecological risk guidance documents that did not exist when the 1995 ERA was prepared and to incorporate the more recent monitoring data collected at OU-2, including sediment, surface water, floodplain soil, vegetation, insect, and fish data. The ERA includes qualitative and quantitative evaluations of risk. The discussion of potential ecological risk is divided into the following sections:

- Ecotoxicity and Potential Receptors
- Selection of COPCs
- Problem Formulation
- Assessment of Measurement Endpoints
- Semi-quantitative Assessment and Measurement Endpoints
- Quantitative Assessment and Measurement Endpoints
- Risk Description
- Uncertainty Analysis
- Conclusions and Recommendations

Section 8.1 through Section 8.4 discuss the Screening Level Ecological Risk Assessment (SLERA), the first two steps in the ERA process. Appendix P2 presents the results of the SLERA in further detail. The Baseline ERA is presented in Sections 8.5 through 8.20.

8.1 SCREENING LEVEL PROBLEM FORMULATION

Prey ingestion and direct contact with constituents in environmental media may result in mortality, decreased reproductive success, and/or decreased growth. Incidental ingestion of abiotic media may result in mortality, decreased reproductive success, and/or decreased growth for ecological receptors exposed to COPCs.

The ecological system associated with OU-2 consists of interconnected habitats: aquatic habitat comprised of the Basin and Round Pond, and terrestrial habitat comprised of the adjacent wetlands and floodplains. The boundaries of these habitats vary based on water levels in the Basin and Round Pond.

For the purpose of this ERA, the boundary of the aquatic habitat is based on a minimum maintained water elevation of 6-feet NAVD88. Subsequent calculations presented in this ERA reflect this boundary. Risk associated with a 3-foot NAVD88 water elevation is addressed in Section 8.18.4.

Several potential ecological receptors are within or near OU-2. The local species populate numerous trophic levels, as indicated in the Generalized Food Web Model (Figure 8-1). A subset of the potential OU-2 ecological receptors was identified as surrogate species to represent the trophic levels that are presented in the Site-Specific Food Web Model (Figure 8-2). These surrogate receptors were selected using the information presented in the food web model and by considering the following:

- Does the receptor occur or potentially occur in OU-2?
- Is exposure of the receptor to the COPCs likely?
- Can the receptor's sensitivity to constituents be characterized?
- Does the receptor occupy significant feeding niches, guilds, or habitats in OU-2?

8.1.1 Environmental Setting

Identification and characterization of an ecosystem potentially at risk provides the context for the updated ERA, allowing anticipation of the interactions between stressors (e.g., COPCs) and the ecological components that are most relevant to developing exposure scenarios (USEPA, 1997a). The term *ecosystem* is used here in the broad sense of a spatially defined assemblage of biological populations and the abiotic media in which the organisms interact, with the energy that is "processed by" the system (Odum, 1971; Erlich and Roughgarden, 1987).

OU-2 comprises the Olin Basin (Basin), Round Pond, surrounding floodplains on the Olin property, and the wastewater ditch and former discharge ditch (Figure 1-1). Additional descriptive information is provided in Section 1.2.1 of Part 1 of this document.

8.1.2 Geography/Climate/Hydrology

OU-2 is located adjacent to the Tombigbee River in Washington County, Alabama. The Basin and Round Pond cover approximately 76 and 4 acres, respectively, at 3-feet NAVD88. The inundated area of OU-2 when the water is held at 6-feet NAVD88 is approximately 135 acres, while the area contained within the berm surrounding the Basin is approximately 156 acres. The area outside the 6-feet NAVD88 elevation inside the berm at OU-2 is usually inundated from fall to the end of spring each year. A detailed description of site geography is included in Section 3.1 of Part 1 of this document.

Washington County is part of the Southern Pine Hills District of the East Gulf Coastal Plain Physiographic Province (Mettee et al., 1996). OU-2 lies in the Alluvial-deltaic Plain, which consists of sediment deposits associated with larger rivers. The climate in this area is humid subtropical, with relatively mild winters. Rainfall in southern Alabama is relatively evenly distributed throughout the year. Frost and especially snow seldom occur. According to the National Weather Service (NWS) regional report (1971–2000), the region has an average annual precipitation of 66.62 inches, and an average annual temperature is 67.4 degrees Fahrenheit (°F), with July having the highest monthly average (82.1°F) and January having the lowest monthly average (50.7°F). The National Climatic Data Center reported an average annual precipitation of 66.3 inches from 1990 to 2009 at McIntosh, Alabama. Winds are variable throughout the year, but there are general seasonal patterns. Winds are mainly from the south or southeast from March through August; winds tend to be from the north during the remainder of the year.

A continuously recording data logger with transducers on both the Basin and river sides of the gate maintains a record of water elevations at OU-2. Staff gauges are located on both the Basin and river sides of the gate, and an additional staff gauge is located on the berm to record water elevations above 12-feet NAVD88. The equation relating water levels at the USGS Leroy gauge (02470050) and McIntosh developed by WCC (WCC, 1993) can be used to estimate water levels at the intake channel when an 18- to 24-hour lag time is considered. A description of site hydrology is presented in Sections 3.3 and 5.1 of Part 1 of this document.

Some areas of the Basin, such as the deeper portion of the Basin and the southern portion, experience more deposition than other areas. High wind speeds and low water elevations may increase sediment resuspension. Maintenance of a minimum 6-foot water elevation (NAVD88) at the gate may reduce sediment resuspension by maintaining a water depth over the sediment bed that dissipates wind-induced energy, thus potentially dampening the effects of wind-driven mixing. Sediment deposition and resuspension are described in Sections 2.2.7, 4.2.7, and 5.1.3 of Part 1 of this document.

Sediment in the northern and central portions of the Basin and Round Pond consists of silts and clays and have a TOC greater than 10,000 mg/kg. Sediment in the southern portion of the Basin has a sand component and TOC generally less than 10,000 mg/kg. Sediment pH is generally circumneutral and ORP indicates reducing conditions. Detailed descriptions of sediment physical characteristics and chemical properties are included in Section 4.2.5 of Part 1 of this document.

OU-2 surface water quality is typical of southern freshwater lakes—pH is circumneutral, water temperatures follow seasonal trends and decrease with depth, DO decreases with depth, and oxic conditions in surface water are present throughout most of the year. There is evidence of thermal stratification in the deeper portion of the Basin in late summer. Turbidity is generally less than 15 NTUs throughout the water column during non-flood conditions except within a foot of the surface water-sediment interface, when turbidity increases to 50–60 NTUs. Detailed descriptions of water quality and chemical analyses for surface water are included in Section 4.2.1 and 4.2.2 of Part 1 of this document.

Section 5.0 of the RI Addendum presents the CSM for OU-2, which describes the site conditions present pre- and post-berm construction, sediment deposition, reduction of resuspension, and COPC distribution.

8.1.3 Potential Receptors

This section provides a brief overview of information previously compiled on the biological populations and major communities of OU-2 during the 1990s, supplemented by current observations, to complete a description of the setting and context for assessment of ecological risks. Intensive studies were performed in the 1990s on vascular plant communities, infaunal benthic invertebrates, and fish (WCC, 1993, 1994, 1995). Qualitative assessments were made of terrestrial or semiaquatic vertebrates (amphibians, reptiles, birds, and mammals, collectively referred to as tetrapods) and the potential occurrence of federally protected species in OU-2 (WCC, 1994, 1995).

8.1.3.1 Vegetation

A study of OU-2 vegetation was performed in September 1991 as part of the initial ecological assessment (WCC, 1993). A detailed pedestrian survey for federally threatened or endangered plants was also conducted as part of this activity.

Six basic vascular plant communities, or vegetative cover types, were identified within OU-2 as presented in Table 8-1. The cover types include ponds and streams (permanent water bodies), semi-permanently/permanently flooded bottomland forest, temporarily flooded bottomland forest, successional shrub-dominated bottomland areas, herbaceous-dominated bottomland areas, and mixed hardwood/pine upland forest. The vascular flora identified during the previous survey were consistent with the current vegetative communities present on site (WCC, 1994).

Details of vegetative community structure in these various habitat types (by stratum) are available in WCC (1993). There was some evidence of logging, apparently long before the Olin McIntosh Plant was developed. Disturbance also occurred to northern and eastern portions of OU-2, which appeared to be related largely to construction of the BASF (formerly Ciba-Giegy) effluent pipeline in the late 1980s. An approximately 6.4-acre borrow area adjacent to OU-2 was cleared for the construction of the berm in 2006. The berm and gate system was constructed along the northern, eastern, and southern portions of OU-2 in 2006–2007. The detailed vegetative stress survey conducted in the early 1990s and additional observations during recent field activities revealed no indication of adverse effects of site-related COPCs on individual plants, populations, or communities in OU-2.

The distribution of vascular plant communities in OU-2 generally follows a pattern expected for a riparian wetland. Early successional herbaceous and shrub-dominated zones occur along the lower terrace of the river southeast of OU-2. The zonation of these communities generally is perpendicular to the river, reflecting a pattern of active terrace and natural levee development near the river. Most of the herbaceous vegetation consists of annual species and grasses/sedges commonly found along such periodically inundated areas. A successional gradient from an herbaceous zone along a shrub zone to a mature hardwood forest occurs towards the Basin. Although the successional areas southwest and southeast of the Basin have the superficial appearance of disturbed lands (especially from the air and in relation to the dense bottomland forest), the areas do not show evidence of stresses other than those normally associated with active riverine or streambank areas.

The temporarily flooded bottomland forest, semipermanently flooded bottomland forest, and mixed upland forest all appeared to be typical of these types within the Southern Pine Hills District of the Eastern Gulf Coastal Plain in terms of species composition and structural characteristics. The limited signs of stress and disturbance in these wooded areas included;

- Evidence of logging (apparently many decades ago)
- At least one (perhaps more) localized fire
- Localized physical disruption of the soil and/or hydrology (e.g., along where BASF's discharge line was laid adjacent to the eastern property boundary of the site, where the berm was constructed around the Basin and Round Pond, and in the borrow area on the top of the western bluff area)

Insect and disease damage, including webworms, chewing insects, and rusts, were noted in scattered locations, but were not indicative of a pattern that could be associated with any other stress(es), such as

the presence of COPCs, fire, or hydrologic factors. Other than the effects mentioned above, vegetative conditions throughout OU-2 appear to be good, with normal vigor and color. Significant deformities or other indications of altered plant growth were not found.

8.1.3.2 Benthic and Other Aquatic Invertebrates

Benthic macroinvertebrate sampling to characterize the infaunal community was conducted in three phases at OU-2 during the RI/FS investigation in 1991 and 1992 (WCC, 1993) and during the additional ecological studies (WCC, 1994). The benthic community at OU-2 was dominated by oligochaetes (segmented worms, especially of the families Tubificidae and Naididae); larval dipteran insects (especially chironomids [midges] and chaoborids [phantom midges]); and ostracods, as would be expected in a freshwater or oligohaline environment such as OU-2. There was a strong inverse correlation between taxonomic richness and invertebrate densities versus depth, likely due to hypoxic conditions at depth. Multivariate statistical analyses (clustering procedures) indicated no significant relationships between benthic invertebrate diversities and densities and COPC concentrations in the sediments. No clear patterns were evident in a qualitative assessment of the distribution of pollutant-tolerant or pollutant-sensitive taxa relative to COPCs. Relatively high incidences of oligochaete worms with aberrant chetae were noted in some locations, although these had no definite relationship to location-specific COPC concentrations. Details of the benthic macroinvertebrate studies are presented in WCC (1993).

The benthic macroinvertebrate community results were reviewed and bioturbation depths were evaluated by MACTEC using WCC's results. Bioturbation is the movement or alteration of sediment particles or porewater mediated by organisms. Bioturbation is a broadly defined term that includes several distinct processes (including bioadvection, biodiffusion, and bioirrigation) that influence sediment properties. Bioadvection is the nonrandom, generally vertical flux of particles due to biological activity such as feeding and burrow construction or maintenance. Biodiffusion is the vertical and horizontal transport of materials, including contaminants, through the sediment column as a result of biological activity. Bioirrigation is the movement of water and solutes within and out of the sediment column due to active or passive flushing of infaunal burrows (Clarke et al., 2001). The depth to which organisms will bioturbate depends on behaviors of the specific organisms and the characteristics of the substrate (Palermo et al., 1998). The roles in bioturbation of the dominant groups described above are discussed in more detail below.

The tubificid worms are most commonly found in soft sediments that are rich in organic matter. As lakes become eutrophic and DO concentrations decrease, tubificid oligochaetes tend to replace other benthic animals due to their tolerance for these conditions (Soil & Water Conservation Society of Metro Halifax, 2008). None of the oligochaete worms identified from OU-2 have a designated habit classification; however, oligochaetes are generally expected to be important freshwater bioturbators (Barbour et al., 1999).

Members of the chironomid family are classified as burrowers (Barbour et al., 1999). Chironomids are often the only insects found in lake sediments of the profundal zone where hypoxic (oxygen concentrations less than 3 mg/L) and even anoxic conditions sometimes occur (Rasmussen, 1996). The larvae and pupae of most species occurring in low-oxygen sediments construct burrows and fixed tubes of sediments held together with silky secretions. Tube and burrow dwellers can ventilate their tubes with fresh water by dorso-ventral undulations of the body, thereby facilitating gas exchange during times of low ambient oxygen and resulting in bioadvection and bioirrigation.

The benthic macroinvertebrates listed in WCC (1993) were provided to several experts in invertebrate ecology and bioturbation to assess expected bioturbation depths in OU-2. Douglas Clark, a co-author on several subaqueous cap design guidance documents for the U.S. Army Corps of Engineers, responded: "It appears from your list of taxa that you are dealing with a freshwater or perhaps an oligohaline system. I base this on the listing of tubificid oligochaetes and chironomids. It is impossible to tell much more about taxa shown at the family level. Freshwater systems are less well-understood than estuarine systems with respect to bioturbation depths, but largely would be expected to be confined to the uppermost 10 to 15 cm of the sediment column, *and probably considerably shallower than that* [emphasis added]." Mr. Clark's response is interpreted to indicate that, based on the benthic infaunal species present at OU-2, bioturbation would be largely confined to the uppermost 6 inches (i.e., 15 cm) of the sediment column.

Additional aquatic invertebrates (various crayfish species, grass shrimp, and blue crab [WCC, 1994]) were encountered during efforts to collect selected prey animals for COPC analyses for the additional ecological studies. Mayflies were also collected in 1994.

The benthic invertebrate community of OU-2 exhibited some evidence of stress (lower diversity and abundance, and chetal aberrations in many oligochaetes) based on limited comparisons with a reference area, Hatchetigbee Lake, that may in part be attributable to the presence of COPCs. Another important

factor to recognize in characterizing the benthic invertebrate community of OU-2 is that limnological conditions in the deeper portions of the Basin appear to be unfavorable to aerobically respiring organisms.

8.1.3.3 Fish

The Lower Tombigbee River drainage has 131 documented fish species (Mettee et al., 1996). Approximately 60 of these species are expected to occur in OU-2 or the immediate vicinity based on habitat preferences (Table 8-2). The presence of 41 of the expected species has been confirmed (Table 8-2), and approximately 30 to 35 species appear to be relatively abundant based on the semi-quantitative data summarized in WCC (1993) and observations during fish collection activities. The location of OU-2 in the Lower Tombigbee River Basin near the Mobile River Basin (two of the most diverse river systems in Alabama) accounts for the high species diversity in OU-2. Habitat diversity within OU-2 (deepwater habitat, shallows, large woody debris, permanently and semi-permanently flooded wetlands, and floodplains) and abundant food sources further support the species diversity observed at OU-2.

Fish were collected in 1986, 1991, 1994, 1995, 2001, 2003, 2005, 2006, and 2008. The main objective of fish sampling activities in OU-2 has been to obtain tissues for COPC analyses. The results of the sampling were summarized in Section 1.2.3 and 4.5.3 of Part 1 of this document. The fish community of OU-2 appears to be typical of similar environments throughout the Eastern Gulf Coastal Plain, considering the gear used, level of effort, and the prevailing sampling conditions. The only species that is usually common in such habitats that has not been observed is the bowfin *(Amia calva)*. The OU-2 fish community includes certain euryhaline fishes (e.g., least killifish [*Heterandria formosa*], Atlantic needlefish [*Strongylura marina*], and hogchoker [*Trinectes maculatus*]).

Discussions of trends in fish tissue concentrations of COPCs were presented in Section 4.5.3 of Part 1. For completeness, those trends in fish tissue concentrations over time are summarized as follows:

- Mercury concentrations in upper trophic level fish have increased since 2006. Middle and lower trophic level fish mercury concentrations have decreased over time based on the available data. As the upper trophic level fish continue to feed on the middle and lower trophic level fish with lower tissue concentrations, the upper trophic level fish may decrease in concentration, as discussed in the prior subsections.
- HCB concentrations in the upper and lower trophic level fish have decreased over time. No middle trophic level fish sampled from multiple years are available for historical trend comparison.

- DDTR concentrations in the upper and lower trophic level fish have decreased over time. No middle trophic level fish sampled from multiple years are available for historical trend comparison.

The documented increases in mercury without increases documented for HCB and DDTR are likely associated with the lack of continuous, uniform data for statistical analysis.

8.1.3.4 Terrestrial and Semi-Aquatic Vertebrates (Wildlife)

The occurrence and relative abundance of terrestrial and semi-aquatic vertebrates (amphibians, reptiles, birds, and mammals) in OU-2 was summarized in WCC, 1994. These faunal lists were updated throughout the field investigations at OU-2, in particular the annotations regarding confirmed presence in the area. These species are presented in Table 8-3. Many of the strictly terrestrial vertebrates (e.g., some reptiles, most mammals) probably occur in the floodplain area of OU-2 only as dry-season transients. WCC (1994) indicated that there was no evidence to suggest that the terrestrial vertebrate populations in OU-2 were different from those in comparable habitats in the region.

The available information on tetrapod vertebrates in OU-2 is generally observational and limited, since minimal standardized quantitative sampling was performed. Nevertheless, it provides a basis for a general qualitative description of the higher vertebrate communities in the study area. The presence of at least 12 types of amphibians, 17 types of reptiles, 58 types of birds, and 16 types of mammals in OU-2 have been confirmed directly through observation or indirectly through scat and sign.

8.1.3.5 Threatened and Endangered Species

The potential occurrence of federally protected species at OU-2 was evaluated from a review of the USFWS Alabama Ecological Service Field Office list of federally protected species by county (USFWS, 2010). Twenty-two federally protected taxa are known to occur in Washington, Baldwin, Choctaw, Clarke, and Mobile Counties. These species include one amphibian, five birds, two fishes, three mammals, two invertebrates (mussels), two plants, and seven reptiles (Table 8-4). Of these 22 protected species, the bald eagle (*Haliaeetus leucocephalus*) has been observed at OU-2. Bald eagles were delisted as a protected species by USFWS as of June 29, 2007. Although no longer afforded protection by the Endangered Species Act, the bald eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, both of which protect bald eagles by prohibiting killing, selling, or otherwise harming eagles, their nests, or eggs.

The wood stork (*Mycteria americana*) and the Alabama redbelly turtle (*Pseudemys alabamensis*) are two federally protected species with moderate likelihood of actually residing in OU-2, although neither of these has been observed throughout the numerous field efforts. Occurrence of the remaining federally protected species in habitats available in OU-2 is highly improbable, because either the preferred habitat is elsewhere; or suitable habitat is present but the species were reportedly extirpated from the area long ago.

8.1.4 Complete Exposure Pathways

The identification of exposure pathways was necessary to develop a CSM (USEPA, 1997b). The identification of exposure pathways varied by the different organisms selected as potential receptors. Varying exposure to COPCs in the ecosystem is expected due to differences in habitat and life cycles between different species. For example, aquatic organisms, such as fish and aquatic invertebrates, often have more exposure to COPCs in the water column or through the aquatic food web than to COPCs in the sediments. Benthic organisms often have higher exposures from direct contact with sediments than organisms that live in the water column. Mammals, birds, amphibians, and reptiles that live in and/or forage in OU-2 also may be exposed to COPCs in the surface water, sediment, and prey. Potential exposure routes and receptors are summarized in the CSM for ecological receptors, which is presented in Figure 8-3. A generalized food web model and a site-specific food web model (Figures 8-1 and 8-2, respectively) are also presented to show the relationship between the different levels of the food chain.

No barriers exist to prevent potential exposure to COPCs for ecological receptors on and adjacent to OU-2 because OU-2 and adjacent land consist mainly of forests and other undeveloped lands. Therefore, potential ecological receptors are present along OU-2. These potential primary and secondary ecological receptors might include aquatic organisms residing in OU-2, wildlife using OU-2 as a source of food and drinking water, and plant and other terrestrial organisms in potential floodplain soil areas. Ecological receptor exposures may have occurred historically due to the surface water flow patterns in OU-2.

The potential exposure pathways have been identified in the CSM and presented in Figure 8-3. Complete exposure pathways identified for aquatic organisms (e.g., benthic macroinvertebrates and fish) residing within the Basin include dermal contact with surface water and sediments, ingestion of surface water and sediments, and ingestion of prey organisms that may bioaccumulate COPCs. Complete pathways identified for semi-aquatic and terrestrial wildlife using OU-2 as a source of food and drinking water include the incidental ingestion of surface soil, dermal contact with surface soil, inhalation of volatile

emissions (qualitative assessment only), ingestion of plants and prey organisms that may bioaccumulate COPCs, and dermal contact with subsurface soil by burrowing species.

This detailed and updated ERA incorporates the most recent data and further quantifies the exposure and risk to the receptors for each pathway. A comprehensive variety of biological field assessments were conducted for OU-2. These assessments provide sufficient evidence and information to estimate the exposure to biota in the assessment area. Risk comparisons were performed for constituents in surface water, sediment, floodplain soil, and tissue residues from OU-2. Concentrations are compared to toxicity studies from literature and presented in Section 8.4.

Biological tissue from several trophic levels had detectable concentrations of constituents indicating some degree of exposure through the food web. The concentrations detected in biological tissues are evaluated by comparison to values from literature or regulatory requirements in Section 8.4 and Section 8.5. The most significant potential exposure pathway is the ingestion of fish by avian receptors.

8.2 SCREENING LEVEL ASSESSMENT ENDPOINTS

Endpoints were defined to evaluate potential ecological effects. Consistent with USEPA guidance (USEPA, 1997a), two types of endpoints were identified. Assessment endpoints are ecological values to be protected (e.g., maintenance of a viable community of aquatic organisms, such as fish inhabiting the Basin). Because direct measurement of these assessment endpoints is often not practical, measurement endpoints are used to evaluate the assessment endpoints. A measurement endpoint is a measurable ecological characteristic and/or response to a stressor (e.g., increased mortality or reduced fecundity).

The assessment endpoints evaluated in the SLERA for OU-2 included the following:

- Assessment Endpoint 1: Protection of the Long-term Health and Reproductive Success of the Benthic Macroinvertebrate Community
- Assessment Endpoint 2: Protection of the Long-term Health and Reproductive Success of the Fish Community
- Assessment Endpoint 3: Protection of the Long-term Health and Reproductive Success of the Soil Invertebrates in Floodplain Soils

Assessment endpoints for benthic macroinvertebrates, fish, and soil invertebrates (Assessment Endpoints 1, 2, and 3, respectively) were evaluated using a qualitative approach in the SLERA (Appendix P2). The qualitative approach compared concentrations detected in OU-2 media (i.e., sediment, surface water,

surface soil, fish tissue, and crayfish tissue) to applicable ecological toxicity benchmarks or effects concentrations.

8.3 SCREENING LEVEL ECOLOGICAL EFFECTS EVALUATION

A screening-level ecological effects evaluation was performed for benthic macroinvertebrates, fish, and soil invertebrates (Assessment Endpoints 1, 2, and 3, respectively). This screening-level evaluation compared concentrations detected in OU-2 media (i.e., sediment, surface water, surface soil, fish tissue, and crayfish tissue) to applicable ecological toxicity benchmarks or effects concentrations to characterize risk to these Assessment Endpoints. A detailed discussion of the reviewed and selected toxicity benchmarks or effects concentrations, as well as the toxicity profiles of the COPCs, are provided in Appendix P2. The toxicity benchmarks or effects concentrations used in the qualitative analysis of Assessment Endpoints 1, 2, and 3 provide the concentration of a chemical that can be received by each receptor without experiencing measurable adverse health effects. These values come from scientific studies of organisms directly exposed to contaminated media. The qualitative approach for Assessment Endpoints 1, 2, and 3 is appropriate since these organisms are exposed to chemicals primarily through direct contact with OU-2 media. Site-specific toxicity testing was not performed for Assessment Endpoints 1, 2, or 3.

8.4 SELECTION OF CONSTITUENTS OF POTENTIAL CONCERN AND SCREENING LEVEL RISK CHARACTERIZATION

8.4.1 Selection of Constituents of Potential Concern

Development of the ecological COPCs was based on OU-2 data collected and documents written since 1991. Data collection was performed in 1991/1992, 1994, and 1995 and was reported in the 1993 RI (WCC, 1993), the 1994 Additional Ecological Studies of OU-2 (WCC, 1994), and in the first ERA for OU-2 (WCC, 1995). More recent data collection was performed at OU-2 between 2008 and 2010, including the collection of sediment, surface water, and surface soil data. Numerous studies were conducted from 1991 through 2010 that include surface water, surficial sediment, sediment cores, sediment pore water, soils, and biota sampling and analysis. Refer to Section 1.2.3 of Part 1 of this document for a complete listing.

Detected analytes from the soil/sediment, surface water, and fish samples that are described in Section 2.1 of the 1995 ERA were considered for the list of COPCs. More recent sampling data were also included in

the COPC selection process in the SLERA. The SLERA datasets include historical (i.e., data included in the 1995 ERA) and more recent sampling data (i.e., data collected between 2001 and 2010). Surface soil, sediment, and surface water data collected at OU-2 in 1991/1992 as part of RI efforts and in 1994 as part of the Additional Ecological Studies performed at OU-2 were re-evaluated as part of the SLERA. This re-evaluation was performed at the request of USEPA to determine if any additional COPCs should be addressed based on currently available screening criteria. Analytical data for surface soil, sediment, and surface water from 2008, 2009, and 2010 sampling events were also screened against currently available screening criteria to compare current OU-2 conditions to ecological screening values. The list of detected analytes was then reduced based on the concentrations, frequency of detection, comparison to literature-based ecological effects concentrations, and site conditions.

Based on the sediment, surface water, and surface soil screening results presented in the SLERA (Appendix P2), the COPCs include the following constituents:

COPCs
Sediment
Mercury
Methylmercury
HCB
DDTR
Surface Water
Mercury
Methylmercury
HCB
DDTR
Surface Soil
Mercury
HCB
DDTR

The COPCs to be carried forward in the risk assessment process for OU-2 include mercury, methylmercury, HCB, and DDTR. Details on the COPC selection process are discussed in the SLERA (Appendix P2). The historical and current analytical results of the COPCs for various media are presented in the datasets summarized on Tables 1-1 through 1-6, Tables H-1, H-2, and H-6, and Table 4-20. These data were used to estimate exposure point concentrations (EPCs).

8.4.2 Summary of Potential Risks – Assessment Endpoints 1, 2, and 3

Exceedances of potential toxicity levels were identified for benthic macroinvertebrates and fish with the exception of the following:

- Benthos exposed to methylmercury concentrations in sediment
- Benthos exposed to mercury surface water concentrations
- Benthos tissue residue concentrations for mercury and methylmercury
- Fish exposed to HCB sediment concentrations
- Fish exposed to mercury surface water concentrations
- Fish tissue residue concentrations for mercury (bluegill sunfish and silversides)

Fish exposure to methylmercury in sediments cannot be evaluated due to the lack of available toxicity studies. However, comparison of fish tissue sampling results shows that fish tissue body burdens for mercury are in the no-effects range, except for largemouth bass, which is within the lowest effects range for fish tissue mercury body burdens.

No exceedances of potential toxicity levels were identified for soil invertebrates. COPC concentrations in OU-2 surface soils are not anticipated to pose a potential for risk to soil invertebrates.

8.4.3 SLERA Summary

Results of the sediment, surface water, and surface soil screening performed in the SLERA indicated that the COPCs to be carried through the risk assessment process for OU-2 include mercury, methylmercury, HCB, and DDTR. The qualitative risk assessments performed for benthic macroinvertebrates and fish indicated the potential for risk to these communities in OU-2. Mercury, methylmercury, HCB, and DDTR in environmental media in OU-2 are anticipated to cause adverse effects to the benthic macroinvertebrate community in OU-2. Exceedances of mercury effects levels indicate a potential for risk to the fish community from exposure to mercury in OU-2 sediments. Surface water methylmercury, HCB, and DDTR concentrations indicate a potential for risk to the fish community from exposure to OU-2 surface water. Fish tissue residue concentrations also exceed effects levels for mercury, HCB, and DDTR. DDTR surface water data used in this qualitative assessment were collected in 1994 and concentrations may be lower today based on two remedial efforts conducted by the adjacent landowner and reductions in DDTR sediment concentrations since the 1990s. HCB surface water data were also collected in 1994. Therefore, potential risk from exposure to DDTR and HCB in surface water may be overestimated. Potential risk to the benthic macroinvertebrate and fish communities must be concluded for DDTR and HCB, but may be overestimated for exposure to these two COPCs. Based on the

qualitative risk assessment for soil invertebrates, mercury, methylmercury, DDTR, and HCB do not pose a potential for risk to the soil invertebrate community in OU-2.

8.5 BASELINE PROBLEM FORMULATION

8.5.1 Refinement of Chemicals of Potential Concern

The COPCs selected as part of the SLERA are applicable for the Baseline ERA. No refinement to the original list of COPCs is required.

8.5.2 Modeling Studies and Dose Conversions

Ingestion-based modeling calculations were conducted to characterize potential exposures and to identify potential effects for the following assessment endpoints. The receptor species quantified to represent the assessment endpoints are included. Assessment Endpoints 1, 2, and 3 are not presented here because food chain exposure estimation was not performed for these endpoints (Section 8.5 to Section 8.7).

- Assessment Endpoint 4: Protection of the Long-Term Health And Reproductive Success of Insectivorous Aquatic Mammals - Receptor Species Selected: Little Brown Bat
- Assessment Endpoint 5: Protection of the Long-Term Health And Reproductive Success of Carnivorous Aquatic Mammals - Receptor Species Selected: River Otter and Mink
- Assessment Endpoint 6: Protection of the Long-Term Health And Reproductive Success of Insectivorous Aquatic Birds - Receptor Species Selected: Pied-Billed Grebe
- Assessment Endpoint 7: Protection of the Long-Term Health And Reproductive Success of Piscivorous Aquatic Birds - Receptor Species Selected: Belted Kingfisher, Little Blue Heron, and Great Blue Heron
- Assessment Endpoint 8: Protection of the Long-Term Health And Reproductive Success of Omnivorous Aquatic Birds - Receptor Species Selected: Wood Duck
- Assessment Endpoint 9: Protection of the Long-Term Health And Reproductive Success of Carnivorous Aquatic Reptile - Receptor Species Selected: American Alligator

- Assessment Endpoint 10: Protection of the Long-Term Health And Reproductive Success of Insectivorous Terrestrial Mammals - Receptor Species Selected: Short-Tailed Shrew
- Assessment Endpoint 11: Protection of the Long-Term Health And Reproductive Success of Omnivorous Terrestrial Mammals - Receptor Species Selected: Raccoon
- Assessment Endpoint 12: Protection of the Long-Term Health And Reproductive Success of Herbivorous Terrestrial Mammals - Receptor Species Selected: Pine Vole
- Assessment Endpoint 13: Protection of the Long-Term Health And Reproductive Success of Insectivorous Terrestrial Birds - Receptor Species Selected: Carolina Wren

The food chain and environmental intakes for each species were calculated as follows:

$$EDD = NFIR * AUF * [\Sigma(C_i * FR_i) + C_{SED/SOIL} * FR_{SED/SOIL}] + (C_{WATER} * FR_{WATER})/BW$$

Where:

EDD	=	Estimated Daily Dose, mg/kg/day
NFIR	=	Body-weight normalized food ingestion rate, kg dry weight/kg bw/day
AU	=	Area Use Factor
Σ	=	Summation sign, signifying the summation of contributions from multiple dietary items
C_i	=	Concentration of contaminant in food item i, mg/kg dry weight
FR_i	=	Fraction of food item i in diet of receptor, unitless
$C_{SED/SOIL}$	=	Concentration of contaminant in sediment/surface soil, mg/kg dry weight
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR in kg dry weight/kg bw/day
C_{WATER}	=	Concentration of contaminant in ingested water, mg/L
FR_{WATER}	=	Water ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR in kg/kg bw/day
BW	=	Body weight of receptor, kg

The principal sources of mercury, methylmercury, HCB, and DDTR were species-specific, depending on the exposure media for each receptor. The specific equation used for each receptor is presented with the exposure parameters in Table 8-7 through Table 8-19. In general, the ingestion rate of food overshadows the ingestion rate of water in the equation, because of the mass of food versus the mass of water ingested.

In addition, the proportion of diet from prey items outweighs the proportion of diet from incidental ingestion of surface soils and sediments.

Environmental and some prey species' concentrations were based on measured levels from collections during the field efforts and were used directly in the above equation. Tissue and environmental media samples were collected from biota representative of a class of organisms and analyzed. Sample locations are presented on Figure 8-5 and were collected for the following purposes:

- Aquatic insect nymph samples (including Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) and other insect species) were historically analyzed for total mercury, HCB, and DDTR. These historical datasets do not likely reflect current site conditions. Therefore, the 2001 historical aquatic insect data were used to develop a biota-sediment accumulation factor (BSAF) for aquatic insects to estimate current aquatic insect tissue concentrations based on current sediment data. Data collected from the Basin and Round Pond were used in the BSAF approach. Additional detail on the development of this BSAF is provided below. The aquatic insect concentrations developed using the BSAF approach were used for the aquatic insect component of receptor diets, except for the little brown bat and the wood duck.

- Flying insect data collected in 2010 were used for the insect component for the little brown bat as the most appropriate data available for use in the food web exposure model. The little brown bat will opportunistically feed on flying insects from either the aquatic or terrestrial environment. The flying insects collected in 2010 include a mixture of emergent aquatic insects and terrestrial insects.

- Insect data collected in 2010, which consists of flying insects, crawling insects, and spiders, were used for the insect component for the wood duck as the most appropriate data available for use in the food web exposure model. The wood duck will opportunistically feed on a mixture of aquatic insects and terrestrial insects and spiders located on the banks and floodplains of the Basin. The 2010 dataset includes aquatic insects (in the form of emergent flying insects), terrestrial insects and spiders and reflects a more typical diet for the wood duck than aquatic insects alone.

- Crawling insect and spider data collected in 2010 were used for the insect component for the short-tailed shrew as the most appropriate data available for use in the food web exposure model. The shrew will predominately and opportunistically feed on crawling insects and spiders from the terrestrial environment. Flying insect data were excluded from risk quantification for the short-tailed shrew.

- No methylmercury data were present in historical Basin tissue samples for aquatic insects; therefore, the total mercury was partitioned into 53 percent mercury and 47 percent methylmercury for aquatic insects per the requirements of USEPA (2009a) based on Tremblay, et al. (1998). For the insect data collected in 2010, total mercury was partitioned into 51 percent mercury and 49 percent methylmercury per the requirements of USEPA (2009a) based on Cristol (2008).

- Crayfish samples were analyzed for total mercury, HCB, and DDTR to represent crayfish and benthic macroinvertebrate concentrations. No methylmercury data were present in historical Basin tissue samples for crayfish; therefore, the total mercury was partitioned into 42 percent mercury and 58 percent methylmercury per the requirements of USEPA (2009a) based on Simon and Boudou (2001).

- Bullfrog samples were analyzed for total mercury, HCB, and DDTR to represent amphibian concentrations. No methylmercury data were present in historical Basin tissue samples for amphibians; therefore, the total mercury was partitioned into 65 percent mercury and 35 percent methylmercury per the requirements of USEPA (2009a) based on Unrine, et al. (2005).

- Whole body bluegill and silverside samples were analyzed for total mercury and HCB to represent forage fish concentrations. DDTR data were not collected for these species. DDTR concentrations in mosquitofish were used to represent forage fish concentrations for this COPC. No methylmercury data were present in historical Basin tissue samples for these species; therefore, the total mercury was partitioned into 6 percent mercury and 94 percent methylmercury per the requirements of USEPA (2009a) based on 1995 OU-2 bluegill data.

- Whole body largemouth bass samples were analyzed for total mercury and HCB to represent predatory fish concentrations. DDTR data were not collected for whole body largemouth bass samples. DDTR concentrations in predatory fish were determined by multiplying available largemouth bass filet data by a factor of 1.35 as recommended by USEPA (Lechich, 1998). No methylmercury data were present in historical Basin tissue samples for largemouth bass; therefore, the total mercury was partitioned into 6 percent mercury and 94 percent methylmercury per the requirements of USEPA (2009a) based on 1995 OU-2 bluegill data.

- Whole body raccoon samples were analyzed for total mercury, HCB, and DDTR to represent terrestrial vertebrate prey concentrations for the raccoon. No methylmercury data were present in historical Basin tissue samples for the raccoon; therefore, the total mercury was partitioned into 27 percent mercury and 73 percent methylmercury per the requirements of USEPA (2009a) based on Jernelov, et al. (1976).

- Whole body little blue heron samples were analyzed for total mercury and HCB to represent aquatic vertebrate prey concentrations for the mink and the alligator. Directly measured tissue concentrations were used for total mercury and HCB since sediment concentrations for these two COPCs have typically been within an order of magnitude during historical (i.e., 1994) and more recent (i.e., 2008 and 2009) sampling events. No methylmercury data were present in historical Basin tissue samples for the little blue heron; therefore, the total mercury was partitioned into 27 percent mercury and 73 percent methylmercury per the requirements of USEPA (2009a) based on Jernelov, et al. (1976). Whole body little blue heron samples were historically analyzed for DDTR. Sediment concentrations of DDTR have decreased an order of magnitude and remedial actions have been completed on the adjacent property since the tissue collection was performed in 1994. Tissue concentrations for DDTR may decrease to the reduction in DDTR sediment concentrations. A DDTR BSAF was developed using the historical little blue heron tissue and sediment data. Additional detail on the development of this BSAF is provided below. The DDTR

BSAF was used to estimate current tissue concentrations in aquatic vertebrate prey (i.e., little blue heron) based on current sediment data.

- Flying insects, crawling insects, and spiders collected in 2010 were analyzed for total mercury, HCB and DDTR to represent concentrations for flying insects, terrestrial insects, and terrestrial invertebrates. No methylmercury data were present in historical or more recent Basin tissue samples for insects; therefore, the total mercury was partitioned into 51 percent mercury and 49 percent methylmercury for the insects collected in 2010 per the requirements of USEPA (2009a) based on Cristol (2008).

- Terrestrial vegetation was collected in 2010 and analyzed for total mercury, HCB, and DDTR to represent the concentrations for terrestrial vegetation. Aquatic vegetation is not available for the site at this time. Terrestrial vegetation was used in the food web exposure model for the wood duck due to the lack of available aquatic vegetation data for the site.

- Bulk sediment and core samples were collected to represent the concentrations of sediment incidentally ingested during feeding activities for various aquatic and avian receptors.

- Floodplain soil samples were collected in 2010 to represent the concentrations of soil incidentally ingested during feeding activities for various terrestrial receptors.

For prey species that did not have current site-specific measured tissue concentrations (i.e., aquatic insects and aquatic vertebrate prey), prey species tissue concentrations were calculated using BSAFs. The equation used to calculate the prey species tissue concentration using the BSAF approach was as follows:

$$C_{PS} = C_{MED} \times BSAF_{PS}$$

Where:
C_{PS} = Chemical concentration in prey species (mg/kg)
C_{MED} = Chemical concentration in exposed media (mg/kg)
$BSAF_{PS}$ = Biota-sediment accumulation factor in prey species (unitless)

Site-specific BSAFs were generated for aquatic insects due to the lack of current tissue data available for this prey species. Historical aquatic insect concentrations were not used because the data did not represent current site conditions. For example, DDTR concentrations in sediments have decreased an order of magnitude and the adjacent property owner (i.e., BASF) has implemented two remedial actions at the neighboring site. Historical tissue and media concentrations in OU-2 were not likely to be representative of current conditions; however, these data were used in calculating the site-specific BSAF as follows:

$$BSAF_{PS} = C_{PS}/C_{MED}$$

Where: C_{PS} = Average chemical concentration in prey species (mg/kg)
C_{MED} = Average chemical concentration in exposed media (mg/kg)
$BSAF_{PS}$ = Biota-sediment accumulation factor in prey species (unitless)

Individual aquatic insect BSAFs were determined for mercury, methylmercury, DDTR, and HCB using the following rules and methods:

- Sediment and aquatic insect data collected in 2001 from the Basin and Round Pond were used for determining site-specific BSAFs for aquatic insects.
- Sediment and aquatic insect data collected in September 2001 and October 2001 were used for determining site-specific BSAFs for aquatic insects.
- Total mercury in 2001 sediments was partitioned into mercury and methylmercury based on the following percentages: 99.97 percent mercury/0.03 percent methylmercury. This ratio of mercury to methylmercury was determined from analysis of 2008–2009 concentrations for these two chemicals in Basin sediments.
- Total mercury in 2001 aquatic insects was partitioned into mercury and methylmercury based on the following percentages: 53 percent total mercury/47 percent methylmercury. This ratio of mercury to methylmercury was provided by USEPA Region 4 for Olin McIntosh.
- Mercury and methylmercury BSAFs for aquatic insects were determined by dividing the average COPC concentrations in tissue samples (i.e., 0.058 mg/kg mercury and 0.051 mg/kg methylmercury) by average COPC concentrations in OU-2 sediments (i.e., 64.98 mg/kg mercury and 0.019 mg/kg methylmercury). DDTR and HCB concentrations in aquatic insect tissue samples and sediments were first normalized. Normalization was done by dividing the average tissue concentration (11.46 mg/kg DDTR and 0.97 mg/kg HCB) by the average fraction lipid content (0.046 for DDTR and 0.046 for HCB). The average sediment concentrations (3.98 mg/kg DDTR and 4.48 mg/kg HCB) were then divided by the average fraction of organic carbon (0.054 for DDTR and 0.053 for HCB). The DDTR and HCB BSAFs for aquatic insects were determined by dividing the average normalized tissue concentration by the average normalized sediment concentration. This resulted in the following BSAFs for aquatic insects: 0.0009 (mercury), 2.6 (methylmercury), 3.33 (DDTR), 0.25 (HCB). Tables 8-20 to 8-22 provide these BSAF calculations for aquatic insects.

An aquatic vertebrate prey BSAF for DDTR was determined using the following rules and methods:

- Historical sediment and little blue heron tissue data collected in 1994 were used for determining the site-specific DDTR BSAF for aquatic vertebrate prey (Table 8-23). Basin and Round Pond historical samples were included in the BSAF approach. Cypress Swamp samples were excluded from this analysis because the area is outside of the berm.

- Sediment data were normalized using the fractional organic carbon (FOC) data collected from the same sampling event (Table 8-24). Little blue heron tissue data were normalized using the lipid data collected from the same sampling event (Table 8-24).

- The average normalized tissue concentration (247 mg/kg) for DDTR was then divided by the average normalized sediment concentration (365 mg/kg). This resulted in a DDTR BSAF of 0.677 for aquatic vertebrate prey (Table 8-24). The most recent sediment data was from 2008-2009 (Table 8-25a). The DDTR BSAF was then multiplied by the average 2008-2009 organic carbon normalized DDTR sediment concentration (41.9 mg/kg) and the average lipid fraction for the little blue heron (0.045) to obtain an estimated 2009 aquatic vertebrate prey tissue concentration (Table 8-25b).

- The 2008-09 DDTR tissue concentration for aquatic vertebrate prey (i.e., the little blue heron) was estimated at 1.28 mg/kg using the above procedures (Table 8-25b). This aquatic vertebrate prey concentration was used in the food web modeling for the mink and American alligator.

The development of the site-specific DDTR BSAF for the little blue heron was performed in response to USEPA comments dated February 18, 2011, on the remedial goal option (RGO) document for OU-2. BSAFs are not necessary for mercury, methylmercury, or HCB because sediment concentrations for these COPCs have not decreased to the extent observed for DDTR. Sediment concentrations of DDTR have decreased an order of magnitude since the 1990s. Therefore, directly measured tissue DDTR concentrations from 1994 would have overestimated the potential risk for receptors consuming aquatic vertebrate prey items. Directly measured tissue concentrations for mercury and HCB were used for aquatic vertebrate prey. Total mercury data were partitioned into 27 percent mercury and 73 percent methylmercury per the requirements of USEPA (2009a) based on Jernelov, et al. (2008) due to a lack of available methylmercury data for aquatic vertebrate prey.

8.5.3 Exposure Point Concentrations

EPCs were based on concentrations to which receptor populations were expected to be exposed. Ecological risk guidance states that the 95 percent upper confidence limit (UCL) of the arithmetic mean should be used to develop EPCs. For instances where samples are insufficient to calculate a UCL or the UCL exceeds the maximum concentration, the maximum detected concentration can be used as a default EPC (USEPA, 2002). The UCLs were developed from multiple samples collected from numerous locations over several years in most cases and used as EPCs where appropriate. Insects (including crawling insects, spiders, and flying insects), terrestrial vegetation, and floodplain soil EPCs were based on the 2010 sample collection (Figure 8-5 and Figure 8-6). Sediment EPCs included the Basin and Round Pond sampling locations. Separate Round Pond EPCs were also developed.

EPCs were also developed for two water level scenarios. EPCs were calculated for water levels at 3-feet NAVD88 and at 6-feet NAVD88. The minimum water level currently held at OU-2 is 6-feet NAVD88; a minimum water level was maintained starting in February 2009 to the present. EPCs for a 3-foot water level were also provided to represent historical low-water levels. EPCs at both water level scenarios were developed to allow a comparison of the EPCs for the differing water levels. EPCs (UCLs) were calculated for biota, surface water, sediment, and soil samples. Constituents for which EPCs were developed included mercury, methylmercury, HCB, and DDTR. DDTR was calculated in two ways: first, the sum of the isomers was calculated with non-detect isomers as zero and, second, the sum of the isomers with non-detect isomers as half the detection limit. The EPCs are presented in Table 8-5. The sample data and exposure point calculations are contained in Appendices L, M, N, O, and P1.

USEPA required the use of 2008 bluegill and silverside whole body samples to develop EPCs for forage fish for mercury and HCB. No DDTR data were available for these samples. EPCs for DDTR in forage fish were based on 2001 mosquitofish whole body samples. EPCs for predatory fish were developed using LMB sample data from 2001, 2006, and 2008 for whole body and filet samples. USEPA required the use of LMB whole body data collected in 2008 for developing a mercury EPC for ecological receptors. USEPA required the use of LMB filet data collected in 2001 adjusted to whole body concentrations by multiplying the filet data UCL by a factor of 1.35 (Lechich, 1998) for the DDTR predatory fish EPC. Additional mercury EPCs for LMB have been developed for filet samples in 2006 and 2008. A HCB EPC for predatory fish was developed using 2008 LMB filet samples. Lower trophic level fish species EPCs have been developed using mosquitofish whole body composite samples from 1994 and 2001 for mercury, HCB, and DDTR.

EPCs for surface water were calculated in several ways. USEPA required the use of 2008 and 2009 samples and a combination of samples from available years except 2006. The surface water dataset for 2006 was excluded due to relatively high detection limits for mercury. For surface water, 1991 and 1994 samples were used to calculate the UCL. Separate shallow and deep surface water EPCs and combined shallow and deep sample EPCs were developed using 2008 and 2009 surface water data for total mercury and dissolved mercury. As required by USEPA, 1991, 1994, 2008, and 2009 surface water samples were combined to develop EPCs for total mercury. An EPC for the 2009 surface water was also developed to represent current and future conditions where a minimum water level is maintained. Separate methylmercury EPCs were obtained for both unfiltered and filtered methylmercury using 1995 samples, shallow 2008 and 2009 samples, deep 2008 and 2009 samples, 2009 samples, and all three sample years and depths combined.

USEPA required the use of surface sediment data for sediment EPCs using two methods. One method was to calculate the EPCs using sediment samples collected in 2008 and 2009 during the ESPP. The second method was to calculate EPCs using sediment samples collected in all years combined. EPCs for 2008 and 2009 were calculated along with EPCs for 1991, 1994, 2001, 2006, 2008, and 2009. EPCs for 3-feet NAVD88 and 6-feet NAVD88 water level elevations were developed. EPCs for the 3-feet NAVD88 level represented sediment locations that are underwater when at the 3-feet NAVD88 level. EPCs for the 6-feet NAVD88 level were developed including samples that were defined as floodplain soil but represent sediment at 6-feet NAVD88.

Sediment EPCs were also developed by taking into account samples collected at different depths. The first depth profile included sediment samples with beginning and ending depths between 0 to 6 inches, except core samples. In the case of core samples, the sample interval from 4 to 8 inches for finely sectioned cores and the sample interval from 0 to 12 inches for coarsely sectioned cores were included. The second depth profile included sediment samples that had a starting depth of 0 inches with an ending depth no deeper than 12 inches. These two EPCs were calculated with each sediment sample counted individually, using an average of five discrete samples from one location (where five discrete samples were collected at one location) and a weighted average for core samples.

USEPA required the use of floodplain soil data for soil EPCs using two methods. One method was to calculate the EPCs using soil samples collected in 2010. The second method was to calculate EPCs using soil samples collected in all years combined. EPCs for 2010 were calculated along with EPCs for 1992, 1994, and 2010. The datasets used for the generation of the EPCs had the following depth intervals: the 2010 EPCs represent a depth profile of 0 to 1 inches, as required by USEPA; and the 1992 and 1994 EPCs represent depth profiles of 0 to 6 inches. EPCs for 3-feet NAVD88 and 6-feet NAVD88 water elevations were also developed.

Sampling data used in these EPC calculations were selected to provide representation across each medium and account for the actual likelihood of exposure for organisms to media.

8.5.4 Mechanisms of Toxicity

The ecological effects evaluation includes a compilation of toxicological benchmarks or effects concentrations that were used to estimate potential risk to ecological receptors.

COPC toxicity information is available from various sources including, but not limited to, USFWS reports, ATSDR Toxicological Profiles, the Ecotoxicology Database (USEPA, 2010), Integrated Risk Information System (IRIS, 2010), Hazardous Substances Data Bank (HSDB, 2010), Oak Ridge National Laboratory (ORNL; Suter and Tsao, 1996), and various other scientific literature. Exposure intake calculations were compared to published literature values to evaluate potential ecological risks.

The mechanisms of ecotoxicity for mercury, methylmercury, HCB, and DDTR vary depending on the chemical form and receptor species evaluated. Exposure-related toxicity characteristics of environmental COPCs are typically described using no observed adverse effects levels (NOAELs) and lowest observed adverse effects levels (LOAELs) for test species. These toxicological values refer to the dose that the test species receives and an associated effect or lack thereof. Toxicological values may be derived from studies using either chronic or acute dosing.

Toxicity values derived in laboratory studies are often extrapolated for use with ecological receptor species because studies of laboratory test species are the only ones available for many environmental COPCs. These test species typically include rats and mice, although ring-necked pheasants, rabbits, dogs, guinea pigs, mallard ducks, and mink are also used. Because the ERA focused on assessing the potential for long-term effects on native biota, toxicity values used in the ERA had to be applicable chronic values.

Toxicity values presented herein are consistent with recommendations made by USEPA in correspondence dated October 1, 2009, where USEPA provided TRV values for mercury, methylmercury, and DDTR. In discussions with USEPA regarding these TRVs on October 2, 2009, all parties agreed to the use of TRVs for HCB from the 1995 ERA (WCC, 1995).

Mercury/Methylmercury

There were numerous toxicological benchmarks and effects concentrations for mercury and methylmercury for several laboratory species. The compilation of toxicological benchmarks and effects concentrations and identification of which studies to retain required a careful and detailed review. Studies with concentrations indicating population-level effects (e.g., mortality and reproduction effects) were preferred. Where possible, data regarding species most similar to those selected to represent site-specific trophic levels (e.g., avian studies for avian receptors, when available) were collected. Decisions and assumptions for extrapolating the laboratory effects concentrations to TRVs were sometimes necessary because multiple laboratory species and effects concentrations were provided for mercury and

methylmercury. The selected NOAEL TRVs and the NOAEL TRV extrapolations are presented in Table 8-6, as well as the corresponding TRV sources. The NOAEL risk estimates that exceeded a hazard index (HI) of 1, which indicated potential risk, were further evaluated using the LOAEL TRVs presented in Table 8-6.

The NOAEL-based TRV used to quantify methylmercury risk for avian receptors was generated from a juvenile great egret study in which methylmercury chloride was added to diets. Juvenile great egrets feed mainly on aquatic invertebrates, reptiles, and fish, but will consume small mammals opportunistically; however, birds in the study were fed fish. Only an LOAEL could be developed from this study. No studies were available to estimate an avian methylmercury NOAEL, so the NOAEL was set as equal to the LOAEL. The NOAEL-based TRV used to quantify mercury risk for avian receptors was generated from a Japanese quail study in which mercuric chloride was added to diets. Japanese quail feed on plants and insects. These studies approximate the dietary risk of piscivorous and herbivorous birds, which is a very different diet than that of carnivorous birds, which feed mainly on small mammals. This suggests differential forms and bioavailability for the mercury in dietary sources. Avian carnivore data are not available, so available avian toxicity data were used. Metabolic differences between the receptor species and the study species may add a significant level of uncertainty to the quantification of risk.

The NOAEL-based TRV used to quantify methylmercury risk for mammalian receptors was generated from mink studies in which methylmercury were added to diets. The measured endpoint in the mink studies was mortality, which was high. Considering the severity of the observed effect, the lower end of the range between NOAEL and LOAEL may be more appropriate for risk management decisions. The NOAEL-based TRV used to quantify mercury risk for mammalian receptors was a rat study in which mercuric chloride was given via oral gavage. Only an LOAEL could be developed from this study. No studies were available to estimate mammalian mercury NOAEL, so the NOAEL was set as equal to the LOAEL. As with avian studies, metabolic differences between the receptor species and the study species may add a significant level of uncertainty to the quantification of risk.

Mercury and methylmercury TRVs used to quantify risk to reptilian receptors were adopted directly from the 1995 ERA conducted for OU-2 (WCC, 1995). Both the NOAEL- and LOAEL-based TRVs were generated from a study on the American alligator. The measured endpoint was based on a single oral dose of mercury based on a study by Peters (1983) since no chronic dietary values were available. No studies were available to estimate a reptilian methylmercury exposure; therefore, values for mercury were

used as an estimate of methylmercury. The lack of chronic dietary exposure and methylmercury data may add a significant level of uncertainty to the quantification of risk.

HCB

HCB TRVs were adopted directly from the 1995 ERA conducted for OU-2 which was agreed on in meetings with USEPA (WCC, 1995). USEPA agreed that the data and methods used to generate those TRVs remained the most appropriate data and methods, and the values could be used in the current study. The selected NOAEL TRVs are presented in Table 8-6, as well as the corresponding TRV sources. The NOAEL risk estimates that exceeded an HI of 1, which indicated potential risk, were further evaluated using the LOAEL TRVs presented in Table 8-6.

The NOAEL-based TRV used to quantify risk for avian receptors, including carnivorous and piscivorous birds, was based on dietary exposure of Japanese quail and the resulting effect on egg hatchability and egg volume. The LOAEL developed for Japanese quail is the lowest HCB effects level reported for an ecologically relevant endpoint in birds, so it was adopted as the TRV for birds for this assessment. Japanese quail feed on plants and insects, a very different diet than that of carnivorous birds. This suggests possible differential bioavailability for HCB in dietary sources. Metabolic differences between the receptor species and the study species may add a significant level of uncertainty to the quantification of risk.

The NOAEL-based TRV used to quantify risk for mammalian receptors was generated from dietary exposures in mink and rat reproduction studies. In the mink study, an NOAEL was not available; therefore, the NOAEL was set equal to the LOAEL. Both an LOAEL and NOAEL were available from the rat study. Although there are studies of the toxicity of HCB to cats, beagle dogs, and pigs, these studies were not used because the endpoints (i.e., respiratory infection in cats, liver weights in pigs) were inappropriate for the quantification of risk for OU-2. An NOAEL- and LOAEL-based TRV could not be identified for reptilian receptors for HCB. The lack of data for HCB adds uncertainty to the quantification of risk.

DDTR

DDTR TRVs are based on TRVs identified by USEPA. USEPA published new ecological soil screening levels for DDTR in August 2007 (USEPA, 2007) and constructed food chain models for upper trophic level receptors to back-calculate safe levels of DDTR in soils. To evaluate food chain doses of DDTR to upper level receptors, USEPA conducted extensive literature reviews of papers that evaluated

reproduction, growth, or survival endpoints to select TRVs for mammalian and avian receptors. USEPA contends that the values from these papers are not specific to soil ingestion and are applicable to aquatic food chain models where soil exposure is negligible. There is uncertainty in the use of these values based on the difference between terrestrial (i.e., soil) and aquatic (i.e., sediment) environments. The TRV is expressed as a body-weight-normalized ingested dose and is not specific to a particular medium. The DDTR TRV represents a total chemical ingestion across all media, including soil, sediment, water, or food. The selected NOAEL extrapolations and TRVs are presented in Table 8-6, along with the corresponding USEPA source. The NOAEL risk estimates that exceeded an HI of 1, which indicated potential risk, were further evaluated using the LOAEL TRVs presented in Table 8-6.

The selected avian NOAEL TRV was the value that represented the highest bounded NOAEL that is lower than the lowest bounded LOAEL from USEPA's recommended document. USEPA did not identify a preferred avian LOAEL TRV in the soil screening guidance. Using the same rationale and protocol used to derive the NOAEL TRV, a preferred LOAEL TRV can be identified by selecting the lowest bounded LOAEL for reproduction, growth, and survival endpoints that is greater than the NOAEL identified above.

USEPA's selection of a mammalian NOAEL TRV represents the highest bounded NOAEL lower than the lowest bounded LOAEL. A LOAEL TRV was not derived by USEPA, but by applying the same logic used to derive the NOAEL TRV, a LOAEL TRV representing the lowest bounded LOAEL for DDTR can be identified from the USEPA database used to derive the Ecological Soil Screening Guidance Levels.

The selected reptilian NOAEL TRV represents the high-end risk level for DDTR. The DDTR TRV used to quantify risk to reptilian receptors was adopted directly from the 1995 ERA conducted for OU-2 (WCC, 1995). Both the NOAEL- and LOAEL-based TRV was generated from a study on snakes (Hall, 1980). The measured endpoint was based on a single oral dose of DDT since no chronic dietary values were available. The lack of chronic dietary exposure data and metabolic differences between the receptor species and the study species may add a significant level of uncertainty to the quantification of risk.

8.5.5 Contaminant Fate and Transport, Ecosystems Potentially at Risk, and Complete Exposure Pathways

A conceptual site model (CSM) has been developed for OU-2 as part of the RI Addendum. A detailed description of fate and transport mechanisms and complete exposure pathways can be found in Section 5.0 of the RI Addendum.

8.5.6 Assessment and Measurement Endpoints and Risk Questions

Assessment endpoints are the specific ecological values to be protected (USEPA, 1992). This ERA defines and addresses issues based on potentially complete exposure pathways and ecological effects. The CSM identifies the relationships between potential exposures and potential exposure effects. Defining ecological concerns during the ERA involves identifying toxic mechanisms, characterizing potential receptors, and estimating exposure and evaluating the resulting potential ecological effects of exposure. Problem formulation also includes development of the DQO process for the ERA (USEPA, 1993a, b). Potential sources, release mechanisms, media of concern, migration, exposure pathways, and receptor species were evaluated and were adequate for quantifying COPC exposure and addressing the site hypothesis. The site hypothesis is: *Concentrations of mercury, methylmercury, HCB, and DDTR detected in environmental media at OU-2 are not sufficient to impair the function, health, and reproductive success of the ecological community*. The site hypothesis is further discussed in Section 8.19 of this ERA.

8.5.7 Assessment and Measurement Endpoints

Endpoints were defined to evaluate potential ecological effects. Consistent with USEPA guidance (USEPA, 1997a), two types of endpoints were identified. Assessment endpoints are ecological values to be protected (e.g., maintenance of a viable community of aquatic organisms, such as fish inhabiting the Basin). Because direct measurement of these assessment endpoints is often not practical, measurement endpoints are used to evaluate the assessment endpoints. A measurement endpoint is a measurable ecological characteristic and/or response to a stressor (e.g., increased mortality or reduced fecundity).

Assessment endpoints are the principal focus of the ERA and provide the link between the measurement endpoints and risk management decisions. Assessment endpoints are characteristic of the ecological system or its individual components of concern being evaluated (USEPA, 1997a). The definition (or specification) of an assessment endpoint should include a subject (e.g., the guild, habitat, or species of

interest) and a characteristic of that subject (e.g., survivorship and fecundity). The specification of the assessment endpoint should also describe how the endpoint represents functions important to the health and sustainability of the ecosystem (i.e., biological relevance). Assessment endpoints should consider and reflect societal values and should allow prediction and/or measurement (albeit not always direct measurement). Finally, the assessment endpoints should be susceptible to the stressors being evaluated.

On December 7, 2009, USEPA provided a presentation addressing the ERA approach, including the assessment endpoints that should be addressed (USEPA, 2009a). This presentation listed assessment endpoints for both terrestrial and aquatic species, and provided EPA's requirements regarding the representativeness of each species and the dietary inputs and AUF that should be used in the ERA. A second presentation by USEPA on December 8, 2009, specified which historical and current data should be used in the ERA (USEPA, 2009a). This ERA was performed in accordance with USEPA's required assessment endpoints and data use specifications. The ERA assessment endpoints were further refined and selected based on the ecology and the COPCs present. Based on this information, the following assessment endpoints were identified for OU-2:

- Assessment Endpoint 1: Protection of the Long-term Health and Reproductive Success of the Benthic Macroinvertebrate Community
- Assessment Endpoint 2: Protection of the Long-term Health and Reproductive Success of the Fish Community
- Assessment Endpoint 3: Protection of the Long-term Health and Reproductive Success of the Soil Invertebrates in Floodplain Soils
- Assessment Endpoint 4: Protection of the Long-term Health and Reproductive Success of Insectivorous Aquatic Mammals
- Assessment Endpoint 5: Protection of the Long-term Health and Reproductive Success of Carnivorous Aquatic Mammals
- Assessment Endpoint 6: Protection of the Long-term Health and Reproductive Success of Insectivorous Aquatic Birds
- Assessment Endpoint 7: Protection of the Long-term Health and Reproductive Success of Piscivorous Aquatic Birds
- Assessment Endpoint 8: Protection of the Long-term Health and Reproductive Success of Omnivorous Aquatic Birds
- Assessment Endpoint 9: Protection of the Long-term Health and Reproductive Success of Carnivorous Aquatic Reptiles

- Assessment Endpoint 10: Protection of the Long-term Health and Reproductive Success of Insectivorous Terrestrial Mammals
- Assessment Endpoint 11: Protection of the Long-term Health and Reproductive Success of Omnivorous Terrestrial Mammals
- Assessment Endpoint 12: Protection of the Long-term Health and Reproductive Success of Herbivorous Terrestrial Mammals
- Assessment Endpoint 13: Protection of the Long-term Health and Reproductive Success of Insectivorous Terrestrial Birds

Assessment Endpoints 1, 2, and 3 were addressed as part of the SLERA (Appendix P2). The BERA will focus on Assessment Endpoints 4 to 13.

8.5.8 Corresponding Measurement Endpoints

Each assessment endpoint was evaluated using measurement endpoints. These measurement endpoints included comparisons among environmental media concentrations associated with estimates of potential toxicity, and comparisons between doses or exposures measured or modeled in biotic receptors to toxicologically relevant doses or tissue concentrations, dependent on the corresponding assessment endpoint. The EPCs detected in various media at OU-2 are presented in Table 8-5.

Each measurement endpoint was selected based on site knowledge, the generalized food web model, information regarding the toxicity of the constituents of concern, and stakeholder consensus. The measurement endpoints constitute a suite of ecotoxicity study concentrations with associated effects, semi-quantitative comparisons to effect and no effect concentrations, and quantitative estimates of potential exposures and potential concerns that were used to assess risks.

Assessment endpoints for the various mammals and birds studied (Assessment Endpoints 4 through 13) were evaluated using a quantitative approach. For the purposes of this ERA, a quantitative approach analyzes biota exposures through food web modeling in addition to direct contact uptake. An estimated exposure dose for each COPC is modeled by using EPCs for site media and prey species tissue. This calculated dose will then be divided by applicable TRVs to assess the likelihood of adverse health effects. The TRVs used in the quantitative analysis of Assessment Endpoints 4 through 13 do not represent direct exposure as the TRVs do in the quantitative approach. Rather, these TRVs represent biological (tissue-related) doses that a receptor can experience (i.e., through bioaccumulation in the food web) without experiencing measurable adverse health effects. EPCs for COPCs used in the risk calculations for OU-2

for total mercury, methylmercury, HCB, and DDTR are presented in Table 8-5. In addition, Appendices L, M, N, O, and P1 present the specific datasets used for the generation of mercury, methylmercury, HCB, and DDTR EPCs in environmental media in the Basin, which are discussed further in Section 8.8.3.

8.6 BASELINE RISK CHARACTERIZATION

8.6.1 Overview of Quantitative Multi-Pathway Risk Estimation for Assessment Endpoints 4 through 13

Assessment Endpoints 4 through 13 were evaluated using current standard practices in ERA for estimating potential risks through the estimation of food chain and environmental media exposure for mercury, methylmercury, HCB, and DDTR. The following discussions outline the approach for the risk assessment, including toxicity data, modeling studies and dose conversions, EPCs, study design, weight of evidence, data analysis summary, and risk characterization. Discussions for Assessment Endpoints 4 through 13, organized by assessment endpoint number, provide descriptions of exposure, discuss associated measurement endpoint(s), and present information regarding the potential for effects on associated receptors.

8.6.2 Risk Characterization (Assessment Endpoints 4 through 13)

Risk characterization is the final phase of the ERA process and includes two major components: risk estimation and risk description (USEPA, 1992). Risk estimation consists of integrating the exposure profiles with the exposure-effects information and summarizing the associated uncertainties. The risk description provides information to interpret the risk results and identifies a threshold for potential adverse effects on the assessment endpoints.

Numerous values and assumptions were used to generate exposure estimates for ecological receptors. EPCs were generated for mercury, methylmercury, HCB, and DDTR and are presented in Table 8-26 for dietary items sampled. Dietary assumptions were generated for each of the 13 receptors quantified in this assessment and are summarized in Table 8-27. NOAEL and LOAEL TRVs were identified and are discussed in Section 8.8.1, and Table 8-6. These components were used to generate risk estimates or hazard quotients (HQs) for the receptor species.

8.6.3 Risk Estimation

Risk estimates are documented and assumptions are provided herein. Risk estimates quantify the likelihood of adverse effects based on the individual endpoint evaluations. A weight of evidence approach was used to integrate various types of findings to support a conclusion for assessment endpoints that entailed more than one measurement endpoint (or line of evidence).

Predictions of the likelihood of adverse effects from the receptor exposures were based on HQs. HQs were calculated by dividing the chemical-specific estimated ingestion intakes by the NOAEL TRVs. An HQ value of 1 was considered the threshold for indicating that further evaluation was necessary because of the potential for adverse effects. Quotients less than a value of 1 were considered unlikely to be associated with adverse effects.

The HQs calculated for individual COPCs were added to generate an HI. The summation of HQs is a conservative estimate used to indicate whether multiple constituents at a location pose a potential risk. In accordance with *Ecological Risk Assessment Guidance for Superfund* (ERAGS; USEPA, 1997a), a NOAEL-based HI equal to or greater than the threshold value of 1 indicates a potential risk to receptors and requires further assessment or evaluation. For receptors that exceed NOAEL-based HIs, a conclusion of risk is possible, though an exceedance of no-effects concentrations does not confirm that receptors have reached a level of health risk. This indicates that a no-effects concentration has been exceeded and that there is potential for risk. Further assessment was performed as part of the ERA for exceedances of the no-effects concentration through calculation of LOAEL-based HIs. An exceedance of a LOAEL-based HI indicates a higher potential for risk for the receptor than an exceedance of a NOAEL-based HI. An exceedance of a LOAEL-based concentration is an indication of a potential effect to the receptor that might need additional site-specific assessment.

8.7 ASSESSMENT ENDPOINT 4: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF INSECTIVOROUS AQUATIC MAMMALS

Insectivorous aquatic mammals were represented by the little brown bat for the purposes of risk quantification for Assessment Endpoint 4.

8.7.1 Little Brown Bat

Assessment Endpoint 4 addresses the potential risk to insectivorous aquatic mammals residing and foraging within OU-2. This assessment endpoint considers effects on mammals relying on insects as the primary dietary item. The little brown bat (*Myotis lucifugus*) was selected as a conservative representative species of insectivorous aquatic mammals because its dietary intake can consist entirely of insects. The little brown bat's diet, for the purpose of this risk assessment, consists of 100 percent flying insects. The little brown bat is also representative of an aerial mammal with a home range larger than the available habitat at OU-2, therefore only using the site area approximately one-quarter of the time. The little brown bat exposure model was supported by the collection of flying insects in July 2010. This assessment endpoint also addresses other aerial insectivorous mammals, including other species of bats.

The risk calculations for the little brown bat were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-7, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the little brown bat was 1.3 with contributions of mercury (0.21), methylmercury (0.52), DDTR (0.50), and HCB (0.032) (Table 8-28 through Table 8-32). The individual NOAEL-based HQs for the little brown bat did not exceed the threshold value of 1. However, the NOAEL-based HI, which is derived by the sum of the NOAEL-based HQs, exceeded the threshold value of 1. The HI was driven by the ingestion of insects. Methylmercury and DDTR provided the greatest magnitude of the NOAEL-based HI with HQs of 0.52 and 0.50, respectively. Because the NOAEL–based HI exceeded the threshold value of 1, further assessment in the form of a LOAEL-based HI was performed (Table 8-33 through Table 8-37). The LOAEL-based HI for the little brown bat was 0.77, which is below the threshold value of 1.

The little brown bat is considered to have a diet consisting entirely of flying insects with a home range larger than the available area in OU-2. The little brown bat was assumed to use OU-2 for feeding 22 percent of the time. These assumptions accounted for the NOAEL-based HI exceedance of the threshold value of 1, while the individual HQs for mercury, methylmercury, DDTR, and HCB were less than the threshold value of 1. Because the NOAEL-based HI exceeded the threshold value of 1 and the LOAEL-based HI was less than 1, the potential for risk for the little brown bat lies between the no observed adverse effects level and the lowest observed adverse effects level.

8.8 ASSESSMENT ENDPOINT 5: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF CARNIVOROUS AQUATIC MAMMALS

Carnivorous aquatic mammals are represented by the river otter and the mink for the purposes of risk quantification for Assessment Endpoint 5.

8.8.1 River Otter

Assessment Endpoint 5 addresses the potential risk to carnivorous aquatic mammals residing and foraging in OU-2 habitat. Carnivorous mammals may use pools and river edge habitats. In particular, aquatic carnivores typically feed on fish and crustaceans (i.e., crayfish) from pool and run habitats. The river otter was selected as a representative species of carnivorous aquatic mammals for quantification of a diet based on 85 percent fish (75 percent forage fish and 10 percent predatory fish), 10 percent amphibians, and 5 percent crayfish. The river otter is representative of a carnivorous aquatic mammal with a large home range (approximately 870 acres). This area is significantly larger than the available OU-2 habitat, indicating the river otter's area use factor of OU-2 is only approximately 0.09 (i.e., the river otter is using OU-2 habitat only 9 percent of the time). The river otter exposure model was supported by the collection of forage fish, predatory fish, amphibians, and crayfish.

The risk calculations for the river otter were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-8, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the river otter was 0.20 with contributions of mercury (0.0018), methylmercury (0.086), DDTR (0.083), and HCB (0.029) (Tables 8-28 through 8-32). NOAEL-based HIs for the river otter were less than the threshold value of 1. Thus, river otter and carnivorous aquatic mammals are considered unlikely to be adversely affected by mercury, methylmercury, DDTR, and HCB in OU-2.

8.8.2 Mink

The mink was selected as a representative species of carnivorous aquatic mammals for quantification of a diet based not only on aquatic species, but also on mammals and birds that reside in or near aquatic habitat. The mink's dietary makeup consists of 40 percent aquatic mammals/birds, 25 percent amphibians, 10 percent crayfish, 5 percent forage fish, and 20 percent predatory fish. The mink represents a carnivorous aquatic mammal that would spend nearly all of its time at OU-2 habitat. It has a

relatively small home range (approximately 1.34 miles of shoreline), which is essentially the same as the available shoreline of OU-2. The mink exposure model was supported by the collection of amphibians, crayfish, forage fish, predatory fish, and birds (little blue herons).

The risk calculations for the mink were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-9, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the mink was 5.4 with contributions of mercury (1.8), methylmercury (1.3), DDTR (1.2), and HCB (1.1) (Tables 8-28 through 8-32). NOAEL-based HIs for the mink exceeded the threshold value of 1 for mercury, methylmercury, and HCB with potential risk being derived approximately equally from mercury, methylmercury, DDTR, and HCB. The mercury and HCB HQs for the mink were driven only by the incidental ingestion of sediments (assumed to be 9 percent). The methylmercury and DDTR HQs were driven equally by aquatic vertebrate prey items and predatory fish. Because NOAEL-based HQs exceeded the threshold value of 1 for mercury, methylmercury, DDTR, and HCB, further assessment in the form of LOAEL-based HIs was performed for these chemicals (Table 8-33 through Table 8-37).

The LOAEL-based HI for the mink was 4.2 with contributions of mercury (1.8), methylmercury (0.64), DDTR (0.62), and HCB (1.1). LOAEL-based HQs for the mink exceeded the threshold value of 1 for mercury and HCB with the majority of potential risk being derived from mercury. HQs greater than 1 (i.e., mercury and HCB) were driven by sediment ingestion (assumed to be 9 percent incidental ingestion).

The mink was considered to have a diet with more birds as opposed to small mammals in the vertebrate prey portion of the diet than the river otter. That assumption coupled with the higher incidental sediment ingestion rate and the higher area use factor for the mink accounts for an HI for the river otter that does not exceed the threshold value of 1 but an HI for the mink that exceeds the threshold value of 1. Large, carnivorous, aquatic mammals with large home ranges were considered unlikely to be adversely affected by COPCs in OU-2. Smaller carnivorous aquatic mammals with smaller home ranges appeared to be at a level of potential concern for mercury and HCB. The accuracy of this HI is fairly uncertain due to the reliance on 1994 vertebrate prey data and a conservative percentage of incidental sediment ingestion.

8.9 ASSESSMENT ENDPOINT 6: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF INSECTIVOROUS AQUATIC BIRDS

Insectivorous aquatic birds are represented by the pied-billed grebe for the purposes of risk quantification for Assessment Endpoint 6.

8.9.1 Pied-billed Grebe

Assessment Endpoint 6 addresses the potential risk to insectivorous aquatic birds residing and foraging in OU-2 habitats. Insectivorous aquatic birds, such as the pied-billed grebe, typically feed on fish, crustaceans, and aquatic insects by diving under water for food, whether in open water or among vegetation. The pied-billed grebe (*Podilymbus podiceps*) represents a species whose diet is approximately 60 percent aquatic insects, 20 percent forage fish, and 20 percent crayfish. In addition, the home range of a pied-billed grebe is relatively small, only 3.3 acres, compared to the open water area of OU-2, which is 80 acres. This indicates the pied-billed grebe is representative of a receptor that could spend all of its time within OU-2 habitat. The pied-billed grebe exposure model was supported by the collection of forage fish and crayfish. Aquatic insect concentrations were estimated using current sediment concentrations and a site-specific BAF from historical data.

The risk calculations for the pied-billed grebe were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-10, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the pied-billed grebe was 11 with contributions of mercury (1.6), methylmercury (1.2), DDTR (8.0), and HCB (0.31) (Tables 8-28 through 8-32). NOAEL-based HQs for the pied-billed grebe exceeded the threshold value of 1 for mercury, methylmercury, and DDTR with the majority of potential risk being derived from DDTR. HQs were driven by ingestion of forage fish for methylmercury (assumed to be from bluegill and silverside samples collected in 2008), ingestion of aquatic insects for DDTR, and incidental ingestion of sediments for mercury (assumed to be from sediment samples collected in 2008 and 2009). The mercury HQ was driven by incidental ingestion of sediments. Methylmercury HQs were driven by ingestion of forage fish (bluegill and silverside samples). Because NOAEL based HQs exceeded the threshold value of 1 for mercury, methylmercury, and DDTR, further assessment in the form of an LOAEL-based HI was performed for these chemicals (Table 8-33 through Table 8-37).

The LOAEL-based HI for the pied-billed grebe was 8.5 with contributions of mercury (0.78), methylmercury (1.2), and DDTR (6.4). The LOAEL-based HQ for the pied-billed grebe exceeded the threshold value of 1 for methylmercury and DDTR. HIs were driven primarily by the ingestion of forage fish for methylmercury and aquatic insects for DDTR.

The pied-billed grebe was considered to have a small home range (completely within OU-2) and a diet consisting primarily of aquatic insects, with lesser amounts of forage fish and crayfish. The pied-billed grebe was assumed to use the site for all of its dietary needs because of the grebe's small home range. These assumptions accounted for the exceedance of the threshold value of 1 for mercury, methylmercury, and DDTR for the NOAEL-based calculation, while the NOAEL HQ for HCB was less than the threshold value of 1. Insectivorous aquatic birds with small home ranges appeared to be at a level of potential concern for methylmercury and DDTR based on the LOAEL evaluation, but were considered unlikely to be adversely affected by mercury and HCB based on the LOAEL evaluation. There is also a possibility that mercury might be at a level of concern, given that the NOAEL-based risk estimate exceeded the risk threshold but the LOAEL-based risk estimate did not exceed the risk threshold. The accuracy of the DDTR HQ was considered somewhat uncertain due to the reliance on estimated aquatic insect data.

8.10 ASSESSMENT ENDPOINT 7: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF PISCIVOROUS AQUATIC BIRDS

Piscivorous aquatic birds are represented by the belted kingfisher, little blue heron, and great blue heron for the purposes of risk quantification for Assessment Endpoint 7. Assessment Endpoint 7 addresses the potential risk to piscivorous aquatic birds residing and foraging in OU-2. Piscivorous birds may use pool, river, or lake-edge habitats as foraging and bedding areas, and piscivorous birds may feed on fish caught from pool and run habitats.

8.10.1 Belted Kingfisher

The belted kingfisher (*Ceryle alcyon*) was selected as one of the representative species of piscivorous aquatic birds for quantification of an aquatic piscivore since this species is a year-round resident in Alabama. The belted kingfisher exposure model was supported by the collection of forage fish from the Basin.

There is some uncertainty as to the nature and extent of use at OU-2 by the belted kingfisher. A range of exposure parameters is available from scientific literature, and although the belted kingfisher's home

range (approximately 1.6 miles of shoreline) is smaller than the available habitat at OU-2, site conditions could potentially limit the number and foraging ability of the belted kingfisher at OU-2.

The belted kingfisher's home range is similar to the shoreline area of OU-2, indicating that only one belted kingfisher pair (two belted kingfishers) could be present at OU-2. There is no suitable nesting habitat at OU-2. The most likely nesting site for kingfishers in the area is the banks of the Tombigbee River. Belted kingfishers are also highly territorial and will defend against intruders into their territory, effectively excluding other kingfishers from using the habitat and limiting the number of foraging kingfishers to two at OU-2. Belted kingfishers require relatively clear water to effectively forage for fish since this species feeds by diving into water to catch its prey. The surface water in the Basin is not clear and visibility is limited, which may result in belted kingfishers potentially consuming aquatic prey other than fish, such as crayfish, amphibians, and aquatic insects, if these items are readily available. The limited visibility for foraging in the Basin and the distance to available nesting habitat likely inhibits the ability of the belted kingfisher to live or feed in OU-2 100 percent of the time.

Based on the above factors, belted kingfishers were evaluated using two different exposure scenarios to account for the range of exposure parameters and site conditions that are present in OU-2. The first exposure scenario assumes that the belted kingfisher forages exclusively on forage fish obtained from the Basin. This is the recommended exposure scenario by USEPA, and although it is consistent with USEPA's *Wildlife Exposure Factors Handbook* (WEFH) (1993c), it is a highly conservative risk estimation that represents the maximum, or "worst-case", scenario that may be occurring at OU-2. In the second exposure scenario, the dietary composition of the belted kingfisher was adjusted to reflect a more diverse diet that includes forage fish (51 percent), amphibians (25 percent), aquatic insects (19 percent), and crayfish (5 percent). This dietary makeup was obtained from the WEFH for belted kingfishers in a lake-type environment. The area use factor was also set to 0.5 representing a kingfisher that forages 50 percent of the time within OU-2 and 50 percent of the time outside of OU-2. This may represent a more realistic or central tendency exposure scenario for the belted kingfisher. The two scenarios are presented to provide a range of potential risk values that may be used by risk managers when establishing RGOs for OU-2.

The risk calculations for the belted kingfisher were quantified for both exposure scenarios using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Tables 8-11a and 8-11b, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the maximum exposure scenario for the belted kingfisher was 11 with contributions of mercury (0.060), methylmercury (7.0), DDTR (3.9), and HCB (0.12) (Table 8-28 through Table 8-32). NOAEL-based HQs for the belted kingfisher were greater than the threshold value of 1 for methylmercury and DDTR. Potential risk for the belted kingfisher was driven by consumption of forage fish (which was assumed to be 100 percent of the belted kingfisher's diet). The NOAEL-based methylmercury TRV for avian receptors could not be identified in scientific literature, so the LOAEL-based methylmercury TRV was used as the NOAEL-based TRV in the risk assessment. Because NOAEL based HIs exceeded the threshold value of 1 for methylmercury and DDTR, further assessment in the form of LOAEL-based HI was performed for these chemicals (Table 8-33 through Table 8-37).

The LOAEL-based HI for the maximum exposure scenario for the belted kingfisher was 10 with contributions of methylmercury (7.0) and DDTR (3.2). LOAEL-based HIs for the belted kingfisher exceeded the threshold value of 1 for methylmercury and DDTR with the majority of potential risk being derived from methylmercury. HIs were driven by ingestion of forage fish (which was assumed to be 100 percent of the belted kingfisher's diet).

The NOAEL-based HI for the central tendency exposure scenario for the belted kingfisher was 4.8 with contributions of mercury (0.054), methylmercury (2.0), DDTR (2.7), and HCB (0.084) (Table 8-28 through Table 8-32). NOAEL-based HQs for the belted kingfisher were greater than the threshold value of 1 for methylmercury and DDTR. Potential risk for the belted kingfisher was driven by consumption of forage fish for methylmercury (which was assumed to be 51 percent of the belted kingfisher's diet) and consumption of aquatic insects for DDTR (which was assumed to be 19 percent of the belted kingfisher's diet). The NOAEL-based methylmercury TRV for avian receptors could not be identified in scientific literature, so the LOAEL-based methylmercury TRV was used as the NOAEL-based TRV in the risk assessment. Because NOAEL-based HIs exceeded the threshold value of 1 for methylmercury and DDTR, further assessment in the form of LOAEL-based HI was performed for these chemicals (Table 8-33 through Table 8-37).The LOAEL-based HI for the central tendency exposure scenario for the belted kingfisher was 4.2 with contributions of methylmercury (2.0) and DDTR (2.2). LOAEL-based HIs for the belted kingfisher exceeded the threshold value of 1 for methylmercury and DDTR with potential risk being derived from methylmercury and DDTR at approximately the same levels. Methylmercury HQs were driven by ingestion of forage fish (which was assumed to be 51 percent of the belted kingfisher's diet) and DDTR HQs were driven by the ingestion of aquatic insects (which was assumed to be 19 percent of the belted kingfisher's diet).

Although a conclusion of potential risk must be stated based on the NOAEL-based HI exceeding 1, there is uncertainty related to the NOAEL-based and LOAEL-based HI calculation for the belted kingfisher. The dataset used to calculate the EPCs for DDTR in fish and aquatic insects was collected in 2001. Concentrations in fish tissue may have declined in 9 years. In comparison to the other piscivorous birds evaluated in this risk assessment, the belted kingfisher was assumed to eat a diet entirely composed of forage fish in the maximum exposure scenario. In addition, no nesting habitat is available in OU-2 for belted kingfishers, so belted kingfishers feeding in OU-2 must live along the Tombigbee River. The maximum exposure scenario for the belted kingfisher feeding 100 percent of the time in OU-2 may cause an overestimation of potential risk for this receptor.

8.10.2 Little Blue Heron

The little blue heron (*Egretta caerula*) was selected as one of the representative species of piscivorous aquatic birds. This receptor was selected to represent a diet that is composed of 75 percent forage fish and 25 percent aquatic insects. The little blue heron is also a year-round resident in Alabama and has been observed in OU-2 habitat. The little blue heron exposure model was supported by the collection of forage fish and aquatic insects.

The risk calculations for the little blue heron were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-12, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the little blue heron was 10.2 with contributions of mercury (1.5), methylmercury (3.7), DDTR (4.9), and HCB (0.20) (Tables 8-28 through 8-32). NOAEL-based HQs for the little blue heron were greater than the threshold value of 1 for mercury, methylmercury, and DDTR. Potential risk for the little blue heron was driven by consumption of foraging fish for methylmercury and DDTR, which represents 75 percent of the little blue heron's diet, and consumption of aquatic insects for DDTR, which represents 25 percent of the little blue heron's diet. The mercury HQ was driven by incidental ingestion of sediments. The NOAEL-based methylmercury TRV for avian receptors could not be identified in scientific literature, so the LOAEL-based methylmercury TRV was used as the NOAEL-based TRV in the risk assessment. Because NOAEL based HIs exceeded the threshold value of 1 for mercury, methylmercury, and DDTR, further assessment in the form of a LOAEL-based HI was performed for these chemicals (Table 8-33 through Table 8-37).

The LOAEL-based HI for the little blue heron was 8.4 with contributions of mercury (0.75), methylmercury (3.7), and DDTR (3.9). LOAEL-based HQs for the little blue heron exceeded the threshold value of 1 for methylmercury and DDTR with potential risk being derived from methylmercury and DDTR at approximately the same levels. The HQs were driven by ingestion of forage fish for methylmercury (which was assumed to be 75 percent of the little blue heron's diet) and DDTR and the ingestion of aquatic insects for DDTR (which is was assumed to be 25 percent of the little blue heron's diet).

Although a conclusion of potential risk must be stated based on the NOAEL-based HI exceeding 1, there was uncertainty related to the NOAEL-based and LOAEL-based HI calculation for the little blue heron. The dataset used to calculate the EPC for DDTR in fish and aquatic insects was collected in 2001. Concentrations in fish tissue may have declined in nine years. In addition, current aquatic insect data were not available and tissue concentrations in aquatic insects were determined using site-specific BAFs and current sediment data. In comparison to the other piscivorous birds evaluated in this risk assessment, the little blue heron had a slightly lower area use factor, but had a significantly larger percentage of aquatic insects in its diet—25 percent compared to 0 percent for both the belted kingfisher (maximum exposure scenario) and great blue heron. The little blue heron's HI is between the two belted kingfisher HIs and is higher than the great blue heron HI, likely as a result of both the DDTR concentrations in fish and aquatic insects, as well as the higher percentage of aquatic insects in its diet.

8.10.3 Great Blue Heron

The great blue heron (*Herodia ardea*) was also selected as a representative species of piscivorous aquatic bird. In addition to forage fish (50 percent of the great blue heron diet), its dietary makeup consists of 35 percent predatory fish, 10 percent amphibians, and 5 percent aquatic insects. These additional species represent consumption of sediment-dwelling organisms by piscivorous aquatic birds. The great blue heron is also a year-round resident in Alabama, with a home range (approximately 1.1 miles of shoreline) smaller than the available habitat at OU-2, indicating it could spend nearly all of its time in OU-2 habitat. The great blue heron exposure model was supported by the collection of forage fish, predatory fish, amphibians, and aquatic insects.

The risk calculations for the great blue heron were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-13, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the great blue heron was 6.0 with contributions of mercury (0.91), methylmercury (3.5), DDTR (1.5), and HCB (0.089) (Tables 8-28 through 8-32). NOAEL-based HQs for the great blue heron were greater than the threshold value of 1 for methylmercury and DDTR. Potential risk for the great blue heron was driven by consumption of forage fish and predatory fish for methylmercury, which combined to represent 85 percent of the great blue heron's diet and forage fish for DDTR, which represents 50 percent of the great blue heron's diet. The NOAEL-based methylmercury TRV for avian receptors could not be identified in scientific literature, so the LOAEL-based methylmercury TRV was used as the NOAEL-based TRV in the risk assessment. Because NOAEL based HIs exceeded the threshold value of 1 for methylmercury and DDTR, further assessment in the form of LOAEL-based HIs was performed for these chemicals (Table 8-33 through Table 8-37).

The LOAEL-based HI for the great blue heron was 4.7 with contributions of methylmercury (3.5) and DDTR (1.2). LOAEL-based HQs for the great blue heron exceeded the threshold value of 1 for methylmercury and DDTR. The methylmercury HQ was driven by ingestion of forage fish and predatory fish. The DDTR HQ was driven by the ingestion of forage fish.

Although a conclusion of potential risk must be stated based on the NOAEL-based HI exceeding 1, there is uncertainty related to the NOAEL-based and LOAEL-based HI calculation for the great blue heron. The dataset used to calculate the EPC for DDTR in fish was collected in 2001. Concentrations in fish tissue may have declined in nine years. In addition, a conversion factor for DDTR was used to calculate whole body fish tissue concentrations in predatory fish from fish filet tissue concentrations. In comparison to the other piscivorous birds evaluated in this risk assessment, the great blue heron had a significantly higher percentage of predatory fish in its diet—35 percent compared to 0 percent for both the belted kingfisher and little blue heron. The great blue heron HIs were greater than 1 primarily due to the predatory fish portion of its diet (requiring conversion from filet concentrations for DDTR).

8.11 ASSESSMENT ENDPOINT 8: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF OMNIVOROUS AQUATIC BIRDS

Omnivorous aquatic birds are represented by the wood duck for the purposes of risk quantification for Assessment Endpoint 8.

8.11.1 Wood Duck

Assessment Endpoint 8 addresses the potential risk to omnivorous aquatic birds residing and foraging in OU-2 habitats. Omnivorous birds, such as the wood duck (*Aix sponsa*), will nest next to water, often using trees or nest boxes. This receptor feeds by picking or "dabbling" at the surface, and frequently dives for submerged food items (i.e., vegetation). The wood duck was selected as the representative species of omnivorous aquatic birds at OU-2 for quantification of an aquatic omnivore with a dietary makeup of 75 percent vegetation and 25 percent insects. The wood duck's home range is less than the available open water habitat at the Basin, indicating this receptor could spend all of its time at the site. The wood duck exposure model was supported by the collection of insect (i.e., crawling insects, flying insects, and spiders) and vegetation data. Site-specific aquatic vegetation data are not available for use in the exposure model because no aquatic vegetation was available for collection in OU-2. Therefore, terrestrial vegetation data were used in the exposure model for the wood duck.

The dietary parameters and intake equations for this receptor are presented in Table 8-27 and Table 8-14, respectively, and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the wood duck was 1.0 with contributions of mercury (0.71), methylmercury (0.15), DDTR (0.12), and HCB (0.023) (Tables 8-28 through 8-32). The individual NOAEL-based HQs for the wood duck did not exceed the threshold value of 1. However, the NOAEL-based HI for the wood duck was equal to the threshold value of 1. The HI was driven by the incidental ingestion of sediments (assumed to be 3.3 percent). Mercury provided the greatest magnitude of the NOAEL-based HI with a HQ of 0.71. Because the NOAEL–based HI was equal to the threshold value of 1, further assessment in the form of a LOAEL-based HI was performed (Table 8-33 through Table 8-37). The LOAEL-based HI for the wood duck was 0.63, which is below the threshold value of 1.

The wood duck was considered to have a small home range (completely within OU-2), a diet consisting of vegetation and insects, and incidental ingestion of sediments. These assumptions accounted for the NOAEL-based HI exceedance of the threshold value of 1, while the individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1. Because the NOAEL-based HI was equal to the threshold value of 1 and the LOAEL-based HI was less than 1, the potential for risk for the wood duck lies between the no observed adverse effects level and the lowest observed adverse effects level. Omnivorous aquatic birds with small home ranges appear to be at a level of potential concern based on the NOAEL-based HI.

8.12 ASSESSMENT ENDPOINT 9: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF CARNIVOROUS AQUATIC REPTILES

Carnivorous aquatic reptiles are represented by the American alligator for the purposes of risk quantification for Assessment Endpoint 9.

8.12.1 American Alligator

Assessment Endpoint 9 addresses the potential risk to carnivorous aquatic reptiles residing and foraging within OU-2. This assessment endpoint considers effects on reptiles relying on fish, small mammals, birds, and amphibians also foraging or residing within OU-2 habitats. The American alligator (*Alligator mississippiensis*) was selected as a conservative representative species of carnivorous aquatic reptile because its dietary intake includes fish (60 percent predatory fish, 30 percent forage fish), 5 percent amphibians, and 5 percent small mammals and birds. The American alligator also represents a large reptile whose home range is smaller than the OU-2 habitat, and therefore has an area use factor of 1, indicating it could spend all of its time with OU-2 habitat. The American alligator exposure model was supported by the collection of predatory fish, forage fish, amphibians, small mammals, and birds.

The risk calculations for the American alligator were quantified using the EPCs presented in Table 8-26 for mercury, methylmercury, HCB, and DDTR; the dietary parameters and intake equations from Table 8-27 and Table 8-15, respectively; and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the American alligator was 0.011 with contributions of mercury (0.0037), methylmercury (0.0025), and DDTR (0.0047) (Tables 8-28 through 8-32). Potential risk was not quantifiable for HCB as no TRVs were available for reptiles specifically for HCB. The NOAEL-based HI for the American alligator was less than the threshold value of 1. The American alligator and carnivorous reptiles were considered unlikely to be adversely affected by mercury, methylmercury, and DDTR.

8.13 ASSESSMENT ENDPOINT 10: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF INSECTIVOROUS TERRESTRIAL MAMMALS

Insectivorous terrestrial mammals are represented by the short-tailed shrew for the purposes of risk quantification for Assessment Endpoint 10.

8.13.1 Short-tailed Shrew

Assessment Endpoint 10 addresses the potential risk to insectivorous terrestrial mammals residing and foraging within OU-2. This assessment endpoint considers effects on mammals relying on terrestrial invertebrates. The short-tailed shrew (*Blarina blevicada*) was selected as a conservative representative species of insectivorous terrestrial mammals because its dietary intake is entirely (100 percent) composed of terrestrial insects and spiders. The short-tailed shrew represents a terrestrial mammal with a home range smaller than the available habitat at OU-2, indicating it could spend all of its time within OU-2. The short-tailed shrew exposure model was supported by the collection of crawling insects and spiders.

The dietary parameters and intake equations for this receptor are presented in Table 8-27 and Table 8-16, respectively, and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the short-tailed shrew was 1.6 with contributions of mercury (0.28), methylmercury (0.56), DDTR (0.78), and HCB (0.0036) (Tables 8-28 through 8-32). The individual NOAEL-based HQs for the short-tailed shrew did not exceed the threshold value of 1. However, the NOAEL-based HI, which is derived by the sum of the NOAEL-based HQs, exceeded the threshold value of 1. The HI was driven by the ingestion of insects and spiders. Methylmercury and DDTR provided the greatest magnitude of the NOAEL-based HI with HQs of 0.56 and 0.78, respectively. Because the NOAEL–based HI exceeded the threshold value of 1, further assessment in the form of a LOAEL-based HI was performed (Table 8-33 through Table 8-37). The LOAEL-based HI for the short-tailed shrew was 0.98, which is below the threshold value of 1.

The short-tailed shrew was considered to have a small home range (completely within OU-2) and a diet consisting entirely of terrestrial insects and spiders. These assumptions accounted for the NOAEL-based HI exceedance of the threshold value of 1, while the individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1. Because the NOAEL-based HI exceeded the threshold value of 1 and the LOAEL-based HI was less than 1, the potential for risk for the short-tailed shrew lies between the no observed adverse effects level and the lowest observed adverse effects level. Insectivorous terrestrial mammals with small home ranges appear to be at a level of potential concern based on the NOAEL-based HI.

8.14 ASSESSMENT ENDPOINT 11: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF OMNIVOROUS TERRESTRIAL MAMMALS

Omnivorous terrestrial mammals are represented by the raccoon for the purposes of risk quantification for Assessment Endpoint 11.

8.14.1 Raccoon

Assessment Endpoint 11 addresses the potential risk to omnivorous terrestrial mammals residing and foraging within OU-2. This assessment endpoint considers effects on mammals relying on terrestrial insects, small mammals, birds, and vegetation as primary dietary items. The raccoon (*Procyon lotor*) was selected as a conservative representative species of omnivorous terrestrial mammals because its dietary intake includes a variety of terrestrial prey items (40 percent terrestrial invertebrates, 40 percent terrestrial vertebrates) and vegetation (20 percent) and is found near virtually every aquatic habitat. The raccoon represents mammalian receptors that spend approximately half their time in OU-2 habitat, with an area use factor of 0.48. The raccoon exposure model was supported by the collection of insects, small mammals, birds, and vegetation.

The dietary parameters and intake equations for this receptor are presented in Table 8-27 and Table 8-17, respectively, and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the raccoon was 0.30 with contributions of mercury (0.046), methylmercury (0.13), DDTR (0.12), and HCB (0.0007) (Tables 8-28 through 8-32). The NOAEL-based HI for the raccoon was less than the threshold value of 1. Thus, the raccoon and other omnivorous terrestrial mammals are considered unlikely to be adversely affected by mercury, methylmercury, DDTR, and HCB in OU-2.

8.15 ASSESSMENT ENDPOINT 12: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF HERBIVOROUS TERRESTRIAL MAMMALS

Herbivorous terrestrial mammals are represented by the pine vole for the purposes of risk quantification for Assessment Endpoint 12.

8.15.1 Pine Vole

Assessment Endpoint 12 addresses the potential risk to herbivorous terrestrial mammals residing and foraging within OU-2. This assessment endpoint considers effects on mammals relying on terrestrial vegetation as the primary dietary item. The pine vole (*Microtus pinetorum*) was selected as a conservative representative species of herbivorous terrestrial mammals because its dietary intake consists entirely (100 percent) of terrestrial vegetation. The pine vole represents herbivorous mammals with an area use factor of 1. The pine vole exposure model was supported by the collection of terrestrial vegetation. This species served as a surrogate species for voles, moles, mice, and rats residing in OU-2.

The dietary parameters and intake equations for this receptor are presented in Table 8-27 and Table 8-18, respectively, and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the pine vole was 0.20 with contributions of mercury (0.054), methylmercury (0.034), DDTR (0.11), and HCB (0.0016) (Tables 8-28 through 8-32). The NOAEL-based HI for the pine vole was less than the threshold value of 1. Thus, the pine vole and other herbivorous terrestrial mammals are considered unlikely to be adversely affected by mercury, methylmercury, DDTR, and HCB in OU-2.

8.16 ASSESSMENT ENDPOINT 13: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF INSECTIVOROUS TERRESTRIAL BIRDS

Insectivorous terrestrial birds are represented by the Carolina wren for the purposes of risk quantification for Assessment Endpoint 13.

8.16.1 Carolina Wren

Assessment Endpoint 13 addresses the potential risk to insectivorous terrestrial birds residing and foraging within OU-2. This assessment endpoint considers effects on birds relying heavily on terrestrial invertebrates as dietary items. The Carolina wren (*Thryothorus ludovicianus*) was selected as a conservative representative species of insectivorous terrestrial birds because its dietary intake is comprised entirely (100 percent) of terrestrial invertebrates. The Carolina wren represents an insectivorous bird with an area use factor of 1, as its home range is smaller than the area of OU-2. The Carolina wren model was supported by the collection of insects (i.e., crawling insects, flying insects, and spiders).

The dietary parameters and intake equations for this receptor are presented in Table 8-27 and Table 8-19, respectively, and the NOAEL/LOAEL TRVs from Table 8-6.

The NOAEL-based HI for the Carolina wren was 5.2 with contributions of mercury (1.0), methylmercury (2.4), DDTR (1.8), and HCB (0.022) (Tables 8-28 through 8-32). NOAEL-based HQs for the Carolina wren were equal to or exceeded the threshold value of 1 for mercury, methylmercury, and DDTR with the highest potential risk being derived from methylmercury. The NOAEL-based HQ for HCB did not exceed the threshold value of 1. HQs were driven by the ingestion of insects. Because the NOAEL-based HQs exceeded the threshold value of 1 for mercury, methylmercury and DDTR, further assessment in the form of LOAEL-based HQs was performed for the Carolina wren (Table 8-33 through Table 8-37).

The LOAEL-based HI for the Carolina wren was 4.3 with contributions of mercury (0.50), methylmercury (2.4), and DDTR (1.4). The LOAEL-based HI for the Carolina wren exceeded the threshold value of 1 with the methylmercury and DDTR HQs also exceeding the threshold value of 1. HQs were driven by the ingestion of insects.

The Carolina wren was considered to have a small home range (completely within OU-2) and a diet consisting entirely of insects. These assumptions accounted for the exceedance of or equivalency to the threshold value of 1 for mercury, methylmercury, and DDTR for the NOAEL-based calculation, while the NOAEL-based HQ for HCB was less than the threshold value of 1. The LOAEL-based calculation for the Carolina wren exceeded the threshold value of 1 for methylmercury and DDTR, but not for mercury. Because the NOAEL-based HQ for mercury was equal to the threshold value of 1 and the LOAEL-based HQ was less than 1, the potential for risk due to mercury lies between the no observed adverse effects level and the lowest observed adverse effects level. However, because the NOAEL-based and LOAEL-based HIs exceeded the threshold value of 1, insectivorous terrestrial birds with small home ranges appear to be at a level of potential concern.

8.17 RISK DESCRIPTION

Risk description comprises two components: risk summary and interpretation of ecological significance. The risk summary integrates the results of each potential risk estimate for each measurement endpoint. The interpretation of ecological significance provides additional analysis. The quality and quantity of data obtained during the field investigations are sufficient to support conclusions regarding OU-2.

The interpretation of ecological significance places the potential risk estimates in the context of the types and extent of anticipated adverse effects. Defining the significance of potential ecological change is fundamental to the ERA process. For assessment endpoints with an HI greater than 1.0, a discussion is provided to address a combination of elements in terms that are intended to consider the ecological significance. In addition, this section addresses the "site" hypothesis: Concentrations of mercury, methylmercury, DDTR, and HCB detected in environmental media at OU-2 are not sufficient to impair the function, health, and reproductive success of the ecological community.

8.17.1 Summary of Potential Risks – Assessment Endpoints 4 Through 13

Assessment endpoints 4 through 13 are for the protection of the long-term health and reproductive success of the following communities:

Endpoint	Receptor Group	Selected Species
Assessment Endpoint 4	Insectivorous aquatic mammals	Little brown bat
Assessment Endpoint 5	Carnivorous aquatic mammals	River otter and mink
Assessment Endpoint 6	Insectivorous aquatic birds	Pied-billed grebe
Assessment Endpoint 7	Piscivorous aquatic birds	Belted kingfisher, little blue heron, and great blue heron
Assessment Endpoint 8	Omnivorous aquatic birds	Wood duck
Assessment Endpoint 9	Carnivorous aquatic reptile	American alligator
Assessment Endpoint 10	Insectivorous terrestrial mammals	Short-tailed shrew
Assessment Endpoint 11	Omnivorous terrestrial mammals	Raccoon
Assessment Endpoint 12	Herbivorous terrestrial mammals	Pine vole
Assessment Endpoint 13	Insectivorous terrestrial birds	Carolina wren

Because the aquatic communities are an important source of secondary food production and largely support the food chains of many terrestrial and semiaquatic vertebrates at OU-2, the potential for indirect effects on selected ecological receptor communities must be considered. Ingestion-pathway exposures to the higher consumers in the system indicated potential for adverse effects on the ecological receptors overall (Figure 8-2). The quotient method used for assessment of hazards in this ERA focused principally on potential effects on individuals, requiring further judgment in interpreting the results in the context of higher levels of organization, such as populations and communities. In addition to HQ calculations, historical survey information was included in this ERA. In some cases, the NOAEL-based TRVs were

set as being equivalent to the LOAELs, specifically for the avian methylmercury and HCB; mammalian mercury and HCB; and reptilian mercury, methylmercury, and HCB, when a NOAEL-based HI exceeds 1.

HIs are presented for the evaluated receptors at OU-2. HIs were determined using toxicity values shown to not induce receptor effects (i.e., NOAELs). Where NOAEL-based HIs were equal to or greater than the threshold value of 1 and indicated potential risk, further assessment in the form of risk estimations was presented based on the lowest toxicity values shown to induce an effect on receptors (i.e., LOAELs). NOAEL and LOAEL HIs are presented in Table 8-32 and Table 8-37, respectively. These summary tables were generated to identify the type of receptors with potential concerns for similarities and to compare the HIs among species for the study area.

NOAEL-based HIs for the river otter, the American alligator, the raccoon, and the pine vole were less than the threshold value of 1. The remaining receptors have at least one COPC whose HQ exceeded the threshold value of 1 or the HI (i.e., the summation of the HQs) was equal to or exceeded the threshold value of 1. The little brown bat, the short-tailed shrew, and the wood duck have NOAEL-based HIs that are equal to or exceed the threshold value of 1, but the LOAEL-based HIs are below the threshold value of 1. Receptors that have both NOAEL-based and LOAEL-based HQs that exceed the threshold value of 1 by COPC are as follows:

- Mercury
  - Mink
- Methylmercury
  - Pied-billed grebe, belted kingfisher, little blue heron, great blue heron, and Carolina wren
- DDTR
  - Belted kingfisher, pied-billed grebe, little blue heron, great blue, heron, and Carolina wren
- HCB
  - Mink

These chemicals have the potential for producing adverse health effects for the identified receptors. The majority of the potential risk for most receptors was from methylmercury and DDTR as demonstrated by the above bulleted list. Potential risks for these COPCs were driven by the following pathways:

- Mercury
  - Incidental ingestion of sediments (mink)
- Methylmercury
  - Ingestion of forage fish (pied-billed grebe, belted kingfisher, little blue heron, great blue heron)
  - Ingestion of predatory fish (great blue heron)
  - Ingestion of insects - crawling insects, flying insects, and spiders (Carolina wren)
- DDTR
  - Ingestion of forage fish (belted kingfisher, little blue heron, and great blue heron)
  - Ingestion of aquatic insects (pied-billed grebe, belted kingfisher, and little blue heron)
  - Ingestion of insects - crawling insects, flying insects, and spiders (Carolina wren)
- HCB
  - Incidental ingestion of sediments (mink)

There are a few receptors whose NOAEL-based HQs exceeded the threshold value of 1, but the LOAEL-based HQs did not exceed the threshold value of 1. This gives an indication that these receptors' potential risk lie between the no observed adverse effects level and the lowest observed adverse effects level. Risk assessment results indicate potential risk exists to individual organisms, though whether this risk represents a potential population level effect remains an uncertainty. The mink for methylmercury, the pied-billed grebe for mercury, the little blue heron for mercury, and the Carolina wren for mercury are the receptors and the chemicals that are borderline for potential adverse health effects.

The little brown bat, the short-tailed shrew, and the wood duck have NOAEL-based HIs that are equal to or exceed the threshold value of 1, but the LOAEL-based HIs are below the threshold value of 1. The individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1. However, the HI exceeded the threshold value of 1, indicating the potential for risk. Further assessment in the form of a LOAEL-based HI resulted in a LOAEL-based HI was below the threshold value of 1, which indicates that potential risk for these three receptors lies between the no observed adverse effects level and the lowest observed adverse effects level. Thus, there is potential for these three receptors to experience adverse effects based on the NOAEL-based HI.

Therefore, based on the NOAEL-based and LOAEL-based HI exceedances of 1, a conclusion of potential risk must be stated for insectivorous aquatic mammals, carnivorous aquatic mammals, insectivorous

aquatic birds, piscivorous aquatic birds, omnivorous aquatic birds, insectivorous terrestrial mammals, and insectivorous terrestrial birds.

8.18 UNCERTAINTY ANALYSIS

Uncertainties, which may lead to either overstatement or understatement of risk, are associated with any ERA. The uncertainties can generally be categorized into four main categories: problem formulation, exposure assessment, effects assessment, and risk characterization. The uncertainties from each of these areas are part of the total uncertainty of the ERA. The identification of these uncertainties and a description of how the uncertainties may influence the ERA are provided in the following sections.

8.18.1 Problem Formulation

Uncertainties associated with problem formulation include the following:

- Specific species tissue from discrete locations was collected and analyzed to represent a larger group of organisms located in OU-2 habitats. Concentrations from these species were used in potential risk estimates for selected ecological receptors. This may overestimate or underestimate potential risk.
- Only receptors known to spend a significant amount of time in OU-2 habitats were quantified, rather than every possible receptor. The representativeness of the chosen species was such that an overestimate of potential risk to the actual communities within OU-2 will be quantified because conservative receptors were chosen for risk quantification.
- Data were not available for every measurable ecological characteristic and/or response to a stressor. This could lead to an overestimation or an underestimation of potential risk.

8.18.2 Exposure Assessment

Uncertainties associated with exposure assessment include the following:

- The use of a 95 percent upper confidence limit as the EPCs may overestimate the reasonable maximum exposure of sensitive species to site contaminants. For some EPCs, the maximum concentrations were used due to small samples sizes. Use of the maximum concentration may overestimate potential risk to receptors.
- Sediment data in the NOAEL-based and LOAEL-based HQ calculations was used because of an assumption that consumers come into contact with sediment while feeding on aquatic organisms. However, some species consume fish from the top 15 cm of the water column and may not often come into contact with sediments.

This assumption that consumers come into contact with sediment while feeding on aquatic organisms may overestimate potential risk.

- Some species selected as assessment endpoints for OU-2 have large home ranges and may opportunistically feed along the Tombigbee River as well as areas outside the riparian zone. Therefore, an AUF less than 1 is expected. AUFs for each receptor species were discussed and USEPA required the use of an AUF of 1 for the majority of receptors. These differ from the AUF approved by USEPA in a previous round of discussions and USEPA comments and values utilized in the 1995 ERA. The use of an AUF of 1 may overestimate potential risk for these receptors.

- Concentrations up to 1 foot in depth were utilized to estimate sediment EPCs to aquatic receptors in OU-2. Surface sediment EPCs were developed for 3-feet NAVD88 (more disturbance by wind driven wave action) and 6-feet NAVD88 (less sediment disturbance due to higher water levels) water elevations using data from multiple years. Surface sediment EPCs also were developed from core samples taken at different depths up to 1 foot deep. This may overestimate or underestimate potential risk.

- Floodplain soil samples collected in 2010 from 0 to 1 inch deep were utilized to estimate floodplain soil EPCs to terrestrial receptors in OU-2. The 0 to 1 inch depth interval was used for consistency in sampling intervals from core and grab samples and is considered to be representative of the 0 to 6 inch depth interval as the variations in concentration between depth intervals is negligible for floodplain soils. This may overestimate or underestimate potential risk.

- The use of BSAFs for calculating the concentration in aquatic insects and the aquatic vertebrate prey DDTR concentration may overestimate or underestimate potential risk to receptors. Since 1994, DDTR migration to OU-2 has been mitigated by the adjacent landowner and DDTR in sediment has been reduced approximately one order in magnitude since the 1990s.

- The BSAF for aquatic insects included historical data from 2001, which consisted of aquatic insect tissue and sediment samples collected from the Basin and Round Pond. Use of this data may overestimate or underestimate potential risk.

- The exposure parameters for each ecological receptor were identified from the most comparable habitat to that of OU-2. These parameters were not specific to areas along OU-2. Because of geographical and climatic differences in regions of the United States, the use of assumptions for exposure parameters is not necessarily representative of OU-2 habitats. The uses of these parameters may overestimate or underestimate potential risk.

- For Assessment Endpoints 1, 2, and 3, the ecotoxicity values in scientific literature were compared to the results for each sampling point. The ecotoxicity values used for comparison were not the most conservative values available in scientific literature, and therefore, potential risk may be underestimated. This comparison assumes that the detected concentration at each sampling point is the concentration ecological receptors would be exposed to 100 percent of the time. This may overestimate or underestimate the potential risk.

- The main dietary intake percentages for the mink were assumed to be 40 percent aquatic mammals/birds (vertebrate prey), 25 percent amphibians, 10 percent crayfish, 5 percent forage fish, and 20 percent predatory fish per site-specific requirement by USEPA. The percentages previously derived from the USEPA guidance manual (WEFH) were 20 percent fish, 9 percent crayfish, and 71 percent vertebrate prey (mammals/birds). In addition, the AUF is 1.0 per USEPA requirement. The use of these exposure assumptions may overestimate or underestimate potential risk.

- The main dietary intake percentage for the maximum exposure scenario for the belted kingfisher was assumed to be 100 percent fish, per site-specific requirement by USEPA. Alternative dietary (i.e., the central tendency scenario) percentages were derived from the USEPA guidance manual (WEFH) as 51 percent fish, 25 percent amphibians, 19 percent aquatic insects, and 5 percent crayfish. The use of the different dietary assumptions may overestimate or underestimate potential risk. The belted kingfisher is a duplicative receptor for the little blue heron.

- The AUF of 1 recommended by USEPA for the belted kingfisher is consistent with the territory sizes presented in the WEFH; however, the kingfisher can potentially feed on the Tombigbee River in addition to the site. OU-2 does not have suitable nesting habitat for the belted kingfisher. The belted kingfisher is not likely to spend 100 percent of its time feeding in OU-2. The AUF of 1 may overestimate potential risk in the maximum exposure scenario by assuming the belted kingfisher lives and forages exclusively in OU-2. In the central tendency scenario for the belted kingfisher, an AUF of 0.5 was used. This exposure assumption may overestimate or underestimate potential risk. There is uncertainty in the usage of the site by belted kingfishers because no site-specific comprehensive wildlife surveys have been conducted.

- The home ranges identified in the WEFH vary for the great blue heron based on the environmental setting. The AUF for the great blue heron was assumed to be 1, per USEPA's recommendation. The AUF of 1 is consistent with the home ranges presented in the WEFH for great blue herons in a lake-type environment. This assumption may overestimate potential risk to the great blue heron because it assumes the great blue heron lives and feed exclusively in OU-2.

- The pied-billed grebe was not recorded onsite by field teams. This receptor is infrequently used in risk assessments and less data are available for a complete risk assessment independent of extrapolations from other species. The main (60 percent) dietary component for the pied-billed grebe is aquatic insects. The accuracy of the DDTR HQ was considered uncertain due to the reliance on historical aquatic insect data from 2001. This exposure assumption may overestimate or underestimate potential risk. The use of the mallard as a receptor would cover this feeding niche and has much data available to complete a risk assessment for this type or receptor.

- The main dietary intake percentage for the little brown bat was assumed to be 100 percent insects per site-specific requirement by USEPA. The flying insect data used as the EPC for the little brown bat may overestimate or underestimate potential risk.

- The main dietary intake percentage for the Carolina wren was assumed to be 100 percent insects with all insect data (i.e., flying insects, crawling insects, and

spiders) used to generate the EPC. . The use of all insect data for the Carolina wren may have overestimated or underestimated potential risk for this receptor.

- Flying insect data was not included in the dietary intake percentages for the short-tailed shrew. Use of only crawling insects and spiders may have overestimated or underestimated potential risk for this receptor.

- Insect data from 2010 was utilized in the dietary intake percentages for risk quantification for the wood duck. The 2010 dataset includes aquatic insects (in the form of emergent flying insects), terrestrial insects, and spiders and reflects a more typical diet for the wood duck than aquatic insect data alone. The aquatic insect data collected in 2001 was not included in the risk quantification for the wood duck. This use of the 2010 insect data may have overestimated or underestimated potential risk for this receptor.

- Previous studies on the effects of site COPCs to the prothonotary warbler, an insectivorous bird with a small home range similar to the Carolina wren, indicated no adverse risk to the reproduction or long-term survival of insectivorous birds. This study indicates that the potential risk to the insectivorous terrestrial birds, such as the Carolina wren, may be overestimated.

- The dietary intake percentage for the wood duck was assumed to be 75 percent terrestrial vegetation and 25 percent insects per site-specific requirement by USEPA. Site-specific aquatic vegetation is not available. All insect data (i.e., flying insects, crawling insects, and spiders) were used to generate the EPC. The terrestrial vegetation and all insect data used as the EPCs for the wood duck may overestimate or underestimate potential risk.

- The main dietary intake percentages for the raccoon were assumed to be 20 percent vertebrate prey, 40 percent terrestrial vegetation, and 40 percent terrestrial invertebrates, per USEPA's site-specific requirement. These percentages were previously derived from the USEPA guidance manual (WEFH) as 2 percent crayfish, 80 percent vegetation, and 7 percent insects. These USEPA-required changes in exposure assumptions remain a reasonably conservative exposure scenario. The use of these exposure assumptions may overestimate or underestimate potential risk.

- DDTR biota concentrations are historical in nature and were collected between 1991 and 2001, except for the insect data collected in 2010, the predicted aquatic vertebrate prey DDTR concentration derived using the BSAF approach, and the predicted aquatic insect prey DDTR concentration derived using the BSAF approach. Biota concentrations during this time period do not likely represent current or future exposure concentrations for several reasons:

  1) The source of DDTR and pathways of migration to OU-2 from the adjacent property have been mitigated during two remedial efforts.

  2) Sediment concentrations within OU-2 indicate an order of magnitude reduction in DDTR sediment concentrations from the 1990s to 2008/2009.

  3) DDT has likely undergone decomposition based on the ratio of congeners detected in 2008 and 2009 sediment samples.

Potential risk resulting from DDTR exposure may be overestimated as a result.

- The 3-feet NAVD88 exposure point sample concentration (i.e., Basin only samples) for forage fish was used for risk characterization instead of the 6-feet NAVD88 because concentrations of DDTR in the Round Pond area have decreased an order of magnitude since the 1990s when these fish samples were collected. The use of these exposure assumptions may overestimate or underestimate potential risk because the current concentrations of DDTR in fish in unknown.

- Data from multiple years were used to estimate the 95 percent UCL or EPC for several media. Pre-2009 data may reflect higher a EPC than is experienced currently or in the future, resulting in an overestimation of current and future potential risk.

8.18.3 Effects Assessment

A conservative approach was used for the selection of each exposure parameter and toxicity value. Use of USEPA's proposed values may overestimate or underestimate potential risks to receptors. Uncertainties associated with the exposure assessment include the following:

- The conversion of total mercury toxicity values to methylmercury toxicity values using site-specific percentages of methylmercury and total mercury by test medium may overestimate or underestimate potential risks.

- The use of ecotoxicity values developed from studies using mercury compounds other than methylmercury assumes that each form of mercury is absorbed, is metabolized, and has the same toxicological effects as mercury or methylmercury. This may overestimate or underestimate potential risk.

- NOAEL and LOAEL ecotoxicity values are the result of experimental design and depend on laboratory test conditions. Actual threshold concentrations are difficult to determine, and although there is potential for effects that occur at concentrations less than published LOAEL TRVs, these are the only known values that cause an effect. Assuming that there is no effect at a concentration below the LOAEL TRVs may underestimate potential risk.

- NOAEL and LOAEL mercury ecotoxicity values provided by USEPA for mammalian receptors (0.37 mg/kg) and avian receptors (0.45 mg/kg and 0.9 mg/kg, respectively) are not species-specific and are not BW adjusted for each receptor. Additional ecotoxicity values for mercury identified in scientific literature range up to 1 mg/kg for the mammals (mink) (Sample et al., 1996). Additional LOAEL ecotoxicity values were not identified in scientific literature. This variation in reported NOAEL values and variation in BW between individual species could overestimate or underestimate potential risk for each ecological receptor.

- NOAEL and LOAEL methylmercury ecotoxicity values provided by USEPA for mammalian receptors (0.075 mg/kg and 0.15 mg/kg, respectively) and avian receptors (0.06 mg/kg) are not species-specific and are not BW adjusted for each receptor. Additional ecotoxicity values identified in scientific literature for

methylmercury range from 0.032 mg/kg (NOAEL) to 0.16 mg/kg (LOAEL) in the rat, 0.015 mg/kg (NOAEL) to 0.025 mg/g (LOAEL) for the minks, and 0.0064 mg/kg (NOAEL) to 0.064 mg/kg (LOAEL) in mallard ducks (Sample et al., 1996). This variation in reported NOAEL and LOAEL values and variation in BW between individual species could overestimate or underestimate potential risk for each ecological receptor. The EPA-provided TRVs for methylmercury are within the range of available literature values, but the EPA-provided TRVs are not the lowest TRVs available, and thus, are not the most conservative values available. Use of these TRVs may underestimate potential risk for methylmercury.

- NOAEL and LOAEL DDTR ecotoxicity values provided by USEPA for mammalian receptors (0.147 mg/kg and 0.274 mg/kg, respectively) and avian receptors (0.227 mg/kg and 0.281 mg/kg, respectively) are not species-specific and are not BW adjusted for each receptor. Additional ecotoxicity values identified in scientific literature for DDTR components (DDT, DDE, DDD) range from 0.8 mg/kg (NOAEL) to 4 mg/kg (LOAEL) in mammals (rat) and 0.0028 mg/kg (NOAEL) to 0.028 mg/kg (LOAEL) for birds (brown pelican (Sample *et. al*, 1996). This variation in reported NOAEL and LOAEL values and variation in BW between individual species could overestimate or underestimate potential risk for each ecological receptor. The EPA-provided TRVs for DDTR are within the range of available literature values, but the EPA-provided TRVs are not the lowest TRVs available, and thus, are not the most conservative values available. Use of these TRVs may underestimate potential risk for DDTR.

- NOAEL and LOAEL HCB ecotoxicity values provided by USEPA for aquatic mammals (0.137 mg/kg), terrestrial mammals (3.2 mg/kg), and avian receptors (2.25 mg/kg) are not species-specific and are not BW adjusted for each receptor. Additional ecotoxicity values identified in scientific literature for HCB range from 0.8 mg/kg (NOAEL) to 4 mg/kg (LOAEL) in mammals (rat) and 0.0028 mg/kg (NOAEL) to 0.028 mg/kg (LOAEL) for birds (brown pelican (Sample et al., 1996). This variation in reported NOAEL and LOAEL values and variation in BW between individual species could overestimate or underestimate potential risk for each ecological receptor.

- Performing calculations for representative species evaluates potential ecological effects on individual organisms but does not evaluate potential population-level risks. Generally, effects may occur on individual organisms, with little potential population- or community-level effects. Because of this assumption, the calculated potential risk may overestimate the population- or community-level effects.

8.18.4 Risk Characterization

Uncertainties associated with exposure assessment include the following:

- BW extrapolations were not performed for the mammalian NOAEL and LOAEL TRVs. This assumes that an organism's ability to metabolize constituents is not proportional to body size. This may overestimate or underestimate potential risk.

- Extrapolation of LOAEL values from NOAEL values from guidance documents by multiplying the NOAEL value by 10 assumes an uncertainty or modifying factor for each species, which may overestimate or underestimate potential risk.

- LOAEL TRVs where used in the NOAEL-based risk calculations when a NOAEL was unavailable in the scientific literature. This may underestimate potential risk at the NOAEL level.

- Interspecies extrapolation assumes that species have similar absorption, metabolism, distribution, and excretion of constituents. Mammalian and bird TRVs were selected from the USEPA Combustion Guidance, which presents the TRVs as being representative for numerous species (USEPA, 1999b). However, for the TRV, it is assumed that receptors of similar size have similar cellular and physiological interactions with mercury and methylmercury. For those receptors without TRVs, exposure is difficult to interpret with certainty since comparable TRVs are not available. This may overestimate or underestimate potential risk.

- The NOAEL toxicity value was used initially when the HQ calculations were performed. This is expected to overestimate potential risk. However, when NOAEL-based calculated HQs were greater than 1, the LOAEL values were used to perform the HQ calculation.

- The NOAEL-based and LOAEL-based HQ calculations for the representative species are meant to characterize risk for specific groups of ecological receptors in OU-2 habitats. The conservative assumptions for the representative species may overestimate potential risk for species (such as the belted kingfisher) that fall within a given group as an ecological receptor if a species only occasionally occurs in or visits OU-2 habitats; that is, exposure frequency for other species within the same ecological receptor group may be less than that used for the representative species.

- Based on the NOAEL-based and LOAEL-based HIs, insectivorous terrestrial birds residing or foraging in OU-2 appear to be at a level of potential concern. However, previous site-specific studies on the effects of site COPCs to insectivorous terrestrial birds with small home ranges, represented by the prothonotary warbler, support the hypothesis that site COPC concentrations do not pose unacceptable risk to this receptor (IEHH, 1999).

- Potential risk estimations for Assessment Endpoints 4 through 13 used the 95 percent mean UCL concentration as EPCs at each sampling location, except for flying insects for which the maximum concentration was used due to a small sample size. This could overestimate potential risks.

- Three possible water elevation scenarios could have been quantified for potential risk. Scenario 1 was Basin concentrations at a water elevation of 6-feet NAVD88, which is the scenario that was quantified in this ERA. Scenario 2 was for Basin concentrations at a water elevation of 3-feet NAVD88. Scenario 3 was for Round Pond concentrations only.

  Table 8-38 compares exposure point concentrations for these three scenarios for the aquatic receptors with potential risk (based on the NOAEL and LOAEL calculations) and a summary of this comparison is as follows:

- Potential risk quantification for Scenario 2 (Basin at 3-feet NAVD88) would generally be equivalent to Scenario 1 (Basin at 6-feet NAVD88), if quantified, because the EPCs are equivalent with the exception of the potential risks driven by the incidental ingestion of sediments for mercury. Mercury sediment concentrations for both scenarios are almost equivalent (i.e., 51 mg/kg [Basin at 6-feet NAVD88] and 53 mg/kg [Basin at 3-feet NAVD88]).

- Potential risk quantification for Scenario 3 (Round Pond) would generally be less than Scenario 1 (Basin at 6-feet NAVD88) with the exception of the potential risks driven by the ingestion of forage fish for DDTR. Concentrations of DDTR in sediment in the Round Pond area have decreased an order of magnitude since the 1990s when these fish samples were collected. Fish sample concentrations of DDTR in Round Pond may decrease as well. This may be an overestimation of the fish concentration for DDTR.

Table 8-39 compares exposure point concentrations for these three scenarios for the terrestrial receptors with potential risk (based on the NOAEL and LOAEL calculations) and a summary of this comparison is as follows:

- Potential risk quantification for Scenario 2 (Basin at 3-feet NAVD88) would generally be equivalent to or less than Scenario 1 (Basin at 6-feet NAVD88), if quantified.

- Potential risk quantification for Scenario 3 (Round Pond) would generally be equivalent to Scenario 1 (Basin at 6-feet NAVD88), if quantified, with the exception of floodplain soils for DDTR whose concentrations would cause an increase in potential risk for terrestrial receptors. This observation is based on maximum concentrations available for Scenario 3 (Round Pond) versus 95 percent UCL values for Scenario 1 (Basin at 6-feet NAVD88).

8.19 INTERPRETATION OF ECOLOGICAL SIGNIFICANCE

The ecological significance of the potential risks posed by mercury, methylmercury, DDTR, and HCB in OU-2 is discussed below in the context of the assessment endpoints. The following sections briefly summarize how the results relate to the hypotheses associated with the assessment endpoints.

8.19.1 Assessment Endpoint 4 - Insectivorous Aquatic Mammals

Endpoint: Protection of the long-term health and reproductive success of insectivorous aquatic mammals.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations are not sufficient to impair the function, health, and reproductive success of insectivorous aquatic mammals.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Little Brown Bat)

- The NOAEL-based HI suggested that function, health, and reproductive success for the little brown bat, an appropriately representative species selected for this endpoint, appears to have a potential for adverse effects from exposure to COPC concentrations in OU-2.
- The NOAEL-based HQs for the little brown bat were as follows and resulted in a NOAEL-based HI of 1.3: mercury (0.21), methylmercury (0.52), DDTR (0.50), and HCB (0.032). The individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1. However, the HI exceeded the threshold value of 1, indicating the potential for risk. This HI suggested that there is potential for the little brown bat to experience adverse effects associated with assumed exposure to the ingestion of flying insects and further consideration of reported COPC concentrations is necessary.
- The LOAEL-based HI for the little brown bat was calculated as 0.77, which is below the threshold value of 1, which indicates that potential risk for the little brown bat lies between the no observed adverse effects level and the lowest observed adverse effects level.

The hypothesis is rejected for the little brown bat based on the measurement endpoint for the NOAEL assumptions. There is potential for the impairment of the function, health, or reproductive success of the little brown bat or other insectivorous aquatic mammals with large home ranges residing and foraging in OU-2 based on the NOAEL-based HI. However, there is uncertainty in the potential for impairment of insectivorous aquatic mammals because the LOAEL-based HI does not exceed 1.

8.19.2 Assessment Endpoint 5 - Carnivorous Aquatic Mammals

Endpoint: Protection of the long-term health and reproductive success of carnivorous aquatic mammals.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of carnivorous aquatic mammals.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (River Otter)

- The NOAEL-based HI suggested that the function, health, and reproductive success for the river otter, an appropriately selected representative species for this endpoint, will not be impaired. The HI did not exceed the threshold value of 1 for the river otter.

- The reproductive success of the river otter is unlikely to be impaired. The mammalian NOAEL TRV for mercury was based on reproduction, the methylmercury TRV was based on mortality, the HCB TRV was based on reproduction, and the DDTR TRV was based on various endpoints from literature including mortality and reproduction. No adverse effects on mortality or reproduction are expected because the river otter HI does not exceed one.

The hypothesis is accepted for the river otter based on the measurement endpoints for the NOAEL assumptions. There is little potential for impairment of the function, health, or reproductive success of the river otter. It is not anticipated that the river otter or other carnivorous aquatic mammals with large home ranges will experience adverse effects due to exposure to COPCs while residing or foraging in OU-2.

Dietary Exposure (Mink)

- The NOAEL-based and LOAEL-based HIs suggested that function, health, and reproductive success for the mink, an appropriately representative species selected for this endpoint, appear to have a potential for adverse effects from exposure to mercury, methylmercury, DDTR, and HCB concentrations.

- The NOAEL-based HQs for the mink were as follows: mercury (1.8), methylmercury (1.3), DDTR (1.2), and HCB (1.1). These HQs suggested that there is potential for the mink to exceed a reported no-effects dose for mercury, methylmercury, and HCB, and further consideration of reported concentrations is necessary.

- LOAEL-based HQs were calculated for the mink, and the resulting values were as follows: mercury (1.8), methylmercury (0.64), DDTR (0.62), and HCB (1.1). These HQs suggested that there is a potential for the mink to experience adverse effects from mercury and HCB, mainly associated with assumed exposure to incidentally ingested sediments (assumed to be 9 percent). Methylmercury appears to have a possibility of potential for adverse health effects because the NOAEL-based HQ (1.3) exceeded the risk threshold, but the LOAEL-based HQ (0.64) did not exceed the risk threshold. The methylmercury HQ was driven equally by aquatic vertebrate prey items and predatory fish. The mink was assumed to ingest 40 percent aquatic vertebrate prey, which was assumed to be represented by whole body concentrations collected from little blue herons in 1994. The likelihood of impairment of the function, health, and reproductive success of the mink is uncertain based on the conservative nature of the NOAEL and LOAEL values and associated exposure assumptions.

- There is also uncertainty in the actual percentage of incidental sediment ingestion that occurs for a mink in the wild.

The hypothesis is rejected for the mink based on the measurement endpoint for the NOAEL and LOAEL assumptions. Mercury and HCB concentrations have the potential to impair the function, health, or

reproductive success of the mink or other carnivorous terrestrial mammals with relatively small home ranges. There is uncertainty whether members of the carnivorous aquatic mammal community will experience adverse effects due to exposure to COPCs while residing and foraging in Basin habitats due to the degree of conservatism in the current exposure assumptions.

8.19.3 Assessment Endpoint 6 - Insectivorous Aquatic Birds

Endpoint: Protection of the long-term health and reproductive success of insectivorous aquatic birds.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of insectivorous aquatic birds.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Pied-billed Grebe)

- The NOAEL-based and LOAEL-based HIs suggested that function, health, and reproductive success for the pied-billed grebe, an appropriately representative species selected for this endpoint, appear to have a potential for adverse effects from exposure to mercury, methylmercury, and DDTR concentrations.
- The NOAEL-based HQs for the pied-billed grebe were as follows: mercury (1.6), methylmercury (1.2), DDTR (8.0), and HCB (0.31). These HQs suggested that there is potential for the pied-billed grebe to exceed a reported no-effects dose for mercury, methylmercury, and DDTR and further consideration of reported concentrations for these three chemicals is necessary.
- LOAEL-based HQs were calculated for the pied-billed grebe and the resulting values were as follows: mercury (0.78), methylmercury (1.2), and DDTR (6.4). These HQs suggested that there is a potential for the pied-billed grebe to experience adverse effects from methylmercury and DDTR mainly associated with assumed exposure via ingestion of forage fish for methylmercury (assumed to be from bluegill and silverside samples collected in 2008 for methylmercury) and ingestion of aquatic insects for DDTR. The likelihood of impairment of the function, health, and reproductive success of the pied-billed grebe is uncertain based on the conservative nature of the NOAEL and LOAEL values and associated exposure assumptions.
- There is also a possibility that mercury might be at a level of concern, given that the NOAEL-based risk estimate exceeded the risk threshold but the LOAEL-based risk estimate did not exceed the risk threshold.
- The DDTR HQ was considered uncertain due to the reliance on estimated aquatic insect data and the use of mosquitofish data from 2001.

The hypothesis is rejected for the pied-billed grebe based on the measurement endpoint for the NOAEL and LOAEL assumptions. Methylmercury and DDTR concentrations have the potential to impair the function, health, or reproductive success of the pied-billed grebe or other insectivorous aquatic birds with relatively small home ranges. There is uncertainty whether members of the insectivorous aquatic bird community will experience adverse effects due to exposure to COPCs while residing and foraging in Basin habitats due to the degree of conservatism in the current exposure assumptions. Potential risk from DDTR is likely overestimated because the DDTR data were collected prior to the implementation of two remedial efforts to mitigate DDTR migration.

8.19.4 Assessment Endpoint 7 - Piscivorous Aquatic Birds

Endpoint: Protection of the long-term health and reproductive success of piscivorous aquatic birds.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of piscivorous aquatic birds.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Belted Kingfisher)

- The NOAEL-based and LOAEL-based HIs suggested that function, health, and reproductive success for the belted kingfisher, an appropriately representative species selected for this endpoint, appear to have a potential for adverse effects from exposure to methylmercury and DDTR concentrations.
- The NOAEL-based HQs for the maximum exposure scenario for the belted kingfisher were as follows: mercury (0.060), methylmercury (7.0), DDTR (3.9), and HCB (0.12). These HQs suggested that there is potential for the belted kingfisher to exceed a reported no-effects dose for methylmercury and DDTR and further consideration of reported concentrations is necessary.
- The NOAEL-based HQs for the central tendency exposure scenario for the belted kingfisher were as follows: mercury (0.054), methylmercury (2.0), DDTR (2.7), and HCB (0.084). These HQs suggested that there is potential for the belted kingfisher to exceed a reported no-effects dose for methylmercury and DDTR and further consideration of reported concentrations is necessary.
- LOAEL-based HQs were calculated for maximum exposure scenario for the belted kingfisher and the resulting values were as follows: methylmercury (7.0) and DDTR (3.2). These HQs suggested that there is a potential for the belted kingfisher to experience adverse effects from ingestion of forage fish (assumed to be from bluegill and silverside samples collected in 2008 for methylmercury and assumed to be mosquitofish samples collected in 2001 for DDTR). The likelihood of impairment of

the function, health, and reproductive success of the belted kingfisher is uncertain based on the conservative nature of the NOAEL and LOAEL values and associated exposure assumptions.

- LOAEL-based HQs were calculated for central tendency exposure scenario for the belted kingfisher and the resulting values were as follows: methylmercury (2.0) and DDTR (2.2). These HQs suggested that there is a potential for the belted kingfisher to experience adverse effects from ingestion of forage fish for methylmercury (assumed to be from bluegill and silverside samples collected in 2008) and ingestion of forage fish and aquatic insects for DDTR. The likelihood of impairment of the function, health, and reproductive success of the belted kingfisher is uncertain based on the conservative nature of the NOAEL and LOAEL values and associated exposure assumptions.

- No nesting habitat is available in OU-2 for belted kingfishers, so belted kingfishers feeding in OU-2 must live along the Tombigbee River. This means that the assumption that the belted kingfisher feeds 100 percent of the time in OU-2 (i.e., the maximum exposure scenario) may cause an overestimation of potential risk for this receptor.

The hypothesis is rejected for the belted kingfisher based on the measurement endpoint for the NOAEL and LOAEL assumptions. Methylmercury and DDTR concentrations have the potential to impair the function, health, or reproductive success of the belted kingfisher or other piscivorous aquatic birds with relatively high fish consumption rates. There is uncertainty whether members of the piscivorous aquatic bird community will experience adverse effects due to exposure to DDTR while residing and foraging in OU-2 habitats. This uncertainty is due to the remedial efforts for DDTR by the adjacent landowner have resulted in an order of magnitude reduction in DDTR sediment concentrations since the 1990s and the degree of conservatism in the current exposure assumptions.

Dietary Exposure (Little Blue Heron)

- The NOAEL-based and LOAEL-based HIs suggested that function, health, and reproductive success for the little blue heron, an appropriately representative species selected for this endpoint, appear to have a potential for adverse effects from exposure to methylmercury and DDTR concentrations.

- The NOAEL-based HQs for the little blue heron were as follows: mercury (1.5), methylmercury (3.7), DDTR (4.9), and HCB (0.20). These HQs suggested that there is potential for the little blue heron to exceed a reported no-effects dose for mercury, methylmercury, and DDTR and further consideration of reported concentrations is necessary.

- LOAEL-based HQs were calculated for the little blue heron and the resulting values were as follows: mercury (0.75), methylmercury (3.7), and DDTR (3.9). These HQs suggested that there is a potential for the little blue heron to experience adverse

effects from methylmercury associated with the ingestion of forage fish for methylmercury and DDTR and from the ingestion of aquatic insects for DDTR. The likelihood of impairment of the function, health, and reproductive success of the little blue heron is uncertain based on the conservative nature of the NOAEL and LOAEL values and associated exposure assumptions.

- In comparison to the other piscivorous birds evaluated in this risk assessment, the little blue heron has a slightly lower area use factor, but has a significantly larger percentage of aquatic insects in its diet—25 percent compared to 0 percent for both the belted kingfisher and great blue heron. The little blue heron's HI is between the two belted kingfisher HIs and is higher than the great blue heron HI, likely as a result of both the historical DDTR concentrations in fish and the higher percentage of aquatic insects in its diet.

The hypothesis is rejected for the little blue heron based on the measurement endpoint for the NOAEL and LOAEL assumptions. Methylmercury and DDTR concentrations have the potential to impair the function, health, or reproductive success of the little blue heron or other piscivorous aquatic birds with diets consisting of forage fish and aquatic insects. There is uncertainty whether members of the piscivorous aquatic bird community will experience adverse effects due to exposure to COPCs while residing and foraging in Basin habitats due to the lack of current tissue data for forage fish for DDTR and the degree of conservatism in the current exposure assumptions. Potential risk from DDTR is likely overestimated because the DDTR data were collected prior to the implementation of two remedial efforts to mitigate DDTR migration.

Dietary Exposure (Great Blue Heron)

- The NOAEL-based and LOAEL-based HIs suggested that function, health, and reproductive success for the great blue heron, an appropriately representative species selected for this endpoint, appear to have a potential for adverse effects from exposure to methylmercury and DDTR concentrations.

- The NOAEL-based HQs for the great blue heron were as follows: mercury (0.91), methylmercury (3.5), DDTR (1.5), and HCB (0.089). These HQs suggested that there is potential for the great blue heron to exceed a reported no-effects dose for methylmercury and DDTR and further consideration of reported concentrations is necessary.

- LOAEL-based HQs were calculated for the great blue heron and the resulting values were as follows: methylmercury (3.5) and DDTR (1.2). These HQs suggested that there is a potential for the great blue heron to experience adverse effects from methylmercury and DDTR associated with the ingestion of forage fish and predatory fish for methylmercury and the ingestion of forage fish for DDTR.

- Forage fish were assumed to be from bluegill and silverside samples collected in 2008 for methylmercury and assumed to be mosquitofish samples collected in 2001 for DDTR.
- Predatory fish were assumed to be whole body fish tissue concentrations for methylmercury from 2008 and estimated whole body tissue concentrations from filet concentrations collected in 2008 for DDTR.
- The likelihood of impairment of the function, health, and reproductive success of the little blue heron is uncertain based on the conservative nature of the NOAEL and LOAEL values and associated exposure assumptions.
- In comparison to the other piscivorous birds evaluated in this risk assessment, the great blue heron has a significantly higher percentage of predatory fish in its diet; 35 percent compared to 0 percent for both the belted kingfisher and little blue heron. The great blue heron HIs were greater than 1 primarily due to the predatory fish portion of its diet.

The hypothesis is rejected for the great blue heron based on the measurement endpoint for the NOAEL and LOAEL assumptions. Methylmercury and DDTR concentrations have the potential to impair the function, health, or reproductive success of the great blue heron or other piscivorous aquatic birds with diets consisting of forage fish, predatory fish, and other sediment dwelling organisms. There is uncertainty whether members of the piscivorous aquatic bird community will experience adverse effects due to exposure to COPCs while residing and foraging in Basin habitats due to the degree of conservatism in the current exposure assumptions. Potential risk from DDTR may be overestimated because the DDTR data were collected prior to the implementation of two remedial efforts to mitigate DDTR migration.

8.19.5 Assessment Endpoint 8 - Omnivorous Aquatic Birds

Endpoint: Protection of the long-term health and reproductive success of omnivorous aquatic birds.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of omnivorous aquatic birds.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Wood duck)

- The NOAEL-based HI suggested that the function, health, and reproductive success for the wood duck, an appropriately selected representative species for this endpoint, appears to have a potential for adverse effects from exposure to COPC concentrations in OU-2.

- The NOAEL-based HQs for the wood duck were as follows and resulted in a NOAEL-based HI of 1.0: mercury (0.71), methylmercury (0.15), DDTR (0.12), and HCB (0.023). The individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1. However, the HI was equal to the threshold value of 1, indicating the potential for risk. This HI suggested that there is potential for the wood duck to experience adverse effects driven by the incidental ingestion of sediments and further consideration of reported COPC concentrations is necessary.

- The LOAEL-based HI for the wood duck was calculated as 0.63, which is below the threshold value of 1, which indicates that potential risk for the wood duck lies between the no observed adverse effects level and the lowest observed adverse effects level.

The hypothesis is rejected for the wood duck based on the measurement endpoint for the NOAEL assumptions. There is potential for the impairment of the function, health, or reproductive success of the wood duck or other omnivorous aquatic birds with small home ranges residing and foraging in OU-2 based on the NOAEL-based HI. However, there is uncertainty in that potential for impairment of omnivorous aquatic birds due to the LOAEL-based HI, which was less than 1.

8.19.6 Assessment Endpoint 9 - Carnivorous Aquatic Reptile

Endpoint: Protection of the long-term health and reproductive success of carnivorous aquatic reptiles.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of carnivorous aquatic reptiles.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure

- The NOAEL-based HI suggested that the function, health, and reproductive success for the American alligator, an appropriately selected representative species for this endpoint, will not be impaired. The HI did not exceed the threshold value of 1 for the American alligator.

- The health and reproductive success of the American alligator is unlikely to be impaired. The reptilian NOAEL TRVs for mercury, methylmercury, and DDTR were based on a single dose value (Hall, 1980; Peters, 1983). Potential risk was not quantifiable for HCB as there are no available TRVs for reptiles specific for HCB. No adverse effects on mortality or reproduction are expected because the American alligator HI does not exceed one.

The hypothesis is accepted for the American alligator based on the measurement endpoints for the NOAEL assumptions. There is little potential for impairment of the function, health, or reproductive success of the American alligator. It is not anticipated that the American alligator or other carnivorous aquatic reptiles will experience adverse effects due to exposure to COPCs while residing or foraging in OU-2.

8.19.7 Assessment Endpoint 10 - Insectivorous Terrestrial Mammals

Endpoint: Protection of the long-term health and reproductive success of insectivorous terrestrial mammals.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of insectivorous terrestrial mammals.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Short-tailed shrew)

- The NOAEL-based HI suggested that the function, health, and reproductive success for the short-tailed shrew, an appropriately selected representative species for this endpoint, appears to have a potential for adverse effects from exposure to COPC concentrations in OU-2.

- The NOAEL-based HQs for the short-tailed shrew were as follows and resulted in a NOAEL-based HI of 1.6: mercury (0.28), methylmercury (0.56), DDTR (0.78), and HCB (0.0036). The individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1. However, the HI exceeded the threshold value of 1, indicating the potential for risk. This HI suggested that there is potential for the short-tailed shrew to experience adverse effects associated with assumed exposure to the ingestion of terrestrial insects and further consideration of reported COPC concentrations is necessary.

- The LOAEL-based HI for the short-tailed shrew was calculated as 0.98, which is below the threshold value of 1, which indicates that potential risk for the short-tailed shrew lies between the no observed adverse effects level and the lowest observed adverse effects level.

The hypothesis is rejected for the short-tailed shrew based on the measurement endpoint for the NOAEL assumptions. There is potential for the impairment of the function, health, or reproductive success of the short-tailed shrew or other insectivorous terrestrial mammals with small home ranges residing and

foraging in OU-2 based on the NOAEL-based HI. However, there is uncertainty in the potential for impairment of insectivorous terrestrial mammals because the LOAEL-based HI does not exceed 1.

8.19.8 Assessment Endpoint 11 - Omnivorous Terrestrial Mammals

Endpoint: Protection of the long-term health and reproductive success of omnivorous terrestrial mammals.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of omnivorous terrestrial mammals.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Raccoon)

- The NOAEL-based HI suggested that the function, health, and reproductive success for the raccoon, an appropriately selected representative species for this endpoint, will not be impaired. The HI did not exceed the threshold value of 1 for the raccoon.

- The health and reproductive success of the raccoon is unlikely to be impaired because the raccoon NOAEL-based HI does not exceed 1.

The hypothesis is accepted for the raccoon based on the measurement endpoints for the NOAEL assumptions. There is little potential for impairment of the function, health, or reproductive success of the raccoon. It is not anticipated that the raccoon and other omnivorous terrestrial mammals will experience adverse effects due to exposure to COPCs while residing or foraging in OU-2.

8.19.9 Assessment Endpoint 12 - Herbivorous Terrestrial Mammals

Endpoint: Protection of the long-term health and reproductive success of herbivorous terrestrial mammals.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of herbivorous terrestrial mammals.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Pine Vole)

- The NOAEL-based HI suggested that the function, health, and reproductive success for the pine vole, an appropriately selected representative species for this endpoint, will not be impaired. The HI did not exceed the threshold value of 1 for the pine vole.

- The health and reproductive success of the pine vole is unlikely to be impaired because the pine vole NOAEL-based HI does not exceed 1.

The hypothesis is accepted for the pine vole based on the measurement endpoints for the NOAEL assumptions. There is little potential for impairment of the function, health, or reproductive success of the pine vole. It is not anticipated that the pine vole and other herbivorous terrestrial mammals will experience adverse effects due to exposure to COPCs while residing or foraging in OU-2.

8.19.10 Assessment Endpoint 13 - Insectivorous Terrestrial Birds

Endpoint: Protection of the long-term health and reproductive success of insectivorous terrestrial birds.

Hypothesis: Mercury, methylmercury, DDTR, and HCB concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of insectivorous terrestrial birds.

The measurement endpoints selected to address this hypothesis indicate that:

Dietary Exposure (Carolina wren)

- The NOAEL-based and LOAEL-based HIs suggested that the function, health, and reproductive success for the Carolina wren, an appropriately representative species selected for this endpoint, appear to have a potential for adverse effects from exposure to mercury, methylmercury, and DDTR concentrations.

- The NOAEL-based HQs for the Carolina wren were as follows and resulted in a NOAEL-based HI of 5.2: mercury (1.0), methylmercury (2.4), DDTR (1.8), and HCB (0.022). These HQs suggested that there is potential for the Carolina wren to exceed a reported no-effects dose for mercury, methylmercury, and DDTR and further consideration of reported concentrations is necessary.

- LOAEL-based HQs were calculated for the Carolina wren were as follows and resulted in a LOAEL-based HI of 4.3: mercury (0.50), methylmercury (2.4), and

DDTR (1.4). These HQs suggested that there is a potential for the Carolina wren to experience adverse effects from methylmercury and DDTR associated with the ingestion of insects (i.e., crawling insects, flying insects, and spiders). The LOAEL-based HQ for mercury was below the threshold value of 1, which indicates that potential risk for the Carolina wren due to mercury lies between the no observed adverse effects level and the lowest observed adverse effects level.

The hypothesis is rejected for the Carolina wren based on the measurement endpoint for the NOAEL and LOAEL assumptions. Mercury, methylmercury, and DDTR concentrations have the potential to impair the function, health, or reproductive success of the Carolina wren and other insectivorous terrestrial birds. Thus, insectivorous terrestrial birds residing or foraging in OU-2 appear to be at a level of potential concern based on the assumptions and calculations performed in this ERA.

8.20 SUMMARY AND CONCLUSIONS

An ERA was performed to evaluate the potential for adverse effects associated with mercury, methylmercury, DDTR, and HCB concentrations from various environmental media at OU-2. Results from biological field investigations and extensive OU-2 sample data were used to develop potential risk estimates. Remedial activities including removal and capping occurred upgradient of OU-2 for DDTR, which will minimize migration of DDTR into OU-2. Concentrations of DDTR in OU-2 sediment decreased an order of magnitude since the 1990s, thus reducing exposure for this COPC.

NOAEL-based HIs for the river otter, the American alligator, the raccoon, and the pine vole were less than the threshold value of 1, which indicates that the potential for these receptors to experience adverse health effects is unlikely. The remaining receptors have at least one COPC whose HQ exceeds the threshold value of 1 or the HI (i.e., the summation of the HQs) was equal to or exceeded the threshold value of 1. The little brown bat, the short-tailed shrew, and the wood duck have NOAEL-based HIs that are equal to or exceed the threshold value of 1, but the LOAEL-based HIs are below the threshold value of 1. COPCs with NOAEL-based and LOAEL-based HQs exceeding the threshold value of 1 by pathway of concern and receptor for OU-2 are as follows:

- Mercury
  - Incidental ingestion of sediments (mink)
- Methylmercury
  - Ingestion of forage fish (pied-billed grebe, belted kingfisher, little blue heron, great blue heron)
  - Ingestion of predatory fish (great blue heron)
  - Ingestion of insects (Carolina wren)

- DDTR
  - Ingestion of forage fish (belted kingfisher, little blue heron, and great blue heron)
  - Ingestion of aquatic insects (pied-billed grebe, belted kingfisher, and little blue heron)
  - Ingestion of insects (Carolina wren)

- HCB
  - Incidental ingestion of sediments (mink)

There are a few receptors whose NOAEL-based HQs exceeded the threshold value of 1 but the LOAEL-based HQs did not exceed the threshold value of 1. This indicates that these receptors' potential risk lies between the NOAEL and the LOAEL. The potential risk assessment results indicate potential risks to individual organisms, and whether this risk represents a potential population level effect remains uncertain. The mink for methylmercury, the pied-billed grebe for mercury, the little blue heron for mercury, and the Carolina wren for mercury are the receptors and the COPCs that may have a borderline potential for adverse health effects.

The little brown bat, the short-tailed shrew, and the wood duck have NOAEL-based HIs that are equal to or exceed the threshold value of 1, but the LOAEL-based HIs are below the threshold value of 1. The individual HQs for mercury, methylmercury, DDTR, and HCB were all less than the threshold value of 1, but the HI exceeded the threshold value of 1, indicating the potential for risk. Further assessment in the form of a LOAEL-based HI resulted in a LOAEL-based HI below the threshold value of 1, which indicates that potential risk for these three receptors lies between the NOAEL and the LOAEL. This would indicate that there may be a potential for individual receptors to experience adverse effects, though whether this represents a potential population-level effect remains uncertain. The Carolina wren has NOAEL-based HIs that exceed the threshold value of 1. Individual HQs for mercury and HCB were below the threshold value of 1; however, the individual HQs for methylmercury and DDTR (2.4 and 1.8, respectively) were above the threshold value of 1. Further assessment in the form of a LOAEL-based HI for methylmercury and DDTR resulted in LOAEL-based HIs that also exceeded the threshold value of 1, with potential risk being driven from methylmercury (HQ=2.4) and DDTR (HQ=1.4). This indicates that the potential for adverse risk for this receptor is present for methylmercury and DDTR. The flying insects collected in 2010 and included in the risk characterization typically had higher concentrations of site COPCs than the 2010 crawling insects and spiders that would be typically consumed by the Carolina wren. Carolina wrens are primarily ground foragers and are not expected to ingest significant amounts of flying insects. The inclusion of flying insects for the Carolina wren increased the EPCs for the site COPCs and may have overestimated potential risk for this receptor.

The previous study on prothonotary warblers nesting in OU-2 did not indicate adverse effects from mercury or DDTR on reproduction or long-term survival of this receptor (IEHH, 1999). The prothonotary warbler has a similar diet and forage range as the Carolina wren. This site-specific study indicates that the potential risk may be overestimated and the potential for population-level effects are uncertain in insectivorous terrestrial birds.

The most significant potential exposure pathway was determined to be ingestion of fish by avian receptors. The DDTR dataset for this pathway was from 2001, which is historical and adds a notable level of uncertainty or overestimation of potential risk for this pathway. When potential risks were estimated using the lowest effect values reported, three avian receptors (belted kingfisher, little blue heron, and great blue heron) were calculated to have potential to reach exposures exceeding these values (i.e., these receptors had LOAEL-based HIs that exceeded 1). Assumptions in the exposure scenarios for these three receptors may have caused potential risk estimates to be overestimated or underestimated. Typically, the exposure assumptions utilized were conservative in nature which may generally lead to an overestimation of risk. The uncertainty in exposure assumptions should be considered in the development of RGOs. These three receptors will be used for the development of RGOs in a separate report and both scenarios for the belted kingfisher (i.e., maximum exposure and central tendency) will be included in the RGO calculation for risk management purposes. Two additional notable potential exposure pathways based on the current datasets were the incidental ingestion of sediments (2008 and 2009 dataset) and ingestion of insects (2010 dataset).

Seven of the ten assessment endpoints quantitatively assessed had NOAEL-based HIs that are equal to or greater than the threshold value of 1 and these endpoints are as follows:

- Assessment Endpoint 4: Insectivorous Aquatic Mammals - Receptor Species: Little Brown Bat
- Assessment Endpoint 5: Carnivorous Aquatic Mammals - Receptor Species: Mink
- Assessment Endpoint 6: Insectivorous Aquatic Birds - Receptor Species : Pied-Billed Grebe
- Assessment Endpoint 7: Piscivorous Aquatic Birds - Receptor Species: Belted Kingfisher, Little Blue Heron, and Great Blue Heron
- Assessment Endpoint 8: Omnivorous Aquatic Birds – Receptor Species: Wood Duck
- Assessment Endpoint 10: Insectivorous Terrestrial Mammals – Receptor Species: Short-tailed Shrew

- Assessment Endpoint 13: Insectivorous Terrestrial Birds – Receptor Species: Carolina Wren

Various biotic and abiotic field assessments were conducted for OU-2. These assessments provide weight of evidence and information to estimate the potential risk to biota in the assessment area. Biological tissue from several trophic levels had detectable concentrations of COPCs. These concentrations were evaluated by comparison to toxicity values from the literature or regulatory required values. Because either NOAEL-based or LOAEL-based HIs were equal to or exceeded the threshold value of 1, potential risk must be concluded for these seven assessment endpoints and nine receptors.

8.21 REFERENCES

Abbasi, S.A. and R. Soni, 1983. *Stress-Induced Enhancement of Reproduction in Earthworm Octochaetus pattoni Exposed to Chromium (VI) and Mercury (II) – Implications in Environmental Management*. Intern. J. Environ. Stud. 22:43-47.

Barbour, M.T., J. Gerritsen, B. D. Snyder, and J. B. Stribbling, 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition*. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Beckvar, N., Dillion, T.M. and L. B. Read, 2005. *Approaches for Linking Whole-Body Fish Tissue Residues of Mercury or DDT to Biological Effects Thresholds*. Environmental Toxicology and Chemistry, 24 (8): 2094-2105.

Bettinetti, R., V. Croce, and S. Galassi, 2005. *Ecological Risk Assessment for the Recent Case of DDT Pollution in Lake Maggiore (Northern Italy).* Water, Air and Soil Pollution, 162:1-4(2005 Mar), pp. 385-399.

Beyer, W.N., E. Cromartie, and G.B. Moment, 1985. *Accumulation of Methylmercury in the Earthworm Eisenia fetida, and its Effect on Regeneration*. Bull. Environ. Contam. Toxicol. 35:157-162.

Bitman, J., H. C. Cecil, S.J. Harris, and G.F. Fries, 1969. *DDT Induces a Decrease in Eggshell Calcium*. Nature 224:44-46.

Bitman, J.J., Cecil, C. and Fries, G.F., 1969. *DDT- Induced Inhibition of Avian Shell Gland Carbonic Anhydrase: A Mechanism For Thin Eggshells*. Science 168: 594-595.

Calamari, D., Galassi, S., Setti, F., and Vighi, M., 1983. *Toxicity of Selected Chlorobenzenes to Aquatic Organisms*. Chemosphere 12:253-262.

Callahan, M.A., Slimak, M.W., Gabel, N.W., 1979. *Water-Related Environmental Fate of 129 Priority Pollutants, Vol 1.* Washington, D.C. USEPA, EPA-440/4-79-029a.

Carlson, A.R. and Kosian, P.A., 1987. *Toxicity of Chlorinated Benzenes to Fathead Minnows (Pimephales promelas)*. Arch Environ Contam Toxicol 16:129-135.

Cathey, B., 1982. *Comparative Toxicities of Five Insecticides to the Earthworm, Lumbricus terrestris*. Agric. Environ.7(1): 73-81

Chambers, J. E., 1994. *Toxicity of Pesticides*. Chapter 7 (pp. 485-498) in L. Cockerham and G. Shane (editors) *Basic Environmental Toxicology.* CRC Press, Boca Raton, FL.

Chibunda, R.T, 2009. *Chronic Toxicity of Mercury ($HgCl_2$) to the Benthic Midge Chironomus riparius. Int. J. Environ. Res*., 3(3):455-462.

Clarke, D. G., M. R. Palermo, and T. C. Sturgis, 2001. *Subaqueous Cap Design: Selection of Bioturbation Profiles, Depths, and Rates*. DOER Technical Notes Collection (ERDC TN-DOER-C21), U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Courtney, C.H. and Reed, J.K., 1971. *Accumulation of DDT from Food and from Water by Golden Shiner Minnows, Notemigonus crusoleucas*. 25th Annual Conference, Southeastern Association of Game and Fish Commissioners. October 17-20, 1971; Charleston, SC. Frankfort, KY: Southeastern Association of Game and Fish Commissioners, p. 426-431.

Courtney, K.D. 1979. *Hexachlorobenzene (HCB): A Review*. Environmental Research 20:255-266.

Crosby, D.G., and Tucker, R.K., 1971. Accumulation of DDT by Daphnia Magna.Environ Sci Tech 5:714-716.

Efroymson, R.A., G.W. Suter, B.E. Sample, and D.S. Jones, 1997. *Preliminary Remediation Goals for Ecological Endpoints*. ES/ER/TM-162/R2. Environmental Restoration Program, ORNL, Oak Ridge, TN.

Efroymonson, R.A., M.E. Will, and G.W. Suter II. 1997. *Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes*. Prepared for the U.S. Department of Energy Office of Environmental Management by Lockheed Martin Energy Systems, Inc. November 1997.

Eisler, R. 1987. Mercury Hazards to fish, wildlife, and invertebrates: A synoptic review. U.S. Fish and Wildlife Service, Biological Report 85(1.10). 90pp.

Eisler, R. 1987. Polycylic Aromatic Hydrocarbons Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service, Washington, DC. Biological Report No 85(1.11).

Eisler, R. 1991. Cyanide hazards to fish, wildlife, and invertebrates: A synoptic review. U.S. Fish and Wildlife Service, Biological Report 85(1.23). 55 pp.

Erlich, P.R. and J. Roughgarden. 1987. *The Science of Ecology.* Macmillan Publishing Company, New York. 710pp.

Fjeld, E., T.O. Haugen, and L.A. VØllestad, 1998. "Permanent impairment in the feeding behavior of greyling (Thymallus thymallus) exposed to methylmercury during embryogenesis." The Science of the Total Environment, 213:247-254.

Friedmann, A.S., M.C. Watzin, T. Brinck-Johnsen and J.C. Leiter, 1996. Aquatic Toxicology, 35:265-278.

Gillespie, D.C.; Scott, D.P., 1971. "Mobilization of Mercuric Sulfide from Sediment into Fish under Aerobic Conditions." Journal of the Fisheries Research Board of Canada, Vol. 28, No. 11, pp 1807-1808."

Hall, R. J., 1980. Effects of Environmental Contaminants on Reptiles: A Review. U.S. Fish and Wildlife Service. Special Scientific Report-Wildlife No. 228.

Hansen, L. 1994. Halogenated Aromatic Compounds. Chapter 8 (pp. 199-203) in L. Cockerham and B. Shane (editors). Basic Environmental Toxicology. CRC Press, Boca Raton, FL.

Hansen, L. 1994. Halogenated aromatic compounds. Chapter 8 (pp. 199-230) in L. Cockerham and G. Shane (editors). *Basic Environmental Toxicology.* CRC Press, Boca Raton, FL.

Hartenstein, R., E.F. Neuhauser, and A. Narahara, 1981. "Effects of Heavy Metal and Other Elemental Additives to Activated Sludge on Growth of Eisenia foetida." *J. Environ. Qual.*10(3): 372-376.

HSDB, 2010. Hazardous Substance Databank website (http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB), (http://www.nlm.nih.gov/pubs/factsheets/hsdbfs.html).

Ingersoll C.G. and MacDonald D.D. 1999. An Assessment of Sediment Injury in the West Branch of the Grand Calumet River, Vol 1. US Geological Survey, Columbia, MO. MacDonald Environmental Sciences Ltd., Ladysmith, British Columbia, 161 pp.

Integrated Risk Information System (IRIS), 2002. Integrated Risk Information System (IRIS), United States Environmental Protection Agency, Environmental Criteria and Assessment Office, Cincinnati, Ohio, http://www.epa.gov/iris/index.html.

IRIS, 2010. USEPA Integrated Risk Information Systems (IRIS) website (http://www.epa.gov/iris/)

Jarvinen, A.W., Hoffman, M.J., and Thorslund, T.W., 1976. Toxicity of DDT food and water exposure to fathead minnows, Duluth, MN: U.S. Environmental Protection Agency, EPA-600/3-76/114.

Jarvinen, A.W., Hoffman, M.J., and Thorslund, T.W., 1977. Long-term toxic effects of DDT food and water exposure to fathead minnows (Pimephales promelas). J Fish Res Board Can 34:2089-2103.

Kabata, A., and H. Kabata-Pendias. 1992. *Trace Elements in Soils and Plants.* 2nd Edition. CRC Press, Boca Raton, FL. 365pp.

Kudo, A. and D.C. Mortimer. 1979. "Pathways for Mercury Uptake by Fish from Bed Sediments." Environmental Pollution 19:239-245.

Lechich, A. 1998. Development of Bioaccumulation Guidance for Dredged Material Evaluations in EPA Region 2.MACTEC, 2010c. Supplemental Remedial Investigation for Operable Unit 4, Saltville Waste Disposal Ponds Superfund Site, Saltville, VA. Appendix L.

Long, E.R., and L. G. Morgan. 1990. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. Office of Oceanography and Marine Assessment, Seattle, Washington.

Lundholm, C.E., 1997, DDE-Induced Eggshell Thinning in Birds: Effects of p,p'-DDE on the Calcium and Prostoglandin Metabolism of the Eggshell Gland, Comp. Biol. Physiol. V. 118C, p. 113-128.

MacDonald, D.D., C.G. Ingersoll, and T.A. Berger, 2000. "Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems." Arch. Environ. Contam. Toxicol. 39: 20-31.

MacLeod, J.C., and Pessah, E., 1973. "Temperature Effects on Mercury Accumulation, Toxicity, and Metabolic Rate in Rainbow Trout (Salmo gairdneri)." J Fish Res Board Can 30:485-492.

MACTEC, 2007. *Enhanced Sedimentation Pilot Project (ESPP) Baseline Sampling.* Operable Unit 2, Olin Corporation, McIntosh, Alabama. June 8, 2007.

MACTEC, 2009. *Enhanced Sedimentation Pilot Project Annual Report – Year 1 Results*, Operable Unit 2, McIntosh, Alabama, March 31, 2009.

Mayer, F.L., and Ellersieck, M.R., 1986. Manual of acute toxicity: Interpretation and data base for 410 chemicals and 66 species of freshwater animals. U.S. Department of the Interior, Fish and Wildlife Service. Resource Publication 160. Washington, D.C., 506p.

McKim, J.M., G.F. Olson, G.W. Holcombe, E.P. Hunt, 1976. "Long-term Effects of Methylmercuric Chloride on Three Generations of Brook Trout (Salvelinus fontinalis): Toxicity, Accumulation, Distribution, and Elimination." J Fish Res Board Can 33:2726-2739.

McMurry, S., 1999. *Exposure and Effects of DDT and Mercury in Prothonotary Warblers Nesting on the Ciba and Olin Floodplain in McIntosh, Alabama.* The Institute of Environmental and Human Health Reese Center, Texas Tech University Lubbock, Texas. December.

Mettee, M. F., P. E. O'Neil, and J. M. Pierson, 1996. *Fishes of Alabama and the Mobile Basin. Monograph 15, Geological Survey of Alabama*. Oxmoor House: Birmingham. 820 pp.

Meyers, T. and J. Hendricks. 1985. Histopathology. Chapter 11 (pp. 283-334) in Fundamentals of Aquatic Toxicology. Hemisphere Publishers, Washington, D.C.

Meyers, T.R., and J.D. Hendricks. 1985. Histopathology, p. 283-331. *In* G.M. Rand & S.R. Petrochelli (eds.). Fundamentals of Aquatic Toxicology. Mc Graw Hill, Johannesburg, South Africa.

National Weather Service (NWS) Regional Report. 1971-2000.

Nebeker, A.V., Griffis, W.L., Wise, C.M., Hopkins, E., and Barbitta, J.A., 1989. Survival, reproduction, and bioconcentration in invertebrates and fish exposed to hexachlorobenzene. Environ Toxicol Chem 8:601-611.

Newell, A.J., D.W. Johnson, and L.K. Allen. 1987. Niagara River biota contamination project: Fish flesh criteria for piscivorous wildlife. New York State Department of Environmental Conservation, Technical Report 87-3, Division of Fish and Wildlife, Bureau of Environmental Protection. V+182 p.

Odin, M., Feurtet-Mazel, A., Ribeyre, F., and A. Boudou, 1994. "Actions and Interactions of Temperature, pH and Photoperiod on Mercury Bioaccumulation by Nymphs of the Burrowing Mayfly Hexagenia rigida, from the Sediment Contamination Source." Environmental Toxicology and Chemistry. 13:1291-1302.

Odin, M., Ribeyre, F., and Boudou, A., 1995. "Cadmium and Methylmercury Bioaccumulation by Nymphs of the Burrowing Mayfly Hexagenia rigida from the Water Column and Sediment." Environ Sci Pollut Res. 2:145-152.

Odum, E.P. 1971. *Fundamentals of Ecology.* Third Edition. W.B. Saunders Company, Philadelphia, PA, 574p.

Olson, G.F., D.I. Mount, V.M. Snarski, and T.W. Thorslund, 1975. "Mercury Residues in Fathead Minnows, Pimephales promelas Rafinesque, Chronically Exposed to Methylmercury in Water." Bulletin of Environmental Contamination and Toxicology, 14:129-134.

Ontario Ministry of Environment and Energy (OMEE), 1999. "Water Management Policies, Guidelines and Provincial Water Quality Objectives of the Ministry of Environment and Energy," July 1994, reprinted February 1999, www.ene.gov.on.ca/envision/gp/3303e.pdf.

Palermo, M.R., J. E. Clausner, M. P. Rollings, G. L. Williams, T. E. Myers, T. J. Fredette, R. E. and Randall. 1998. Guidance for subaqueous dredged material capping Technical Report DOER-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS

Persaud, D., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Water Resources Branch, Ontario Ministry of the Environment. Toronto. Peters, L. J., 1983. Mercury Accumulation in the American Alligator, *Alligator mississippiensis*. University of Florida. M.S. Thesis.

Peters, L. J., 1983. Mercury Accumulation in the American Alligator, *Alligator mississippiensis*. University of Florida. M.S. Thesis.

Pillai, M.K.K., Agarwal, H.C., and Yadav, D.V., 1977. Tolerance, uptake and metabolism of DDT in Gambusia-affinis. Indian J Exp Biol 15:40-41.

Rajanna, B. and A.A. de la Cruz. 1977. Stand establishment and early growth of field crops as influenced by seed vigor and pesticide residues. Seed Science Technology 5:71-85.

Rajanna, B., and A. A. de la Cruz. 1977. Uptake of Zn, Cd, and Hg by Fish in the Presence of Competing Compartments. Can. J. Fish. Aquatic. Sci., V. 41, p. 750-756.

Randall, W.F., W.H. Dennis, and M.C. Warner. Acute Toxicity of Dechlorinated DDT, Chlordane, and Lindane to Bluegill (Lepomis macrochirus) and Daphnia Magna. Bull. Environm. Contam. Toxicol. 21, 849-854 (1979).

Rasmussen, A. 1996. University of Florida Book of Insect Records. Chapter 20 *Least Oxygen Dependent*. Available: (http://ufbir.ifas.ufl.edu/Chap20.htm)

Rossaro, B., Gaggino, G.F., and Marchetti, R., 1986. "Accumulation of Mercury in Larvae and Adults, Chironomus riparius (Meigen)." Bull Environ Contam Toxicol 37:402-406.

Sample *et al.*, 1996. "Toxicological Benchmarks for Wildlife: 1996 Revisions.", *Risk Assessment Program, Oak Ridge, Tennessee.* June 1996. ES/ER/TM-86/R3.

Saouter, E., Hare, L., Campbell, PGC, Boudou, A., Ribeyre, F., 1993. "Mercury Accumulation in the Burrowing Mayfly Hexagenia rigida (Ephemeroptera) Exposed to CH3HgCl or HgCl2 in Water and Sediment." Water Res 27:1041-1048.

Schuytema, G.S., Krawczyk, D.F., Griffis, W.L., Nebeker, A.V., and Robideaux, J. L., 1990. Hexachlorobenzene uptake by fathead minnows and macroinvertebrates in recirculating sediment/water systems. Arch Environ Contam Toxicol 19:1-9.

Schuytema, G.S., Krawczyk, D.F., Griffis, W.L., Nebeker, A.V., Robideaux, J. L., Brownawell, G.J., and Westall, J.C. 1988. Comparative uptake of hexachlorobenzene by fathead minnows, amphipods and oligochaete worms from water and sediment. Environ Toxicol Chem 7:1035-1045.

Sheppard, S.C., W.G. Evenden, S.A. Abboud, and M. Stephenson, 1993. "Plant Life-Cycle Bioassay for Contaminated Soil, with Comparison to Other Bioassays: Mercury and Zinc." Archives of Environmental Contamination and Toxicology. Volume 25, p. 27-35.

Sheppard, S.C., 2005. Emails from Steve Sheppard with studies of earthworm and mercury toxicity values. January 5, 2005.

Smith, S.L., D.D. MacDonald, K.A. Keenleyside, C.G. Ingersoll, and J. Field. 1996. A preliminary evaluation of sediment quality assessment values for freshwater ecosystems. Journal of Great Lakes Research 22:624-638.Snarski, V.M., and Olson, G.F., 1982. "Chronic Toxicity and Bioaccumulation of Mercuric Chloride in the Fathead Minnow (Pimephales promelas)." Aquat Toxicol 2:143-156.

Sodergren, A, and Svensson, G.J, 1973. Uptake and accumulation of DDT and PCB by Ephemera danicaI(Ephemeroptica) in continuous-flow systems. Bull Environ Contam Toxicol 9:345-350.

Soil & Water Conservation Society of Metro Halifax, 2008. (http://www.chebucto.ns.ca/ccn/info/Science/SWCS/ZOOBENTH/BENTHOS/xxv.html)

Suter, G.W, II, and C.L.Tsao. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Oak Ridge National Laboratory, ES/ER/TM-96/R2, Oak Ridge National Laboratory, Oak Ridge, TN.

U.S. Environmental Protection Agency (USEPA), 1980. Ambient Water Quality Criteria for DDT. Office of Water Regulations and Standards, Criteria and Standards Division, Washington, D.C. EPA 440/5-80-038.

USEPA, 1985, Drinking Water Criteria Document for Mercury. Prepared by the Office of Health and Environmental Assessment Office, Cincinnati, OH forthe Office of Drinking Water, Washington, DC. EPA/600/X-84/178. NTIS PB86-117827.

USEPA, 1985. Ambient Water Quality Criteria for Mercury – 1984, United States Environmental Protection Agency, Office of Water Regulations and Standards Criteria and Standards Division, EPA/440/5-84-026, January 1985.

USEPA, 1988, Ambient Water Quality Criteria for Hexachlorobenzene. Office of Research and Development, Environmental Research Laboratory, Duluth, Minnesota. Draft Dated 8/31/88.

USEPA, 1992, Framework for ecological risk assessment. EPA/630/R-92/001. Washington,DC: U.S. Environmental Protection Agency, Risk Assessment Forum.

USEPA, 1993a, Data Quality Objectives for Superfund: Interim Final Guidance. Publication 9255.9-01. Office of Emergency and Remedial Response, Washington, DC. EPA 540-R-93-071. NTIS PB94-963203.

USEPA, 1993b, Quality Assurance for Superfund Environmental Data Collection Activities. Quick Reference Fact Sheet. Office of Emergency and Remedial Response, Washington, DC. NTIS PB93-963273.

USEPA, 1993b. Wildlife Exposure Factors Handbook Volume II, United States Environmental Protection Agency, Office of Research and Development, EPA/600/R-93/187b, December 1993.

USEPA, 1993c. Wildlife Exposure Factors Handbook Volume I, United States Environmental Protection Agency, Office of Research and Development, EPA/600/R-93/187a, December 1993.

USEPA, 1995a. AQUIRE Database. Environmental Research Laboratory-Duluth, MN.

USEPA, 1995b. ASTER Database. Environmental Research Laboratory-Duluth, MN.

USEPA, 1996b. Assessment of Sediment in the Indiana Harbor Area of Concern, EPA 905-R96-009, Great Lakes National Program Office, Region V, Chicago, IL.

USEPA, 1997a. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final, United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, EPA 540-R-97-006, June 1997.

USEPA, 1997a, Mercury Study Report to Congress. EPA-425/R-97-003. Office of Air Quality Planning and Standards and Offices of Research and Development. December.

USEPA, 1997b, Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final, EPA/540-R-97-006, OSWER 9285.7-25.

USEPA, 1999c. Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, 2nd Ed., United States Environmental Protection Agency, Office of Water, EPA 841-B-99-002, http://www.epa.gov/OWOW/monitoring/techmon.html.

USEPA, 2001. Region 4 Freshwater Surface Water Screening Value.

USEPA, 2001. USEPA Region 4's Ecological Risk Assessment Bulletins-Supplement to RAGS. Originally published November 1995. Website version last updated November 30, 2001: http://www.epa.gov/region4/waste/ots/ecolbul.htm.

USEPA, 2002, Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. Office of Emergency and Remedial Response. Washington, D.C. OSWER 9285.6-10, December.

USEPA, 2002g. SRIR NFHR EPA Comments, United States Environmental Protection Agency Region III, December 2002.

USEPA, 2002f. Ecotoxicology Database, United States Environmental Protection Agency, Office of Research and Development, www.epa.gov/ecotox.

USEPA, 2007, Ecological Soil Screening Levels for DDT and Metabolites. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC. OSWER Directive 9285.7-57

USEPA, 2008.An Introduction to Freshwater Fishes as Biological Indicators (EPA-260-R-08-016;)

USEPA, 2009. National Recommened Water Quality Criteria. http://water.epa.gov/scitech/swguidance/standards/current/index.cfm#D. Accessed April 1, 2011.

USEPA, 2009a, Olin McIntosh OU-2 ERA Data Use Specifications, EPA Region 4. Presentation, December.

USEPA, 2010. USEPA Comments on PART 1: Remedial Investigation Addendum and Enhanced Sedimentation Pilot Project Annual Report, Year Two Results, Part 2: Updated Ecological Risk Assessment, Part 3: Updated Human Health Risk Assessment. Operable Unit 2, McIntosh, Alabama. Dated September 10, 2010.

USEPA, 2011, ECOTOX Database (http://cfpub.epa.gov/ecotox/)

USFWS, 2010, U.S. Fish and Wildlife Service. Daphne Ecological Services Field Station. Available: http://www.fws.gov/daphne/es/specieslst.html. Accessed April 20, 2010.

Walton, B.T., T.A. Anderson, M.S. Hendricks, and S.S. Talmage. 1989. Physiochemical properties as predictors of organic chemical effects on soil microbial respiration. Environ Toxicol Chem 8:53-63.

Wobeser, G., 1975. "Prolonged Oral Administration of Methyl Mercury Chloride to Rainbow Trout (Salmo gairdneri) Fingerlings." J Fish Res Board Can 32:2015-2023.

Woodward-Clyde Consultants (WCC). 1993. Remedial Investigation Report. McIntosh Plant Site, Olin Corporation, McIntosh, Alabama. February.

WCC. 1994. Additional Ecological Studies of OU-2 Work Plan. McIntosh Plant Site, Olin Corporation, McIntosh, Alabama. June.

Woodward-Clyde Consultants (WCC). 1995. Ecological Risk Assessment. McIntosh Plant Site, Olin Corporation, McIntosh, Alabama. May 1995.

TABLE 8-1

VEGETATION AND LAND COVER TYPES
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Vegetation/Land Cover Type	Acres	Percentage of Total
Mixed Upland Forest	1	1%
Semi-Permanently Flooded Bottomland Forest	35	18%
Temporarily Flooded Bottomland Forest	60	30%
Shrub Dominated Zone	4	2%
Herbaceous Dominated Zone	2	1%
Open Water Ponds and Streams	82	42%
Other (roads, etc.)	12	6%

Notes :
Vegetation survey conducted in September 1991.

PREPARED BY/DATE: RMR 5/4/2010
CHECKED BY/DATE: HEF 5/7/10

TABLE 8-2

FISHES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	Frequency[3]	Trophic Level[4]	Tolerance[5]
Family POLYODONTIDAE	**paddlefishes**					
Polyodon spathula	paddlefish	ECON	Transient (RI)	I	F	Intolerant
Family LEPISOSTEIDAE	**gars**					
Lepisosteus oculatus	spotted gar	ECON	Resident	V	P	Intermediate
Lepisosteus osseus	longnose gar	ECON	Resident	C	P	Intermediate
Family AMIIDAE	**bowfin**					
Amia calva	bowfin	EXP	(Resident)		P	Intermediate
Family ANGUILLIDAE	**freshwater eels**					
Anguilla rostrata	American eel	ECON	Transient (MA)	I	P	Intermediate
Family CLUPEIDAE	**herrings**					
Alosa chrysochloris	skipjack herring	ECON	Transient (RI)	I	P	Intermediate
Dorosoma cepedianum	gizzard shad	ECON	Resident	C	O	Intermediate
Dorosoma petenense	threadfin shad	ECON	Resident	C	O	Intermediate
Family ENGRAULIDAE	**anchovies**					
Anchoa mitchilli	bay anchovy	EXP	(Transient [MA])		NC	NC
Family CYPRINIDAE	**minnows and carps**					
Cyprinella venusta	blacktail shiner	ECON	Transient (UP)	I	NC	NC
Cyprinus carpio	common carp	ECON	Resident	C	O	Tolerant
Hybognathus nuchalis	Mississippi silvery minnow	ECON	Resident	C	H	Intermediate
Macrhybopsis storeriana	silver chub	ECON	Transient (RI)	I	I	Intermediate
Notemigonus crysoleucas	golden shiner	ECON	Resident	V	O	Tolerant
Notropis atherinoides	emerald shiner	ECON	Transient (RI)	I	I	Intermediate
Notropis candidus	silverband shiner	ECON	Transient (RI)	I	NC	NC
Notropis texanus	weed shiner	ECON	Resident	I	I	Intolerant
Opsopoeodus emiliae	pugnose minnow	ECON	Resident	C	I	Intolerant
Pimephales vigilax	bullhead minnow	ECON	Resident	I	O	Intermediate
Family CATOSTOMIDAE	**suckers**					
Carpiodes cyprinus	quillback (carpsucker)	ECON	Transient (RI)	C	O	Intermediate
Carpiodes velifer	highfin carpsucker	EXP	(Transient [RI])		O	Intolerant
Erimyzon sucetta	lake chubsucker	EXP	(Resident)		I	Intermediate
Ictiobus bubalus	smallmouth buffalo	ECON	Transient (RI)	C	I	Intermediate
Minytrema melanops	spotted sucker	EXP	(Resident)		I	Intermediate
Moxostoma poecilurum	blacktail redhorse	UCON	Transient (UP)	I	I	NC

TABLE 8-2

FISHES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	OU-2 Occurrence Frequency[3]	Trophic Level[4]	Tolerance[5]
Family ICTALURIDAE	**bullhead catfishes**					
Ameiurus melas	black bullhead	EXP	(Resident)		I	Intermediate
Ameiurus natalis	yellow bullhead	EXP	(Resident)		I	Tolerant
Ictalurus furcatus	blue catfish	ECON	Resident	C	P	Intermediate
Ictalurus punctatus	channel catfish	ECON	Resident	C	P	Intermediate
Noturus gyrinus	tadpole madtom	EXP	(Resident)		I	Intermediate
Pylodictis olivaris	flathead catfish	EXP	(Transient [RI])		P	Intermediate
Family ESOCIDAE	**pikes**					
Esox americanus	grass pickerel	EXP	(Resident)		P	Intermediate
Esox niger	chain pickerel	ECON	Resident	I	P	Intermediate
Family APHREDODERIDAE	**pirate perches**					
Aphredoderus sayanus	pirate perch	ECON	Resident	C	I	Intermediate
Family BELONIDAE	**needlefishes**					
Strongylura marina	Atlantic needlefish	ECON	Resident	I	NC	NC
Family FUNDULIDAE	**topminnows**					
Fundulus olivaceus	blackspotted topminnow	ECON	Resident	C	I	Intermediate
Family POECILIIDAE	**livebearers**					
Gambusia affinis	mosquitofish	ECON	Resident	C	I	Intermediate
Heterandria formosa	least killifish	UCON	Resident	C	NC	NC
Family ATHERINIDAE	**silversides**					
Labidesthes sicculus	brook silverside	ECON	Resident	C	I	Intermediate
Family MORONIDAE	**striped basses**					
Morone chrysops	white bass	ECON	Transient (RI)	C	P	Intermediate
Morone mississippiensis	yellow bass	ECON	Resident	I	P	Intermediate
Morone saxatilis	striped bass	ECON	Transient (RI)	I	P	Intermediate
Family CENTRARCHIDAE	**sunfishes**					
Centrarchus macropterus	flier	EXP	(Resident)		I	Intermediate
Elassoma zonatum	banded pygmy sunfish	ECON	Resident	I	I	Intermediate
Lepomis cyanellus	green sunfish	EXP	(Resident)		I	Tolerant
Lepomis gulosus	warmouth	ECON	Resident	C	P	Intermediate
Lepomis macrochirus	bluegill	ECON	Resident	V	I	Intermediate

TABLE 8-2

FISHES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	OU-2 Occurrence Frequency[3]	Trophic Level[4]	Tolerance[5]
Lepomis marginatus	dollar sunfish	EXP	(Resident)		NC	NC
Lepomis megalotis	longear sunfish	ECON	Resident	I	I	Intolerant
Lepomis microlophus	redear sunfish	ECON	Resident	I	I	Intermediate
Lepomis punctatus	spotted sunfish	EXP	(Resident)		I	Intermediate
Micropterus salmoides	largemouth bass	ECON	Resident	C	P	Intermediate
Pomoxis annularis	white crappie	EXP	(Resident)		P	Intermediate
Pomoxis nigromaculatus	black crappie	ECON	Resident	C	P	Intermediate
Family PERCIDAE	**perches**					
Etheostoma chlorosoma	bluntnose darter	EXP	(Resident)		I	Intermediate
Etheostoma fusiforme	swamp darter	EXP	(Resident)		I	Intermediate
Etheostoma proeliare	cypress darter	ECON	Resident	C	NC	NC
Family SCIAENIDAE	**drums**					
Aplodinotus grunniens	freshwater drum	ECON	Transient (RI)	C	V	Intermediate
Family MUGILIDAE	**mullets**					
Mugil cephalus	striped mullet	ECON	Transient (MA)	C	NC	NC
Family SOLEIDAE	**soles**					
Trinectes maculatus	hogchoker	ECON	Transient (MA)	I	G	Intolerant

Notes:

[1] ECON = expected and confirmed (by at least one capture); EXP = expected on the basis of zoogeographic literature (i.e., known to occur in similar habitats of Lower Tombigbee River system), but not confirmed; UCON = unexpected based on zoogeographic literature but confirmed (by at least one capture).

[2] Resident fishes are those known to spend their entire life cycle within habitats similar to those represented in OU-2 (i.e., lowland swamps). Transients are known to spend at least some part of their life cycle in habitat(s) not represented in OU-2 (i.e., RI = predominantly riverine; MA = part of most of life spent in marine/estuarine areas; UP = predominantly in upland streams). Transients in general are unlikely to spawn in OU-2, but in some cases their larval and/or fishes other early life-history stages may be present.

[3] I = infrequent (encountered on only one or a few occasions, usually singly or in very low numbers); C = common (often encountered in appropriate gear/habitat(s), usually in moderate to high numbers); V = very common (encountered during virtually every use of appropriate gear, usually in moderate to high numbers).

[4] F= filter-feeder; P = piscivore; O = omnivore; H = herbivore (includes detritivores); I = insectivore; G = generalist feeder; V = invertivore, NC = not classified. Levels are based on categories established in Barbour, 1999.

[5] NC = not classified. Levels assigned by Barbour, 1999.

PREPARED BY/DATE: RMR 5/4/2010
CHECKED BY/DATE: HEF 5/7/10

TABLE 8-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
			CLASS AMPHIBIA							
Family AMBYSTOMATIDAE	**tiger salamanders**									
Ambystoma maculatum	spotted salamander	EXP	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Ambystoma opacum	marbled salamander	EXP[7]	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Ambystoma talpoideum	mole salamander	EXP	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Ambystoma tigrinum	tiger salamander	EXP	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Family AMPHIUMIDAE	**amphiumas**									
Amphiuma means	two-toed amphiuma	EXP	(Resident)		AM	AM	ANK, TGR	ANK, TGR	Carnivore	Carnivore
Family PLETHODONTIDAE	**woodland salamanders**									
Desmognathus fuscus	dusky salamander	EXP[7]	(Resident)		AM	AM	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Eurycea cinigera	southern two-lined salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Eurycea longicauda	long-tailed salamander	ECON	Resident	I	AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Eurycea quadridigitata	dwarf salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Plethodon glutinosus	slimy salamander	EXP[7]	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Pseudotriton montanus	mud salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	ND	ND
Pseudotriton ruber	red salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Family PROTEIDAE	**mudpuppies and waterdogs**									
Necturus beyeri	Gulf coast waterdog	EXP	(Resident)		AQ	AQ	ANK	ANK	Carnivore	Carnivore
Family SALAMANDRIDAE	**newts**									
Notophthalmus viridescens	eastern newt	EXP	(Resident)		AQ	AM	ANK	TGR, SNK	Carnivore	Carnivore
Family SIRENIDAE	**sirens**									
Siren intermedia	lesser siren	EXP	(Resident)		AQ	AQ	ANK	ANK	Carnivore	Carnivore
Family BUFONIDAE	**toads**									
Bufo quercicus	oak toad	EXP	(Resident)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Bufo terrestris	southern toad	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Bufo woodhousei	Woodhouse's toad	ECON	Resident	I	TE	AQ	TGR	ANK	Carnivore	Herbivore
Family HYLIDAE	**treefrogs and cricket frogs**									
Acris crepitans	northern cricket frog	EXP	(Resident)		TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Acris gryllus	southern cricket frog	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Hyla avivoca	bird-voiced frog	EXP	(Resident)		TE	AQ	TAR, TGR	ANK	Carnivore	Herbivore
Hyla cinema	green treefrog	ECON	Resident	C	TE	AQ	TAR, TGR	ANK	Carnivore	Herbivore
Hyla crucifer	spring peeper	ECON	Resident	I	TE	AQ	TAR	ANK	Carnivore	Herbivore
Hyla femoralis	pine woods treefrog	EXP	(Transient)		TE	AQ	TAR	ANK	Carnivore	Herbivore
Hyla gratiosa	barking treefrog	EXP	(Transient)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Hyla squirella	squirrel treefrog	EXP	(Resident)		TE	AQ	TAR	ANK	Carnivore	Herbivore
Hyla versicolor	gray treefrog	ECON	Resident	C	TE	AQ	TGR, TAR	ANK	Carnivore	Herbivore
Pseudacris nigrita	southern chorus frog	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Pseudacris ornata	ornate chorus frog	EXP	(Resident)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Family MICROHYLIDAE	**narrow-mouthed toads**									
Gastrophryne carolinensis	eastern narrow-mouthed toad	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Family PELOBATIDAE	**spadefoot toads**									
Scaphiopus holbrookii	eastern spadefoot toad	EXP[7]	(Resident)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Family RANIDAE	**true frogs**									
Rana catesbeiana	bullfrog	ECON	Resident	C	TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Rana clamitans	bronze frog	ECON	Resident	V	TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Rana grylio	pig frog	EXP	(Resident)		TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Rana sphenocephala	southern leopard frog	ECON	Resident	I	TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore

TABLE 8-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
			CLASS REPTILIA							
Family CHELYDRIDAE	**snapping turtles**									
Chelydra serpentina	common snapping turtle	ECON	Resident	I	AM	AM	ANK	ANK	Omnivore	Omnivore
Macroclemys temminckii	alligator snapping turtle	ECON	Resident	C	AM	AM	ANK	ANK	Omnivore	Omnivore
Family EMYDIDAE	**land and freshwater turtles**									
Chrysemys picta	painted turtle	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Deirochelys reticularia	chicken turtle	EXP	(Transient		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Graptemys nigrinoda	black-knobbed sawback	EXP	(Transient		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Graptemys pulchra	Alabama map turtle	EXP[7]	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Pseudemys concinna	river cooter	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Herbivore	Herbivore
Pseudemys floridana	water	EXP	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Terrapene carolina	eastern box turtle	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Trachemys scripta	slider	ECON	Resident	C	AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Family KINOSTERNIDAE	**mud and musk turtles**									
Kinosternon subrubrum	eastern musk turtle	EXP[7]	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Sternotherus minor	loggerhead musk turtle	EXP	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Sternotherus odoratus	stinkpot	ECON	Resident	C	AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Family TRIONYCHIDAE	**soft-shelled turtles**									
Apalone mutica	smooth softshell	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Carnivore	Carnivore
Apalone spinifera	spiny softshell	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Carnivore	Carnivore
Family ANGUIDAE	**glass lizards**									
Ophisaurus attenuatus	slender glass lizard	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Ophisaurus ventralis	eastern glass lizard	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family IGUANIDAE	**iguanids**									
Anolis carolinensis	green anole	ECON	Resident	C	TE	TE	TAR	TAR	Carnivore	Carnivore
Sceloporus undulatus	eastern fence lizard	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Family SCINCIDAE	**skinks**									
Eumeces anthracinus	coal skink	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Eumeces fasciatus	five-lined skink	ECON	Resident	I	TE	TE	TAR, TGR	TAR, TGR	Carnivore	Carnivore
Eumeces inexpectatus	southeastern five-lined skink	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Eumeces laticeps	broad-headed skink	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Scincella lateralis	ground skink	ECON	Resident	C	TE	TE	TGR	TGR	Carnivore	Carnivore
Family TEIDAE	**racerunners**									
Cnemidophorus sexlineatus	six-lined racerunner	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family COLUBRIDAE	**colubrid snakes**									
Coluber constrictor	racer	ECON	Resident	I	TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Diadophis punctatus	ring-necked snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Elaphe guttata	corn snake	EXP	(Resident)		TE	TE	TGR	TGR, TAR	Carnivore	Carnivore
Elaphe obsoleta	rat snake	ECON	Resident	I	TE	TE	TAR, TGR	TGR, TAR	Carnivore	Carnivore
Farancia abacura	mud snake	EXP	(Resident)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Farancia erytrogramma	rainbow snake	EXP	(Transient)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Heterodon platirhinos	eastern hog-nosed snake	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Heterodon simus	southern hog-nosed snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Lampropeltis getulus	common kingsnake	ECON	Resident	I	TE	TE	TGR, SNK	TRG,SNK	Carnivore	Carnivore
Lampropeltis triangulum	milk snake	EXP	(Resident)		TE	TE	TAR,TGR	TGR, TAR	Carnivore	Carnivore
Masticophis flagellum	coachwhip	EXP[7]	(Resident)		TE	TE	TGR	TRG,SNK	Carnivore	Carnivore
Nerodia erythrogaster	plain-bellied water snake	ECON	Resident	I	TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Nerodia fasciata	banded water snake	ECON	Resident	C	TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Nerodia rhombifera	diamond-backed water snake	EXP	(Resident)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Nerodia sipedon	northern water snake	EXP	(Resident)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore

TABLE 8-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Opheodrys aestivus	rough green snake	EXP	(Resident)		TE	TE	TAR,TGR	TGR, TAR	Carnivore	Carnivore
Regina rigida	glossy crayfish snake	EXP	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Carnivore	Carnivore
Rabida flavilata	pine woods snake	EXP	(Transient)		TE	TE	TAR,TGR	TGR, TAR	Carnivore	Carnivore
Storeria dekayi	brown snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Storeria occipitomaculata	red-bellied snake	EXP[7]	(Resident)		TE	TE	TRG	TGR	Carnivore	Carnivore
Tantilla coronata	southeastern crowned snake	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Thamnophis sauritus	eastern ribbon snake	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Thamnophis siralis	garter snake	ECON	Resident	I	TE	TE	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Virginia striatula	rough earth snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Virginia valeriae	smooth earth snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family ELAPIDAE	**coral snakes**									
Micrurus fulvius	eastern coral snake	EXP	(Resident)	I	TE	TE	TGR	TGR	Carnivore	Carnivore
Family VIPERIDAE	**vipers**									
Agkistrodon contortrix	copperhead	ECON	Resident	C	TE	TE	TGR	TGR	Carnivore	Carnivore
Agkistrodon piscivorus	cottonmouth	ECON	Resident	C	TE	TE	TAR, ANK	TAR, ANK	Carnivore	Carnivore
Crotalus adamanteus	eastern diamond-backed rattlesnake	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Crotalus horridus	timber (canebrake) rattlesnake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Sistrurus miliarius	pygmy rattlesnake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family CROCODYLIDAE	**crocodilians**									
Alligator mississippiensis	American alligator	ECON	Resident	C I	TE	TE	SNK, TGR	SNK, TGR	Carnivore	Carnivore
			CLASS AVES							
Family GAVIIDAE	**loons**									
Gavia immer	common loon	ECON	(Transient)	I	TE	TE	SDV	SDV	Carnivore	Carnivore
Family PODICIPEDIDAE	**grebes**									
Podiceps auritus	horned grebe	EXP	(Transient)		TE	TE	SDV	SDV	Carnivore	Carnivore
Podilymbus podiceps	pie-billed grebe	ECON	Resident	I	TE	TE	SDV	SDV	Omnivore	Omnivore
Family PHALACROCORACIDAE	**cormorants**									
Phalacrocorax aurints	double-crested cormorant	ECON	Transient	C	TE	TE	SDV	SDV	Carnivore	Carnivore
Family ANHINGIDAE	**darters**									
Anhinga anhinga	anhinga (snakebird)	ECON	Transient	I	TE	TE	SDV	SDV	Carnivore	Carnivore
Family ARDEIDAE	**herons, bitterns, and allies**									
Ardea herodias	great blue heron	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Butorides virescens	green heron	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Egretta caerulea	little blue heron	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Bubulcus ibis	cattle egret	ECON	Transient	I	TE	TE	TGR	TGR	Carnivore	Carnivore
Ardea alba	great egret	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Egretta thula	snowy egret	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Hydranassa tricolor	Louisiana heron	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Nycticorax nycticorax	black-crowned night heron	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Nyctanassa violacea	yellow-crowned night heron	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Ixobrychus exilis	least bittern	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Botaurus lentiginosus	American bittern	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Family CICONIIDAE	**storks**									
Mycteria americana	wood stork	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Family THRESKIORNITHIDAE	**ibises**									
Plegadis falcinellus	glossy ibis	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Eudocimus albus	white ibis	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore

TABLE 8-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Family ANATIDAE	**swans, geese, and ducks**									
Cygnus columbianus	whistling swan	EXP	(Transient)		TE	TE	SNK	SNK	Herbivore	Herbivore
Branta canadensis	Canada goose	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Omnivore	Omnivore
Anser albigrons	white-fronted goose	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Omnivore	Omnivore
Chen caerulescens	snow goose	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Omnivore	Omnivore
Dendrocygna bicolor	fulvous tree-duck	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Herbivore	Herbivore
Anas platyrhynchos	mallard	ECON	Resident	C	TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas rubripes	black duck	EXP[7]	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas strepera	gadwall	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas acuta	pintail	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas crecca	green-winged teal	ECON	Transient	I	TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas discors	blue-winged teal	EXP	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas americana	American wigeon	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas clypeata	northern shoveler	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Aix sponsa	wood duck	ECON	Resident	C	TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Aythya americana	redhead	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Aythya collaris	ring-necked duck	EXP[7]	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Aythya valisineria	canvasback	EXP	(Transient)		TE	TE	SDV, TGR	SDV, TGR	Omnivore	Omnivore
Aythya affinis	lesser scaup	EXP[7]	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Bucephala clangula	common goldeneye	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Bucephala albeola	bufflehead	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Melanitta deglandi	white-winged scoter	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Oxyura jamaicensis	ruddy duck	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Lophodytes cucullatus	hooded merganser	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Mergus merganser	common merganser	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Mergus serrator	red-breasted merganser	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Family CATHARTIDAE	**vultures**									
Cathartes aura	turkey vulture	ECON	Resident	C	TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Cathartes atratus	black vulture	ECON	Resident	I	TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Family ACCIPITRIDAE	**hawks, kites, eagles**									
Accipiter striatus	sharp-shinned hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Aquila chrysaetos	golden eagle	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo jamaicensis	red-tailed hawk	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo platypterus	broad-winged hawk	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo swainsoni	Swainson's hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo lagopus	rough-legged hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Circus cyaneus	marsh hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Elanoides forficatus	swallow-tailed kite	ECON	(Transient)	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Ictinia mississippiensis	Mississippi kite	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Haliaeetus leucocephalus	bald eagle[9]	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Family PANDIONIDAE	**ospreys**									
Pandion haliaetus	osprey	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Family FALCONIDAE	**falcons**									
Falco peregrinus	peregrine falcon[8]	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Falco columbarius	merlin	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Falco spatverius	American kestrel (sparrow hawk)	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Family PHASIANIDAE	**quails, pheasants**									
Colinus virginianus	bobwhite	EXP[7]	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Family MELEAGRIDIDAE	**turkeys**									
Meleagris gallopavo	turkey (wild turkey)	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore

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			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
Family RALLIDAE	**rails**									
Rallus elegans	king rail		(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Rallus limicola	Virginia rail	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Porzana carolina	sora	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Porphyrula martinica	purple gallinule	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Gallinula chloropus	common gallinule	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Fulica americana	American coot	ECON	Resident	C	TE	TE	SDV, TGR	SDV, TGR	Omnivore	Omnivore
Family CHARADRIIDAE	**plovers**									
Charadrius semipalmatus	semipalmated plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Charadrius melodus	piping plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Pluvialis dominica	American golden plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Pluvialis squatarola	black-billed plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family SCOLOPACIDAE	**sandpipers**									
Capella gallinago	common snipe	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Numenius phaeopus	whimbrel	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Bartramia longicauda	upland sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Actitis macularia	spotted sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Tringa solitaria	solitary sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Tringa melanoleuca	greater yellowlegs	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Tringa flavipes	lesser yellowlegs	EXP[7]	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Catoptrophorus semipalmatus	willet	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Calidris melanotos	pectoral sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris fuscicollis	white-rumped sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris minutilla	least sandpiper	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris alpina	dunlin	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris pusilla	semipalmated sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris mauri	western sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris himantopus	stilt sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Limnodromus griseus	short-billed dowitcher	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Family LARIDAE	**gulls and terns**									
Larus argentatus	herring gull	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Larus delawarensis	ring-billed gull	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Larus atricilla	laughing gull	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Larus philadelphia	Bonaparte's gull	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Sterna forsteri	Forster's tern	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Sterna hirundo	common tern	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Sterna fuscata	sooty tern	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Hydroprogne caspia	Caspian tern	EXP	(Transient)	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Chlidonias niger	black tern	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Family COLUMBIDAE	**pigeons and doves**									
Columba livia	rack dove ("common pigeon")	ECON	Resident	I	TE	TE	TGR	TGR	Herbivore	Herbivore
Zenaida asiatica	white-winged dove	EXP[7]	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Zenaida macroura	mourning dove	ECON	Resident	C	TE	TE	TGR	TGR	Herbivore	Herbivore
Columbina passerina	common ground dove	EXP[7]	(Resident)		TE	TE	TGR	TGR	Herbivore	Herbivore
Family CUCULIDAE	**cuckoos**									
Coccyzus americanus	yellow-billed cuckoo	ECON	Resident	I	TE	TE	TAR	TAR	Omnivore	Omnivore
Coccyzus erythropthalmus	black-billed cuckoo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family TYTONIDAE	**barn owls**									
Tyto alba	barn owl	EXP	(Resident)		TE	TE	TAR	TAR	Carnivore	Carnivore

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			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
Family STRIGIDAE	**typical owls**									
Otus asio	screech owl	EXP[7]	(Resident)		TE	TE	TAR	TAR	Carnivore	Carnivore
Bubo virginianus	great horned owl	EXP[7]	(Resident)		TE	TE	TAR	TAR	Carnivore	Carnivore
Strix varia	barred owl	ECON	Resident		TE	TE	TAR	TAR	Carnivore	Carnivore
Asio flammeus	short-eared owl	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Aegolius acadicus	saw-whet owl	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Family CAPRIMULGIDAE	**goatsuckers**									
Caprimulgus carolinensis	chuck-will's-widow	EXP[7]	(Transient)		TE	TE	TGR, TAE	TGR, TAE	Carnivore	Carnivore
Caprimulgus vociferus	whip-poor-will	EXP	(Transient)		TE	TE	TGR, TAE	TGR, TAE	Carnivore	Carnivore
Chordeiles minor	common nighthawk	EXP[7]	(Transient)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Family APODIDAE	**swifts**									
Chaetura pelagica	chimney swift	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Family TROCHILIDAE	**hummingbirds**									
Archilochus colubris	ruby-throated hummingbird	EXP[7]	(Transient)		TE	TE	TAE	TAE	Omnivore	Omnivore
Family ALCEDINIDAE	**kingfishers**									
Megaceryle alcyon	belted kingfisher	ECON	Transient	C	TE	TE	TAR	TAR	Carnivore	Carnivore
Family PICIDAE	**woodpeckers**									
Colaptes auratus	common flicker	ECON	Transient	I	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Dryocopus pileatus	pileated woodpecker	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Melanerpes carolinus	red-bellied woodpecker	ECON	Resident	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Melanerpes erythrocephalus	red-headed woodpecker	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Sphyrapicus varius	yellow-bellied sapsucker	ECON	Transient	I	TE	TE	TAR	TAR	Omnivore	Omnivore
Dendrocopos villosus	hairy woodpecker	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendrocopos pubescens	downy woodpecker	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family TYRANNIDAE	**flycatchers**									
Tyrannus tyrannus	eastern kingbird	ECON	Transient	I	TE	TE	TAR	TAR	Omnivore	Omnivore
Tyrannus verticalis	western kingbird	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Muscivora forficata	scissor-tailed flycatcher	EXP	(Transient)		TE	TE	TAE	TAE	Omnivore	Omnivore
Myiarchus crinitus	great crested flycatcher	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Sayornis phoebe	eastern phoebe	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Empidonax virescens	Acadian flycatcher	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Contopus virens	eastern wood pewee	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family HIRUNDINIDAE	**swallows**									
Iridoprocne bicolor	tree swallow	ECON	Transient	I	TE	TE	TAR, TAE	TAR, TAE	Omnivore	Omnivore
Riparia riparia	bank swallow	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Stelgidopteryx ruficollis	rough-winged swallow	EXP	(Resident)		TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Hirundo rustica	barn swallow	ECON	Resident		TE	TE	TAE	TAE	Carnivore	Carnivore
Petrochelidon pyrrhonota	cliff swallow	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Progne subis	purple martin	ECON	Transient	C	TE	TE	TAE	TAE	Carnivore	Carnivore
Family CORVIDAE	**jays, magpies, and crows**									
Cyanocitta cristata	blue jay	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Corvus brachyrhynchos	common crow	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Corvus ossifragus	fish crow	ECON	Resident	I	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family PARIDAE	**titmice**									
Poecile carolinensis	Carolina chickadee	ECON	Resident	I	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Baeolophus bicolor	tufted titmouse	ECON	Resident	I	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family SITTIDAE	**nuthatches**									
Sitta canadensis	red-breasted nuthatch	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family CERTHIIDAE	**creepers**									
Certhia familiaris	brown creeper	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore

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			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
Family TROGLODYTIDAE	**wrens**									
Troglodytes aedon	northern house wren	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Troglodytes troglodytes	winter wren	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Thryomanes bewickii	Bewick's wren	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Thryothorus ludovicianus	Carolina wren	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Telmarodytes palustris	long-billed marsh wren	EXP[7]	(Transient)		TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Cistothorus palustris	sedge wren	EXP[7]	(Transient)		TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Family MIMIDAE	**mimic thrushes**									
Dumetella carolinensis	gray catbird	EXP[7]	(Transient)		TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Mimus polyglottos	northern mockingbird	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Toxostoma rufum	brown thrasher	ECON	Resident	I	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family TURDIDAE	**true thrushes**									
Turdus migratorius	American robin	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Hylocichla mustelina	wood thrush	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Catharus guttatus	hermit thrush	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Catharus ustulatus	Swainson's thrush	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Ominivore
Catharus minimus	gray-cheeked thrush	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Catharus fuscescens	veery	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Sialia sialis	eastern bluebird	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family SYLVIIDAE	**old world warblers**									
Polioptila caerulea	blue-gray gnatcatcher	EXP	(Transient)		TE	TE	TAE, TAR	TAE, TAR	Carnivore	Carnivore
Regulus satrapa	golden-crowned kinglet	EXP[7]	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Regulus calendula	ruby-crowned kinglet	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family MOTACILLIDAE	**wagtails**									
Anthus spinoletta	water pipit	EXP	(Transient)		TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family BOMBYCILLIDAE	**waxwings**									
Bombycilla cedrorum	cedar waxwing	EXP[7]	(Transient)		TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family LANIIDAE	**shrikes**									
Lanius ludoviclanus	loggerhead shrike	ECON	Resident	I	TE	TE	TAR	TAR	Carnivore	Carnivore
Family STURNIDAE	**starlings**									
Sturnus vulgaris	European starling	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family VIREONIDAE	**vireos**									
Vireo griseus	white-eyed vireo	ECON	Resident	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo flavifrons	yellow-throated vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo solitarius	solitary vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo olivaceus	red-eyed vireo	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo philadelphicus	Philadelphia vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo gilvus	warbling vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family PARULIDAE	**wood warblers**									
Mniotilta varia	black-and-while warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Protonotaria citrea	prothonotary warbler	ECON	Transient	C	TE	TE	TAR	TAR	Carnivore	Carnivore
Limnothlypis swainsonii	Swainson's warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Helmitheros vermivorus	worm-eating warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Vermivora chrysoptera	golden-winged warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Vermivora peregrina	Tennessee warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vermivora celata	orange-crowned warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vermivora ruficapilla	Nashville warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Parula americana	northern parula	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica petechia	yellow warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica magnolia	magnolia warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore

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			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Dendroica coronata	yellow-rumped warbler	ECON	Transient	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica discolor	prairie warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica fusca	Blackburnian warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica dominica	yellow-throated warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica pensylvanica	chestnut-sided warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica castanea	bay-breasted warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica striata	blackpoll warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica pinus	pine warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica palmanrum	palm warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Seiurus aurocapillus	ovenbird	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Seiurus noveboracensis	northern waterthrush	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Seiurus motacilla	Louisiana waterthrush	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Geothlypis formosa	Kentucky warbler	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Wilsonia citrina	hooded warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Icteria virens	yellow-breasted chat	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Setophaga ruticilla	American redstart	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family PLOCEIDAE	**weaver finches**									
Passer domesticus	house sparrow	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family ICTERIDAE	**blackbirds, orioles, meadowlarks**									
Dolichonyx oryzivorus	bobolink	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Sturnella magna	eastern meadowlark	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Agelaius phoeniceus	red-winged blackbird	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Icterus spurius	orchard oriole	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Icterus galbula	Baltimore oriole	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Quiscalus quiscula	common grackle	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Euphagus carolinus	rusty blackbird	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Euphagus cyanocephalus	Brewer's blackbird	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Molothrus ater	brown-headed cowbird	ECON	(Transient)	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Family THRAUPIDAE	**tanagers**									
Piranga olivacea	scarlet tanager	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Piranga rubra	summer tanager	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family FRINGILLIDAE	**finches**									
Cardinalis cardinalis	cardinal	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Pheucticus lubdovicianus	rose-breasted grosbeak	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Guiraca caerulea	blue grosbeak	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Passerina cyanea	indigo bunting	ECON	Resident	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Passerina ciris	painted bunting	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Coccothraustes vespertinus	evening grosbeak	EXP	(Transient)		TE	TE	TAR	TAR	Herbivore	Herbivore
Carpodacus purpureus	purple finch	EXP	(Transient)		TE	TE	TAR	TAR	Herbivore	Herbivore
Carduelis pinus	pine siskin	EXP	(Transient)		TE	TE	TAR	TAR	Herbivore	Herbivore
Spinus tristis	American goldfinch	EXP	(Transient)		TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Pipilo erythrophthalmus	rufous-sided towhee	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Passerculus sandwichensis	savannah sparrow	EXP7	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Ammodramus savannarum	grasshopper sparrow	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Ammodramus leconteii	Le Conte's sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Pooecetes gramineus	vesper sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Aimophila aestivalis	Bachman's sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Junco hyemalis	slate-colored junco	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Spizella passerina	chipping sparrow	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Spizella pusilla	field sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore

TABLE 8-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
Zonotrichia leucophrys	white-crowned sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Zonotrichia albicollis	white-throated sparrow	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Passerella iliaca	fox sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Melospiza georgiana	swamp sparrow	ECON	(Transient)	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Melospira melodia	song sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
			CLASS MAMMALIA							
Family DIDELPHIDAE	**opossums**									
Didelphis virginiana	Virginia opossum	EXP[7]	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family SORICIDAE	**shrews**									
Blarina brevicauda	short-tailed shrew	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Cryptotis parva	least shrew	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family TALPIDAE	**moles**									
Scalopus aquaticus	eastern mole	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family VESPERTILIONIDAE	**vespertilionid bats**									
Myotis austroriparius	southeastern myotis	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Pipistrellus subflavus	eastern pipistrelle	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Eptesicus fuscus	big brown bat	EXP[7]	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Lasiurus borealis	red bat	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Lasiurus seminolus	Seminole bat	EXP[7]	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Lasiurus cinereus	hoary bat	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Nycticeius humeralis	evening bat	ECON	Resident	C	TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Plecotus rafinesquii	Rafinesque's big-eared bat	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Family MOLOSSIDAE	**free-tailed bats**									
Tadarida brasiliensis	Brazilian free-tailed bat	EXP	(Transient)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Family DASYPODIDAE	**armadillos**									
Dasypus novemcinctus	nine-banded armadillo	ECON	Resident	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Family LEPORIDAE	**hares and rabbits**									
Sylvilagus aquaticus	swamp rabbit	ECON	Resident	V	TE	TE	TGR	TGR	Herbivore	Herbivore
Sylvilagus floridanus	eastern cottontail	ECON	(Transient)	C	TE	TE	TGR	TGR	Herbivore	Herbivore
Family SCIURIDAE	**squirrels**									
Sciurus carolinensis	gray squirrel	ECON	Resident	C	TE	TE	TAR	TAR	Herbivore	Herbivore
Sciurus niger	fox squirrel	EXP	(Resident)		TE	TE	TAR	TAR	Herbivore	Herbivore
Glaucomys volans	southern flying squirrel	EXP	(Resident)		TE	TE	TAR	TAR	Herbivore	Herbivore
Family CASTORIDAE	**beavers**									
Castor canadensis	American beaver	ECON	Resident	C	TE	TE	SNK, TGR	SNK, TGR	Herbivore	Herbivore
Family CRICETIDAE	**new world rats and mice**									
Oryzomys palustris	marsh rice rat	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Reithrodontomys humulis	eastern harvest mouse	EXP	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Peromyscus polionotus	oldfield mouse	EXP	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Peromyscus gossypinus	cotton mouse	EXP[7]	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Ochrotomys nuttalli	golden mouse	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Herbivore	Herbivore
Sigmodon hispidus	hispid cotton rat	EXP[7]	Resident	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Neotoma floridana	eastern wood rat	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Microtus pinetorum	woodland vole	EXP	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Ondatra zibethicus	muskrat	EXP[7]	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Family CAPROMYIDAE	**coypus**									
Myocastor coypus	nutria	EXP[7]	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Herbivore	Herbivore
Family MURIDAE	**old world rats and mice**									
Rattus norvegicus	Norway rat	EXP	(Transient)		TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Mus musculus	house mouse	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore

TABLE 8-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Amphibians						
Ambystoma cingulatum	Flatwoods alamander	Ba, Mo	T	Seasonally wet, pine flatwoods, and pine savannas. Topographically flat or slightly rolling wiregrass dominated grassland having little to no midstory and an open overstory of widely scattered longleaf pine. Lower Coastal Plain regions of Alabama, Florida, Georgia, and South Carolina. Rare; i.e., no individuals found in Alabama since 1981.	No	UnlikeLy
Birds						
Charadrius melodus	Piping plover	Ba, Mo	T	Beach dune/coastal strand, nearshore reef. Winter range typically encompasses South Atlantic, Gulf Coast, and Caribbean beaches and barrier islands. Optimal wintering habitat includes intertidal beaches with sand and/or mud flats with no or sparse vegetation.	No	UnlikeLy
Haliaeetus leucocephalus	Bald eagle	All	BGEPA	High pine, scrubby high pine, maritime hammock, mesic temperate hammock, pine rockland, scrubby flatwoods, mesic pine flatwoods, hydric pine flatwoods, dry prairie, wet prairie, freshwater marsh, seepage swamp, flowing water swamp, pond swamp, mangrove, saltmarsh, and seagrass. In general, habitats include riparian areas along the coast and near major rivers, wetlands, and reservoirs. Typically nest in large, tall open topped trees near open water.	Yes	Present
Picoides borealis	Red-cockaded woodpecker	All	E	Current distribution includes East Texas and Oklahoma, to Florida, and north through Carolinas. Open stands of pines with a minimum age of 80 to 120 years provide suitable nesting habitat. Longleaf pines are most commonly used, but other species of southern pine are also acceptable. Roosting cavities are excavated in living pines, with red heart disease.	No	UnlikeLy

TABLE 8-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
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Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Mycteria americana	Wood stork	Ba, Ch, Cl, Wa	E	Cypress swamp, hydric pine flatwoods, wet prairie, freshwater marsh, seepage swamp, flowing water swamp, pond swamp, mangrove, and saltmarsh. Forages in prairie ponds, flooded pastures, or fields, ditches, and other shallow standing water, including saltwater. Usually roosts communally in tall snags, sometimes in association with other wading birds (i.e., active heronries). Breeds in Mexico and birds move into Gulf States in search of mudflats and other wetlands, even those associated with forested areas.	Yes	Low to Moderate
Sterna antillarum	Least tern	Ba, Mo	E	Riverine nesting areas include sparsely vegetated sand and gravel bars within a wide unobstructed river channel or salt flats along lake shorelines.	No	UnlikeLy
Fishes						
Acipenser oxyrinchus desotoi	Gulf sturgeon	All	T	Anadromous; adult fish tend to congregate in deeper waters of rivers with moderate currents and sand and rocky bottoms. Seagrass beds with mud and sand substrates appear to be important marine habitats. Spend 8 to 9 months in rivers and 3 to 4 cool months in the estuarine waters of the Gulf of Mexico. From the Mississippi River eastward to the Tampa Bay area.	No	Unlikely
Scaphirhynchus suttkusi	Alabama sturgeon	Ba, Cl	E	The Alabama sturgeon is endemic to rivers of the Mobile River Basin below the Fall Line. Its current range includes the Alabama River from R.F. Henry Lock and Dam downstream to the confluence of the Tombigbee River. The species is also known to survive in the Cahaba River.	No	Unlikely

TABLE 8-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Mammals						
Peromyscus polionotus ammobates	Alabama beach mouse	Ba	E	Species known only from coastal dune and scrub habitat in Baldwin County, Alabama.	No	Unlikely
Peromyscus polionotus trissylepsis	Perdido Key beach mouse	Ba	E	Typically inhabits primarily primary and secondary dunes, not including high-elevation (scrub dune) habitat in Baldwin County, Alabama.	No	Unlikely
Trichechus manatus	West Indian manatee	Ba, Mo	E	Typically inhabit warm, shallow, coastal estuarine waters of sufficient depth (5 feet to usually less than 20 feet). During the winter months, most the United States manatee population shifts to the coastal waters of the southern half of peninsular Florida.	No	Unlikely
Mussels						
Pleurobema taitianum	Heavy pigtoe mussel	Ba, Cl	E	The heavy pigtoe mussel was historically found in the Tombigbee River from the mouth of Tibbee Creek near Columbus, Mississippi, to Demopolis, Alabama; the Alabama River at Claiborne and Selma, Alabama; the lower Cahaba River, Alabama; and possibly the Coosa River, Alabama. Only four sites with suitable habitat remain: these consist of localities in a bendway of the Tombigbee River (Alabama), the East Fork Tombigbee River (Mississippi), the Buttahatchie River (Mississippi), and the Sipsey River.	No	Unlikely
Potamilus inflatus	Inflated heelsplitter mussel	Ba, Ch, Cl, Wa	T	Soft, stable substrata in slow to moderate currents. It has been found in sand, mud, silt and sandy gravel, but not in large or armored gravel. It is usually collected on the protected side of bars and may occur in depths over 20 feet. Not abundant within any known habitat. Spawning begins in late February or early March through late April. Limited to the Amite River, Louisiana, and five sites in the Tombigbee and Black Warrior Rivers, Alabama.	No	Unlikely

TABLE 8-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Plants						
Isoetes louisianensis	Louisiana quillwort	Mo, Wa	E	Sand and gravel bars on small to medium sized streams; prefer regular and sometimes long term inundation.	No	Unlikely
Schwalbea americana	American chaffseed	Ba	E	Typically inhabits open pine flatwoods, savannas, and other open areas, in moist to dry acidic sandy loams or sandy peat loams.	No	Unlikely
Reptiles						
Caretta caretta	Loggerhead sea turtle	Ba, Mo	T	Beach dune/coastal strand, seagrass, nearshore reef. Feeds in shallow waters of the continental shelves. Frequently found in bays and estuaries and may enter river mouths. Females nest on sandy beaches, usually just above the average high tide line.	No	Unlikely
Chelonia mydas	Green sea turtle	Ba, Mo	T	Beach dune/coastal strand, seagrass, nearshore reef. Occupies warm tropical waters from New England to South Africa and in the Pacific from Western Africa to the Americas. The only time they emerge from the water is when they are nesting on beaches.	No	Unlikely
Gopherus polyphemus	Gopher tortoise	Ch, Mo, Wa	T	The species is found on droughty, deep sand ridges which originally supported longleaf pine and patches of scrub oak.	No	Unlikely
Lepidochelys kempii	Kemp's Ridley sea turtle	Ba, Mo	E	Inhabits coastal waters and bays of the Gulf of Mexico and Atlantic. Prefers shallow coastal waters. Nest almost exclusively on the beaches of Rancho Nuevo on the Mexican Gulf Coast.	No	Unlikely
Pseudemys alabamensis	Alabama red-bellied turtle	Ba, Mo	E	Inhabits the lower part of the floodplain of the Mobile River System in Baldwin and Mobile Counties, Alabama. Presently occurs at least as far north as the Mobile River below David Lake in Mobile County.	Yes	Low to Moderate

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FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated Ecological Risk Assessment
Olin – McIntosh
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McIntosh, Alabama

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Drymarchon corais couperi	Eastern indigo snake	Ba, Mo	T	Typically inhabits pinelands and associated with the gopher tortoise in the longleaf pine system. Also found in dry glades, tropical hammocks, and muckland field from Florida, west to Louisiana.	No	Unlikely
Pituophis melanoleucus lodingi	Black pine snake	Cl, Mo, Wa	C	Requires dry sandy soils for burrowing and is usually found in pine and mixed hardwood forests. Feeds primarily on pocket gophers.	No	Unlikely

Source: http://www.fws.gov/daphne/es/specieslst.html (April 20, 2010)
Listed by the U.S. Fish and Wildlife Service, Region 4.

[1]County	[2]Federal Status
Ba - Baldwin	C - Species of Concern
Ch - Choctaw	E - Endangered
Cl - Clarke	T - Threatened
Mo - Mobile	BGEPA - Bald and Golden Eagle
Wa - Washington	

PREPARED BY/DATE: KPH 4/20/2010
CHECKED BY/DATE: RRP 4/27/2010

TABLE 8-5
MCINTOSH OU-2 MEDIA CONCENTRATIONS

		Media Concentration											
Sample Type	Year(s) of Sample Collection	Elevation Independent	3 ft. NAVD88 Elevation	6 ft. NAVD88 Elevation	Mercury	Filtered Mercury	MeHg	Dissolved MeHg	HCB	DDTR (ND=0)	DDTR (1/2 DL)	6 Isomers DDT Available	3 Isomers DDT Available
Terrestrial Vegetation	2010	X			0.0085[j]		0.0071		0.0048[f]		0.13		
Insects (Spiders, Flying Insects, and Crawling Insects)	2010	X			0.36				0.022		0.36	X	
Insects (Flying Insects)	2010	X			0.553				0.029		0.516	X	
Insects (Crawling Insects & Spiders)	2010	X			0.20				0.019		0.24		
Insects (Terrestrial Insects and Spiders) (mg/kg) ww	1994, 1995	X			0.203				0.547	3.70	3.71	X	X
Aquatic Insects (mg/kg) ww	1994, 1995, 2001	X			0.186				1.14	16.7	16.7	X	
Crayfish (mg/kg) ww	1994		X		0.184				0.516	1.09	1.10		X
Bullfrog (mg/kg) ww	1994		X		0.349				0.04	0.859	0.871	X	
Bullfrog (mg/kg) ww	1994			X	0.297				0.035	1.267	1.244	X	
Little Blue Heron (mg/kg) ww - whole body[a]	1994		X		0.96				0.291	17.3	17.3	X	
Little Blue Heron (mg/kg) ww - whole body[a]	1994			X	1.17				0.286	35.2	34.4		
Raccoon (mg/kg) ww- whole body[d]	1994		X		0.96				0.021	0.55	0.57	X	
Largemouth Bass (mg/kg) - filet	2008	X			2.47				0.077				
Largemouth Bass (mg/kg) - whole body	2008	X			1.59				0.708	1.46[e]	0.532[e]		
Largemouth Bass (mg/kg) - filet	2001	X								1.08	0.394	X	
Largemouth Bass (mg/kg) - filet	2006	X			1.42								
Mosquitofish (mg/kg) - whole body	1994		X		0.545				0.121	4.21	4.23	X	
Mosquitofish (mg/kg) - whole body	1994			X	0.521				0.15	13.41	13.47	X	
Mosquitofish (mg/kg) - whole body	2001		X		0.481				0.109	1.36	1.57	X	
Mosquitofish (mg/kg) - whole body	2001			X	0.46				0.10	10.81	6.61	X	
Bluegill - whole body	2008	X			0.769				0.37				
Silverside - whole body	2008	X			1.2[g]				1.99[g]				
Forage Fish[h] (mg/kg)	2008	X			0.793				0.469				
Surface Water (ng/L)	1991, 1994	X			182				39.6	135	135	X	
Surface Water (ng/L)	1995	X					3.50	0.508					
Surface Water (ng/L) - Shallow	2008, 2009		X		152	15.8	2.56	0.691					
Surface Water (ng/L) - Shallow	2008, 2009			X	138	15.0	2.84	0.839					
Surface Water (ng/L) - Deep	2008, 2009		X		319	14.9	2.51	0.686					
Surface Water (ng/L) - Deep	2008, 2009			X	295	14.3	3.34	0.989					
Surface Water (ng/L) - Deep and Shallow	2008, 2009		X		182	15.4	2.51	0.666					
Surface Water (ng/L) - Deep and Shallow	2008, 2009			X	169	14.7	2.74	0.855					
Surface Water (ng/L) - Deep and Shallow	1991, 1994, 2008, 2009		X		156	24.9[i]							
Surface Water (ng/L) - Deep and Shallow	1991, 1994, 2008, 2009			X	149	14.7							
Surface Water (ng/L) - Deep and Shallow	1995, 2008, 2009		X				2.67	0.636					
Surface Water (ng/L) - Deep and Shallow	1995, 2008, 2009			X			2.83	0.800					
Sediment (mg/kg) - Basin 0-2, 2-4, 4-8 and 0-12 in	2008, 2009		X		57.8		0.00765		8.29	1.09	1.16	X	
Sediment (mg/kg) - Basin 0-2, 2-4, 4-8 and 0-12 in	2008, 2009			X	53.8		0.00853		8.29	1.49	1.57	X	
Sediment (mg/kg) - Basin Depths Starting at 0	2008, 2009		X		57.5		0.00767		8.29	1.09	1.16	X	
Sediment (mg/kg) - Basin Depths Starting at 0	2008, 2009			X	53.8		0.00736		8.29	1.49	1.57	X	
Sediment (mg/kg) - Basin Average 0-2, 2-4, 4-8 and 0-12 in	2008, 2009		X		53.4		0.00762		8.29	1.09	1.16	X	
Sediment (mg/kg) - Basin Average 0-2, 2-4, 4-8 and 0-12 in	2008, 2009			X	51.0		0.00728		8.29	1.49	1.57	X	
Sediment (mg/kg) - Basin Average Depths Starting at 0	2008, 2009		X		51.7		0.00737		8.29	1.09	1.16	X	
Sediment (mg/kg) - Basin Average Depths Starting at 0	2008, 2009			X	48.8		0.00712		8.29	1.49	1.57	X	
Sediment (mg/kg) - Basin 0-2, 2-4, 4-8 and 0-12 in	1991, 1994, 2001, 2006, 2008, 2009		X		63.8		0.00745		26.4	4.16	7.39	X	
Sediment (mg/kg) - Basin 0-2, 2-4, 4-8 and 0-12 in	1991, 1994, 2001, 2006, 2008, 2009			X	57.5		0.00719		23.0	17.7	18.7	X	
Sediment (mg/kg) - Basin Depths Starting at 0 in	1991, 1994, 2001, 2006, 2008, 2009		X		62.9		0.00745		26.4	4.16	7.39	X	
Sediment (mg/kg) - Basin Depths Starting at 0 in	1991, 1994, 2001, 2006, 2008, 2009			X	57.9		0.00724		23.0	17.7	18.7	X	
Sediment (mg/kg)- Basin Average 0-2, 2-4, 4-8 and 0-12 in	1991, 1994, 2001, 2006, 2008, 2009		X		70.7		0.00722		26.4	4.16	7.39	X	
Sediment (mg/kg) - Basin Average 0-2, 2-4, 4-8 and 0-12 in	1991, 1994, 2001, 2006, 2008, 2009			X	64.2		0.00693		23.0	17.7	18.7	X	
Sediment (mg/kg) - Basin Average Depths Starting at 0	1991, 1994, 2001, 2006, 2008, 2009		X		70.5		0.00709		26.4	4.16	7.39	X	
Sediment (mg/kg) - Basin Average Depths Starting at 0	1991, 1994, 2001, 2006, 2008, 2009			X	63.3		0.00682		23.0	17.7	18.7	X	
Sediment (mg/kg) - Round Pond[a] 0-2, 2-4, 4-8 and 0-12 in	2008, 2009	X			22.8		0.00532			0.222[f]	0.226[f]	X	
Sediment (mg/kg) - Round Pond Depths Starting at 0 in	2008, 2009	X			23.5		0.00561			0.222[f]	0.226[f]	X	
Sediment (mg/kg) - Round Pond Average 0-2, 2-4, 4-8 and 0-12 in	2008, 2009	X			20.5		0.00715[f]			0.222[f]	0.226[f]		
Sediment (mg/kg) - Round Pond Average Depths Starting at 0 in	2008, 2009	X			21.6		0.00715[f]			0.222[f]	0.226[f]		
Sediment (mg/kg) - Round Pond 0-2, 2-4, 4-8 and 0-12 in	1991, 1994, 2001, 2006, 2008, 2009	X			20.5		0.00633		1.19	70.1	70.1	X	
Sediment (mg/kg) - Round Pond Depths Starting at 0 in	1991, 1994, 2001, 2006, 2008, 2009	X			20.6		0.00661		1.19	70.1	70.1	X	
Sediment (mg/kg) - Round Pond Average 0-2, 2-4, 4-8 and 0-12 in	1991, 1994, 2001, 2006, 2008, 2009	X			21.0		0.00750[f]		1.19	70.1	70.1		
Sediment (mg/kg) - Round Pond Average Depths Starting at 0 in	1991, 1994, 2001, 2006, 2008, 2009	X			21.2		0.00750[f]		1.19	70.1	70.1		
Floodplain Soil (mg/kg) - Basin 0-1 in.	2010		X		1.9		0.0051		0.19		1.2	X	
Floodplain Soil (mg/kg) - Basin 0-1 in.	2010			X	2.0		0.0051		0.38		1.4	X	
Floodplain Soil (mg/kg) - 0-6 in., 0-1 in.	1992, 1994, 2010		X		8.1		0.0051		0.39		80.6	X	
Floodplain Soil (mg/kg) - 0-6 in., 0-1 in.	1992, 2010			X	3.0		0.0051		1.7		1.4	X	

Notes:
Concentrations used as exposure point concentrations in the ecological risk assessment are highlighted in green.
DDTR - The sum of 2,4' and 4,4'-isomers of DDT, DDD, and DDE
DL - detection limit
ft - feet
HCB - hexachlorobenzene
in - inches
LMB - largemouth bass
MeHg - methylmercury
mg/kg - milligram per kilogram
ND - non-detect
ng/L - nanogram per liter
UCL - upper confidence limit
ww - wet weight

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CHECKED BY/DATE: NSR 3/29/11

[a]Includes two Round Pond samples

[b]Maximum concentration for spider mercury

[c]Spider DDTR is based on one 1995 DDTr sample multiplied by 1.97 (a factor based on the sediment ratio of 2,4 to 4,4 DDT, DDE and DDD isomers).

[d]Maximum whole body concentrations

[e]LMB whole body DDTR for 2008 is based on 2001 filet DDTR multiplied by 1.35 as recommended by the EPA (Lecich, 1998).

[f]Insufficient number of detected samples for accurate UCL, maximum detected concentration used.

[h]Forage fish include bluegill and silverside samples from 2008.

[i]The calculated exposure point concentration (UCL) exceedes the maximum detected concentration due to a detection limit of 200 ng/L in 1991 samples thus the maximum detected concentration was used.
Basin average UCL values include individual samples as well as an average of samples with a North, East, South, West and Center designation and a weighted average of core samples.

[j]All samples collected were non-detect for this constituent. Media concentration estimated as 1/2 the detection limit.

TABLE 8-6

TOXICITY REFERENCE VALUES
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

	AVIAN			MAMMALIAN (AQUATIC)			MAMMALIAN (TERRES.)			REPTILE		
Toxicant	NOAEL (mg/kg·day)	LOAEL (mg/kg·day)	Source	NOAEL (mg/kg·day)	LOAEL (mg/kg·day)	Source	NOAEL (mg/kg·day)	LOAEL (mg/kg·day)	Source	NOAEL (mg/kg·day)	LOAEL (mg/kg·day)	Source
Methylmercury	0.06	0.06	a, b	0.075	0.15	e	0.075	0.15	e	5	5	f
Mercury	0.45	0.9	c	0.37	0.37	g	0.37	0.37	g	5	5	f
DDTR	0.227	0.281	d	0.147	0.274	d	0.147	0.274	d	3.7	3.7	f
HCB	2.25	2.25	h	0.137	0.137	i	3.2	3.2	j	NA	NA	k

Notes:

(a) Spalding, M. G., P. C. Frederick, H. C. McGill, S. N. Bouton and L. R. McDowell. 2000a. Methylmercury accumulation in tissues and its effects on growth and appetite in captive great egrets. J. Wild. Dis. 36(3): 411-422.

(b) Spalding, M. G., P. C. Frederick, H. C. McGill, S. N. Bouton, L. J. Richey, I. M. Schumacher, C. G. Blackmore and J. Harrison. 2000b. Histologic, neurologic, and immunologic effects of methylmercury in captive great egrets. J. Wild. Dis. 36(3): 423-435.

(c) Hill, E. F., and C. S. Schaffner. 1976. Sexual maturity and productivity of Japanese quail fed graded concentrations of mercuric chloride. Poult. Sci. 55: 1449-1459.

(d) EPA. 2007. Ecological Soil Screening Levels for DDT and Metabolites. OSWER Directive 9285.7-57. US EPA Office of Solid Waste and Emergency Response. Washington D.C. April 2007.

(e) Dansereau, M., N. Lariviere, D. Du Tremblay and D. Belanger (1999). Reproductive performance of two generations of female semidomesticated mink fed diets.

(f) Hall, R.J. 1980. Effects of Environmental contaminants on reptiles: a review. U.S. Fish and Wildlife Service. Special Scientific Report-Wildlife No. 228. Previously used in 1995 ERA for McIntosh Site.

(g) Atkinson, A.; Thompson, S.J.; Khan, A.T.; Graham, T.C.; Ali, S.; Shannon, C.; Clarke, O.; and L. Upchurch. 2001. Assessment of a two-generation reproductive and fertility study of mercuric chloride in rats. Food and Chemical Toxicology 39: 73-84.

(h) Vos et.al., 1971. Toxcicity of hexachlorobenzene in Japanese quail with special reference to porphyria, liver damage, reproduction, and tissue residues. Toxicology and Applied Pharmacology 18:944-957. Previously used in 1995 ERA for McIntosh Site.

(i) Bleavens et al., 1984. Effects of chronic dietary hexachlorobenzene on the reproductive preformance and survivability of mink and European ferrets. Archives of Environmental Contamination and Toxicology 13:357-365. Previously used in 1995 ERA for McIntosh Site.

(j) Grant et al., 1977. Effects of hexachorobenzene on reproduction in the rat. Archives of Environmental Contamination and Toxicology 5:207-216. Previously used in 1995 ERA for McIntosh Site.

(k) No data available for HCB toxicity to alligators

NOAEL No Observable Adverse Effects Level
LOAEL Lowest Observable Adverse Effects Level
(mg/kg·da milligrams per kilogram per day
NA Not Available

PREPARED BY: MKB 4/29/10
CHECKED BY: LSV 5/02/10

TABLE 8-7

LITTLE BROWN BAT EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS (a)
Little Brown Bat	Order: *Chiroptera* Family: *Vespertilionidae* Genus: *Myotis* Species: *Myotis lucifugus*	
Body Weight (BW)(kg)	Average adult weight is 0.0075 kg (Gould, 1955), but ranges from 0.004 kg to 0.008 kg (Menzel *et al.*, 2003). Females are typically slightly larger than males.	0.0075 kg
Dietary Makeup	Little brown bats are opportunistic feeders, primarily feeding on emergent aquatic insects (Belwood and Fenton, 1976; Fenton and Bell, 1979). Little brown bats feed low over the water at margins of lakes, streams and ponds, as well as along forest edges.	Insects – 100% (Flying Insects)
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (All Mammals) for fresh matter intake in Nagy 2001 (b). $IR_F = 0.794 \times BW(g)^{0.773} \times 1.00\ E^{-3}$	0.00377 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.503 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is calculated using the average adult BW of 0.0075 kg and the water ingestion rate (WIR) formula presented in Sample and Suter (1994): $WIR = 0.099(BW)^{0.90}$.	0.0012 L/day
Home Range	The home range of little brown bats is poorly understood. One study conducted on pregnant and lactating females reported a home range of 43 acres for lactating females to 74 acres for pregnant females (Henry *et al.*, 2002). They prefer roosts near water and have an average home range of 12km of shoreline.	12 km of shoreline
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. Based on the home range of 12 km and the available OU-2 shoreline of approximately 2.2 km at the Basin and 0.50 km at Round Pond, a value of 0.22 is used.	0.22

TABLE 8-7

LITTLE BROWN BAT EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds*. Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{I\text{-}FI} \times FR_{FI}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Normalized (body weight) food ingestion rate (kg/day)
AUF	=	Area Use Factor (unitless)
$C_{I\text{-}FI}$	=	Chemical Concentration in Flying Insect Prey collected in October 2010 (mg/kg)
FR_{FI}	=	Fraction of Flying Insect Prey in diet of receptor (unitless)
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

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TABLE 8-8

RIVER OTTER EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
River Otter	Order: *Carnivora* Family: *Mustelidae* Genus: *Lutra* Species*: canadensis*	
Body Weight (BW)(kg)	The average adult male weights 8.13 kg and the average adult female weighs 6.73 kg (Alabama/Georgia). The average adult body weight is 7.4 kg.	7.4 kg
Dietary Makeup	A river otter's primary dietary component is fish; however, they will feed on other prey items depending on availability and ease of capture. The will probe the bottom of ponds in search of invertebrates when necessary. Additional dietary components include amphibians, reptiles, birds, and small mammals when necessary (Illinois/Mississippi River).	Forage Fish – 75% Predatory Fish – 10% Crayfish – 5% Amphibians – 10%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivora) for fresh matter intake in Nagy 2001 (b). $IR_F = 0.348 \times BW(g)^{0.859} \times 1.00\ E^{-3}$	0.733 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.099 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	The estimated mean water ingestion rate for adult river otters (0.081 g water/ g BW/day) and average adult BW of 7.4 kg were used to estimate the Water Ingestion Rate: (0.081 g water/g BW/day x 7,400 g BW x 1.04E-03 L/day = 0.62 L/day).	0.62 L/day
Home Range	The average adult male home range is 400 hectares (ha) and the average adult female is 295 ha (southeast Texas/coastal marsh). The adult average home range is approximately 870 acres, though they have smaller distinct "activity centers" within their home ranges.	870 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The area of OU 2 open water habitat (78 acres), divided by the average adult home range of 870 acres, is approximately 0.09.	0.09

TABLE 8-8

RIVER OTTER EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{PF} \times FR_{PF}) + (C_{FF} \times FR_{FF}) + (C_{AM} \times FR_{AM}) + (C_{CR} \times FR_{CR}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Ingestion rate of food (kg/day)
AUF	=	Area Use Factor (unitless)
C_{AM}	=	Chemical Concentration in Amphibian Prey (mg/kg)
FR_{AM}	=	Fraction of Amphibian prey in diet of receptor, unitless
C_{CR}	=	Chemical Concentration in Crayfish Prey (mg/kg)
FR_{CR}	=	Fraction of Crayfish prey in diet of receptor, unitless
C_{PF}	=	Chemical Concentration in Predatory Fish Prey (mg/kg)
FR_{PF}	=	Fraction of Predatory Fish prey in diet of receptor, unitless
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish prey in diet of receptor, unitless
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR, unitless
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

PREPARED BY/DATE: CMB 04/19/10
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TABLE 8-9

MINK EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER (a)	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Mink	Order: *Carnivora* Family: *Mustelidae* Genus: *Mustela* Species: *vison*	
Body Weight (BW)(kg)	Males weigh markedly more than females. Adult body weights can range from an average of 0.55 kg (female, summer) to an average of 1.734 kg (male, spring).	0.85 kg
Dietary Makeup	Mink are primarily nocturnal hunters, although can be opportunistic to feed during the day time. Shorelines and emergent vegetation proved optimal hunting ground for the mink. Mammals comprise the majority of the mink's diet, though they also consume crustaceans, amphibians, fish, birds, reptiles, and insects.	Vertebrates – 40% Frogs – 25% Crayfish – 10% Predatory Fish – 20% Forage Fish – 5%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivora) for fresh matter intake in Nagy 2001 (b). $IR_F = 0.348 \times BW(g)^{0.859} \times 1.00\ E^{-3}$	0.1145 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.1344 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	The estimated mean water ingestion rate for adult mink (0.10 g water/ g BW/day) and average adult BW of 0.85 kg were used to estimate the Water Ingestion Rate: (0.10 g water/g BW/day x 850 g BW x 1.04E-03 L/day = 0.71 L/day) (a).	0.71 L/day
Home Range	The home range of mink includes their foraging areas around waterways and their dens. Riverine home ranges are linear and depend on food abundance. The home range of adult male mink range from 1.8 km to 5.0 km with an average of 2.63 km (Sweden, stream); whereas female home range tends to be less and averages 1.85 km (Sweden, stream).	2.15 km of shoreline
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The area of OU 2 Basin (2.2 km), divided by the average adult home range of 2.15km, is approximately 1.0.	1.0

TABLE 8-9

MINK EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds*. Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{VP} \times P_{VP}) + (C_{AM} \times P_{AM}) + (C_{CR} \times P_{CR}) + (C_{PF} \times P_{PF}) + (C_{FF} \times P_{FF}) + (C_{SED/SOIL} \times P_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Ingestion rate of food (kg/day)
AUF	=	Area Use Factor (unitless)
C_{VP}	=	Chemical Concentration in Vertebrate Prey (mg/kg)
P_{VP}	=	Percentage of vertebrate prey in diet of receptor, unitless
C_{AM}	=	Chemical Concentration in Amphibian Prey (mg/kg)
P_{AM}	=	Percentage of Amphibian prey in diet of receptor, unitless
C_{CR}	=	Chemical Concentration in Crayfish Prey (mg/kg)
P_{CR}	=	Percentage of Crayfish prey in diet of receptor, unitless
C_{PF}	=	Chemical Concentration in Predatory Fish Prey (mg/kg)
P_{PF}	=	Percentage of Predatory Fish prey in diet of receptor, unitless
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
P_{FF}	=	Percentage of Forage Fish prey in diet of receptor, unitless
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$P_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR, unitless
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

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TABLE 8-10

PIED-BILLED GREBE EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Pied-Billed Grebe	Order: *Podicipediformes* Family: *Podicipedidae* Genus: *Podilymbus* Species: *podiceps*	
Body Weight (BW)(kg)	Average adult weight is 0.417 kg.	0.417 kg
Dietary Makeup	The pie-billed grebe feeds primarily on fish, crustaceans, and aquatic insects. They typically feed by diving underwater, whether in open water or amongst vegetation.	Aquatic Insects – 60% Forage Fish – 20% Crayfish – 20%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivorous bird) for fresh matter intake presented in Nagy 2001. $IR_F = 3.048 \times BW(g)^{0.665}$ (b)	0.168 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.4039 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Based on the allometric equation in Wildlife Exposure Factors Handbook (c) for all birds: $0.059 \times BW(kg)^{0.67}$	0.0328 L/day
Home Range	The average home range for male and female, adults and juveniles is 3.275 acres.	3.275 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. Based on the available habitat at the OU-2 Basin and the average home range of the pie-billed grebe, the AUF is 1.	1

TABLE 8-10

PIED-BILLED GREBE EXPOSURE PARAMETERS
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993).
(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{AI} \times FR_{AI}) + (C_{CR} \times FR_{CR}) + (C_{FF} \times FR_{FF}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Ingestion rate of food (kg/day)
AUF	=	Area Use Factor (unitless)
C_{AI}	=	Chemical Concentration in Aquatic Insect Prey (mg/kg)
FR_{AI}	=	Fraction of Aquatic Insect prey in diet of receptor, unitless
C_{CR}	=	Chemical Concentration in Crayfish Prey (mg/kg)
FR_{CR}	=	Fraction of Crayfish prey in diet of receptor, unitless
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish prey in diet of receptor, unitless
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR, unitless
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

PREPARED/DATE: CMB 4/22/10
CHECKED/DATE: MKB 5/3/10

TABLE 8-11a

BELTED KINGFISHER EXPOSURE PARAMETERS – MAXIMUM EXPOSURE SCENARIO
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Belted Kingfisher	Order: *Carciiformes* Family: *Alcedinidae* Genus: *Ceryle* Species*: alcyon*	
Body Weight (BW)(kg)	Males and females are close in body weight; females weighing slightly more. Average weight is 0.15 kg, but ranges from 0.13 to 0.21 kg (Pennsylvania).	0.15 kg
Dietary Makeup	For the maximum exposure scenario, the belted kingfisher's diet is assumed to be comprised entirely of forage fish that are caught by diving. Kingfishers feed on fish that swim near the surface or in shallow water, usually within the upper 12-15 cm of the water column.	Forage Fish – 100%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivorous Birds) for fresh matter intake in Nagy 2001 (b). $IR_F = 3.048 \times BW(g)^{0.665} \times 1.00\ E^{-3}$	0.086 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.566 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is estimated using the average BW of 0.15 kg and 0.11g/g-day water ingestion rate: (0.11g water/g BW/day x 150 g x 1.04E-03 L/day = 0.017 L/day).	0.017 L/day
Home Range	Throughout the spring and summer, both male and female will defend a territory that includes their nest site and their foraging area. Territory size averages approximately 1.6 km. Kingfishers are year-round residents of Alabama, and winter populations are augmented by northern migrants.	1.6 km of shoreline
Area Use Frequency (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The site does not have available habitat for kingfisher nesting. Therefore, the most likely nesting site for kingfishers in the area is the banks of the Tombigbee River. As a conservative measure, an AUF of 1.0 is used for the maximum exposure scenario.	1.0

TABLE 8-11a

BELTED KINGFISHER EXPOSURE PARAMETERS – MAXIMUM EXPOSURE SCENARIO
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds*. Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{FF} \times FR_{FF}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg-day)
NFIR	=	Normalized (body-weight) food ingestion rate (kg/day)
AUF	=	Area Use Factor (unitless)
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish Prey in diet of receptor (unitless)
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg-day = milligrams per kilogram per day

PREPARED BY/DATE: MKB 3/24/11
CHECKED BY/DATE: NSR 3/28/11

TABLE 8-11b

BELTED KINGFISHER EXPOSURE PARAMETERS – CENTRAL TENDENCY EXPOSURE SCENARIO
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Belted Kingfisher	Order: *Carciiformes* Family: *Alcedinidae* Genus: *Ceryle* Species*: alcyon*	
Body Weight (BW)(kg)	Males and females are close in body weight; females weighing slightly more. Average weight is 0.15 kg, but ranges from 0.13 to 0.21 kg (Pennsylvania).	0.15 kg
Dietary Makeup	For the central tendency exposure scenario, the belted kingfisher's diet is assumed to be primarily comprised of forage fish that are caught by diving, as well as other prey items including crayfish, amphibians, and insects. Kingfishers feed on fish that swim near the surface or in shallow water, usually within the upper 12-15 cm of the water column.	Forage Fish – 51% Crayfish – 5% Amphibians – 25% Aquatic Insects – 19%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivorous Birds) for fresh matter intake in Nagy 2001 (b). $IR_F = 3.048 \times BW(g)^{0.665} \times 1.00\ E^{-3}$	0.086 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.566 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is estimated using the average BW of 0.15 kg and 0.11g/g-day water ingestion rate: (0.11g water/g BW/day x 150 g x 1.04E-03 L/day = 0.017 L/day).	0.017 L/day
Home Range	Throughout the spring and summer, both male and female will defend a territory that includes their nest site and their foraging area. Territory size averages approximately 1.6 km. Kingfishers are year-round residents of Alabama, and winter populations are augmented by northern migrants.	1.6 km of shoreline
Area Use Frequency (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The site does not have available habitat for kingfisher nesting. Therefore, the most likely nesting site for kingfishers in the area is the banks of the Tombigbee River. An AUF of 0.5 is used for the central tendency exposure scenario based on the lack of available habitat for kingfisher nesting in OU-2.	0.5

TABLE 8-11b

BELTED KINGFISHER EXPOSURE PARAMETERS – CENTRAL TENDENCY EXPOSURE SCENARIO
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{FF} \times FR_{FF}) + (C_{AI} \times FR_{AI}) + (C_{AM} \times FR_{AM}) + (C_{CR} \times FR_{CR}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg-day)
NFIR	=	Normalized (body-weight) food ingestion rate (kg/day)
AUF	=	Area Use Factor (unitless)
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish Prey in diet of receptor (unitless)
C_{AI}	=	Chemical Concentration in Aquatic Insect Prey (mg/kg)
FR_{AI}	=	Fraction of Aquatic Insect Prey in diet of receptor (unitless)
C_{AM}	=	Chemical Concentration in Amphibian Prey (mg/kg)
FR_{AM}	=	Fraction of Amphibian Prey in diet of receptor (unitless)
C_{CR}	=	Chemical Concentration in Crayfish Prey (mg/kg)
FR_{CR}	=	Fraction of Crayfish Prey in diet of receptor (unitless)
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg-day = milligrams per kilogram per day

PREPARED BY/DATE: MKB 3/24/11
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TABLE 8-12

LITTLE BLUE HERON EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Little Blue Heron	Order: *Ciconiformes* Family: *Ardeidae* Genus: *Egretta* Species*: caerula*	
Body Weight (BW)(kg)	Average adult weight ranges from 296 g to 412 g (www.allaboutbirds.org).	0.34 kg
Dietary Makeup	Herons feed primarily during daytime, by wading out to water, then remaining still to jab at prey. They generally consume fish and aquatic invertebrates, though at some times, amphibians (Terres, 1990; Riegner, 1998).	Forage Fish – 75% Aquatic insects – 25%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivorous Birds) for fresh matter intake in Nagy 2001 (b). $IR_F = 3.048 \times BW(g)^{0.665} \times 1.00\ E^{-3}$	0.147 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.432 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is calculated using the average adult BW of 0.34 kg and an estimated mean ingestion rate of 0.045 g water/g BW/day: (0.045 g water/g BW/day x 340 g BW x 1.04E-03 L/day = 0.16 L/day).	0.16 L/day
Home Range	.Little blue herons can be found in swamps, estuaries, nearby river, ponds, and lakes.	2.9 km
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The total shoreline for the Basin is approximately 2.6 km, which is slightly larger than the average home range (2.6 km).	0.9

TABLE 8-12

LITTLE BLUE HERON EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{AI} \times FR_{AI}) + (C_{FF} \times FR_{FF}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Ingestion rate of food (kg/day)
AUF	=	Area Use Factor (unitless)
C_{AI}	=	Chemical Concentration in Aquatic Insect Prey (mg/kg)
FR_{AI}	=	Fraction of Aquatic Insect prey in diet of receptor, unitless
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish prey in diet of receptor, unitless
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR, unitless
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

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TABLE 8-13

GREAT BLUE HERON EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Great Blue Heron	Order: *Ciconiiformes* Family: *Ardeidae* Genus: *Ardea* Species*: herodias*	
Body Weight (BW)(kg)	The average adult body weight for males and females is 2.22 kg, but ranges from 1.47 kg to 2.99 kg in eastern North America.	2.2 kg
Dietary Makeup	Great blue herons fish in shallow water (up to 1.5 feet deep). Great Blue Herons prefer fish, but will also feed on amphibians and aquatic insects, as well as reptiles, crustaceans, birds, and small mammals (lower Michigan/river). They use two techniques to fish: standing and waiting for fish to swim within striking distance, or slowly wading to catch more sedentary prey.	Forage Fish – 50% Predatory Fish – 35% Aquatic Insects – 5% Amphibians- 10%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivorous Birds) for fresh matter intake in Nagy 2001 (b). $IR_F = 3.048 \times BW(g)^{0.665} \times 1.00\ E^{-3}$	0.509 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.231 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is calculated using the average adult BW of 2.2 kg and an estimated mean ingestion rate of 0.045 g water/g BW/day: (0.045 g water/g BW/day x 2,229 g BW x 1.04E-03 L/day = 0.10 L/day).	0.10 L/day
Home Range	Breeding colonies are generally close to foraging grounds. The average summer foraging distance to heronries along rivers and streams (based on a South Dakota study) is 3.1 km. The range of foraging grounds to heronries around lakes (Minnesota) is 0 to 4.2 km with an average of 1.8 km.	1.8 km
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The total shoreline for the Basin is approximately 2.2 km, which is larger than the average home range in a lake environment (1.8 km).	1

TABLE 8-13

GREAT BLUE HERON EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds*. Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{AM} \times FR_{AM}) + (C_{AI} \times FR_{AI}) + (C_{PF} \times FR_{PF}) + (C_{FF} \times FR_{FF}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Ingestion rate of food (kg/day)
AUF	=	Area Use Factor (unitless)
C_{AM}	=	Chemical Concentration in Amphibian Prey (mg/kg)
FR_{AM}	=	Fraction of Amphibian prey in diet of receptor, unitless
C_{AI}	=	Chemical Concentration in Aquatic Insect Prey (mg/kg)
FR_{AI}	=	Fraction of Aquatic Insect prey in diet of receptor, unitless
C_{PF}	=	Chemical Concentration in Predatory Fish Prey (mg/kg)
FR_{PF}	=	Fraction of Predatory Fish prey in diet of receptor, unitless
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish prey in diet of receptor, unitless
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR, unitless
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

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TABLE 8-14

WOOD DUCK EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Wood Duck	Order: *Anseriformes* Family: *Anatidae* Genus: *Aix* Species: *Aix sponsa*	
Body Weight (BW)(kg)	Adult male and female weight ranges from 0.454 kg to 0.862 kg (www.allaboutbirds.org).	0.673 kg
Dietary Makeup	Wood ducks feed primarily on vegetation (seeds, acorns, fruits) and invertebrates.	Insects– 25% (Crawling and flying insects; spiders) Terrestrial Vegetation – 75%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Omnivorous Birds) for fresh matter intake in Nagy 2001 (b). $IR_F = 2.094 \times BW(g)^{0.627} \times 1.00\ E^{-3}$	0.12 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.18 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is calculated using the average adult BW of 0.673 kg and an estimated mean ingestion rate of 0.055 g water/g BW/day (using Mallard water ingestion rate as surrogate). (0.055 g water/g BW/day x 673 g BW x 1.04E-03 L/day = 0.039 L/day)	0.039 L/day
Home Range	Wood ducks nest in trees near water, sometimes directly above water, but up to 2 km away as well. They have a home range of approximately 31 acres.	31 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. Based on the available habitat at the OU-2 Basin (open water acreage is 78) and the average home range of the wood duck (31 acres), the AUF is 1.	1

TABLE 8-14

WOOD DUCK EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{I\text{-}ALL} \times FR_I) + (C_{TV} \times FR_{TV}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Normalized (body weight) food ingestion rate (kg/day)
AUF	=	Area Use Factor (unitless)
$C_{I\text{-}ALL}$	=	Chemical Concentration in all Insect Prey (Crawling and Flying Insects and Spiders) collected in October 2010 (mg/kg)
FR_I	=	Fraction of Insect Prey in diet of receptor (unitless)
C_{TV}	=	Chemical Concentration in Terrestrial Vegetation (mg/kg)
FR_{TV}	=	Fraction of Terrestrial Vegetation in diet of receptor (unitless)
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg-day = milligrams per kilogram per day

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TABLE 8-15

AMERICAN ALLIGATOR EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
American Alligator	Order: *Crocodilia* Family: *Crocodylidae* Genus: *Alligator* Species*: mississippiensis*	
Body Weight (BW)(kg)	The estimated mid-point of length of alligators observed within OU-2 is 2.1 meters. Weight/length relationship obtained from Coulson *et al*, 1979 yields a body weight of 50 kg.	50 kg
Dietary Makeup	Fish are the most important dietary component for alligators, followed by reptiles, amphibians, birds, mammals, and invertebrates (Delaney and Abercrombie, 1986). Soil and sediment are included based on professional judgment that some amount of incidental ingestion occurs.	Predatory Fish – 33% Forage Fish – 17% Crayfish – 10% Amphibians- 25% Vertebrate prey – 15%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula for fresh matter intake for all reptiles in Nagy 2001 (b). $IR_F = 0.0333 \times BW(g)^{0.932} \times 1.00\ E^{-3}$	0.798 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.016 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Reptiles seldom drink water, though incidental ingestion is possible. Therefore, an allometric equation has not been developed for reptiles (USEPA, 1993). For the purpose of food chain modeling, no water consumption is assumed.	0 L/day
Home Range	Alligators prefer large, shallow lakes, marshes, ponds, and swamps. Goodwin and Marion (1979) found that the minimum average seasonal home ranges for adult females ranged from 14 acres in the winter to 39 acres in the spring (north-central Florida lake study). Male alligators tended to have a larger home range in the same study, ranging from a minimum average of 22 acres in the winter to a minimum average of 630 acres in the spring.	Minimum range of 14 to 630 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. Because the home range for females (year round) and males (75% of the year) is smaller than or equal to the area of OU 2 (227 acres), a AUF of 1 is appropriate.	1.0

TABLE 8-15

AMERICAN ALLIGATOR EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds*. Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{PF} \times FR_{PF}) + (C_{FF} \times FR_{FF}) + (C_{CR} \times FR_{CR}) + (C_{AM} \times FR_{AM}) + (C_{VP} \times FR_{VP}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Ingestion rate of food (kg/day)
AUF	=	Area Use Factor (unitless)
C_{PF}	=	Chemical Concentration in Predatory Fish Prey (mg/kg)
FR_{PF}	=	Fraction of Predatory Fish prey in diet of receptor, unitless
C_{FF}	=	Chemical Concentration in Forage Fish Prey (mg/kg)
FR_{FF}	=	Fraction of Forage Fish prey in diet of receptor, unitless
C_{CR}	=	Chemical Concentration in Crayfish Prey (mg/kg)
FR_{CR}	=	Fraction of Crayfish prey in diet of receptor, unitless
C_{AM}	=	Chemical Concentration in Amphibian Prey (mg/kg)
FR_{AM}	=	Fraction of Amphibian prey in diet of receptor, unitless
C_{VP}	=	Chemical Concentration in Vertebrate Prey (mg/kg)
FR_{VP}	=	Fraction of vertebrate prey in diet of receptor, unitless
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR, unitless
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

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TABLE 8-16

SHORT-TAILED SHREW EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Short-Tailed Shrew	Order: *Insectivora* Family: *Soricidae* Genus: *Blarina* Species: *blevicauda*	
Body Weight (BW)(kg)	The average body weight for males and females in a summer study (New Hampshire).	0.015 kg
Dietary Makeup	The short-tailed shrew is primarily carnivorous. Diet consists primarily of invertebrates. Small mammals are consumed when invertebrates become less available (New York).	Insects – 100% (Crawling insects and spiders)
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Carnivora) for fresh matter intake in Nagy 2001 (b). $IR_F = 0.348 \times BW(g)^{0.859} \times 1.00\ E^{-3}$	0.0036 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.237 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate of the short-tailed shrew (Illinois/lab) using an average adult BW of 15 grams and an average water ingestion rate of 0.223 g water/g BW/day (0.223 g water/g BW/day x 15 g BW x 1.04E-03 L/day)	0.0035 L/day
Home Range	The average adult home range in a Manitoba tamarack bog or in Michigan bluegrass is slightly less than 1 acre.	0.975 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. As the Basin shoreline is greater than the home range of the shrew, a value of 1 is used.	1 (Maximum exposure scenario)

TABLE 8-16

SHORT-TAILED SHREW EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{I\text{-}S,CI} \times FR_I) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg·day)
NFIR	=	Normalized (body weight) food ingestion rate (kg/day)
AUF	=	Area Use Factor (unitless)
$C_{I\text{-}S,CI}$	=	Chemical Concentration in Insect Prey (Spiders and Crawling Insects) collected in 2010 (mg/kg)
FR_I	=	Fraction of Insect Prey in diet of receptor (unitless)
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

PREPARED BY/DATE:	CMB 04/19/10
CHECKED BY/DATE:	MKB 5/4/10
REVISED BY/DATE:	MKB 3/23/11
CHECKED BY/DATE:	NSR 3/28/11

TABLE 8-17

RACCOON EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Raccoon	Order: *Carnivora* Family: *Procyonidae* Genus: *Procyon* Species*: lotor*	
Body Weight (BW)(kg)	Adult males are typically larger than adult females. The average body weight for adults is 3.99 kg, but ranges up to 8.8 kg (Alabama).	3.99 kg
Dietary Makeup	Raccoons are omnivorous and opportunistic feeders. The proportion of different foods in their diet depends on the location and season.	Insects – 40% (Crawling and flying insects; spiders) Vertebrates – 20% Terrestrial Vegetation – 40%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Omnivorous Mammal) for fresh matter intake in Nagy 2001 (b). $IR_F = 1.346 \times BW(g)^{0.678} \times 1.00\ E^{-3}$	0.372 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.093 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	The Ingestion Rate for Water was estimated using the average BW of 3.99 kg and a mean water ingestion rate of 0.0825 g/g-day. (0.0825 g water/g BW/day x 3,990 g BW x 1.04E-03 L/day = 0.34 L/day)	0.34 L/day
Home Range	Average from Kaufman (1982) used by USEPA in 2002.	270 acres
Area Use Frequency (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. The area of OU 2 floodplains (130 acres) is less than the home range of the raccoon. Therefore, a value of 0.48 was used.	0.48

TABLE 8-17

RACCOON EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{VP} \times FR_{VP}) + (C_{I\text{-}ALL} \times FR_I) + (C_{TV} \times FR_{TV}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

EDD	=	Estimated Daily Dose (mg/kg-day)
NFIR	=	Normalized (body weight) food ingestion rate (kg/day)
AUF	=	Area Use Factor (unitless)
C_{VP}	=	Chemical Concentration in Vertebrate Prey (mg/kg)
FR_{VP}	=	Fraction of Vertebrate Prey in diet of receptor (unitless)
$C_{I\text{-}ALL}$	=	Chemical Concentration in all Insect Prey (Crawling and Flying Insects and Spiders) collected in October 2010 (mg/kg)
FR_I	=	Fraction of Insect Prey in diet of receptor (unitless)
C_{TV}	=	Chemical Concentration in Terrestrial Vegetation (mg/kg)
FR_{TV}	=	Fraction of Terrestrial Vegetation in diet of receptor (unitless)
$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
C_W	=	Chemical concentration in water (mg/L)
IR_W	=	Ingestion rate of water (L/day)
BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg-day = milligrams per kilogram per day

PREPARED BY/DATE:	CMB 04/19/10
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TABLE 8-18

PINE VOLE EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Pine Vole	Order: *Rodentia* Family: *Cricetidae* Genus: *Microtus* Species*: pinetorum*	
Body Weight (BW)(kg)	Females are typically larger than males. Average body weights for males and females range from 21-56 grams.	0.039 kg
Dietary Makeup	Grasses and forbs are the main part of the diet for pine voles that live in orchards, while those that live in deciduous or pine forests have a diet of forbs and seeds. Grasses and forbs are consumed in the summer followed by fruit and seeds in autumn, and bark and roots in the winter. In addition to grasses and forbs, poke berries, wild onions, and wild morning glories are sometimes consumed.	Terrestrial Vegetation – 100%
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (Rodentia) for fresh matter intake presented in Nagy 2001 (b) $IR_F = 0.588 \times BW(g)^{0.864} \times 1.00E^{-3}$	0.014 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.357 kg/kg·day
Ingestion Rate for Water (IR_W) (L/day)	$0.099 \times BW(kg)^{0.90}$ (c)	0.0072 L/day
Home Range	Pine voles can occur in a variety of habitats from deciduous and pine forest to grassy fields. Pine voles spend much of their time in underground burrows and usually have an extensive subsurface trail system (1 to 2 in. deep). The home range is limited to the burrow which varies in size from 0.1-1.6 ha (0.24-4 acres).	2.12 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. As the available OU-2 Basin habitat is greater than the home range of the meadow vole, a value of 1 is appropriate.	1

TABLE 8-18

PINE VOLE EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Species Information from the Virginia Department of Game and Inland Fisheries, *http://www.vafwis.org/fwis*
(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds.* Nutrition Abstracts and Reviews, Series B 71, 21R-31R.
(c) Wildlife Exposure Factors Handbook (WEFH), 1993

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{TV} \times FR_{TV}) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

	EDD	=	Estimated Daily Dose (mg/kg·day)
	NFIR	=	Ingestion rate of food (kg/day)
	AUF	=	Area Use Factor (unitless)
	C_{TV}	=	Chemical concentration in Terrestrial Vegetation (mg/kg)
	FR_{TV}	=	Fraction of Terrestrial Vegetation in diet of receptor, unitless
	$C_{SED/SOIL}$	=	Chemical concentration in sediment/surface soil (mg/kg)
	$FR_{SED/SOIL}$	=	Incidental ingestion as a unitless fraction of the body-weight normalized ingestion rate NFIR in kg (dw) / kg bw / day
	C_W	=	Chemical concentration in water (mg/L)
	IR_W	=	Ingestion rate of water (L/day)
	BW	=	Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

PREPARED/DATE: MKB 4/30/10
CHECKED/DATE: CMB 5/2/10

TABLE 8-19

CAROLINA WREN EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

EXPOSURE PARAMETER	DESCRIPTION (a)	VALUES SELECTED FOR EXPOSURE/RISK CALCULATIONS
Carolina Wren	Order: *Passeriformes* Family: *Troglodytidae* Genus: *Thryothorus* Species*: ludovicianus*	
Body Weight (BW)(kg)	Average adult weight ranges from 0.18 kg to 0.22 kg (www.allaboutbirds.org).	0.02 kg
Dietary Makeup	The wren's diet is mostly comprised of insects. Some plant matter is occasionally consumed. Reportedly grit is ingested, probably to aid in digestion or as a source of inorganic nutrients. The wren generally picks food from the ground, or gleens them foliage, log, branches, etc. (www.natureserve.org)	Insects – 100% (Crawling and flying insects; spiders)
Ingestion Rate for Food (IR_F) (kg/day)	Based on formula (All Birds) for fresh matter intake in Nagy 2001 (b). $IR_F = 2.065 \times BW(g)^{0.689} \times 1.00\ E^{-3}$	0.016 kg/day
BW Normalized Food Ingestion Rate (NFIR)	$NFIR = IR_F/BW$	0.8135 kg/kg-day
Ingestion Rate for Water (IR_W) (L/day)	Water ingestion rate is based on the avian allometric equation: IR_W (L/day) = $0.059(BW^{0.67})$. The average adult BW of 0.02 kg is used to estimate the Ingestion Rate of Water (Pennsylvania).	0.0043 L/day adults
Home Range	The wren is found in a variety of habitats from swamps to forest, however, generally requires dense shrub or brushy cover.	1.75 acres
Area Use Factor (AUF) (unitless)	The AUF is the ratio of the site area to home range, not to exceed a maximum value of 1.0. Carolina wrens do not migrate. Based on the area of OU-2 Basin habitat and the Carolina wren's home range, an AUF of 1 is appropriate.	1.0

TABLE 8-19

CAROLINA WREN EXPOSURE PARAMETERS
ECOLOGICAL RISK ASSESSMENT
Olin-McIntosh
Operable Unit 2
McIntosh, Alabama

Notes:

(a) Wildlife Exposure Factors Handbook (USEPA, 1993)

(b) Nagy, KA. 2001. *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds*. Nutrition Abstracts and Reviews, Series B 71, 21R-31R.

$$EDD\ (mg/kg\text{-}day) = AUF \times NFIR \times [(C_{I\text{-}ALL} \times FR_I) + (C_{SED/SOIL} \times FR_{SED/SOIL})] + \frac{C_W \times IR_W}{BW}$$

Where:

	EDD	= Estimated Daily Dose (mg/kg-day)
	NFIR	= Normalized (body weight) food ingestion rate (kg/day)
	AUF	= Area Use Factor (unitless)
	$C_{I\text{-}ALL}$	= Chemical Concentration in all Insect Prey (Crawling and Flying Insects and Spiders) collected in October 2010 (mg/kg)
	FR_I	= Fraction of Insect Prey in diet of receptor (unitless)
	$C_{SED/SOIL}$	= Chemical concentration in sediment/surface soil (mg/kg)
	$FR_{SED/SOIL}$	= Incidental ingestion as a unitless fraction of the body-weight normalized food ingestion rate (NFIR) (unitless)
	C_W	= Chemical concentration in water (mg/L)
	IR_W	= Ingestion rate of water (L/day)
	BW	= Body weight (kg)

mg/L = milligrams per liter
kg/day = kilograms per day
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
L/day = liters per day
mg/kg·day = milligrams per kilogram per day

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TABLE 8-20

SITE-SPECIFIC SEDIMENT-TO-AQUATIC INSECT BSAFs (Hg & MeHg)

Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

OU-2 Sediment (Hg/MeHg) - 2001[1]					OU-2 Aquatic Insect Tissue (Hg/MeHg) - 2001[1]				
Sample ID	Date	THg (mg/kg)	Hg (99.97% THg) (mg/kg)	MeHg (0.03% THg) (mg/kg)	Sample ID	Date	THg (mg/kg)	Hg (53% THg) (mg/kg)	MeHg (47% THg) (mg/kg)
SE-H2-0901	9/7/2001	26	25.9922	0.0078	AI-1 (0700)-070:	2001	0.12	0.0636	0.0564
SE-H6-0901	9/7/2001	42	41.9874	0.0126	AI-1 (0715)-070:	2001	0.15	0.0795	0.0705
SE-J3-0901	9/7/2001	30	29.991	0.009	AI-1-060101	2001	0.12	0.0636	0.0564
SE-J6-0901	9/7/2001	47	46.9859	0.0141	AI-2 (0800)-070:	2001	0.15	0.0795	0.0705
SE-K4-0901	9/7/2001	9.1	9.09727	0.00273	AI-2 (0815)-070:	2001	0.11	0.0583	0.0517
SE-K5-0901	9/7/2001	18	17.9946	0.0054	AI-2-060101	2001	0.11	0.0583	0.0517
SE-B4-0901	9/8/2001	200	199.94	0.06	AI-3-060101	2001	0.063	0.03339	0.02961
SE-B5-0901	9/8/2001	590	589.823	0.177	AI-4 (0900)-070:	2001	0.07	0.0371	0.0329
SE-C6-0901	9/8/2001	33	32.9901	0.0099	AI-4-060101	2001	0.033	0.01749	0.01551
SE-D10-0901	9/8/2001	330	329.901	0.099	AI-6 (0630)-070:	2001	0.14	0.0742	0.0658
SE-D3-0901	9/8/2001	8.6	8.59742	0.00258	AI-6-060101	2001	0.13	0.0689	0.0611
SE-E2-0901	9/8/2001	4.4	4.39868	0.00132					
SE-E3-0901	9/8/2001	3.4	3.39898	0.00102					
SE-F7-0901	9/8/2001	42	41.9874	0.0126					
SE-FP17-0901	9/8/2001	24	23.9928	0.0072					
SE-G3-0901	9/8/2001	4.3	4.29871	0.00129					
SE-H4-0901	9/8/2001	37	36.9889	0.0111					
SE-H8-0901	9/8/2001	44	43.9868	0.0132					
SE-I10-0901	9/8/2001	32	31.9904	0.0096					
SE-C-E2-100101-01	10/1/2001	47	46.9859	0.0141					
SE-C-I10-100101-01	10/1/2001	56	55.9832	0.0168					
SE-C-I7-100101-01	10/1/2001	68	67.9796	0.0204					
SE-C-E2-100201-08	10/2/2001	34	33.9898	0.0102					
SE-R1-101101-01	10/4/2001	18	17.9946	0.0054					
SE-R1-101101-02	10/4/2001	28	27.9916	0.0084					
SE-R1-101101-03	10/4/2001	27	26.9919	0.0081					
SE-R2-101101-01	10/4/2001	12	11.9964	0.0036					
SE-R2-101101-02	10/4/2001	16	15.9952	0.0048					
SE-R2-101101-03	10/4/2001	15	14.9955	0.0045					
SE-R7-101101-01	10/4/2001	18	17.9946	0.0054					
SE-R7-101101-02	10/4/2001	25	24.9925	0.0075					
SE-R7-101101-03	10/4/2001	20	19.994	0.006					
SE-B10-101101-01	10/11/2001	41	40.9877	0.0123					
SE-B10-101101-03	10/11/2001	52	51.9844	0.0156					
SE-B10-101101-04	10/11/2001	86	85.9742	0.0258					
SE-B10-101101-05	10/11/2001	93	92.9721	0.0279					
SE-B10-101101-06	10/11/2001	32	31.9904	0.0096					
SE-B1-101101-01	10/11/2001	91	90.9727	0.0273					
SE-B1-101101-02	10/11/2001	67	66.9799	0.0201					
SE-B1-101101-03	10/11/2001	78	77.9766	0.0234					
SE-B2-101101-01	10/11/2001	130	129.961	0.039					
SE-B2-101101-02	10/11/2001	150	149.955	0.045					
SE-B2-101101-03	10/11/2001	110	109.967	0.033					
SE-B3-101101-01	10/11/2001	140	139.958	0.042					
SE-B3-101101-02	10/11/2001	93	92.9721	0.0279					
SE-B3-101101-03	10/11/2001	96	95.9712	0.0288					
SE-B4-101101-01	10/11/2001	110	109.967	0.033					
SE-B4-101101-02	10/11/2001	110	109.967	0.033					
SE-B4-101101-03	10/11/2001	130	129.961	0.039					
SE-B5-101101-01	10/11/2001	36	35.9892	0.0108					
SE-B5-101101-02	10/11/2001	51	50.9847	0.0153					
SE-B5-101101-03	10/11/2001	43	42.9871	0.0129					
SE-B6-101101-01	10/11/2001	25	24.9925	0.0075					
SE-B6-101101-02	10/11/2001	24	23.9928	0.0072					
SE-B6-101101-03	10/11/2001	27	26.9919	0.0081					
SE-B6-101101-04	10/11/2001	22	21.9934	0.0066					
SE-B6-101101-05	10/11/2001	21	20.9937	0.0063					
SE-B6-101101-06	10/11/2001	22	21.9934	0.0066					
AVE=			**64.98**	**0.019**	**AVE =**			**0.058**	**0.051**
BSAF=								**0.0009**	**2.6**

Notes:

(1) 1/2 the detection limit used for non-detected samples.

BSAF Biota-sediment accumulation factor
Equal to Ave. Tissue Concentration/Average Sediment Concentraton

PREPARED BY: MKB 5/5/10
CHECKED BY: EFC 5/6/10
REVISED BY: MKB 4/4/11
CHECKED BY: NSR 4/4/11

TABLE 8-21

SITE-SPECIFIC SEDIMENT-TO-AQUATIC INSECT BSAF (DDTR)
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

OU-2 Sediment (DDTR) - 2001[1]		Sediment Concentration (mg/kg)	TOC (mg/kg)	FOC	OU-2 Aquatic Insect Tissue (DDTR) - 2001[1]		Tissue Concentration (mg/kg)	Fraction Lipid
SE-H2-0901	9/7/2001	1.821	28000	0.028	AI-1 (0700)-070201	2001	11.026	0.051
SE-H6-0901	9/7/2001	0.737	12000	0.012	AI-1 (0715)-070201	2001	10.71	0.0528
SE-J3-0901	9/7/2001	1.696	11000	0.011	AI-1-060101	2001	11.06	0.0466
SE-J6-0901	9/7/2001	1.078	15000	0.015	AI-2 (0800)-070201	2001	4.43	0.0499
SE-K4-0901	9/7/2001	3.48	7300	0.0073	AI-2 (0815)-070201	2001	4.186	0.038
SE-K5-0901	9/7/2001	1.24	10000	0.01	AI-2-060101	2001	5.1	0.0417
SE-B4-0901	9/8/2001	0.411	17000	0.017	AI-6 -060101	2001	12.74	0.0369
SE-B5-0901	9/8/2001	1.69	9400	0.0094	AI-6 (0630)-070201	2001	8.74	0.044
SE-C6-0901	9/8/2001	0.697	20000	0.02	AI-4 (0900)-070201	2001	13.092	0.0537
SE-D10-0901	9/8/2001	1.185	29000	0.029	AI-4-060101	2001	17.69	0.0519
SE-D3-0901	9/8/2001	0.732	10000	0.01	AI-3-060101	2001	27.3	0.0436
SE-E2-0901	9/8/2001	0.082	3000	0.003				
SE-E3-0901	9/8/2001	0.159	2600	0.0026				
SE-F7-0901	9/8/2001	0.684	23000	0.023				
SE-FP17-0901	9/8/2001	3.36	48000	0.048				
SE-G3-0901	9/8/2001	0.0921	3200	0.0032				
SE-H4-0901	9/8/2001	0.868	14000	0.014				
SE-H8-0901	9/8/2001	0.63	15000	0.015				
SE-I10-0901	9/8/2001	0.635	24000	0.024				
SE-R1-100401-01	10/4/2001	10.12	65000	0.065				
SE-R1-100401-02	10/4/2001	20.54	65000	0.065				
SE-R1-100401-03	10/4/2001	13.7	65000	0.065				
SE-R1-100401-04	10/4/2001	25.94	65000	0.065				
SE-R1-100401-05	10/4/2001	10.18	65000	0.065				
SE-R1-100401-06	10/4/2001	14.43	65000	0.065				
SE-R2-100401-01	10/4/2001	2.341	25000	0.025				
SE-R2-100401-03	10/4/2001	2.225	25000	0.025				
SE-R7-100401-01	10/4/2001	2.82	23000	0.023				
SE-R7-100401-02	10/4/2001	2.73	23000	0.023				
SE-R7-100401-03	10/4/2001	2.202	23000	0.023				
SE-R2-100401-02	10/4/2001	2.97	25000	0.025				
SE-B10-101101-01	10/11/2001	4.45	65000	0.065				
SE-B10-101101-02	10/11/2001	2.37	65000	0.065				
SE-B10-101101-03	10/11/2001	2.27	65000	0.065				
SE-B10-101101-04	10/11/2001	3.71	65000	0.065				
SE-B10-101101-05	10/11/2001	1.96	65000	0.065				
SE-B10-101101-06	10/11/2001	1.57	65000	0.065				
SE-B1-101101-01	10/11/2001	3.21	84000	0.084				
SE-B1-101101-02	10/11/2001	2.54	84000	0.084				
SE-B1-101101-03	10/11/2001	3.15	84000	0.084				
SE-B2-101101-01	10/11/2001	7.5	140000	0.14				
SE-B2-101101-02	10/11/2001	6.14	140000	0.14				
SE-B2-101101-03	10/11/2001	5.16	140000	0.14				
SE-B3-101101-01	10/11/2001	4.04	170000	0.17				
SE-B3-101101-02	10/11/2001	5.18	170000	0.17				
SE-B3-101101-03	10/11/2001	5.09	170000	0.17				
SE-B4-101101-01	10/11/2001	4.55	130000	0.13				
SE-B4-101101-02	10/11/2001	8.86	130000	0.13				
SE-B4-101101-03	10/11/2001	5.98	130000	0.13				
SE-B5-101101-01	10/11/2001	3.28	55000	0.055				
SE-B5-101101-02	10/11/2001	9.06	55000	0.055				
SE-B5-101101-03	10/11/2001	4.86	55000	0.055				
SE-B6-101101-01	10/11/2001	0.77	25000	0.025				
SE-B6-101101-02	10/11/2001	0.76	25000	0.025				
SE-B6-101101-03	10/11/2001	0.57	25000	0.025				
SE-B6-101101-04	10/11/2001	0.7	25000	0.025				
SE-B6-101101-05	10/11/2001	1.14	25000	0.025				
SE-B6-101101-06	10/11/2001	0.7	25000	0.025				
AVE =		**3.98**	**53664**	**0.054**	**AVE =**		**11.46**	**0.046**
BSAF =								**3.33**

Notes:
(1) 1/2 the detection limit used for non-detected samples.
BSAF Biota-sediment accumulation factor
Equal to Ave. Tissue Concentration/Average Sediment Concentraton

PREPARED BY: MKB 5/5/10
CHECKED BY: EFC 5/6/10
REVISED BY: MKB 4/4/11
CHECKED BY: NSR 4/4/11

TABLE 8-22

SITE-SPECIFIC SEDIMENT-TO-AQUATIC INSECT BSAF (HCB)

OU-2 Sediment (HCB) - 2001[1]					OU-2 Aquatic Insect Tissue (HCB) - 2001[1]			
Sample ID	Date	HCB (mg/kg)	TOC (mg/kg)	FOC	Sample ID	Date	HCB (mg/kg)	Fraction Lipid
SE-H2-0901	9/7/2001	0.9	28000	0.028	AI-1 (0700)-070201	2001	1.4	0.051
SE-H6-0901	9/7/2001	1.2	12000	0.012	AI-1 (0715)-070201	2001	1.2	0.0528
SE-J3-0901	9/7/2001	0.29	11000	0.011	AI-1-060101	2001	2.1	0.0466
SE-J6-0901	9/7/2001	0.12	15000	0.015	AI-2 (0800)-070201	2001	0.54	0.0499
SE-K4-0901	9/7/2001	0.14	7300	0.0073	AI-2 (0815)-070201	2001	0.24	0.038
SE-K5-0901	9/7/2001	0.1	10000	0.01	AI-2-060101	2001	0.77	0.0417
SE-B4-0901	9/8/2001	0.086	17000	0.017	AI-6 (0915)-070201	2001	0.91	0.0369
SE-B5-0901	9/8/2001	7.9	9400	0.0094	AI-6-060601	2001	3.1	0.044
SE-C6-0901	9/8/2001	0.42	20000	0.02	AI-4 (0900)-070201	2001	0.15	0.0537
SE-D10-0901	9/8/2001	0.38	29000	0.029	AI-4-060101	2001	<0.25	0.0519
SE-D3-0901	9/8/2001	51	10000	0.01	AI-3-060101	2001	<0.25	0.0436
SE-E2-0901	9/8/2001	53	3000	0.003				
SE-E3-0901	9/8/2001	16	2600	0.0026				
SE-F7-0901	9/8/2001	0.23	23000	0.023				
SE-FP17-0901	9/8/2001	0.032	48000	0.048				
SE-G3-0901	9/8/2001	32	3200	0.0032				
SE-H4-0901	9/8/2001	0.7	14000	0.014				
SE-H8-0901	9/8/2001	0.24	15000	0.015				
SE-I10-0901	9/8/2001	0.12	24000	0.024				
SE-R1-100401-01	10/4/2001	0.45	65000	0.065				
SE-R1-100401-02	10/4/2001	0.01	65000	0.065				
SE-R1-100401-03	10/4/2001	0.01	65000	0.065				
SE-R2-100401-01	10/4/2001	0.01	25000	0.025				
SE-R2-100401-02	10/4/2001	0.28	25000	0.025				
SE-R2-100401-03	10/4/2001	2	25000	0.025				
SE-R7-100401-01	10/4/2001	0.01	23000	0.023				
SE-R7-100401-02	10/4/2001	0.01	23000	0.023				
SE-R7-100401-03	10/4/2001	0.01	23000	0.023				
SE-B10-101101-01	10/11/2001	1	65000	0.065				
SE-B10-101101-02	10/11/2001	0.79	65000	0.065				
SE-B10-101101-03	10/11/2001	5.3	65000	0.065				
SE-B10-101101-04	10/11/2001	0.9	65000	0.065				
SE-B10-101101-05	10/11/2001	2.2	65000	0.065				
SE-B10-101101-06	10/11/2001	2	65000	0.065				
SE-B1-101101-01	10/11/2001	15	84000	0.084				
SE-B1-101101-02	10/11/2001	1.4	84000	0.084				
SE-B1-101101-03	10/11/2001	18	84000	0.084				
SE-B2-101101-01	10/11/2001	1.7	140000	0.14				
SE-B2-101101-02	10/11/2001	0.48	140000	0.14				
SE-B2-101101-03	10/11/2001	0.87	140000	0.14				
SE-B3-101101-01	10/11/2001	2.9	170000	0.17				
SE-B3-101101-02	10/11/2001	1.3	170000	0.17				
SE-B3-101101-03	10/11/2001	1.9	170000	0.17				
SE-B4-101101-01	10/11/2001	0.95	130000	0.13				
SE-B4-101101-02	10/11/2001	5.1	130000	0.13				
SE-B4-101101-03	10/11/2001	3.9	130000	0.13				
SE-B5-101101-01	10/11/2001	0.8	55000	0.055				
SE-B5-101101-02	10/11/2001	6.5	55000	0.055				
SE-B5-101101-03	10/11/2001	0.83	55000	0.055				
SE-B6-101101-01	10/11/2001	0.52	25000	0.025				
SE-B6-101101-02	10/11/2001	0.91	25000	0.025				
SE-B6-101101-03	10/11/2001	1.5	25000	0.025				
SE-B6-101101-04	10/11/2001	0.6	25000	0.025				
SE-B6-101101-05	10/11/2001	0.63	25000	0.025				
SE-B6-101101-06	10/11/2001	0.75	25000	0.025				
AVE =		**4.48**	**53045**	**0.053**	**AVE =**		**0.97**	**0.046**
BSAF =								**0.25**

Notes:

(1) 1/2 the detection limit used for non-detected samples.

BSAF Biota-sediment accumulation factor
Equal to Ave. Tissue Concentration/Average Sediment Concentraton

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CHECKED BY: NSR 4/4/11

Table 8-23
1994 Sediment and Little Blue Heron Tissue DDTR Concentrations Used for BSAF Approach

Location	Sample ID	Sample Date		DDTR Sediment Concentration[1] (mg/kg dw)	TOC Concentration (mg/kg)	Sample Depth (inches)
Basin	ODG0101-0694	6/30/94		1.431	4,450	0-6
	ODG0102-0694	6/30/94		1.408		0-6
	ODG0103-0694	6/30/94		2.014		0-6
			Mean	1.62		
	ODG0301-0694	6/30/94		4.748	>16,000	0-6
	ODG0302-0694	6/30/94		5.283		0-6
	ODG0303-0694	6/30/94		6.178		0-6
			Mean	5.40		
Round Pond	ODG0501-0694	6/30/1994		5.86	>16,000	0-6
	ODG0502-0694	6/30/1994		5.99		0-6
	ODG0503-0694	6/30/1994		7.14		0-6
			Mean	6.33		
Reference Area	RDG0201	6/1994		0.00101	>16,000	0-6
	RDG0202	6/1994		0.00501		0-6
	RDG0203	6/1994		0.003465		0-6
	RDG0301	6/1994		0.003165	>16,000	0-6
	RDG0302	6/1994		0.003035		0-6
	RDG0303	6/1994		0.001775		0-6
	RDG0401	6/1994		0.00319	>16,000	0-6
	RDG0402	6/1994		0.00417		0-6
	RDG0403	6/1994		0.00283		0-6
	RDG0601	6/1994		0.00189	9,470	0-6
	RDG0602	6/1994		0.00473		0-6
	RDG0603	6/1994		0.00473		0-6
			Mean	0.00325	14,368	

Location	Sample ID	Sample Date		DDTR Little Blue Heron Tissue Concentration[1] (mg/kg ww)	Percent Lipid Content
Basin	OAFXX01	8/10/1994		1.34	2.7
	OAFXX04	8/10/1994		0.414	3.47
	OAFXX07	8/11/1994		1.997	5.0
	OAFXX08	8/11/1994		16.1	1.75
	OAFXX09	8/11/1994		20.91	4.8
Round Pond	OAFXX02	8/10/1994		25.79	9.74
	OAFXX03	8/10/1994		0.363	4.22
		Mean (Basin and Round Pond)			4.526
Reference Area	RAFXX01	8/13/1994		0.03	3.27
	RAFXX02	8/15/1994		0.147	2.96
			Mean	0.0885	3.115

Notes:

[1] Using half the detection limit for non-detect concentrations.
mg/kg = milligrams per kilogram
dw = dry weight
ww = wet weight
TOC = Total Organic Carbon

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Table 8-24
Summary of Data Used to Obtain BSAF for Predicted 2008-09 Little Blue Heron Tissue DDTR Concentration

1994 Little Blue Heron Sample ID	Nearest 1994 Sediment Sample Location	Location	1994 Little Blue Heron Tissue DDTR Conc.[1] (mg/kg ww)	% Lipid	Fraction Lipids	Normalized Tissue Conc.	Sediment DDTR Conc.[1] (mg/kg	FOC[2]	Normalized Sediment Conc.	DDTR BSAF
OAFXX01	ODG03	Basin	1.34	2.7	0.027	49.63	5.40	0.016	338	
OAFXX02	ODG05	Round Pond	25.79	9.74	0.0974	265	6.33	0.016	396	
OAFXX03	ODG05	Round Pond	0.363	4.22	0.0422	8.60	6.33	0.016	396	
OAFXX04	ODG01	Basin	0.414	3.47	0.0347	11.93	1.62	0.00445	364	
OAFXX07	ODG03	Basin	1.997	5	0.05	39.94	5.40	0.016	338	
OAFXX08	ODG01	Basin	16.1	1.75	0.0175	920	1.62	0.00445	364	
OAFXX09	ODG01	Basin	20.91	4.8	0.048	436	1.62	0.00445	364	
		Average	**9.56**	**4.53**	**0.045**	**247**	**4.05**	**0.011**	**365**	**0.677**

Notes:

[1] Using half the detection limit for non-detect concentrations.

[2] FOC calculated by dividing the total organic carbon (TOC) by 1,000,000.

mg/kg = milligrams per kilogram
dw = dry weight
ww = wet weight
FOC = Fractional Organic Carbon

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Table 8-25a
2008-09 Sediment DDTR Concentrations Used for BSAF Approach

Location	Sample ID	Sample Date		Sediment DDTR Concentration[1] (mg/kg dw)	TOC Concentration (mg/kg)	Sample Depth (inches)
Basin	OU2B-SED-103DC-09	6/6/09		0.318	10,900	0-4
	OU2B-SED-303DC-09	6/7/09		2.71765	7,240	0-4
	OU2B-SED-402C-09	6/7/09		0.0784	12,300	0-4
	OU2B-SED-203DC-09	6/7/09		1.14315	5,740	0-4
	OU2B-SED-402C-08	6/6/08		0.065798	17,100	0-4
	OU2B-SED-203DC-08	6/10/08		0.639068	6,610	0-4
	OU2B-SED-303DC-08	6/10/08		0.518898	6,750	0-4
	OU2B-SED-103DC-08	6/7/08		0.0144	16,900	0-4
Round Pond	OU2R-SED-101DC-08	6/5/08		0.117018	25,500	0-4
	OU2R-SED-101DC-09	6/5/09		0.22585	30,400	0-4
			Mean	0.5838	13,944	
			FOC[2]		0.01394	
Average 2008-09 Organic Carbon-Normalized Sediment DDTR Concentration					**41.9**	

Notes:

[1] Using half the detection limit for non-detect concentrations.

[2] FOC calculated by dividing the mean TOC by 1,000,000.

mg/kg = milligrams per kilogram
dw = dry weight
FOC = Fractional Organic Carbon
TOC = Total Organic Carbon

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CHECKED BY/DATE: NSR 10/28/11

Table 8-25b
Estimated DDTR Tissue Concentrations - Aquatic Insects & Little Blue Heron

Average Lipid normalized DDTR Tissue Concentration (mg/kg)		Organic Carbon-normalized Sediment DDTR Concentration (mg/kg)			Tissue Lipid Fraction		Estimated DDTR Tissue Concentration (mg/kg)	
1	2	3	4	5	6	7	8	9
Aquatic Insect 2001[a]	Little Blue Heron 1994[b]	Sediment 1994[b]	Sediment 2001[a]	Sediment 2008-09[c]	Aquatic Insects 2001[a]	Little Blue Heron 1994[b]	Aquatic Insect 2008-09[d]	Little Blue Heron 2008-09[e]
249	247	365	73.7	41.9	0.046	0.045	6.51	1.28

Notes:
(a) From Table 8-21
(b) From Table 8-24
(c) From Table 8-25a
(d) (Column 1 / Column 4) x Column 5 x Column 6
(e) (Column 2 / Column 3) x Column 5 x Column 7

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TABLE 8-26

EXPOSURE POINT CONCENTRATIONS
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	C_{SW} (mg/L)	C_{SOIL} (mg/kg)	C_{TV} (mg/kg)	C_{SED} (mg/kg)	C_{AV}[a] (mg/kg)	$BSAF_{AI}$[b]	C_{AI}[c] (mg/kg)	$C_{I\text{-}ALL}$ (mg/kg)	C_{CR} (mg/kg)	C_{AM} (mg/kg)	C_{FF} (mg/kg)	C_{PF} (mg/kg)	$C_{VP,T}$ (mg/kg)	$C_{VP,A}$ (mg/kg)	$C_{I\text{-}FI}$ (mg/kg)	$C_{I\text{-}S,CI}$ (mg/kg)
Mercury	1.69E-04	2.0	0.0085	51.0		0.0009	0.0459	0.36	0.0773	0.193	0.0476	0.0954	0.259	0.316	0.71	0.20
Methylmercury	2.74E-06	0.0051	0.0071	0.00728		2.6	0.0189	0.18	0.107	0.104	0.745	1.495	0.701	0.854	0.35	0.098
DDTR	1.35E-04	1.4	0.013	1.57		3.33	6.51	0.36	1.10	1.244	1.57	0.532	0.570	1.28	0.66	0.24
HCB	3.96E-05	0.38	0.0048	8.29		0.25	2.07	0.022	0.516	0.035	0.469	0.708	0.0210	0.286	0.039	0.019

Notes:

(a) Current data not available for this media.

(b) Refer to Tables 8-22 through 8-24 for calculation of BSAFs.

(c) Calculated Aquatic Insect Concentration Based on BSAF: $C_{AI} = C_{SED} \times BSAF_{AI}$; DDTR denormalized as shown in Table 8-25b.

C_{SW} Concentration in Surface Water. Value is the 95UCL of water collected in 2008, 2009

C_{SOIL} Concentration in Floodplain Soil. Value is 95UCL of soil collected in 2010.

$BSAF_{AI}$ Biota-Sediment Accumulation Factor in Aquatic Insects

C_{TV} Concentration in Terrestrial Vegetation. Value is 95UCL of terrestrial vegetation collected in 2010.

C_{SED} Concentration in Sediment. Value is the 95UCL for basin sediment (depths starting at 0) collected in 2008, 2009

C_{AV} Concentration in Aquatic Vegetation

C_{AI} Concentration in Aquatic Insects

$C_{I\text{-}ALL}$ Concentration in All Insects. Value is 95UCL of all insects collected in 2010.

C_{CR} Concentration in Crayfish. Value is the 95UCL of Crayfish data collected in 1994.

C_{AM} Concentration in Amphibians. Value is the 95UCL of Bullfrog data collected in 1994.

C_{FF} Concentration in Forage Fish. Values is the average 95UCL of Bluegill (whole) and Silverside collected in 2008.

C_{PF} Concentration in Predatory Fish. Value is the 95UCL of Largemouth Bass (whole) collected in 2008.

$C_{VP,T}$ Concentration of Vertebrate Prey for terrestrial receptors (Raccoon). Value is the maximum concentration of whole body Raccoon data collected in 1994 due to small sample size.

$C_{VP,A}$ Concentration of Vertebrate Prey for aquatic receptors (Mink & Alligator). Value is the 95UCL of whole body Little Blue Heron data collected in 1994 except for DDTR. Refer to Section 8.8.2 for calculation of DDTR value.

$C_{I\text{-}FI}$ Concentration in Flying Insects only. Value is the maximum flying insect concentration collected in 2010 due to small sample size.

$C_{I\text{-}S,CI}$ Concentration in Spiders and Crawling Insects only. Value is 95UCL of all spiders and crawling insects collected in 2010.

Methylmercury biota data not available:

Methylmercury insect data estimated based on assumption that 49% of total mercury concentration is methylmercury.
Methylmercury crayfish data estimated based on assumption that 58% of total mercury concentration is methylmercury.
Methylmercury amphibian data estimated based on assumption that 35% of total mercury concentration is methylmercury.
Methylmercury fish data estimated based on assumption that 94% of total mercury concentration is methylmercury.
Methylmercury vertebrate prey data estimated based on assumption that 73% of total mercury concentration is methylmercury.

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TABLE 8-27
EXPOSURE PARAMETERS BY ASSESSMENT ENDPOINT
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	BW (kg)	P_{AI} unitless	P_{FF} unitless	P_{PF} unitless	P_{CR} unitless	P_{AM} unitless	P_{VP} unitless	P_{AV} unitless	P_I [(a)] unitless	P_{TV} unitless	P_{Total} unitless	P_S unitless	NFIR kg/kg·day	IR_W L/day	AUF unitless
Little Brown Bat	0.008	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0.503	0.0012	0.22
River Otter	7.4	0%	75%	10%	5%	10%	0%	0%	0%	0%	100%	0%	0.0991	0.62	0.09
Mink	0.852	0%	5%	20%	10%	25%	40%	0%	0%	0%	100%	9.4%	0.134	0.71	1
Pied-Billed Grebe	0.417	60%	20%	0%	20%	0%	0%	0%	0%	0%	100%	3.3%	0.404	0.0328	1
Belted Kingfisher (Maximum Exposure)	0.152	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0.566	0.017	1
Belted Kingfisher (Central Tendency)	0.152	19%	51%	0%	5%	25%	0%	0%	0%	0%	100%	0%	0.566	0.017	0.50
Little Blue Heron	0.34	25%	75%	0%	0%	0%	0%	0%	0%	0%	100%	3.3%	0.432	0.16	0.90
Great Blue Heron	2.2	5%	50%	35%	0%	10%	0%	0%	0%	0%	100%	3.3%	0.231	0.1	1
Wood Duck	0.673	0%	0%	0%	0%	0%	0%	0%	25%	75%	100%	3.3%	0.18	0.039	1
American Alligator	50	0%	17%	33%	10%	25%	15%	0%	0%	0%	100%	2%	0.0160	0	1
Short-tailed Shrew	0.015	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	2%	0.430	0.0035	1
Raccoon	3.99	0%	0%	0%	0%	0%	20%	0%	40%	40%	100%	9.4%	0.0930	0.34	0.48
Pine Vole	0.039	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	2.4%	0.357	0.0072	1
Carolina Wren	0.02	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	10%	0.814	0.0043	1

Notes:

(a) Little brown bat's diet is assumed to be 100% insects. For calculation purposes, diet assumed to be 100% flying insects (P_I).
Short-tailed shrew's diet is assumed to be 100% insects. For calculation purposes, diet assumed to be 100% crawling insects and spiders (P_I).
Raccoon's diet is assumed to contain 40% insects. For calculation purposes, insect diet assumed to consist of crawling and flying insects and spiders (P_I).
Wood duck's diet is assumed to contain 25% insects. For calculation purposes, insect diet assumed to consist of crawling and flying insects and spiders (PI).
Carolina wren's diet is assumed to be 100% insects. For calculation purposes, diet assumed to be 100% crawling and flying insects and spiders (P_I).

BW	Body Weight
P_{AI}	Percent of Diet composed of Aquatic Insects
P_{FF}	Percent of Diet composed of Forage Fish
P_{PF}	Percent of Diet composed of Predatory Fish
P_{CR}	Percent of Diet composed of Crayfish/Aquatic Invertebrates
P_{AM}	Percent of Diet composed of Amphibians
P_{VP}	Percent of Diet composed of Vertebrate Prey
P_{AV}	Percent of Diet composed of Aquatic Vegetation
P_I	Percent of Diet composed of Insects
P_{TV}	Percent of Diet composed of Terrestrial Vegetation
P_S	Proportion of Incidental Soil/Sediment Ingestion
NFIR	Body Weight Normalized Food Ingestion Rate
IR_W	Ingestion Rate for Water
AUF	Area Use Factor
kg/kg·day	kilograms of food per kilogram of body weight per day
L/day	Liters per day

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TABLE 8-28

NOAEL RISK CALCULATIONS - MERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)
Aquatic Receptors							
Little Brown Bat	Mercury	1.69E-04	2.0	51.0	0.008	0.503	0.00120
River Otter	Mercury	1.69E-04	2.0	51.0	7.4	0.0991	0.620
Mink	Mercury	1.69E-04	2.0	51.0	0.852	0.134	0.710
Pied-Billed Grebe	Mercury	1.69E-04	2.0	51.0	0.417	0.404	0.0328
Belted Kingfisher (Maximum Exposure)	Mercury	1.69E-04	2.0	51.0	0.152	0.566	0.0170
Belted Kingfisher (Central Tendency)	Mercury	1.69E-04	2.0	51.0	0.152	0.566	0.0170
Little Blue Heron	Mercury	1.69E-04	2.0	51.0	0.340	0.432	0.160
Great Blue Heron	Mercury	1.69E-04	2.0	51.0	2.2	0.231	0.100
Wood Duck	Mercury	1.69E-04	2.0	51.0	0.673	0.180	0.0390
American Alligator	Mercury	1.69E-04	2.0	51.0	50	0.016	0.000
Terrestrial Receptors							
Short-tailed Shrew	Mercury	1.69E-04	2.0	51.0	0.0150	0.430	0.00350
Raccoon	Mercury	1.69E-04	2.0	51.0	3.99	0.093	0.340
Pine Vole	Mercury	1.69E-04	2.0	51.0	0.0390	0.357	0.00720
Carolina Wren	Mercury	1.69E-04	2.0	51.0	0.0200	0.814	0.00430

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-28

NOAEL RISK CALCULATIONS - MERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	AUF	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors															
Little Brown Bat	Mercury	0.22	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
River Otter	Mercury	0.09	0.00	0.046	0.75	0.048	0.10	0.095	0.05	0.077	0.10	0.193	0.00	0.259	0.316
Mink	Mercury	1.00	0.00	0.046	0.05	0.048	0.20	0.095	0.10	0.077	0.25	0.193	0.40	0.259	0.316
Pied-Billed Grebe	Mercury	1.00	0.60	0.046	0.20	0.048	0.00	0.095	0.20	0.077	0.00	0.193	0.00	0.259	0.316
Belted Kingfisher (Maximum Exposure)	Mercury	1.00	0.00	0.046	1.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Belted Kingfisher (Central Tendency)	Mercury	0.50	0.19	0.046	0.51	0.048	0.00	0.095	0.05	0.077	0.25	0.193	0.00	0.259	0.316
Little Blue Heron	Mercury	0.90	0.25	0.046	0.75	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Great Blue Heron	Mercury	1.00	0.05	0.046	0.50	0.048	0.35	0.095	0.00	0.077	0.10	0.193	0.00	0.259	0.316
Wood Duck	Mercury	1.00	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
American Alligator	Mercury	1.00	0.00	0.046	0.17	0.048	0.33	0.095	0.10	0.077	0.25	0.193	0.15	0.259	0.316
Terrestrial Receptors															
Short-tailed Shrew	Mercury	1.00	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Raccoon	Mercury	0.48	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.20	0.259	0.316
Pine Vole	Mercury	1.00	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Carolina Wren	Mercury	1.00	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-28

NOAEL RISK CALCULATIONS - MERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	NOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	Mercury	0.00	0.00	1.00	0.71	0.00	0.0085	0.00	7.86E-02	0.370	0.21
River Otter	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.00	6.24E-04	0.370	0.0017
Mink	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.09	6.72E-01	0.370	**1.8**
Pied-Billed Grebe	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.03	7.01E-01	0.450	**1.6**
Belted Kingfisher (Maximum Exposure)	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.00	2.69E-02	0.450	0.060
Belted Kingfisher (Central Tendency)	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.00	2.41E-02	0.450	0.054
Little Blue Heron	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.03	6.73E-01	0.450	**1.5**
Great Blue Heron	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.03	4.08E-01	0.450	0.91
Wood Duck	Mercury	0.00	0.00	0.25	0.360	0.75	0.0085	0.03	3.20E-01	0.450	0.71
American Alligator	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.02	1.86E-02	5.000	0.0037
Terrestrial Receptors											
Short-tailed Shrew	Mercury	0.00	0.00	1.00	0.200	0.00	0.0085	0.02	1.03E-01	0.370	0.28
Raccoon	Mercury	0.00	0.00	0.40	0.360	0.40	0.0085	0.09	1.72E-02	0.370	0.046
Pine Vole	Mercury	0.00	0.00	0.00	0.360	1.00	0.0085	0.02	2.00E-02	0.370	0.054
Carolina Wren	Mercury	0.00	0.00	1.00	0.360	0.00	0.0085	0.10	4.53E-01	0.450	**1.0**

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-29

NOAEL RISK CALCULATIONS - METHYLMERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)
Aquatic Receptors							
Little Brown Bat	Methylmercury	2.74E-06	0.0051	0.00728	0.008	0.503	0.00120
River Otter	Methylmercury	2.74E-06	0.0051	0.00728	7.4	0.0991	0.620
Mink	Methylmercury	2.74E-06	0.0051	0.00728	0.852	0.134	0.710
Pied-Billed Grebe	Methylmercury	2.74E-06	0.0051	0.00728	0.417	0.404	0.0328
Belted Kingfisher (Maximum Exposure)	Methylmercury	2.74E-06	0.0051	0.00728	0.152	0.566	0.0170
Belted Kingfisher (Central Tendency)	Methylmercury	2.74E-06	0.0051	0.00728	0.152	0.566	0.0170
Little Blue Heron	Methylmercury	2.74E-06	0.0051	0.00728	0.340	0.432	0.160
Great Blue Heron	Methylmercury	2.74E-06	0.0051	0.00728	2.2	0.231	0.100
Wood Duck	Methylmercury	2.74E-06	0.0051	0.00728	0.673	0.180	0.0390
American Alligator	Methylmercury	2.74E-06	0.0051	0.00728	50	0.0160	0.000
Terrestrial Receptors							
Short-tailed Shrew	Methylmercury	2.74E-06	0.0051	0.00728	0.0150	0.430	0.00350
Raccoon	Methylmercury	2.74E-06	0.0051	0.00728	3.9900	0.0930	0.340
Pine Vole	Methylmercury	2.74E-06	0.0051	0.00728	0.0390	0.357	0.00720
Carolina Wren	Methylmercury	2.74E-06	0.0051	0.00728	0.0200	0.814	0.00430

Notes:

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-29

NOAEL RISK CALCULATIONS - METHYLMERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	AUF	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors															
Little Brown Bat	Methylmercury	0.22	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
River Otter	Methylmercury	0.09	0.00	0.019	0.75	0.745	0.10	1.495	0.05	0.107	0.10	0.104	0.00	0.701	0.854
Mink	Methylmercury	1.00	0.00	0.019	0.05	0.745	0.20	1.495	0.10	0.107	0.25	0.104	0.40	0.701	0.854
Pied-Billed Grebe	Methylmercury	1.00	0.60	0.019	0.20	0.745	0.00	1.495	0.20	0.107	0.00	0.104	0.00	0.701	0.854
Belted Kingfisher (Maximum Exposure)	Methylmercury	1.00	0.00	0.019	1.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Belted Kingfisher (Central Tendency)	Methylmercury	0.50	0.19	0.019	0.51	0.745	0.00	1.495	0.05	0.107	0.25	0.104	0.00	0.701	0.854
Little Blue Heron	Methylmercury	0.90	0.25	0.019	0.75	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Great Blue Heron	Methylmercury	1.00	0.05	0.019	0.50	0.745	0.35	1.495	0.00	0.107	0.10	0.104	0.00	0.701	0.854
Wood Duck	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
American Alligator	Methylmercury	1.00	0.00	0.019	0.17	0.745	0.33	1.495	0.10	0.107	0.25	0.104	0.15	0.701	0.854
Terrestrial Receptors															
Short-tailed Shrew	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Raccoon	Methylmercury	0.48	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.20	0.701	0.854
Pine Vole	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Carolina Wren	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-29

NOAEL RISK CALCULATIONS - METHYLMERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	NOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	Methylmercury	0.00	0.00	1.00	0.350	0.00	0.0071	0.00	3.87E-02	0.075	0.52
River Otter	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.00	6.46E-03	0.075	0.086
Mink	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.09	9.61E-02	0.075	**1.3**
Pied-Billed Grebe	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.03	7.35E-02	0.060	**1.2**
Belted Kingfisher (Maximum Exposure)	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.00	4.22E-01	0.060	**7.0**
Belted Kingfisher (Central Tendency)	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.00	1.17E-01	0.060	**2.0**
Little Blue Heron	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.03	2.19E-01	0.060	**3.7**
Great Blue Heron	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.03	2.10E-01	0.060	**3.5**
Wood Duck	Methylmercury	0.00	0.00	0.25	0.180	0.75	0.0071	0.03	9.10E-03	0.060	0.15
American Alligator	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.02	1.26E-02	5.000	0.0025
Terrestrial Receptors											
Short-tailed Shrew	Methylmercury	0.00	0.00	1.00	0.098	0.00	0.0071	0.02	4.22E-02	0.075	0.56
Raccoon	Methylmercury	0.00	0.00	0.40	0.180	0.40	0.0071	0.09	9.62E-03	0.075	0.13
Pine Vole	Methylmercury	0.00	0.00	0.00	0.180	1.00	0.0071	0.02	2.58E-03	0.075	0.034
Carolina Wren	Methylmercury	0.00	0.00	1.00	0.180	0.00	0.0071	0.10	1.47E-01	0.060	**2.4**

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-30

NOAEL RISK CALCULATIONS - DDTR
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)
Aquatic Receptors							
Little Brown Bat	DDTR	1.35E-04	1.4	1.57	0.008	0.503	0.00120
River Otter	DDTR	1.35E-04	1.4	1.57	7.4	0.0991	0.620
Mink	DDTR	1.35E-04	1.4	1.57	0.852	0.134	0.710
Pied-Billed Grebe	DDTR	1.35E-04	1.4	1.57	0.417	0.404	0.0328
Belted Kingfisher (Maximum Exposure)	DDTR	1.35E-04	1.4	1.57	0.152	0.566	0.017
Belted Kingfisher (Central Tendency)	DDTR	1.35E-04	1.4	1.57	0.152	0.566	0.017
Little Blue Heron	DDTR	1.35E-04	1.4	1.57	0.340	0.432	0.160
Great Blue Heron	DDTR	1.35E-04	1.4	1.57	2.2	0.231	0.100
Wood Duck	DDTR	1.35E-04	1.4	1.57	0.673	0.180	0.0390
American Alligator	DDTR	1.35E-04	1.4	1.57	50	0.0160	0.000
Terrestrial Receptors							
Short-tailed Shrew	DDTR	1.35E-04	1.4	1.57	0.0150	0.430	0.00350
Raccoon	DDTR	1.35E-04	1.4	1.57	3.9900	0.0930	0.340
Pine Vole	DDTR	1.35E-04	1.4	1.57	0.0390	0.357	0.00720
Carolina Wren	DDTR	1.35E-04	1.4	1.57	0.0200	0.814	0.00430

Notes:

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-30

NOAEL RISK CALCULATIONS - DDTR
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	AUF	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors															
Little Brown Bat	DDTR	0.22	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761
River Otter	DDTR	0.09	0.00	5.228	0.75	1.57	0.10	0.532	0.05	1.10	0.10	1.24	0.00	0.570	0.761
Mink	DDTR	1.00	0.00	5.228	0.05	1.57	0.20	0.532	0.10	1.10	0.25	1.24	0.40	0.570	0.761
Pied-Billed Grebe	*DDTR*	*1.00*	*0.60*	*5.228*	*0.20*	*1.57*	*0.00*	*0.532*	*0.20*	*1.10*	*0.00*	*1.24*	*0.00*	*0.570*	*0.761*
Belted Kingfisher (Maximum Exposure)	DDTR	1.00	0.00	5.228	1.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761
Belted Kingfisher (Central Tendency)	DDTR	0.50	0.19	5.228	0.51	1.57	0.00	0.532	0.05	1.10	0.25	1.24	0.00	0.570	0.761
Little Blue Heron	DDTR	0.90	0.25	5.228	0.75	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761
Great Blue Heron	DDTR	1.00	0.05	5.228	0.50	1.57	0.35	0.532	0.00	1.10	0.10	1.24	0.00	0.570	0.761
Wood Duck	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761
American Alligator	DDTR	1.00	0.00	5.228	0.17	1.57	0.33	0.532	0.10	1.10	0.25	1.24	0.15	0.570	0.761
Terrestrial Receptors															
Short-tailed Shrew	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761
Raccoon	DDTR	0.48	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.20	0.570	0.761
Pine Vole	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761
Carolina Wren	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.24	0.00	0.570	0.761

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-30

NOAEL RISK CALCULATIONS - DDTR
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	NOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	DDTR	0.00	0.00	1.00	0.660	0.00	0.013	0.00	7.31E-02	0.147	0.50
River Otter	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.00	1.26E-02	0.147	0.086
Mink	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.09	1.42E-01	0.147	0.97
Pied-Billed Grebe	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.03	1.50E+00	0.227	**6.6**
Belted Kingfisher (Maximum Exposure)	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.00	8.88E-01	0.227	**3.9**
Belted Kingfisher (Central Tendency)	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.00	6.11E-01	0.227	**2.7**
Little Blue Heron	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.03	9.86E-01	0.227	**4.3**
Great Blue Heron	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.03	3.26E-01	0.227	**1.4**
Wood Duck	DDTR	0.00	0.00	0.25	0.360	0.75	0.013	0.03	2.73E-02	0.227	0.12
American Alligator	DDTR	0.00	0.00	0.00	0.360	0.00	0.013	0.02	1.61E-02	3.7	0.004
Terrestrial Receptors											
Short-tailed Shrew	DDTR	0.00	0.00	1.00	0.240	0.00	0.013	0.02	1.15E-01	0.147	0.78
Raccoon	DDTR	0.00	0.00	0.40	0.360	0.40	0.013	0.09	1.76E-02	0.147	0.12
Pine Vole	DDTR	0.00	0.00	0.00	0.360	1.00	0.013	0.02	1.66E-02	0.147	0.11
Carolina Wren	DDTR	0.00	0.00	1.00	0.360	0.00	0.013	0.10	4.06E-01	0.227	**1.8**

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-31

NOAEL RISK CALCULATIONS - HCB
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)	AUF
Aquatic Receptors								
Little Brown Bat	HCB	3.96E-05	0.38	8.29	0.008	0.503	0.00120	0.22
River Otter	HCB	3.96E-05	0.38	8.29	7.4	0.0991	0.620	0.09
Mink	HCB	3.96E-05	0.38	8.29	0.852	0.134	0.710	1.00
Pied-Billed Grebe	HCB	3.96E-05	0.38	8.29	0.417	0.404	0.0328	1.00
Belted Kingfisher (Maximum Exposure)	HCB	3.96E-05	0.38	8.29	0.152	0.566	0.0170	1.00
Belted Kingfisher (Central Tendency)	HCB	3.96E-05	0.38	8.29	0.152	0.566	0.0170	0.50
Little Blue Heron	HCB	3.96E-05	0.38	8.29	0.340	0.432	0.160	0.90
Great Blue Heron	HCB	3.96E-05	0.38	8.29	2.2	0.231	0.100	1.00
Wood Duck	HCB	3.96E-05	0.38	8.29	0.673	0.180	0.0390	1.00
American Alligator	HCB	3.96E-05	0.38	8.29	50	0.0160	0.000	1.00
Terrestrial Receptors								
Short-tailed Shrew	HCB	3.96E-05	0.38	8.29	0.0150	0.430	0.00350	1.00
Raccoon	HCB	3.96E-05	0.38	8.29	3.9900	0.0930	0.340	0.48
Pine Vole	HCB	3.96E-05	0.38	8.29	0.0390	0.357	0.00720	1.00
Carolina Wren	HCB	3.96E-05	0.38	8.29	0.0200	0.814	0.00430	1.00

Notes:

(a) $EDD\ (mg/kg{\cdot}day) = NFIR \times AUF \times \Sigma[(Ci \times Pi) + (CS/SED \times PS)] + (IRW \times CW)/BW$

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-31

NOAEL RISK CALCULATIONS - HCB
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors														
Little Brown Bat	HCB	0.00	2.07	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.00	0.021	0.286
River Otter	HCB	0.00	2.07	0.75	0.469	0.10	0.708	0.05	0.516	0.10	0.0350	0.00	0.021	0.286
Mink	HCB	0.00	2.07	0.05	0.469	0.20	0.708	0.10	0.516	0.25	0.0350	0.40	0.021	0.286
Pied-Billed Grebe	HCB	0.60	2.07	0.20	0.469	0.00	0.708	0.20	0.516	0.00	0.0350	0.00	0.021	0.286
Belted Kingfisher (Maximum Exposure)	HCB	0.00	2.07	1.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.00	0.021	0.286
Belted Kingfisher (Central Tendency)	HCB	0.19	2.07	0.51	0.469	0.00	0.708	0.05	0.516	0.25	0.0350	0.00	0.021	0.286
Little Blue Heron	*HCB*	*0.25*	*2.07*	*0.75*	*0.469*	*0.00*	*0.708*	*0.00*	*0.516*	*0.00*	*0.0350*	*0.00*	*0.021*	*0.286*
Great Blue Heron	HCB	0.05	2.07	0.50	0.469	0.35	0.708	0.00	0.516	0.10	0.0350	0.00	0.021	0.286
Wood Duck	HCB	0.00	2.07	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.00	0.021	0.286
American Alligator	HCB	0.00	2.07	0.17	0.469	0.33	0.708	0.10	0.516	0.25	0.0350	0.15	0.021	0.286
Terrestrial Receptors														
Short-tailed Shrew	HCB	0.00	2.07	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.00	0.021	0.286
Raccoon	HCB	0.00	2.07	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.20	0.021	0.286
Pine Vole	HCB	0.00	2.07	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.00	0.021	0.286
Carolina Wren	HCB	0.00	2.07	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.0350	0.00	0.021	0.286

Notes:

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_i dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-31

NOAEL RISK CALCULATIONS - HCB
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	NOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	HCB	0.00	0.00	1.00	0.039	0.00	0.0048	0.00	4.32E-03	0.137	0.032
River Otter	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.00	4.03E-03	0.137	0.029
Mink	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.09	1.50E-01	0.137	**1.1**
Pied-Billed Grebe	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.03	6.92E-01	2.250	0.31
Belted Kingfisher (Maximum Exposure)	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.00	2.65E-01	2.250	0.12
Belted Kingfisher (Central Tendency)	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.00	1.89E-01	2.250	0.084
Little Blue Heron	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.03	4.45E-01	2.250	0.20
Great Blue Heron	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.03	2.00E-01	2.250	0.089
Wood Duck	HCB	0.00	0.00	0.25	0.022	0.75	0.0048	0.03	5.09E-02	2.250	0.023
American Alligator	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.02	9.32E-03	NA	NA
Terrestrial Receptors											
Short-tailed Shrew	HCB	0.00	0.00	1.00	0.019	0.00	0.0048	0.02	1.15E-02	3.200	0.0036
Raccoon	HCB	0.00	0.00	0.40	0.022	0.40	0.0048	0.09	2.28E-03	3.200	0.00071
Pine Vole	HCB	0.00	0.00	0.00	0.022	1.00	0.0048	0.02	5.01E-03	3.200	0.0016
Carolina Wren	HCB	0.00	0.00	1.00	0.022	0.00	0.0048	0.10	4.91E-02	2.250	0.022

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-32

NOAEL RISK SUMMARY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	NOAEL Hazard Quotient				
Receptor	**Hg**	**MeHg**	**DDTR**	**HCB**	**Total HI**
Aquatic Receptors					
Little Brown Bat	0.21	0.52	0.50	0.032	**1.3**
River Otter	0.0017	0.086	0.086	0.029	0.20
Mink	**1.8**	**1.3**	0.97	**1.1**	**5.2**
Pied-Billed Grebe	**1.6**	**1.2**	**6.6**	0.31	**9.7**
Belted Kingfisher (Maximum Exposure)	0.060	**7.0**	**3.9**	0.12	**11**
Belted Kingfisher (Central Tendency)	0.054	**2.0**	**2.7**	0.084	**4.8**
Little Blue Heron	**1.5**	**3.7**	**4.3**	0.20	**9.7**
Great Blue Heron	0.91	**3.5**	**1.4**	0.089	**5.9**
Wood Duck	0.71	0.15	0.12	0.023	**1.0**
American Alligator	0.0037	0.0025	0.004	NA	0.011
Terrestrial Receptors					
Short-tailed Shrew	0.28	0.56	0.78	0.0036	**1.6**
Raccoon	0.046	0.13	0.12	0.0007	0.30
Pine Vole	0.054	0.034	0.11	0.0016	0.20
Carolina Wren	**1.0**	**2.4**	**1.8**	0.022	**5.2**

Notes:
Bold Indicates HI = or >1
NA Not Available

PREPARED BY: MKB 4/29/10
CHECKED BY: LSV 5/02/10
REVISED BY: NSR 10/28/10
CHECKED BY: MKB 11/1/10
REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

TABLE 8-33

LOAEL RISK CALCULATIONS - MERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)
Aquatic Receptors							
Little Brown Bat	Mercury	1.69E-04	2.0	51	0.008	0.5030	0.0012
Mink	Mercury	1.69E-04	2.0	51	0.852	0.134	0.710
Pied-Billed Grebe	Mercury	1.69E-04	2.0	51	0.417	0.404	0.0328
Little Blue Heron	Mercury	1.69E-04	2.0	51	0.340	0.432	0.160
Wood Duck	Mercury	1.69E-04	2.0	51	0.673	0.180	0.0390
Terrestrial Receptors							
Short-tailed Shrew	Mercury	1.69E-04	2.0	51	0.0150	0.4300	0.0035
Carolina Wren	Mercury	1.69E-04	2.0	51	0.0200	0.8135	0.0043

Notes:

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-33

LOAEL RISK CALCULATIONS - MERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	AUF	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors															
Little Brown Bat	Mercury	0.2200	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Mink	Mercury	1.00	0.00	0.046	0.05	0.048	0.20	0.095	0.10	0.077	0.25	0.193	0.40	0.259	0.316
Pied-Billed Grebe	Mercury	1.00	0.60	0.046	0.20	0.048	0.00	0.095	0.20	0.077	0.00	0.193	0.00	0.259	0.316
Little Blue Heron	Mercury	0.90	0.25	0.046	0.75	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Wood Duck	Mercury	1.00	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Terrestrial Receptors															
Short-tailed Shrew	Mercury	1.00	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316
Carolina Wren	Mercury	1.0000	0.00	0.046	0.00	0.048	0.00	0.095	0.00	0.077	0.00	0.193	0.00	0.259	0.316

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-33

LOAEL RISK CALCULATIONS - MERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	LOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	Mercury	0.00	0.00	1.00	0.710	0.00	0.0085	0.00	7.86E-02	0.370	0.21
Mink	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.09	6.72E-01	0.370	**1.8**
Pied-Billed Grebe	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.03	7.01E-01	0.900	0.78
Little Blue Heron	Mercury	0.00	0.00	0.00	0.360	0.00	0.0085	0.03	6.73E-01	0.900	0.75
Wood Duck	Mercury	0.00	0.00	0.25	0.360	0.75	0.0085	0.03	3.20E-01	0.900	0.36
Terrestrial Receptors											
Short-tailed Shrew	Mercury	0.00	0.00	1.00	0.200	0.00	0.0085	0.02	1.03E-01	0.370	0.28
Carolina Wren	Mercury	0.00	0.00	1.00	0.360	0.00	0.0085	0.10	4.53E-01	0.900	0.50

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-34

LOAEL RISK CALCULATIONS - METHYLMERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)
Aquatic Receptors							
Little Brown Bat	Methylmercury	2.74E-06	0.0051	0.00728	0.008	0.5030	0.0012
Mink	Methylmercury	2.74E-06	0.0051	0.00728	0.852	0.134	0.710
Pied-Billed Grebe	Methylmercury	2.74E-06	0.0051	0.00728	0.417	0.404	0.0328
Belted Kingfisher (Maximum Exposure)	Methylmercury	2.74E-06	0.0051	0.00728	0.152	0.566	0.017
Belted Kingfisher (Central Tendency)	Methylmercury	2.74E-06	0.0051	0.00728	0.152	0.566	0.017
Little Blue Heron	Methylmercury	2.74E-06	0.0051	0.00728	0.340	0.432	0.160
Great Blue Heron	Methylmercury	2.74E-06	0.0051	0.00728	2.2	0.231	0.100
Wood Duck	Methylmercury	2.74E-06	0.0051	0.00728	0.673	0.180	0.0390
Terrestrial Receptors							
Short-tailed Shrew	Methylmercury	2.74E-06	0.0051	0.00728	0.0150	0.4300	0.0035
Carolina Wren	Methylmercury	2.74E-06	0.0051	0.00728	0.020	0.814	0.00430

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-34

LOAEL RISK CALCULATIONS - METHYLMERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	AUF	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors															
Little Brown Bat	Methylmercury	0.2200	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Mink	Methylmercury	1.00	0.00	0.019	0.05	0.745	0.20	1.495	0.10	0.107	0.25	0.104	0.40	0.701	0.854
Pied-Billed Grebe	Methylmercury	1.00	0.60	0.019	0.20	0.745	0.00	1.495	0.20	0.107	0.00	0.104	0.00	0.701	0.854
Belted Kingfisher (Maximum Exposure)	Methylmercury	1.00	0.00	0.019	1.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Belted Kingfisher (Central Tendency)	Methylmercury	0.50	0.19	0.019	0.51	0.745	0.00	1.495	0.05	0.107	0.25	0.104	0.00	0.701	0.854
Little Blue Heron	Methylmercury	0.90	0.25	0.019	0.75	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Great Blue Heron	Methylmercury	1.00	0.05	0.019	0.50	0.745	0.35	1.495	0.00	0.107	0.10	0.104	0.00	0.701	0.854
Wood Duck	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Terrestrial Receptors															
Short-tailed Shrew	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854
Carolina Wren	Methylmercury	1.00	0.00	0.019	0.00	0.745	0.00	1.495	0.00	0.107	0.00	0.104	0.00	0.701	0.854

Notes:

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-34

LOAEL RISK CALCULATIONS - METHYLMERCURY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	LOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	Methylmercury	0.00	0.00	1.00	0.350	0.00	0.0071	0.00	3.87E-02	0.150	0.26
Mink	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.09	9.61E-02	0.150	0.64
Pied-Billed Grebe	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.03	7.35E-02	0.060	**1.2**
Belted Kingfisher (Maximum Exposure)	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.00	4.22E-01	0.060	**7.0**
Belted Kingfisher (Central Tendency)	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.00	1.17E-01	0.060	**2.0**
Little Blue Heron	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.03	2.19E-01	0.060	**3.7**
Great Blue Heron	Methylmercury	0.00	0.00	0.00	0.180	0.00	0.0071	0.03	2.10E-01	0.060	**3.5**
Wood Duck	Methylmercury	0.00	0.00	0.25	0.180	0.75	0.0071	0.03	9.10E-03	0.060	0.15
Terrestrial Receptors											
Short-tailed Shrew	Methylmercury	0.00	0.00	1.00	0.098	0.00	0.0071	0.02	4.22E-02	0.150	0.28
Carolina Wren	Methylmercury	0.00	0.00	1.00	0.180	0.00	0.0071	0.10	1.47E-01	0.060	**2.4**

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-35

LOAEL RISK CALCULATIONS - DDTR
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)
Aquatic Receptors							
Little Brown Bat	DDTR	1.35E-04	1.4	1.57	0.008	0.503	0.0012
Pied-Billed Grebe	DDTR	1.35E-04	1.4	1.57	0.417	0.404	0.0328
Belted Kingfisher (Maximum Exposure)	DDTR	1.35E-04	1.4	1.57	0.152	0.566	0.0170
Belted Kingfisher (Central Tendency)	DDTR	1.35E-04	1.4	1.57	0.152	0.566	0.0170
Little Blue Heron	DDTR	1.35E-04	1.4	1.57	0.340	0.432	0.160
Great Blue Heron	DDTR	1.35E-04	1.4	1.57	2.2	0.231	0.100
Wood Duck	DDTR	1.35E-04	1.4	1.57	0.673	0.180	0.0390
Terrestrial Receptors							
Short-tailed Shrew	DDTR	1.35E-04	1.4	1.57	0.015	0.430	0.00350
Carolina Wren	DDTR	1.35E-04	1.4	1.57	0.020	0.814	0.00430

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-35

LOAEL RISK CALCULATIONS - DDTR
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	AUF	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors															
Little Brown Bat	DDTR	0.22	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.244	0.00	0.57	0.761
Pied-Billed Grebe	DDTR	1.00	0.60	5.228	0.20	1.57	0.00	0.532	0.20	1.10	0.00	1.244	0.00	0.57	0.761
Belted Kingfisher (Maximum Exposure)	DDTR	1.00	0.00	5.228	1.00	1.57	0.00	0.532	0.00	1.10	0.00	1.244	0.00	0.57	0.761
Belted Kingfisher (Central Tendency)	DDTR	0.50	0.19	5.228	0.51	1.57	0.00	0.532	0.05	1.10	0.25	1.244	0.00	0.57	0.761
Little Blue Heron	DDTR	0.90	0.25	5.228	0.75	1.57	0.00	0.532	0.00	1.10	0.00	1.244	0.00	0.57	0.761
Great Blue Heron	DDTR	1.00	0.05	5.228	0.50	1.57	0.35	0.532	0.00	1.10	0.10	1.244	0.00	0.57	0.761
Wood Duck	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.244	0.00	0.57	0.761
Terrestrial Receptors															
Short-tailed Shrew	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.244	0.00	0.57	0.761
Carolina Wren	DDTR	1.00	0.00	5.228	0.00	1.57	0.00	0.532	0.00	1.10	0.00	1.244	0.00	0.57	0.761

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-35

LOAEL RISK CALCULATIONS - DDTR
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	LOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	DDTR	0.00	0.00	1.00	0.66	0.00	0.013	0.00	7.31E-02	0.274	0.27
Pied-Billed Grebe	DDTR	0.00	0.00	0.00	0.36	0.00	0.013	0.03	1.50E+00	0.281	**5.4**
Belted Kingfisher (Maximum Exposure)	DDTR	0.00	0.00	0.00	0.36	0.00	0.013	0.00	8.88E-01	0.281	**3.2**
Belted Kingfisher (Central Tendency)	DDTR	0.00	0.00	0.00	0.36	0.00	0.013	0.00	6.11E-01	0.281	**2.2**
Little Blue Heron	DDTR	0.00	0.00	0.00	0.36	0.00	0.013	0.03	9.86E-01	0.281	**3.5**
Great Blue Heron	DDTR	0.00	0.00	0.00	0.36	0.00	0.013	0.03	3.26E-01	0.281	**1.2**
Wood Duck	DDTR	0.00	0.00	0.25	0.36	0.75	0.013	0.03	2.73E-02	0.281	0.097
Terrestrial Receptors											
Short-tailed Shrew	DDTR	0.00	0.00	1.00	0.24	0.00	0.013	0.02	1.15E-01	0.274	0.42
Carolina Wren	DDTR	0.00	0.00	1.00	0.36	0.00	0.013	0.10	4.06E-01	0.281	**1.4**

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg-day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-36

LOAEL RISK CALCULATIONS - HCB
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	EPC in Water, C_W (mg/L) (a)	EPC in Soil, C_S (mg/kg) (b)	EPC in Sediment, C_{SED} (mg/kg) (b)	Body Weight (BW) (kg)	BW Normalized Food Ingestion Rate (IR_F) (kg/day)	Water Ingestion Rate (IR_W) (L/day)	AUF
Aquatic Receptors								
Little Brown Bat	HCB	3.96E-05	0.38	8.29	0.008	0.5030	0.0012	0.2200
Mink	HCB	3.96E-05	0.38	8.29	0.852	0.134	0.71	1.00
Wood Duck	HCB	3.96E-05	0.38	8.29	0.673	0.1800	0.04	1.00
Terrestrial Receptors								
Short-tailed Shrew	HCB	3.96E-05	0.38	8.29	0.0150	0.430	0.00	1.00

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-36

LOAEL RISK CALCULATIONS - HCB
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AI}	C_{AI}	P_{FF}	C_{FF}	P_{PF}	C_{PF}	P_{CR}	C_{CR}	P_{AM}	C_{AM}	P_{VP}	$C_{VP,T}$	$C_{VP,A}$
Aquatic Receptors														
Little Brown Bat	HCB	0.00	2.073	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.035	0.00	0.021	0.286
Mink	HCB	0.00	2.073	0.05	0.469	0.20	0.708	0.10	0.516	0.25	0.035	0.40	0.021	0.286
Wood Duck	HCB	0.00	2.073	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.035	0.00	0.021	0.286
Terrestrial Receptors														
Short-tailed Shrew	HCB	0.00	2.073	0.00	0.469	0.00	0.708	0.00	0.516	0.00	0.035	0.00	0.021	0.286

Notes:

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)]
+ (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-36

LOAEL RISK CALCULATIONS - HCB
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	Analyte	P_{AV}	C_{AV}	P_I	C_I	P_{TV}	C_{TV}	P_S	EDD [(a)] (mg/kg-day)	LOAEL TRV (mg/kg-day)	Hazard Quotient (HQ)
Aquatic Receptors											
Little Brown Bat	HCB	0.00	0.00	1.00	0.039	0.00	0.0048	0.00	4.32E-03	0.137	0.032
Mink	HCB	0.00	0.00	0.00	0.022	0.00	0.0048	0.09	0.150	0.137	**1.1**
Wood Duck	HCB	0.00	0.00	0.25	0.022	0.75	0.0048	0.03	0.051	2.250	0.023
Terrestrial Receptors											
Short-tailed Shrew	HCB	0.00	0.00	1.00	0.019	0.00	0.0048	0.02	0.011	3.20	0.0036

Notes:

REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

(a) EDD (mg/kg·day) = NFIR x AUF x Σ[(Ci x Pi) + (CS/SED x PS)] + (IRW x CW)/BW

The C_I dietary component consists of all insects for each receptor, except for the little brown bat (flying insects only) and the short-tailed shrew (spiders and crawling insects only).

Aquatic vertebrate prey items used for the mink and American alligator; terrestrial vertebrate prey items used for the raccoon.

TABLE 8-37

LOAEL RISK SUMMARY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

Receptor	LOAEL Hazard Quotient Hg	MeHg	DDTR	HCB	Total HI
Aquatic Receptors					
Little Brown Bat	0.21	0.26	0.27	0.032	0.77
River Otter	NC	NC	NC	NC	NC
Mink	**1.8**	0.64	NC	**1.1**	**3.6**
Pied-Billed Grebe	0.78	**1.2**	**5.4**	NC	**7.4**
Belted Kingfisher (Maximum Exposure)	NC	**7.0**	**3.2**	NC	**10**
Belted Kingfisher (Central Tendency)	NC	**2.0**	**2.2**	NC	**4.2**
Little Blue Heron	0.75	**3.7**	**3.5**	NC	**7.9**
Great Blue Heron	NC	**3.5**	**1.2**	NC	**4.7**
Wood Duck	0.36	0.15	0.10	0.023	0.63
American Alligator	NC	NC	NC	NC	NC
Terrestrial Receptors					
Short-tailed Shrew	0.28	0.28	0.42	0.0036	0.98
Raccoon	NC	NC	NC	NC	NC
Pine Vole	NC	NC	NC	NC	NC
Carolina Wren	0.50	**2.4**	**1.4**	NC	**4.3**

Notes:
Bold Indicates HI >1
NC = LOAEL not calculated since NOAEL was < 1

PREPARED BY: MKB 4/29/10
CHECKED BY: LSV 5/02/10
REVISED BY: NSR 10/28/10
CHECKED BY: MKB 11/1/10
REVISED BY: MKB 3/23/11
CHECKED BY: NSR 3/29/11

TABLE 8-38
COMPARISON OF EXPOSURE POINT CONCENTRATIONS FOR AQUATIC RECEPTORS
BASIN (6 FEET NAVD88), BASIN (3 FEET NAVD88), AND ROUND POND
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

COPC	Pathway	Receptor	Basin 6 feet NAVD88 Concentration (mg/kg)	Basin 3 feet NAVD88 Concentration (mg/kg)	Round Pond Concentration (mg/kg) (a)
Mercury	Incidental Ingestion of sediments	Mink	51	53.4	20.5
Methylmercury	Ingestion of forage fish	Pied-billed grebe	0.75	0.75	0.44
		Belted Kingfisher	0.75	0.75	0.44
		Little blue heron	0.75	0.75	0.44
		Great blue heron	0.75	0.75	0.44
	Ingestion of predatory fish	Great blue heron	1.50	1.50	(c)
DDTR	Ingestion of forage fish	Belted Kingfisher	1.57 (a)	1.57	10.8
		Little blue heron	1.57 (a)	1.57	10.8
		Great Blue Heron	1.57 (a)	1.57	10.8
	Ingestion of aquatic insects	Pied-billed grebe	5.2 (b)	5.2 (b)	19.4
		Belted Kingfisher (Central Tendency)	5.2 (b)	5.2 (b)	19.4
		Little blue heron	5.2 (b)	5.2 (b)	19.4
HCB	Incidental Ingestion of sediments	Mink	8.29	8.29	1.19

(a) The 3 feet NAVD88 exposure point sample concentrations (i.e., Basin only samples) were used for risk characterization for the 6 feet NAVD88 because concentrations of DDTR in the Round Pond area have decreased an order of magnitude since the 1990s when these fish samples were collected.
(b) EPC calculated by multiplying a site-specific BSAF of 3.33 (derived using 2001 aquatic insect tissue and sediment data) by sediment EPC for 2008 and 2009.
(c) No recent predatory fish data are available for Round Pond.

PREPARED BY/DATE: EJS 5/13/10
CHECKED BY/DATE: EFC 5/13/10
REVISED BY/DATE: MKB 3/23/11
CHECKED BY/DATE: NSR 3/29/11

TABLE 8-39
COMPARISON OF EXPOSURE POINT CONCENTRATIONS FOR TERRESTRIAL RECEPTORS
BASIN (6 FEET NAVD88), BASIN (3 FEET NAVD88), AND ROUND POND
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

COPC	Pathway	Receptor	Basin 6 feet NAVD88 Concentration (mg/kg)	Basin 3 feet NAVD88 Concentration (mg/kg)	Round Pond Concentration (mg/kg) (a)
Methylmercury	Incidental Ingestion of Floodplain Soils	Carolina Wren	0.0051	0.0051	0.0030
	Ingestion of Insects (Spiders, Flying Insects, Crawling Insects)	Carolina Wren	0.18 (b)	0.18 (b)	0.18 (b)
DDTR	Incidental Ingestion of Floodplain Soils	Carolina Wren	1.4	1.2	2.2
	Ingestion of Insects (Spiders, Flying Insects, Crawling Insects)	Carolina Wren	0.36	0.36	0.35

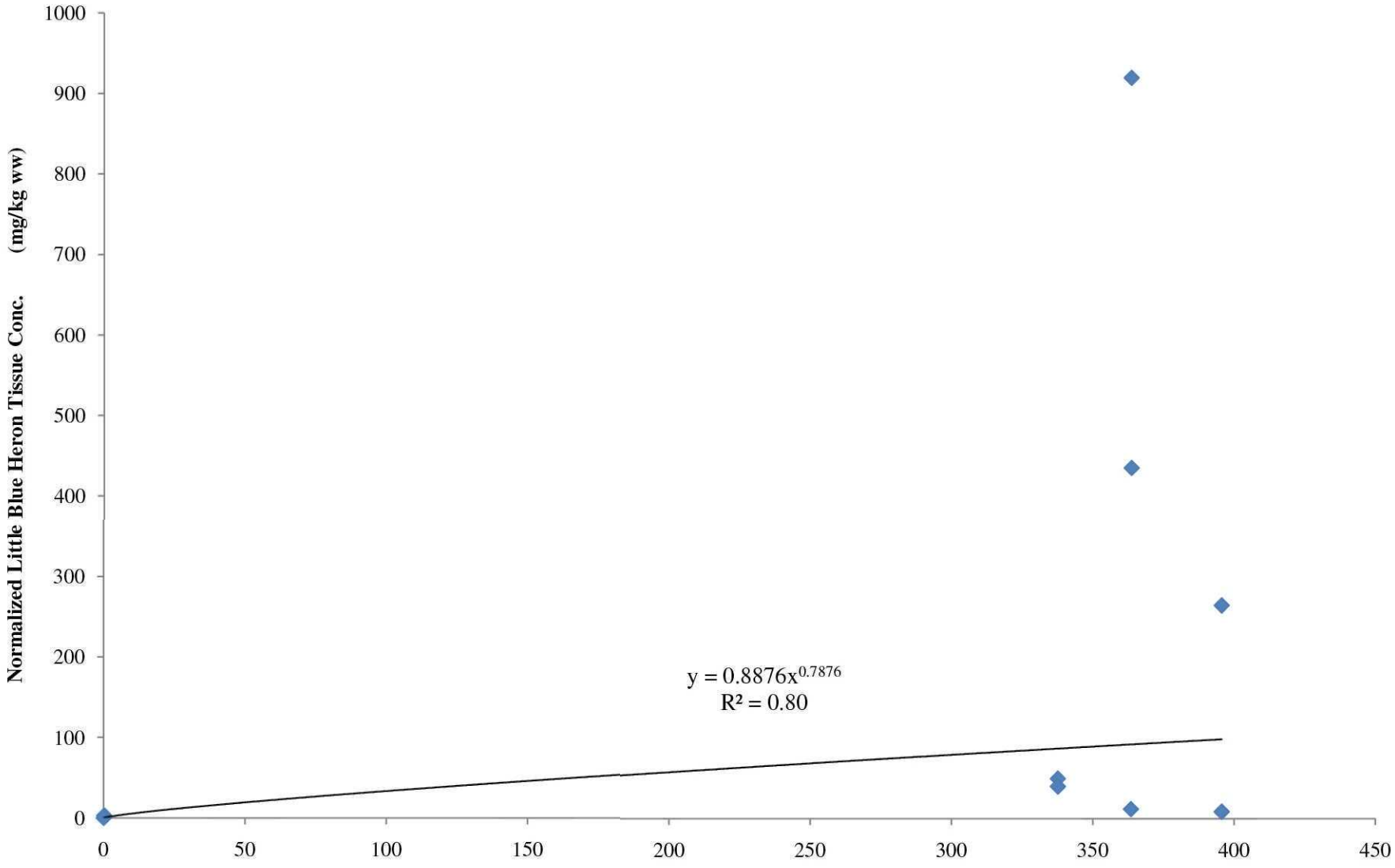
NA = Not Analyzed

(a) Maximum soil concentration in the 0-1 inch interval from locations SB1, SS2, and SS3 used to estimate soil exposures near Round Pond. Insect concentrations near Round Pond are the maximum detected concentrations in the sample collected at INS-2C.

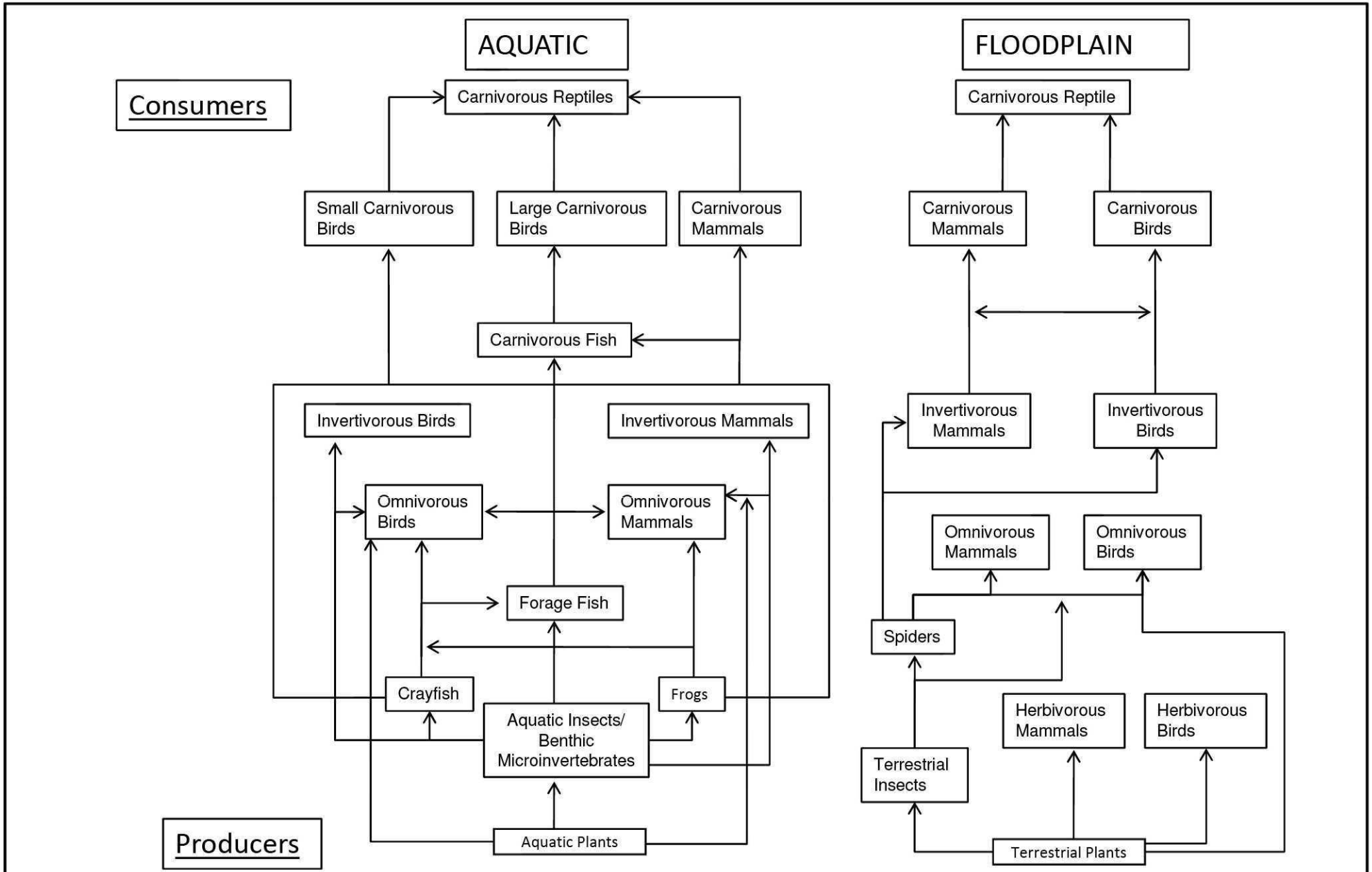
(b) Methylmercury in insect tissue assumed to be 49% of total mercury concentration.

PREPARED BY/DATE: MKB 11/1/10
CHECKED BY/DATE: NSR 11/1/10

Figure 8-0
1994 Normalized Little Blue Heron Tissue and Sediment DDTR Concentrations for Basin and Round Pond



PREPARED BY/DATE: NSR 3/11/11
CHECKED BY/DATE: EFC 3/11/11



Current Proposed Receptors

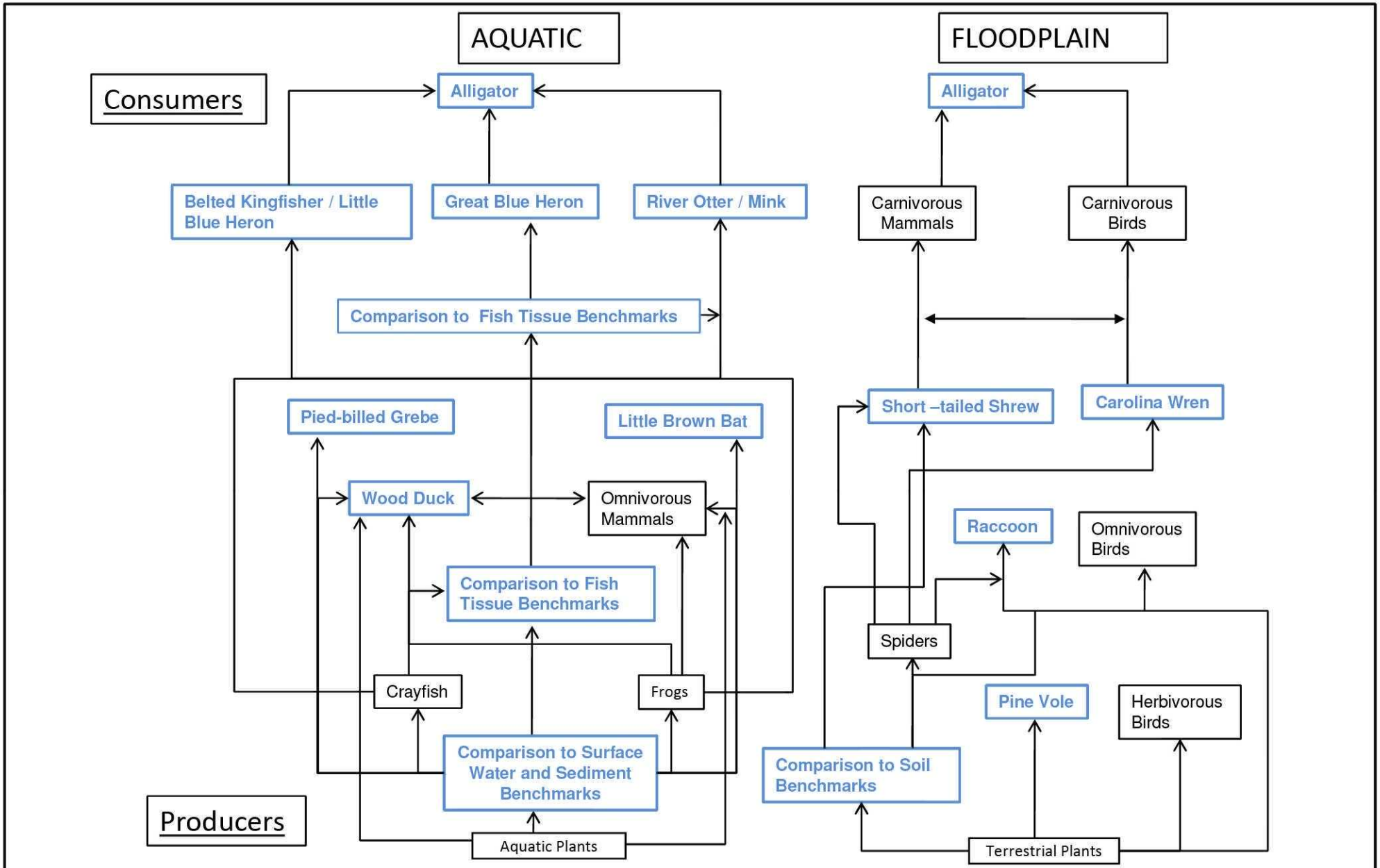
Source: December 2009 EPA McIntosh Presentation

Olin McIntosh OU-2
Generalized Food Web Model

PREPARED BY/DATE: EJS /4/29/10
CHECKED BY/DATE: EFC/4/29/10
PROJECT NUMBER: 6107100036

MACTEC

Figure Number: 8-1



Source: Modified from the December 2009 EPA McIntosh Presentation

Note:

Comparison to Benchmarks

– Media risk evaluated by comparison to benchmarks instead of food chain modeling

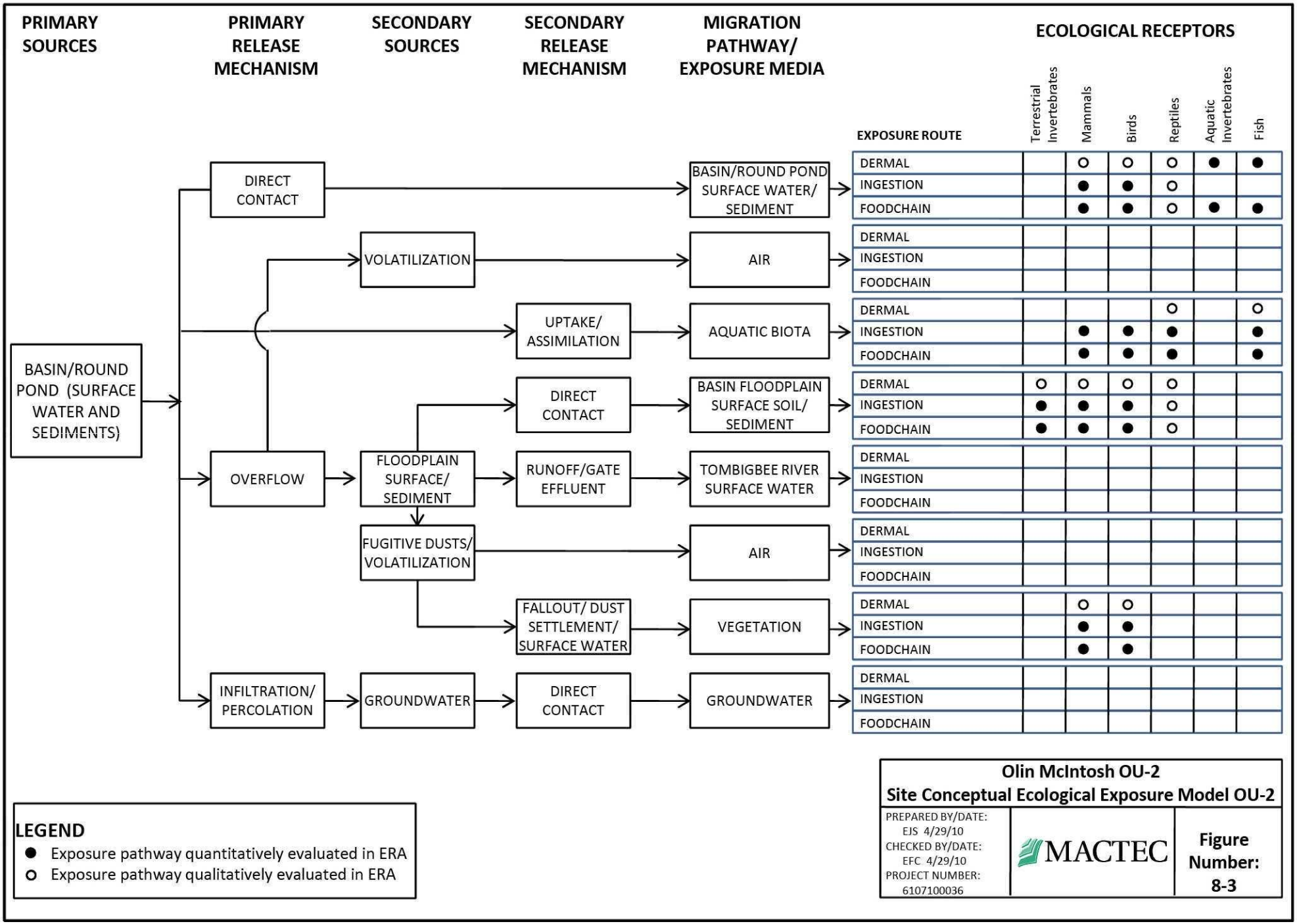
Current Proposed Receptors

Olin McIntosh OU-2
Specific Food Web Model

PREPARED BY/DATE: EJS 4/29/10
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PROJECT NUMBER: 6107100036

MACTEC

Figure Number: 8-2


PRIMARY SOURCES
PRIMARY RELEASE MECHANISM
SECONDARY SOURCES
SECONDARY RELEASE MECHANISM
MIGRATION PATHWAY/ EXPOSURE MEDIA
ECOLOGICAL RECEPTORS
EXPOSURE ROUTE
Terrestrial Invertebrates
Mammals
Birds
Reptiles
Aquatic Invertebrates
Fish
BASIN/ROUND POND (SURFACE WATER AND SEDIMENTS)
DIRECT CONTACT
BASIN/ROUND POND SURFACE WATER/ SEDIMENT
VOLATILIZATION
AIR
UPTAKE/ ASSIMILATION
AQUATIC BIOTA
DIRECT CONTACT
BASIN FLOODPLAIN SURFACE SOIL/ SEDIMENT
OVERFLOW
FLOODPLAIN SURFACE/ SEDIMENT
RUNOFF/GATE EFFLUENT
TOMBIGBEE RIVER SURFACE WATER
FUGITIVE DUSTS/ VOLATILIZATION
AIR
FALLOUT/ DUST SETTLEMENT/ SURFACE WATER
VEGETATION
INFILTRATION/ PERCOLATION
GROUNDWATER
DIRECT CONTACT
GROUNDWATER
DERMAL
INGESTION
FOODCHAIN
LEGEND
● Exposure pathway quantitatively evaluated in ERA
○ Exposure pathway qualitatively evaluated in ERA
Olin McIntosh OU-2
Site Conceptual Ecological Exposure Model OU-2
PREPARED BY/DATE: EJS 4/29/10
CHECKED BY/DATE: EFC 4/29/10
PROJECT NUMBER: 6107100036
MACTEC
Figure Number: 8-3

Legend

COPC Concentrations in Biotic Species

- Mosquito Fish, Group or Composite (2001) (a)
- Crayfish (Group or Discretes) (1994)
- Bullfrog (1994)
- Little Blue Heron (1994)
- Raccoon (1994)
- Bluegill, Whole Body (2008) (b)
- Brook Silverside, Composite (2008) (b)
- Largemouth Bass, Whole Body (2008)
- Largemouth Bass, Filet (2001) (c)

Hg Mercury

HCB Hexachlorobenzene

DDTR Sum of 2, 4' and 4, 4' isomers of DDT, DDD & DDE- A value of 1/2 the detection limit used for individual isomers below detection limit.

(a) 2001 DDTR Values for Mosquito Fish used for Forage Fish.

(b) Composite samples of Bluegill and Silverside used for Forage Fish.

(c) LMB whole body DDTR is based on 2001 filet DDTR multiplied by 1.35 as recommended by the EPA (Lecich, 1998).

ROUND POND

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBN01-RP	0.23J	0.010U	0.32

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBF03-RP	0.20J	0.012	0.31

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBF04-RP	0.22J	0.016	2.8

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX003	0.82	0.010U	0.34

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX002	1.9	0.38	25

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBF05-RP	0.10J	0.013	0.40

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX002-0794	0.21J	0.042	1.2

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX010	0.42J	0.035	1.0

Sample ID	DDTR (mg/kg) (c)
BF-B10-100201-01	0.075

Sample ID	DDTR (mg/kg)
GB-B10-100201-07A	1.588
GB-B10-100201-07B	1.879
GB-B10-100201-07C	1.7775

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX009	0.46J	0.038	0.54

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX008	0.17J	0.046	0.19

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX007	0.42	0.024	0.19

Sample ID	DDTR (mg/kg) (c)
BF-B1-100101-01	0.05

Sample ID	DDTR (mg/kg)
GB-B1-100101-01A	1.61
GB-B1-100101-01B	1.59
GB-B1-100101-01C	2.05

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX001	0.69	0.076	1.3

Sample ID	DDTR (mg/kg) (c)
BF-B2-100101-01	0.175

Sample ID	DDTR (mg/kg)
GB-B2-100101-02A	1.22
GB-B2-100101-02B	1.27
GB-B2-100101-02C	1.395

Sample ID	DDTR (mg/kg) (c)
BF-B3-100101-01	0.173

Sample ID	DDTR (mg/kg) (c)
BF-B4-100101-01	0.25

Sample ID	DDTR (mg/kg)
GB-B4-100101-03A	1.21
GB-B4-100101-03B	1.052
GB-B4-100101-03C	0.99

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
ORT2701	1.0	0.063	0.073

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0021-08WB-NE	1.8	0.697
MCI-0022-08WB-NE	1.4	0.878
MCI-0023-08WB-NE	1.4	0.506
MCI-0024-08WB-NE	1.8	0.275
MCI-0043-08WB-NE	1.7	0.352
MCI-0054-08WB-NE	1.5	0.288
MCI-0055-08WB-NE	1.3	0.188
MCI-0056-08WB-NE	1.3	0.153
MCI-0057-08WB-NE	1.3	0.0422
MCI-0058-08WB-NE	1.4	0.0493

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0061-08WB-NE	0.63	0.231
MCI-0062-08WB-NE	0.54	0.19
MCI-0063-08WB-NE	0.84	0.171
MCI-0064-08WB-NE	0.7	0.14
MCI-0065-08WB-NE	0.8	0.163

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0081-08WB-NE	0.6	1.99
MCI-0082-08WB-NE	1.2	0.0868

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX011-0894	0.25J	0.023	0.98

Sample ID	DDTR (mg/kg) (c)
BF-B5-100201-01	0.423

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX012-0894	0.33J	0.013	0.12

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OCT00D1	0.20	0.20	0.59

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0025-08WB-NW	1.8	0.867
MCI-0026-08WB-NW	1.7	0.853
MCI-0027-08WB-NW	1.2	0.711
MCI-0028-08WB-NW	1.4	0.481
MCI-0029-08WB-NW	1.9	0.49
MCI-0044-08WB-NW	1.3	0.327
MCI-0045-08WB-NW	1.2	0.329
MCI-0046-08WB-NW	1.5	0.113
MCI-0047-08WB-NW	1.7	0.0798
MCI-0048-08WB-NW	1.4	0.126

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0066-08WB-NW	0.85	0.118
MCI-0067-08WB-NW	0.57	0.281
MCI-0068-08WB-NW	0.63	0.364
MCI-0069-08WB-NW	0.58	0.239
MCI-0070-08WB-NW	0.79	0.223

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0085-08WB-NW	0.82	0.199

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0030-08WB-SW	2	1.03
MCI-0031-08WB-SW	1.6	0.754
MCI-0032-08WB-SW	1.8	0.74
MCI-0033-08WB-SW	1.9	0.808
MCI-0034-08WB-SW	1.6	0.51
MCI-0049-08WB-SW	1.5	0.356
MCI-0050-08WB-SW	1.6	0.268
MCI-0051-08WB-SW	1.8	0.034
MCI-0052-08WB-SW	1.6	0.106
MCI-0053-08WB-SW	1.5	0.1

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0076-08WB-SW	0.59	0.456
MCI-0077-08WB-SW	0.57	0.509
MCI-0078-08WB-SW	0.59	0.484
MCI-0079-08WB-SW	0.94	0.36
MCI-0080-08WB-SW	1.2	0.637

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0084-08WB-SW	0.74	0.291

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX004	0.31	0.14	0.39

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OCS0102	0.18	0.29	0.92
OCS0103	0.20	0.094	0.40
OCS0104	0.13	0.15	0.44
OCS0105	0.15	0.15	0.63
OCS0106	0.13	0.91	1.5
OCS0107	0.18	0.11	0.48
OCS0108	0.20	0.34	1.1
OCS0109	0.13	0.69	1.3
OCS0110	0.13	0.088	0.51

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX009	0.82	0.40	20

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX007	0.16J	0.010U	0.023

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OAFX008	1.1	0.063	16

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0035-08WB-SE	1.4	0.773
MCI-0036-08WB-SE	1.4	1.03
MCI-0037-08WB-SE	1.2	0.742
MCI-0038-08WB-SE	1.8	0.64
MCI-0039-08WB-SE	1.5	0.56
MCI-0040-08WB-SE	1.5	0.215
MCI-0041-08WB-SE	1.4	0.554
MCI-0042-08WB-SE	1.6	0.452
MCI-0059-08WB-SE	1.1	0.143
MCI-0060-08WB-SE	1.6	0.0519

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0071-08WB-SE	0.66	0.0543
MCI-0072-08WB-SE	0.59	0.353
MCI-0073-08WB-SE	0.83	0.319
MCI-0074-08WB-SE	0.61	0.44
MCI-0075-08WB-SE	0.59	0.473

Sample ID	Mercury (mg/kg)	HCB (mg/kg)
MCI-0083-08WB-SE	0.82	0.183

Sample ID	DDTR (mg/kg) (c)
BF-B6-100201-01	0.598

Sample ID	DDTR (mg/kg)
GB-B6-100201-06A	0.5825
GB-B6-100201-06B	1.435
GB-B6-100201-06C	1.285

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
ORT2802	0.55	0.21	0.55

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
OBFX002	0.12J	0.057	0.40

Sample ID	Hg (mg/kg)	HCB (mg/kg)	DDTR (mg/kg)
ORT3003	0.95	0.01U	0.045

BASIN

INLET CHANNEL

TOMBIGBEE RIVER

Source: USDA/FSA - Aerial Photography Field Office - 2006

0 200 400 600 800 Feet

Olin McIntosh OU-2

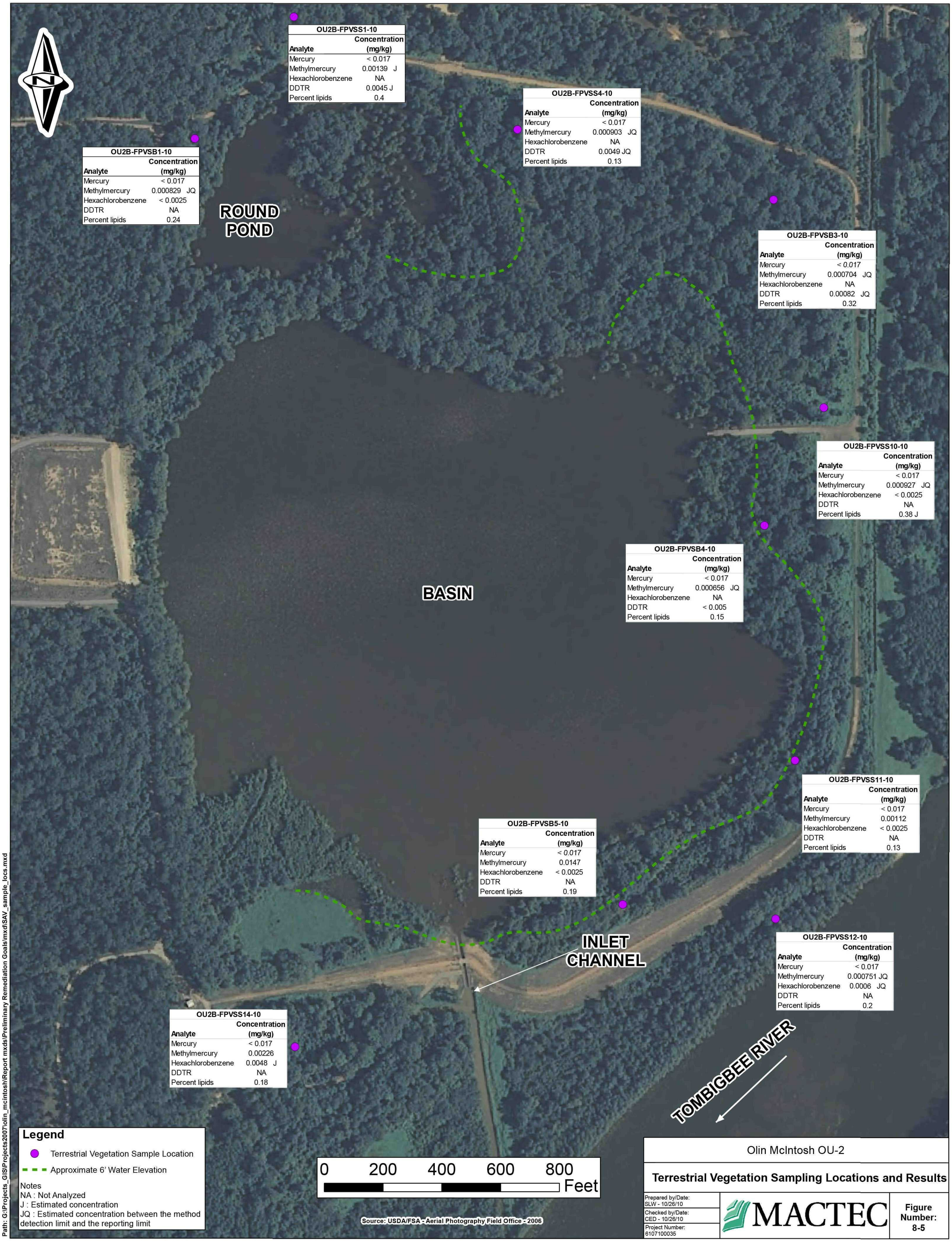
COPC Concentrations in Biotic Species

Prepared by/Date: SAP - 5/13/10
Checked by/Date: MKB 5/13/10
Project Number: 6100080035

MACTEC

Figure Number: 8-4

Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\MXDS_05_12_08\bird maps for Emmett\1994_aquatic_species_Updated050510.mxd) 5/13/2010 -- 2:23:55 PM



Olin McIntosh OU-2

Terrestrial Vegetation Sampling Locations and Results

Prepared by/Date: SLW - 10/26/10	MACTEC
Checked by/Date: CED - 10/26/10	Figure Number: 8-5
Project Number: 6107100035	

ROUND POND

BASIN

INLET CHANNEL

TOMBIGBEE RIVER

OU2B-INS1-10	
Analyte	Concentration (mg/kg)
Flying Insects	
Mercury	0.32
Hexachlorobenzene	0.0018 JQ
DDTR	0.659 J
Percent lipids	3.2

OU2B-INS2-10	
Analyte	Concentration (mg/kg)
Crawling Insects	
Mercury	0.37
Hexachlorobenzene	0.0088
DDTR	0.349 J
Percent lipids	3.3

OU2B-INSNE-10	
Analyte	Concentration (mg/kg)
Spiders	
Mercury	0.17
Hexachlorobenzene	0.0023 JQ
DDTR	0.335
Percent lipids	3.5
Crawling Insects	
Mercury	0.075
Hexachlorobenzene	0.0099
DDTR	0.0463
Percent lipids	4.4

OU2B-INS3-10	
Analyte	Concentration (mg/kg)
Flying Insects	
Mercury	0.31
Hexachlorobenzene	0.0029 J
DDTR	0.337 J
Percent lipids	4.0

OU2B-INS5-10	
Analyte	Concentration (mg/kg)
Crawling Insects	
Mercury	0.067
Hexachlorobenzene	0.015
DDTR	0.0095 J
Percent lipids	3.3
Flying Insects	
Mercury	0.14
Hexachlorobenzene	0.0133
DDTR	0.12
Percent lipids	4.0

OU2B-INS4-10	
Analyte	Concentration (mg/kg)
Crawling Insects	
Mercury	0.0075 JQ
Hexachlorobenzene	0.0025 JQ
DDTR	0.0041 JQ
Percent lipids	2.8
Flying Insects	
Mercury	0.26
Hexachlorobenzene	0.017
DDTR	0.282 J
Percent lipids	4.1

OU2B-INSSE-10	
Analyte	Concentration (mg/kg)
Spiders	
Mercury	0.13
Hexachlorobenzene	0.001 JQ
DDTR	0.141
Percent lipids	3.6

OU2B-INS6-10	
Analyte	Concentration (mg/kg)
Spiders	
Mercury	0.15 J
Hexachlorobenzene	0.0157
DDTR	0.198 J
Percent lipids	3.9
Crawling Insects	
Mercury	0.026
Hexachlorobenzene	0.035
DDTR	0.0042 JQ
Percent lipids	3.6
Flying Insects	
Mercury	0.71
Hexachlorobenzene	0.039
DDTR	0.0379 J
Percent lipids	3.3

Legend

Insect Sample Location

Approximate 6' Water Elevation

Notes:
J : Estimated concentration
JQ : Estimated concentration between the method detection limit and reporting limit

0 200 400 600 800 Feet

Source: USDA/FSA - Aerial Photography Field Office - 2009

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\Preliminary Remediation Goals\mxd\insect sample locs.mxd

Olin McIntosh OU-2

Insect Sampling Locations and Results

Prepared by/Date: SLW - 10/26/10	MACTEC
Checked by/Date: CED - 10/26/10	Figure Number: 8-6
Project Number: 6107100035	

Appendix L Index

(Titles below are active links to the Appendix L data file)

Crayfish, 1994, 3 ft, Mercury

Crayfish, 1994, 3 ft, HCB

Crayfish, 1994, 3 ft, DDTR, ND = 0

Crayfish, 1994, 3 ft, DDTR, ND = ½ DL

Bullfrog, 1994, 3 ft, Mercury

Bullfrog, 1994, 6 ft, Mercury

Bullfrog, 1994, 3 ft, HCB

Bullfrog, 1994, 6 ft, HCB

Bullfrog, 1994, 3 ft, DDTR, ND = 0

Bullfrog, 1994, 3 ft, DDTR, ND = ½ DL

Bullfrog, 1994, 6 ft, DDTR, ND = 0

Bullfrog, 1994, 6 ft, DDTR, ND = ½ DL

Little Blue Heron, 1994, 3 ft, Mercury

Little Blue Heron, 1994, 6 ft, Mercury

Little Blue Heron, 1994, 3 ft, HCB

Little Blue Heron, 1994, 6 ft, HCB

Little Blue Heron, 1994, 3 ft, DDTR, ND = 0

Little Blue Heron, 1994, 3 ft, DDTR, ND = ½ DL

Little Blue Heron, 1994, 6 ft, DDTR, ND = 0

Little Blue Heron, 1994, 6 ft, DDTR, ND = ½ DL

Raccoon, 1994, Mercury

Raccoon, 1994, HCB

Raccoon, 1994, DDTR, ND = 0

Raccoon, 1994, DDTR, ND = ½ DL

Large Mouth Bass Filet, 2008, Mercury

Large Mouth Bass Filet, 2008, HCB

Large Mouth Bass Filet, 2001, DDTR, ND = 0

Large Mouth Bass Filet, 2001, DDTR, ND = ½ DL

Large Mouth Bass Filet, 2006, Mercury

Large Mouth Bass Whole Body, 2008, Mercury

Large Mouth Bass Whole Body, 2008, HCB

Mosquitofish Whole Body, 1994, 3 ft, Mercury

Mosquitofish Whole Body, 1994, 6 ft, Mercury

Mosquitofish Whole Body, 1994, 3 ft, HCB

Mosquitofish Whole Body, 1994, 6 ft, HCB

Mosquitofish Whole Body, 1994, 3 ft, DDTR, ND = 0

Mosquitofish Whole Body, 1994, 3 ft, DDTR, ND = ½ DL

Mosquitofish Whole Body, 1994, 6 ft, DDTR, ND = 0

Mosquitofish Whole Body, 1994, 6 ft, DDTR, ND = ½ DL

Mosquitofish Whole Body, 2001, 3 ft, Mercury

Mosquitofish Whole Body, 2001, 6 ft, Mercury

Mosquitofish Whole Body, 2001, 3 ft, HCB

Mosquitofish Whole Body, 2001, 6 ft, HCB

Mosquitofish Whole Body, 2001, 3 ft, DDTR, ND = 0

Mosquitofish Whole Body, 2001, 3 ft, DDTR, ND = ½ DL

Mosquitofish Whole Body, 2001, 6 ft, DDTR, ND = 0

Mosquitofish Whole Body, 2001, 6 ft, DDTR, ND = ½ DL

Bluegill Whole Body, 2008, Mercury

Bluegill Whole Body, 2008, HCB

Silverside Whole Body, 2008, Mercury

Silverside Whole Body, 2008, Mercury

Forage Fish Whole Body, 2008, Mercury

Forage Fish Whole Body, 2008, HCB

Note: 3 ft and 6 ft elevations correspond to 3 ft or 6 ft NAVD88

Basin Crayfish Mercury

Sample ID	Date	Detect	Mercury (mg/kg)
OCTXX01	1994	1	0.2
OCS0102	1994	1	0.18
OCS0103	1994	1	0.2
OCS0104	1994	1	0.13
OCS0105	1994	1	0.15
OCS0106	1994	1	0.13
OCS0107	1994	1	0.18
OCS0108 (a)	1994	1	0.2
OCS0109	1994	1	0.13
OCS0110	1994	1	0.13

(a) - This sample contained 2 crayfish.

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Crayfish Mercury

General Statistics

Number of Valid Observations	10	Number of Distinct Observations	4

Raw Statistics		Log-transformed Statistics	
Minimum	0.13	Minimum of Log Data	-2.04
Maximum	0.2	Maximum of Log Data	-1.609
Mean	0.163	Mean of log Data	-1.832
Median	0.165	SD of log Data	0.198
SD	0.032		
Coefficient of Variation	0.196		
Skewness	0.0672		

Warning: There are only 4 Distinct Values in this data
There are insufficient Distinct Values to perform some GOF tests and bootstrap methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values to compute bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10-15 or more observations for accurate and meaningful bootstrap results.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.794	Shapiro Wilk Test Statistic	0.789
Shapiro Wilk Critical Value	0.842	Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.182	95% H-UCL	0.185
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.208
95% Adjusted-CLT UCL	0.18	97.5% Chebyshev (MVUE) UCL	0.227
95% Modified-t UCL	0.182	99% Chebyshev (MVUE) UCL	0.265

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	20.08	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.0081		
MLE of Mean	0.163		
MLE of Standard Deviation	0.0364		
nu star	401.7		
Approximate Chi Square Value (.05)	356.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0267	95% CLT UCL	0.18
Adjusted Chi Square Value	348.8	95% Jackknife UCL	0.182
		95% Standard Bootstrap UCL	0.179

Anderson-Darling Test Statistic	0.954	95% Bootstrap-t UCL	0.181
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	0.177
Kolmogorov-Smirnov Test Statistic	0.265	95% Percentile Bootstrap UCL	0.179
Kolmogorov-Smirnov 5% Critical Value	0.266	95% BCA Bootstrap UCL	0.177
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.207
		97.5% Chebyshev(Mean, Sd) UCL	0.226
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.264
95% Approximate Gamma UCL	0.184		
95% Adjusted Gamma UCL	0.188		
Potential UCL to Use		Use 95% Approximate Gamma UCL	0.184

Basin Crayfish HCB

Sample ID	Date	Detect	HCB (mg/kg)
OCTXX01	1994	1	0.2
OCS0102	1994	1	0.29
OCS0103	1994	1	0.094
OCS0104	1994	1	0.15
OCS0105	1994	1	0.15
OCS0106	1994	1	0.91
OCS0107	1994	1	0.11
OCS0108 (a)	1994	1	0.34
OCS0109	1994	1	0.69
OCS0110	1994	1	0.088

(a) - This sample contained 2 crayfish.

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Crayfish HCB

General Statistics

Number of Valid Observations	10	Number of Distinct Observations	9

Raw Statistics		Log-transformed Statistics	
Minimum	0.088	Minimum of Log Data	-2.43
Maximum	0.91	Maximum of Log Data	-0.0943
Mean	0.302	Mean of log Data	-1.519
Median	0.175	SD of log Data	0.812
SD	0.28		
Coefficient of Variation	0.926		
Skewness	1.579		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.77	Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.842	Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.464	95% H-UCL	0.638
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.632
95% Adjusted-CLT UCL	0.495	97.5% Chebyshev (MVUE) UCL	0.779
95% Modified-t UCL	0.472	99% Chebyshev (MVUE) UCL	1.068

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.257	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.241		
MLE of Mean	0.302		
MLE of Standard Deviation	0.27		
nu star	25.13		
Approximate Chi Square Value (.05)	14.71	Nonparametric Statistics	
Adjusted Level of Significance	0.0267	95% CLT UCL	0.448
Adjusted Chi Square Value	13.34	95% Jackknife UCL	0.464
		95% Standard Bootstrap UCL	0.44
Anderson-Darling Test Statistic	0.56	95% Bootstrap-t UCL	0.657
Anderson-Darling 5% Critical Value	0.738	95% Hall's Bootstrap UCL	1.199
Kolmogorov-Smirnov Test Statistic	0.208	95% Percentile Bootstrap UCL	0.454
Kolmogorov-Smirnov 5% Critical Value	0.271	95% BCA Bootstrap UCL	0.477
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.688
		97.5% Chebyshev(Mean, Sd) UCL	0.855
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.182
95% Approximate Gamma UCL	0.516		

95% Adjusted Gamma UCL	0.569		
Potential UCL to Use		Use 95% Approximate Gamma UCL	0.516

Basin Crayfish DDTR with Non-detect Isomers Being Eqaul to Zero

Sample ID	Date	Detect	DDTR (mg/kg)
OCTXX01	1994	1	0.66
OCS0102	1994	1	0.96
OCS0103	1994	1	0.41
OCS0104	1994	1	0.48
OCS0105	1994	1	0.68
OCS0106	1994	1	1.6
OCS0107	1994	1	0.51
OCS0108 (a)	1994	1	1.2
OCS0109	1994	1	1.4
OCS0110	1994	1	0.54

(a) - This sample contained 2 crayfish.

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Crayfish DDTr (ND-0)

General Statistics			
Number of Valid Observations	10	Number of Distinct Observations	10
Raw Statistics		Log-transformed Statistics	
Minimum	0.41	Minimum of Log Data	-0.892
Maximum	1.6	Maximum of Log Data	0.47
Mean	0.844	Mean of log Data	-0.277
Median	0.67	SD of log Data	0.482
SD	0.422		
Coefficient of Variation	0.501		
Skewness	0.819		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.875	Shapiro Wilk Test Statistic	0.922
Shapiro Wilk Critical Value	0.842	Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.089	95% H-UCL	1.212
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.409
95% Adjusted-CLT UCL	1.101	97.5% Chebyshev (MVUE) UCL	1.655
95% Modified-t UCL	1.095	99% Chebyshev (MVUE) UCL	2.138
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.443	Data appear Normal at 5% Significance Level	
Theta Star	0.245		
MLE of Mean	0.844		
MLE of Standard Deviation	0.455		
nu star	68.86		
Approximate Chi Square Value (.05)	50.76	Nonparametric Statistics	
Adjusted Level of Significance	0.0267	95% CLT UCL	1.064
Adjusted Chi Square Value	48.07	95% Jackknife UCL	1.089
		95% Standard Bootstrap UCL	1.054
Anderson-Darling Test Statistic	0.459	95% Bootstrap-t UCL	1.168
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	1.081
Kolmogorov-Smirnov Test Statistic	0.219	95% Percentile Bootstrap UCL	1.076
Kolmogorov-Smirnov 5% Critical Value	0.267	95% BCA Bootstrap UCL	1.093
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.426
		97.5% Chebyshev(Mean, Sd) UCL	1.678
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.173
95% Approximate Gamma UCL	1.145		
95% Adjusted Gamma UCL	1.209		

Potential UCL to Use	Use 95% Student's-t UCL	1.089

Basin Crayfish DDTR with Non-detect Isomers Being Eqaul to Half the PQL

Sample ID	Date	Detect	DDTR (mg/kg)
OCTXX01	1994	1	0.68
OCS0102	1994	1	0.97
OCS0103	1994	1	0.43
OCS0104	1994	1	0.5
OCS0105	1994	1	0.69
OCS0106	1994	1	1.6
OCS0107	1994	1	0.52
OCS0108 (a)	1994	1	1.2
OCS0109	1994	1	1.4
OCS0110	1994	1	0.55

(a) - This sample contained 2 crayfish.

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Crayfish DDTR (ND/2)

General Statistics			
Number of Valid Observations	10	Number of Distinct Observations	10

Raw Statistics		Log-transformed Statistics	
Minimum	0.43	Minimum of Log Data	-0.844
Maximum	1.6	Maximum of Log Data	0.47
Mean	0.854	Mean of log Data	-0.259
Median	0.685	SD of log Data	0.467
SD	0.416		
Coefficient of Variation	0.487		
Skewness	0.823		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.873	Shapiro Wilk Test Statistic	0.917
Shapiro Wilk Critical Value	0.842	Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.095	95% H-UCL	1.208
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.407
95% Adjusted-CLT UCL	1.107	97.5% Chebyshev (MVUE) UCL	1.648
95% Modified-t UCL	1.101	99% Chebyshev (MVUE) UCL	2.121
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.648	Data appear Normal at 5% Significance Level	
Theta Star	0.234		
MLE of Mean	0.854		
MLE of Standard Deviation	0.447		
nu star	72.96		
Approximate Chi Square Value (.05)	54.29	Nonparametric Statistics	
Adjusted Level of Significance	0.0267	95% CLT UCL	1.07
Adjusted Chi Square Value	51.5	95% Jackknife UCL	1.095
		95% Standard Bootstrap UCL	1.062
Anderson-Darling Test Statistic	0.475	95% Bootstrap-t UCL	1.163
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	1.072
Kolmogorov-Smirnov Test Statistic	0.224	95% Percentile Bootstrap UCL	1.064
Kolmogorov-Smirnov 5% Critical Value	0.267	95% BCA Bootstrap UCL	1.097
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.427
		97.5% Chebyshev(Mean, Sd) UCL	1.675
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.161
95% Approximate Gamma UCL	1.148		

95% Adjusted Gamma UCL	1.21		
Potential UCL to Use		Use 95% Student's-t UCL	1.095

Basin Bullfrog Mercury - 3ft

Sample ID	Date	Detect	Mercury (mg/kg)
OBFXX02	1994	1	0.21
OBFXX06	1994	1	0.12
OBFXX07	1994	1	0.16
OBFXX08	1994	1	0.17
OBFXX09	1994	1	0.46
OBFXX10	1994	1	0.42
OBFXX11	1994	1	0.25
OBFXX12	1994	1	0.33

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog Mercury - 3 ft

General Statistics

Number of Valid Observations	8	Number of Distinct Observations	8

Raw Statistics		Log-transformed Statistics	
Minimum	0.12	Minimum of Log Data	-2.12
Maximum	0.46	Maximum of Log Data	-0.777
Mean	0.265	Mean of log Data	-1.428
Median	0.23	SD of log Data	0.481
SD	0.126		
Coefficient of Variation	0.474		
Skewness	0.593		

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.915	Shapiro Wilk Test Statistic	0.955
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.349	95% H-UCL	0.411
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.463
95% Adjusted-CLT UCL	0.348	97.5% Chebyshev (MVUE) UCL	0.549
95% Modified-t UCL	0.351	99% Chebyshev (MVUE) UCL	0.718

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.308	Data appear Normal at 5% Significance Level	
Theta Star	0.0801		
MLE of Mean	0.265		
MLE of Standard Deviation	0.146		
nu star	52.93		
Approximate Chi Square Value (.05)	37.22	Nonparametric Statistics	
Adjusted Level of Significance	0.0195	95% CLT UCL	0.338
Adjusted Chi Square Value	33.91	95% Jackknife UCL	0.349
		95% Standard Bootstrap UCL	0.332
Anderson-Darling Test Statistic	0.267	95% Bootstrap-t UCL	0.374
Anderson-Darling 5% Critical Value	0.719	95% Hall's Bootstrap UCL	0.351

Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	0.334
Kolmogorov-Smirnov 5% Critical Value	0.295	95% BCA Bootstrap UCL	0.339
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.459
		97.5% Chebyshev(Mean, Sd) UCL	0.543
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.707
95% Approximate Gamma UCL	0.377		
95% Adjusted Gamma UCL	0.414		
Potential UCL to Use		Use 95% Student's-t UCL	0.349

Basin Bullfrog Mercury - 6ft

Sample ID	Date	Detect	Mercury (mg/kg)
OBFXX02	1994	1	0.21
OBFXX06	1994	1	0.12
OBFXX07	1994	1	0.16
OBFXX08	1994	1	0.17
OBFXX09	1994	1	0.46
OBFXX10	1994	1	0.42
OBFXX11	1994	1	0.25
OBFXX12	1994	1	0.33
OBF03-RP	1994	1	0.2
OBF04-RP	1994	1	0.22
OBF05-RP	1994	1	0.1
OBN01-RP	1994	1	0.23

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog Mercury - 6 ft

General Statistics			
Number of Valid Observations	12	Number of Distinct Observations	12
Raw Statistics		Log-transformed Statistics	
Minimum	0.1	Minimum of Log Data	-2.303
Maximum	0.46	Maximum of Log Data	-0.777
Mean	0.239	Mean of log Data	-1.527
Median	0.215	SD of log Data	0.458
SD	0.112		
Coefficient of Variation	0.467		
Skewness	0.949		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.905	Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.859	Shapiro Wilk Critical Value	0.859
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.297	95% H-UCL	0.322
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.38
95% Adjusted-CLT UCL	0.302	97.5% Chebyshev (MVUE) UCL	0.441
95% Modified-t UCL	0.299	99% Chebyshev (MVUE) UCL	0.56
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.079	Data appear Normal at 5% Significance Level	
Theta Star	0.0586		
MLE of Mean	0.239		
MLE of Standard Deviation	0.118		
nu star	97.89		
Approximate Chi Square Value (.05)	76.07	Nonparametric Statistics	
Adjusted Level of Significance	0.029	95% CLT UCL	0.292
Adjusted Chi Square Value	73.14	95% Jackknife UCL	0.297
		95% Standard Bootstrap UCL	0.29
Anderson-Darling Test Statistic	0.268	95% Bootstrap-t UCL	0.315
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL	0.322
Kolmogorov-Smirnov Test Statistic	0.152	95% Percentile Bootstrap UCL	0.297
Kolmogorov-Smirnov 5% Critical Value	0.246	95% BCA Bootstrap UCL	0.299
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.38
		97.5% Chebyshev(Mean, Sd) UCL	0.441
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.56
95% Approximate Gamma UCL	0.308		
95% Adjusted Gamma UCL	0.32		

Potential UCL to Use	Use 95% Student's-t UCL	0.297

Basin Bullfrog HCB - 3ft

Sample ID	Date	Detect	HCB (mg/kg)
OBFXX02-0794	1994	1	0.042
OBFXX06-0894	1994	1	0.057
OBFXX07-0894	1994	0	0.01
OBFXX08-0894	1994	1	0.046
OBFXX09-0894	1994	1	0.038
OBFXX10-0894	1994	1	0.035
OBFXX11-0894	1994	1	0.023
OBFXX12-0894	1994	1	0.013

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog HCB-3ft

General Statistics

Number of Valid Data	8	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	1
		Percent Non-Detects	12.50%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.013	Minimum Detected	-4.343
Maximum Detected	0.057	Maximum Detected	-2.865
Mean of Detected	0.0363	Mean of Detected	-3.407
SD of Detected	0.0146	SD of Detected	0.498
Minimum Non-Detect	0.01	Minimum Non-Detect	-4.605
Maximum Non-Detect	0.01	Maximum Non-Detect	-4.605

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.978	Shapiro Wilk Test Statistic	0.899
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0324	Mean	-3.644
SD	0.0175	SD	0.812
95% DL/2 (t) UCL	0.0441	95% H-Stat (DL/2) UCL	0.0694

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.032	Mean in Log Scale	-3.553
SD	0.0172	SD in Log Scale	0.618
95% MLE (t) UCL	0.0435	Mean in Original Scale	0.033
95% MLE (Tiku) UCL	0.0438	SD in Original Scale	0.0163
		95% Percentile Bootstrap UCL	0.0416
		95% BCA Bootstrap UCL	0.0423

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	3.326	Data appear Normal at 5% Significance Level

Theta Star	0.0109		
nu star	46.56		
A-D Test Statistic	0.328	Nonparametric Statistics	
5% A-D Critical Value	0.71	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.71	Mean	0.0334
5% K-S Critical Value	0.313	SD	0.0148
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00565
		95% KM (t) UCL	0.0441
Assuming Gamma Distribution		95% KM (z) UCL	0.0427
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0441
Minimum	0.0106	95% KM (bootstrap t) UCL	0.0433
Maximum	0.057	95% KM (BCA) UCL	0.0439
Mean	0.0331	95% KM (Percentile Bootstrap) UCL	0.0434
Median	0.0365	95% KM (Chebyshev) UCL	0.058
SD	0.0163	97.5% KM (Chebyshev) UCL	0.0687
k star	2.405	99% KM (Chebyshev) UCL	0.0896
Theta star	0.0138		
Nu star	38.49	Potential UCLs to Use	
AppChi2	25.28	95% KM (t) UCL	0.0441
95% Gamma Approximate UCL	0.0504	95% KM (Percentile Bootstrap) UCL	0.0434
95% Adjusted Gamma UCL	0.0563		

Note: DL/2 is not a recommended method.

Basin Bullfrog HCB - 6 ft

Sample ID	Date	Detect	HCB-6ft (mg/kg)
OBFXX02-0794	1994	1	0.042
OBFXX06-0894	1994	1	0.057
OBFXX07-0894	1994	0	0.01
OBFXX08-0894	1994	1	0.046
OBFXX09-0894	1994	1	0.038
OBFXX10-0894	1994	1	0.035
OBFXX11-0894	1994	1	0.023
OBFXX12-0894	1994	1	0.013
OBFXX03-0794	1994	1	0.012
OBFXX04-0794	1994	1	0.016
OBFXX05-0794	1994	1	0.013
OBNXX01-0794	1994	0	0.01

PREPARED BY/DATE: MKB 5/10/10
CHECKED BY/DATE: EJS 5/13/10

Bullfrog HCB-6ft

General Statistics			
Number of Valid Data	12	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	2
		Percent Non-Detects	16.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.012	Minimum Detected	-4.423
Maximum Detected	0.057	Maximum Detected	-2.865
Mean of Detected	0.0295	Mean of Detected	-3.675
SD of Detected	0.0162	SD of Detected	0.597
Minimum Non-Detect	0.01	Minimum Non-Detect	-4.605
Maximum Non-Detect	0.01	Maximum Non-Detect	-4.605

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.898	Shapiro Wilk Test Statistic	0.884
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0254	Mean	-3.946
SD	0.0175	SD	0.831
95% DL/2 (t) UCL	0.0345	95% H-Stat (DL/2) UCL	0.039
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0245	Mean in Log Scale	-3.91
SD	0.0183	SD in Log Scale	0.773
95% MLE (t) UCL	0.034	Mean in Original Scale	0.0256
95% MLE (Tiku) UCL	0.034	SD in Original Scale	0.0172
		95% Percentile Bootstrap UCL	0.0332
		95% BCA Bootstrap UCL	0.0341
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.482	Data appear Normal at 5% Significance Level	
Theta Star	0.0119		
nu star	49.63		
A-D Test Statistic	0.529	Nonparametric Statistics	
5% A-D Critical Value	0.731	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.731	Mean	0.0266
5% K-S Critical Value	0.268	SD	0.0155

Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00471
		95% KM (t) UCL	0.035
Assuming Gamma Distribution		95% KM (z) UCL	0.0343
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0349
Minimum	0.00294	95% KM (bootstrap t) UCL	0.0361
Maximum	0.057	95% KM (BCA) UCL	0.0346
Mean	0.0256	95% KM (Percentile Bootstrap) UCL	0.0348
Median	0.0195	95% KM (Chebyshev) UCL	0.0471
SD	0.0173	97.5% KM (Chebyshev) UCL	0.056
k star	1.555	99% KM (Chebyshev) UCL	0.0734
Theta star	0.0165		
Nu star	37.32	Potential UCLs to Use	
AppChi2	24.33	95% KM (t) UCL	0.035
95% Gamma Approximate UCL	0.0393	95% KM (Percentile Bootstrap) UCL	0.0348
95% Adjusted Gamma UCL	0.0421		

Note: DL/2 is not a recommended method.

Basin Bullfrog DDTR (ND=0), 3ft

Sample ID	Date	Detect	DDTR (mg/kg)
OBFXX02-0794	1994	1	1.166
OBFXX06-0894	1994	1	0.40
OBFXX07-0894	1994	1	0.02
OBFXX08-0894	1994	1	0.19
OBFXX09-0894	1994	1	0.54
OBFXX10-0894	1994	1	1.02
OBFXX11-0894	1994	1	0.98
OBFXX12-0894	1994	1	0.12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog DDTR (ND=0) - 3ft

General Statistics

Number of Valid Observations	8	Number of Distinct Observations	8

Raw Statistics		Log-transformed Statistics	
Minimum	0.023	Minimum of Log Data	-3.772
Maximum	1.166	Maximum of Log Data	0.154
Mean	0.555	Mean of log Data	-1.117
Median	0.471	SD of log Data	1.351
SD	0.447		
Coefficient of Variation	0.806		
Skewness	0.255		

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.883
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.855	95% H-UCL	7.448
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.13
95% Adjusted-CLT UCL	0.83	97.5% Chebyshev (MVUE) UCL	2.756
95% Modified-t UCL	0.857	99% Chebyshev (MVUE) UCL	3.984

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.76	Data appear Normal at 5% Significance Level	
Theta Star	0.73		
MLE of Mean	0.555		
MLE of Standard Deviation	0.637		
nu star	12.16		
Approximate Chi Square Value (.05)	5.332	Nonparametric Statistics	
Adjusted Level of Significance	0.0195	95% CLT UCL	0.815
Adjusted Chi Square Value	4.246	95% Jackknife UCL	0.855
		95% Standard Bootstrap UCL	0.803
Anderson-Darling Test Statistic	0.323	95% Bootstrap-t UCL	0.877
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	0.771

Kolmogorov-Smirnov Test Statistic	0.208	95% Percentile Bootstrap UCL	0.814
Kolmogorov-Smirnov 5% Critical Value	0.301	95% BCA Bootstrap UCL	0.804
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.245
		97.5% Chebyshev(Mean, Sd) UCL	1.543
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.129
95% Approximate Gamma UCL	1.266		
95% Adjusted Gamma UCL	1.589		
Potential UCL to Use		Use 95% Student's-t UCL	0.855

Basin Bullfrog DDTR (ND=1/2 DL), 3ft

Sample ID	Date	Detect	DDTR (mg/kg)
OBFXX02-0794	1994	1	1.181
OBFXX06-0894	1994	1	0.42
OBFXX07-0894	1994	1	0.05
OBFXX08-0894	1994	1	0.21
OBFXX09-0894	1994	1	0.57
OBFXX10-0894	1994	1	1.04
OBFXX11-0894	1994	1	1.00
OBFXX12-0894	1994	1	0.15

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog DDTR (ND=1/2) - 3ft

General Statistics

Number of Valid Observations	8	Number of Distinct Observations	8

Raw Statistics		Log-transformed Statistics	
Minimum	0.048	Minimum of Log Data	-3.037
Maximum	1.181	Maximum of Log Data	0.166
Mean	0.576	Mean of log Data	-0.972
Median	0.491	SD of log Data	1.132
SD	0.445		
Coefficient of Variation	0.773		
Skewness	0.256		

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.897	Shapiro Wilk Test Statistic	0.907
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.874	95% H-UCL	3.589
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.787
95% Adjusted-CLT UCL	0.85	97.5% Chebyshev (MVUE) UCL	2.282
95% Modified-t UCL	0.876	99% Chebyshev (MVUE) UCL	3.255

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.917	Data appear Normal at 5% Significance Level	
Theta Star	0.628		
MLE of Mean	0.576		
MLE of Standard Deviation	0.601		
nu star	14.66		
Approximate Chi Square Value (.05)	7.029	Nonparametric Statistics	
Adjusted Level of Significance	0.0195	95% CLT UCL	0.835
Adjusted Chi Square Value	5.746	95% Jackknife UCL	0.874
		95% Standard Bootstrap UCL	0.812
Anderson-Darling Test Statistic	0.32	95% Bootstrap-t UCL	0.922
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	0.781

Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	0.811
Kolmogorov-Smirnov 5% Critical Value	0.3	95% BCA Bootstrap UCL	0.817
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.262
		97.5% Chebyshev(Mean, Sd) UCL	1.559
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.142
95% Approximate Gamma UCL	1.201		
95% Adjusted Gamma UCL	1.469		
Potential UCL to Use		Use 95% Student's-t UCL	0.874

Basin Bullfrog DDTR (ND=0), 6ft

Sample ID	Date	Detect	DDTR (mg/kg)
OBFXX02-0794	1994	1	1.181
OBFXX03-0794	1994	1	0.32
OBFXX04-0794	1994	1	2.80
OBFXX05-0794	1994	1	0.43
OBFXX06-0894	1994	1	0.42
OBFXX07-0894	1994	1	0.05
OBFXX08-0894	1994	1	0.21
OBFXX09-0894	1994	1	0.57
OBFXX10-0894	1994	1	1.04
OBFXX11-0894	1994	1	1.00
OBFXX12-0894	1994	1	0.15
OBNXX01-0794	1994	1	0.33

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog DDTR (ND=0) - 6ft

General Statistics			
Number of Valid Observations	12	Number of Distinct Observations	12
Raw Statistics		Log-transformed Statistics	
Minimum	0.023	Minimum of Log Data	-3.772
Maximum	2.785	Maximum of Log Data	1.024
Mean	0.687	Mean of log Data	-0.93
Median	0.401	SD of log Data	1.243
SD	0.757		
Coefficient of Variation	1.102		
Skewness	2.172		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.755	Shapiro Wilk Test Statistic	0.948
Shapiro Wilk Critical Value	0.859	Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.08	95% H-UCL	3.021
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.086
95% Adjusted-CLT UCL	1.193	97.5% Chebyshev (MVUE) UCL	2.655
95% Modified-t UCL	1.103	99% Chebyshev (MVUE) UCL	3.771
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.832	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.826		
MLE of Mean	0.687		
MLE of Standard Deviation	0.753		
nu star	19.97		
Approximate Chi Square Value (.05)	10.83	Nonparametric Statistics	
Adjusted Level of Significance	0.029	95% CLT UCL	1.047
Adjusted Chi Square Value	9.813	95% Jackknife UCL	1.08
		95% Standard Bootstrap UCL	1.029
Anderson-Darling Test Statistic	0.242	95% Bootstrap-t UCL	1.403
Anderson-Darling 5% Critical Value	0.756	95% Hall's Bootstrap UCL	2.449
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	1.066
Kolmogorov-Smirnov 5% Critical Value	0.252	95% BCA Bootstrap UCL	1.191
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.64
		97.5% Chebyshev(Mean, Sd) UCL	2.052
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.862
95% Approximate Gamma UCL	1.267		
95% Adjusted Gamma UCL	1.398		

Potential UCL to Use	Use 95% Approximate Gamma UCL	1.267

Basin Bullfrog DDTR (ND=1/2 DL), 6ft

Sample ID	Date	Detect	DDTR (mg/kg)
OBFXX02-0794	1994	1	1.181
OBFXX03-0794	1994	1	0.32
OBFXX04-0794	1994	1	2.80
OBFXX05-0794	1994	1	0.43
OBFXX06-0894	1994	1	0.42
OBFXX07-0894	1994	1	0.05
OBFXX08-0894	1994	1	0.21
OBFXX09-0894	1994	1	0.57
OBFXX10-0894	1994	1	1.04
OBFXX11-0894	1994	1	1.00
OBFXX12-0894	1994	1	0.15
OBNXX01-0794	1994	1	0.33

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Bullfrog DDTR (ND=1/2 DL) - 6ft

General Statistics			
Number of Valid Observations	12	Number of Distinct Observations	12
Raw Statistics		Log-transformed Statistics	
Minimum	0.048	Minimum of Log Data	-3.037
Maximum	2.795	Maximum of Log Data	1.028
Mean	0.706	Mean of log Data	-0.821
Median	0.421	SD of log Data	1.077
SD	0.754		
Coefficient of Variation	1.067		
Skewness	2.171		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.755	Shapiro Wilk Test Statistic	0.977
Shapiro Wilk Critical Value	0.859	Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.097	95% H-UCL	2.121
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.804
95% Adjusted-CLT UCL	1.21	97.5% Chebyshev (MVUE) UCL	2.267
95% Modified-t UCL	1.12	99% Chebyshev (MVUE) UCL	3.177
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.953	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.741		
MLE of Mean	0.706		
MLE of Standard Deviation	0.724		
nu star	22.87		
Approximate Chi Square Value (.05)	12.99	Nonparametric Statistics	
Adjusted Level of Significance	0.029	95% CLT UCL	1.064
Adjusted Chi Square Value	11.87	95% Jackknife UCL	1.097
		95% Standard Bootstrap UCL	1.046
Anderson-Darling Test Statistic	0.262	95% Bootstrap-t UCL	1.403
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	2.455
Kolmogorov-Smirnov Test Statistic	0.16	95% Percentile Bootstrap UCL	1.079
Kolmogorov-Smirnov 5% Critical Value	0.251	95% BCA Bootstrap UCL	1.231
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.655
		97.5% Chebyshev(Mean, Sd) UCL	2.066
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.872
95% Approximate Gamma UCL	1.244		
95% Adjusted Gamma UCL	1.361		

Potential UCL to Use	Use 95% Approximate Gamma UCL	1.244

Little Blue Heron Whole Body Mercury UCL - 3 ft

Sample ID	Date of Sample	Detect	Mercury (mg/kg)
OAFXX01	1994	1	0.68
OAFXX04	1994	1	0.3
OAFXX07	1994	1	0.41
OAFXX08	1994	1	1.1
OAFXX09	1994	1	0.78

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH Mercury - 3ft

General Statistics

Number of Valid Observations	5	Number of Distinct Observations	5

Raw Statistics		Log-transformed Statistics	
Minimum	0.3	Minimum of Log Data	-1.204
Maximum	1.1	Maximum of Log Data	0.0953
Mean	0.654	Mean of log Data	-0.527
Median	0.68	SD of log Data	0.519
SD	0.316		
Coefficient of Variation	0.484		
Skewness	0.419		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.956	95% H-UCL	1.473
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.313
95% Adjusted-CLT UCL	0.915	97.5% Chebyshev (MVUE) UCL	1.598
95% Modified-t UCL	0.96	99% Chebyshev (MVUE) UCL	2.156

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.154	Data appear Normal at 5% Significance Level	
Theta Star	0.304		
MLE of Mean	0.654		
MLE of Standard Deviation	0.446		
nu star	21.54		

Approximate Chi Square Value (.05)	11.99	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	0.887
Adjusted Chi Square Value	9.042	95% Jackknife UCL	0.956
		95% Standard Bootstrap UCL	0.862
Anderson-Darling Test Statistic	0.226	95% Bootstrap-t UCL	0.996
Anderson-Darling 5% Critical Value	0.681	95% Hall's Bootstrap UCL	0.883
Kolmogorov-Smirnov Test Statistic	0.194	95% Percentile Bootstrap UCL	0.856
Kolmogorov-Smirnov 5% Critical Value	0.358	95% BCA Bootstrap UCL	0.888
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.271
		97.5% Chebyshev(Mean, Sd) UCL	1.538
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.062
95% Approximate Gamma UCL	1.175		
95% Adjusted Gamma UCL	1.558		
Potential UCL to Use		Use 95% Student's-t UCL	0.956

Little Blue Heron Whole Body Mercury UCL - 6 ft

Sample ID	Date of Sample	Detect	Mercury (mg/kg)
OAFXX01	1994	1	0.68
OAFXX02[a]	1994	1	1.7
OAFXX03[a]	1994	1	0.8
OAFXX04	1994	1	0.3
OAFXX07	1994	1	0.41
OAFXX08	1994	1	1.1
OAFXX09	1994	1	0.78

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH Mercury - 6ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.3	Minimum of Log Data	-1.204
Maximum	1.7	Maximum of Log Data	0.531
Mean	0.824	Mean of log Data	-0.332
Median	0.78	SD of log Data	0.581
SD	0.468		
Coefficient of Variation	0.567		
Skewness	1.081		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.919	Shapiro Wilk Test Statistic	0.974
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.168	95% H-UCL	1.583
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.622
95% Adjusted-CLT UCL	1.192	97.5% Chebyshev (MVUE) UCL	1.966
95% Modified-t UCL	1.18	99% Chebyshev (MVUE) UCL	2.641

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.239	Data appear Normal at 5% Significance Level	
Theta Star	0.368		
MLE of Mean	0.824		
MLE of Standard Deviation	0.551		
nu star	31.34		

Approximate Chi Square Value (.05)	19.55	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	1.115
Adjusted Chi Square Value	16.8	95% Jackknife UCL	1.168
		95% Standard Bootstrap UCL	1.094
Anderson-Darling Test Statistic	0.213	95% Bootstrap-t UCL	1.348
Anderson-Darling 5% Critical Value	0.71	95% Hall's Bootstrap UCL	3.02
Kolmogorov-Smirnov Test Statistic	0.168	95% Percentile Bootstrap UCL	1.123
Kolmogorov-Smirnov 5% Critical Value	0.313	95% BCA Bootstrap UCL	1.18
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.595
		97.5% Chebyshev(Mean, Sd) UCL	1.928
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.583
95% Approximate Gamma UCL	1.321		
95% Adjusted Gamma UCL	1.538		
Potential UCL to Use		Use 95% Student's-t UCL	1.168

Little Blue Heron Whole Body HCB UCL - 3 ft

Sample ID	Date of Sample	Detect	HCB (mg/kg)
OAFXX01	1994	1	0.078
OAFXX04	1994	1	0.14
OAFXX07	1994	1	0.024
OAFXX08	1994	1	0.064
OAFXX09	1994	1	0.41

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

HCB - Hexachlorbenzene

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH HCB - 3 ft

General Statistics

Number of Valid Observations	5	Number of Distinct Observations	5

Raw Statistics		Log-transformed Statistics	
Minimum	0.024	Minimum of Log Data	-3.73
Maximum	0.41	Maximum of Log Data	-0.892
Mean	0.143	Mean of log Data	-2.377
Median	0.078	SD of log Data	1.046
SD	0.155		
Coefficient of Variation	1.081		
Skewness	1.854		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.788	Shapiro Wilk Test Statistic	0.985
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.291	95% H-UCL	2.309
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.412
95% Adjusted-CLT UCL	0.318	97.5% Chebyshev (MVUE) UCL	0.529
95% Modified-t UCL	0.3	99% Chebyshev (MVUE) UCL	0.76

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.651	Data appear Normal at 5% Significance Level	
Theta Star	0.22		
MLE of Mean	0.143		
MLE of Standard Deviation	0.178		
nu star	6.507		

Approximate Chi Square Value (.05)	1.904	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	0.257
Adjusted Chi Square Value	1.008	95% Jackknife UCL	0.291
		95% Standard Bootstrap UCL	0.245
Anderson-Darling Test Statistic	0.292	95% Bootstrap-t UCL	0.713
Anderson-Darling 5% Critical Value	0.688	95% Hall's Bootstrap UCL	0.905
Kolmogorov-Smirnov Test Statistic	0.225	95% Percentile Bootstrap UCL	0.264
Kolmogorov-Smirnov 5% Critical Value	0.363	95% BCA Bootstrap UCL	0.287
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.445
		97.5% Chebyshev(Mean, Sd) UCL	0.576
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.832
95% Approximate Gamma UCL	0.489		
95% Adjusted Gamma UCL	0.924		
Potential UCL to Use		Use 95% Student's-t UCL	0.291

Little Blue Heron Whole Body HCB UCL - 6 ft

Sample ID	Date of Sample	Detect	HCB (mg/kg)
OAFXX01	1994	1	0.078
OAFXX02[a]	1994	1	0.39
OAFXX03[a]	1994	0	0.01
OAFXX04	1994	1	0.14
OAFXX07	1994	1	0.024
OAFXX08	1994	1	0.064
OAFXX09	1994	1	0.41

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

HCB - Hexachlorbenzene

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH HCB - 6 ft

General Statistics

Number of Valid Data	7	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	1
		Percent Non-Detects	14.29%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.024	Minimum Detected	-3.73
Maximum Detected	0.41	Maximum Detected	-0.892
Mean of Detected	0.184	Mean of Detected	-2.138
SD of Detected	0.171	SD of Detected	1.104
Minimum Non-Detect	0.01	Minimum Non-Detect	-4.605
Maximum Non-Detect	0.01	Maximum Non-Detect	-4.605

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.159	Mean	-2.59
SD	0.17	SD	1.563
95% DL/2 (t) UCL	0.284	95% H-Stat (DL/2) UCL	3.579

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.145	Mean in Log Scale	-2.532
SD	0.177	SD in Log Scale	1.449
95% MLE (t) UCL	0.275	Mean in Original Scale	0.159
95% MLE (Tiku) UCL	0.273	SD in Original Scale	0.17
		95% Percentile Bootstrap UCL	0.256
		95% BCA Bootstrap UCL	0.277

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.74	Data appear Normal at 5% Significance Level

Theta Star	0.249		
nu star	8.886		
A-D Test Statistic	0.365	Nonparametric Statistics	
5% A-D Critical Value	0.711	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.711	Mean	0.161
5% K-S Critical Value	0.339	SD	0.155
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0643
		95% KM (t) UCL	0.286
Assuming Gamma Distribution		95% KM (z) UCL	0.267
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.283
Minimum	1.00E-09	95% KM (bootstrap t) UCL	0.545
Maximum	0.41	95% KM (BCA) UCL	0.271
Mean	0.158	95% KM (Percentile Bootstrap) UCL	0.263
Median	0.078	95% KM (Chebyshev) UCL	0.442
SD	0.171	97.5% KM (Chebyshev) UCL	0.563
k star	0.234	99% KM (Chebyshev) UCL	0.801
Theta star	0.676		
Nu star	3.271		
AppChi2	0.457		
95% Gamma Approximate UCL	1.131		
95% Adjusted Gamma UCL	2.171		
Note: DL/2 is not a recommended method.			
Potential UCLs to Use		95% KM (t) UCL	0.286
		95% KM (Percentile Bootstrap) UCL	0.263

Little Blue Heron Whole Body DDTR (ND=0) - 3ft

Sample ID	Date of Sample	Detect	DDTR (mg/kg)
OAFXX01	1994	1	1.3
OAFXX04	1994	1	0.4
OAFXX07	1994	1	2
OAFXX08	1994	1	16
OAFXX09	1994	1	21

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

DDTr - The sum of the 2,4' and 4,4' isomers of DDT, DDD and DDE

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH DDTR (ND=0) - 3 ft

General Statistics

Number of Valid Observations	5	Number of Distinct Observations	5

Raw Statistics		Log-transformed Statistics	
Minimum	0.4	Minimum of Log Data	-0.916
Maximum	21	Maximum of Log Data	3.045
Mean	8.14	Mean of log Data	1.171
Median	2	SD of log Data	1.695
SD	9.638		
Coefficient of Variation	1.184		
Skewness	0.743		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.8	Shapiro Wilk Test Statistic	0.913
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17.33	95% H-UCL	11894
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	33.6
95% Adjusted-CLT UCL	16.76	97.5% Chebyshev (MVUE) UCL	44.39
95% Modified-t UCL	17.57	99% Chebyshev (MVUE) UCL	65.6

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.397	Data appear Normal at 5% Significance Level	
Theta Star	20.52		
MLE of Mean	8.14		
MLE of Standard Deviation	12.92		
nu star	3.968		

Approximate Chi Square Value (.05)	0.709	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	15.23
Adjusted Chi Square Value	0.291	95% Jackknife UCL	17.33
		95% Standard Bootstrap UCL	14.37
Anderson-Darling Test Statistic	0.43	95% Bootstrap-t UCL	98.28
Anderson-Darling 5% Critical Value	0.703	95% Hall's Bootstrap UCL	132.3
Kolmogorov-Smirnov Test Statistic	0.286	95% Percentile Bootstrap UCL	14.88
Kolmogorov-Smirnov 5% Critical Value	0.368	95% BCA Bootstrap UCL	15.88
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.93
		97.5% Chebyshev(Mean, Sd) UCL	35.06
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	51.03
95% Approximate Gamma UCL	45.55		
95% Adjusted Gamma UCL	111		
Potential UCL to Use		Use 95% Student's-t UCL	17.33
Recommended UCL exceeds the maximum observation			

Little Blue Heron Whole Body DDTR
(ND=1/2 DL) - 3ft

Sample ID	Date of Sample	Detect	DDTR (mg/kg)
OAFXX01	1994	1	1.3
OAFXX04	1994	1	0.41
OAFXX07	1994	1	2
OAFXX08	1994	1	16
OAFXX09	1994	1	21

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

HCB - Hexachlorbenzene

DDTr - The sum of the 2,4' and 4,4' isomers of DDT, DDD and DDE

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH DDTR (ND=1/2 DL) - 3 ft

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	5

Raw Statistics		Log-transformed Statistics	
Minimum	0.41	Minimum of Log Data	-0.892
Maximum	21	Maximum of Log Data	3.045
Mean	8.142	Mean of log Data	1.176
Median	2	SD of log Data	1.687
SD	9.636		
Coefficient of Variation	1.183		
Skewness	0.744		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.799	Shapiro Wilk Test Statistic	0.912
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17.33	95% H-UCL	11121
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	33.43
95% Adjusted-CLT UCL	16.76	97.5% Chebyshev (MVUE) UCL	44.16
95% Modified-t UCL	17.57	99% Chebyshev (MVUE) UCL	65.23

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.398	Data appear Normal at 5% Significance Level	
Theta Star	20.46		
MLE of Mean	8.142		
MLE of Standard Deviation	12.91		
nu star	3.98		

Approximate Chi Square Value (.05)	0.714	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	15.23
Adjusted Chi Square Value	0.293	95% Jackknife UCL	17.33
		95% Standard Bootstrap UCL	14.52
Anderson-Darling Test Statistic	0.433	95% Bootstrap-t UCL	98.78
Anderson-Darling 5% Critical Value	0.703	95% Hall's Bootstrap UCL	138
Kolmogorov-Smirnov Test Statistic	0.287	95% Percentile Bootstrap UCL	14.88
Kolmogorov-Smirnov 5% Critical Value	0.368	95% BCA Bootstrap UCL	15.06
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.93
		97.5% Chebyshev(Mean, Sd) UCL	35.05
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	51.02
95% Approximate Gamma UCL	45.4		
95% Adjusted Gamma UCL	110.5		
Potential UCL to Use		Use 95% Student's-t UCL	17.33

Little Blue Heron Whole Body DDTR (ND=0) - 6ft

Sample ID	Date of Sample	Detect	DDTR (mg/kg)
OAFXX01	1994	1	1.3
OAFXX02[a]	1994	1	26
OAFXX03[a]	1994	1	0.41
OAFXX04	1994	1	0.4
OAFXX07	1994	1	2
OAFXX08	1994	1	16
OAFXX09	1994	1	21

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

DDTr - The sum of the 2,4' and 4,4' isomers of DDT, DDD and DDE

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH DDTR (ND=0) - 6 ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.35	Minimum of Log Data	-1.05
Maximum	25	Maximum of Log Data	3.219
Mean	9.436	Mean of log Data	1.146
Median	2	SD of log Data	1.853
SD	10.84		
Coefficient of Variation	1.149		
Skewness	0.58		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.795	Shapiro Wilk Test Statistic	0.861
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17.4	95% H-UCL	2035
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	43.51
95% Adjusted-CLT UCL	17.13	97.5% Chebyshev (MVUE) UCL	57.47
95% Modified-t UCL	17.55	99% Chebyshev (MVUE) UCL	84.89

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.419	Data appear Gamma Distributed at 5% Significance Level
Theta Star	22.49	
MLE of Mean	9.436	
MLE of Standard Deviation	14.57	
nu star	5.873	

Approximate Chi Square Value (.05)	1.575	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	16.17
Adjusted Chi Square Value	0.998	95% Jackknife UCL	17.4
		95% Standard Bootstrap UCL	15.95
Anderson-Darling Test Statistic	0.567	95% Bootstrap-t UCL	21.3
Anderson-Darling 5% Critical Value	0.747	95% Hall's Bootstrap UCL	13.42
Kolmogorov-Smirnov Test Statistic	0.248	95% Percentile Bootstrap UCL	16.25
Kolmogorov-Smirnov 5% Critical Value	0.326	95% BCA Bootstrap UCL	16.11
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.29
		97.5% Chebyshev(Mean, Sd) UCL	35.02
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	50.19
95% Approximate Gamma UCL	35.18		
95% Adjusted Gamma UCL	55.52		
Potential UCL to Use		Use 95% Approximate Gamma UCL	35.18
Recommended UCL exceeds the maximum observation			

Little Blue Heron Whole Body DDTR (ND=1/2 DL) - 6ft

Sample ID	Date of Sample	Detect	DDTR (mg/kg)
OAFXX01	1994	1	1.3
OAFXX02[a]	1994	1	25
OAFXX03[a]	1994	1	0.35
OAFXX04	1994	1	0.41
OAFXX07	1994	1	2
OAFXX08	1994	1	16
OAFXX09	1994	1	21

Detected: 1=detected, 0 = not detected

[a]Round Pond samples

Source of data - Woodward-Clyde May 1995 Ecological Risk Assessment Table 3-32

Concentrations reported on a mg/kg wet weight basis

HCB - Hexachlorbenzene

DDTr - The sum of the 2,4' and 4,4' isomers of DDT, DDD and DDE

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

LBH DDTR (ND=1/2 DL) - 6 ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.408	Minimum of Log Data	-0.898
Maximum	25.59	Maximum of Log Data	3.242
Mean	9.557	Mean of log Data	1.221
Median	2	SD of log Data	1.769
SD	10.94		
Coefficient of Variation	1.145		
Skewness	0.603		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.798	Shapiro Wilk Test Statistic	0.866
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17.59	95% H-UCL	1249
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	41.25
95% Adjusted-CLT UCL	17.37	97.5% Chebyshev (MVUE) UCL	54.35
95% Modified-t UCL	17.75	99% Chebyshev (MVUE) UCL	80.1

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.436	Data appear Gamma Distributed at 5% Significance Level
Theta Star	21.9	
MLE of Mean	9.557	
MLE of Standard Deviation	14.47	
nu star	6.109	

Approximate Chi Square Value (.05)	1.696	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	16.36
Adjusted Chi Square Value	1.088	95% Jackknife UCL	17.59
		95% Standard Bootstrap UCL	15.89
Anderson-Darling Test Statistic	0.579	95% Bootstrap-t UCL	21.63
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL	13.6
Kolmogorov-Smirnov Test Statistic	0.263	95% Percentile Bootstrap UCL	16.08
Kolmogorov-Smirnov 5% Critical Value	0.325	95% BCA Bootstrap UCL	16.16
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.58
		97.5% Chebyshev(Mean, Sd) UCL	35.38
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	50.7
95% Approximate Gamma UCL	34.43		
95% Adjusted Gamma UCL	53.64		
Potential UCL to Use		Use 95% Approximate Gamma UCL	34.43
Recommended UCL exceeds the maximum observation			

Basin Raccoon Whole Body Mercury

Sample ID	Date	Detect	Mercury (mg/kg)
ORT2701	1994	1	0.96
ORT2802	1994	1	0.53
ORT3003	1994	1	0.92

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Basin Raccoon Whole Body HCB

Sample ID	Date	Detect	HCB (mg/kg)
ORT2701	1994	1	0.063
ORT2802	1994	1	0.21
ORT3003	1994	1	0.01

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Basin Raccoon Whole Body DDTR with Non-detect Samples Equal to Zero

Sample ID	Date	Detect	DDTR (mg/kg)
ORT2701	1994	1	0.073
ORT2802	1994	1	0.55
ORT3003	1994	1	0.045

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Basin Raccoon Whole Body DDTR with Non-detect Samples Equal to Half the PQL

Sample ID	Date	Detect	DDTR (mg/kg)
ORT2701	1994	1	0.093
ORT2802	1994	1	0.57
ORT3003	1994	1	0.07

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 1/6/10

CHECKED BY/DATE: JAB 1/7/10

Basin Largemouth Bass Filet Mercury UCL for 2008

Sample ID	Date	Detect	Mercury (mg/kg)
MCI-0016-08F-NE	10/15/2008	1	2.1
MCI-0017-08F-NE	10/15/2008	1	2.5
MCI-0018-08F-NE	10/15/2008	1	2.5
MCI-0019-08F-NE	10/15/2008	1	2.2
MCI-0020-08F-NE	10/15/2008	1	2.4
MCI-0011-08F-NW	10/15/2008	1	2.4
MCI-0012-08F-NW	10/15/2008	1	2.5
MCI-0013-08F-NW	10/15/2008	1	2.7
MCI-0014-08F-NW	10/15/2008	1	2.2
MCI-0015-08F-NW	10/15/2008	1	2.9
MCI-0006-08F-SE	10/15/2008	1	2.3
MCI-0007-08F-SE	10/15/2008	1	1.6
MCI-0008-08F-SE	10/15/2008	1	2
MCI-0009-08F-SE	10/15/2008	1	2.1
MCI-0010-08F-SE	10/15/2008	1	2.2
MCI-0001-08F-SW	10/15/2008	1	2
MCI-0002-08F-SW	10/15/2008	1	2.5
MCI-0003-08F-SW	10/15/2008	1	3
MCI-0004-08F-SW	10/15/2008	1	2.7
MCI-0005-08F-SW	10/15/2008	1	2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 3/29/10

2008 LMB Filet Mercury

General Statistics			
Number of Valid Observations	20	Number of Distinct Observations	10
Raw Statistics		Log-transformed Statistics	
Minimum	1.6	Minimum of Log Data	0.47
Maximum	3	Maximum of Log Data	1.099
Mean	2.34	Mean of log Data	0.84
Median	2.35	SD of log Data	0.148
SD	0.339		
Coefficient of Variation	0.145		
Skewness	0.0212		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.974	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.471	95% H-UCL	2.486
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.68
95% Adjusted-CLT UCL	2.465	97.5% Chebyshev (MVUE) UCL	2.827
95% Modified-t UCL	2.471	99% Chebyshev (MVUE) UCL	3.116
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	41.54	Data appear Normal at 5% Significance Level	
Theta Star	0.0563		
MLE of Mean	2.34		
MLE of Standard Deviation	0.363		
nu star	1662		
Approximate Chi Square Value (.05)	1568	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	2.465
Adjusted Chi Square Value	1561	95% Jackknife UCL	2.471
		95% Standard Bootstrap UCL	2.461
Anderson-Darling Test Statistic	0.271	95% Bootstrap-t UCL	2.474
Anderson-Darling 5% Critical Value	0.739	95% Hall's Bootstrap UCL	2.469
Kolmogorov-Smirnov Test Statistic	0.104	95% Percentile Bootstrap UCL	2.46
Kolmogorov-Smirnov 5% Critical Value	0.193	95% BCA Bootstrap UCL	2.455
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.671
		97.5% Chebyshev(Mean, Sd) UCL	2.814
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.095
95% Approximate Gamma UCL	2.48		

95% Adjusted Gamma UCL	2.491		
Potential UCL to Use		Use 95% Student's-t UCL	2.471

Basin Largemouth Bass Filet HCB for 2008

Sample ID	Date	Detect	HCB (mg/kg)
MCI-0016-08F-NE	10/15/2008	1	0.0496
MCI-0017-08F-NE	10/15/2008	1	0.037
MCI-0018-08F-NE	10/15/2008	1	0.065
MCI-0019-08F-NE	10/15/2008	1	0.107
MCI-0020-08F-NE	10/15/2008	1	0.048
MCI-0011-08F-NW	10/15/2008	1	0.0526
MCI-0012-08F-NW	10/15/2008	1	0.0663
MCI-0013-08F-NW	10/15/2008	1	0.0445
MCI-0014-08F-NW	10/15/2008	1	0.0539
MCI-0015-08F-NW	10/15/2008	1	0.0572
MCI-0006-08F-SE	10/15/2008	1	0.0548
MCI-0007-08F-SE	10/15/2008	1	0.135
MCI-0008-08F-SE	10/15/2008	1	0.0662
MCI-0009-08F-SE	10/15/2008	1	0.0652
MCI-0010-08F-SE	10/15/2008	1	0.0362
MCI-0001-08F-SW	10/15/2008	1	0.0598
MCI-0002-08F-SW	10/15/2008	1	0.103
MCI-0003-08F-SW	10/15/2008	1	0.0924
MCI-0004-08F-SW	10/15/2008	1	0.0736
MCI-0005-08F-SW	10/15/2008	1	0.0724

Detected: 1=detected, 0 = not detected

HCB-Hexachlorobenzene

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 3/29/10

LMB HCB 2008

General Statistics			
Number of Valid Observations	20	Number of Distinct Observations	20
Raw Statistics		Log-transformed Statistics	
Minimum	0.0362	Minimum of Log Data	-3.319
Maximum	0.135	Maximum of Log Data	-2.002
Mean	0.067	Mean of log Data	-2.762
Median	0.0624	SD of log Data	0.343
SD	0.0251		
Coefficient of Variation	0.374		
Skewness	1.315		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.883	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.0767	95% H-UCL	0.0777
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0895
95% Adjusted-CLT UCL	0.078	97.5% Chebyshev (MVUE) UCL	0.0993
95% Modified-t UCL	0.077	99% Chebyshev (MVUE) UCL	0.119
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.443	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.009		
MLE of Mean	0.067		
MLE of Standard Deviation	0.0246		
nu star	297.7		
Approximate Chi Square Value (.05)	258.7	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	0.0762
Adjusted Chi Square Value	255.9	95% Jackknife UCL	0.0767
		95% Standard Bootstrap UCL	0.076
Anderson-Darling Test Statistic	0.462	95% Bootstrap-t UCL	0.0797
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	0.0793
Kolmogorov-Smirnov Test Statistic	0.167	95% Percentile Bootstrap UCL	0.0766
Kolmogorov-Smirnov 5% Critical Value	0.194	95% BCA Bootstrap UCL	0.0783
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.0914
		97.5% Chebyshev(Mean, Sd) UCL	0.102
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.123
95% Approximate Gamma UCL	0.0771		

95% Adjusted Gamma UCL	0.0779

Potential UCL to Use		Use 95% Approximate Gamma UCL	0.0771

Basin Largemouth Bass Filet DDTR with Non-detect Isomers Being Equal to Zero for 2001

Sample ID	Date	Detect	DDTR (mg/kg)
BF-B1-100101-01	10/1/2001	0	0.05
BF-B2-100101-01-F	10/1/2001	1	0.164
BF-B3-100101-01-F	10/1/2001	1	0.185
BF-B4-100101-01-F	10/1/2001	1	1.378
BF-B5-100201-01-F	10/1/2001	1	1.368
BF-B10-100201-01-F	10/2/2001	1	0.64
BF-B6-100201-01-F	10/2/2001	1	0.852

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 5/3/10

LMB 2001 DDTR ND=0

General Statistics

Number of Valid Data	7	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	1
		Percent Non-Detects	14.29%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.164	Minimum Detected	-1.808
Maximum Detected	1.378	Maximum Detected	0.321
Mean of Detected	0.765	Mean of Detected	-0.578
SD of Detected	0.54	SD of Detected	0.953
Minimum Non-Detect	0.05	Minimum Non-Detect	-2.996
Maximum Non-Detect	0.05	Maximum Non-Detect	-2.996

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.876	Shapiro Wilk Test Statistic	0.843
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.659	Mean	-1.022
SD	0.567	SD	1.462
95% DL/2 (t) UCL	1.075	95% H-Stat (DL/2) UCL	21.61

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.617	Mean in Log Scale	-0.904
SD	0.59	SD in Log Scale	1.224
95% MLE (t) UCL	1.051	Mean in Original Scale	0.663
95% MLE (Tiku) UCL	1.054	SD in Original Scale	0.561
		95% Percentile Bootstrap UCL	0.992
		95% BCA Bootstrap UCL	1.006

Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only

k star (bias corrected)	0.993
Theta Star	0.77
nu star	11.92
A-D Test Statistic	0.457
5% A-D Critical Value	0.706
K-S Test Statistic	0.706
5% K-S Critical Value	0.337
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.015
Maximum	1.378
Mean	0.657
Median	0.64
SD	0.569
k star	0.591
Theta star	1.112
Nu star	8.279
AppChi2	2.898
95% Gamma Approximate UCL	1.878
95% Adjusted Gamma UCL	2.685

Note: DL/2 is not a recommended method.

Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.679
SD	0.503
SE of Mean	0.208
95% KM (t) UCL	1.083
95% KM (z) UCL	1.021
95% KM (jackknife) UCL	1.077
95% KM (bootstrap t) UCL	1.184
95% KM (BCA) UCL	1.077
95% KM (Percentile Bootstrap) UCL	1.033
95% KM (Chebyshev) UCL	1.586
97.5% KM (Chebyshev) UCL	1.979
99% KM (Chebyshev) UCL	2.75
Potential UCLs to Use	
95% KM (t) UCL	1.083
95% KM (Percentile Bootstrap) UCL	1.033

Basin Largemouth Bass Filet DDTR with Non-detect Isomers Being Equal to Half the PQL for 2001

Sample ID	Date	Detect	DDTR (mg/kg)
BF-B10-100201-01	10/1/2001	1	0.075
BF-B1-100101-01	10/1/2001	0	0.05
BF-B2-100101-01	10/1/2001	1	0.175
BF-B3-100101-01	10/1/2001	1	0.173
BF-B4-100101-01	10/1/2001	1	0.25
BF-B5-100201-01	10/1/2001	1	0.423
BF-B6-100201-01	10/2/2001	1	0.598

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

LMB 2001 DDTR ND/2

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.05	Minimum of Log Data	-2.996
Maximum	0.598	Maximum of Log Data	-0.514
Mean	0.249	Mean of log Data	-1.692
Median	0.175	SD of log Data	0.884
SD	0.197		
Coefficient of Variation	0.791		
Skewness	1.026		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.962
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.394	95% H-UCL	0.92
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.626
95% Adjusted-CLT UCL	0.403	97.5% Chebyshev (MVUE) UCL	0.787
95% Modified-t UCL	0.399	99% Chebyshev (MVUE) UCL	1.103

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.125	Data appear Normal at 5% Significance Level	
Theta Star	0.221		
MLE of Mean	0.249		
MLE of Standard Deviation	0.235		

nu star	15.75		
Approximate Chi Square Value (.05)	7.789	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	0.372
Adjusted Chi Square Value	6.177	95% Jackknife UCL	0.394
		95% Standard Bootstrap UCL	0.36
Anderson-Darling Test Statistic	0.218	95% Bootstrap-t UCL	0.503
Anderson-Darling 5% Critical Value	0.717	95% Hall's Bootstrap UCL	1.243
Kolmogorov-Smirnov Test Statistic	0.147	95% Percentile Bootstrap UCL	0.367
Kolmogorov-Smirnov 5% Critical Value	0.316	95% BCA Bootstrap UCL	0.388
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.574
		97.5% Chebyshev(Mean, Sd) UCL	0.714
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.991
95% Approximate Gamma UCL	0.504		
95% Adjusted Gamma UCL	0.635		
Potential UCL to Use		Use 95% Student's-t UCL	0.394

Basin Largemouth Bass Filet Mercury UCL for 2006

Sample ID	Date	Detect	Mercury (mg/kg)
MF-007-1006	10/25/2006	1	1.5
MF-001-1006	10/25/2006	1	1.3
MF-002-1006	10/25/2006	1	1.4
MF-003-1006	10/25/2006	1	1.4
MF-004-1006	10/25/2006	1	1.2
MF-005-1006	10/25/2006	1	1.3
MF-006-1006	10/25/2006	1	1

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 3/29/10

2006 LMB Mercury

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	5

Raw Statistics		Log-transformed Statistics	
Minimum	1	Minimum of Log Data	0
Maximum	1.5	Maximum of Log Data	0.405
Mean	1.3	Mean of log Data	0.255
Median	1.3	SD of log Data	0.133
SD	0.163		
Coefficient of Variation	0.126		
Skewness	-0.964		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.42	95% H-UCL	1.444
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.586
95% Adjusted-CLT UCL	1.377	97.5% Chebyshev (MVUE) UCL	1.709
95% Modified-t UCL	1.416	99% Chebyshev (MVUE) UCL	1.952

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	39.34	Data appear Normal at 5% Significance Level	
Theta Star	0.033		
MLE of Mean	1.3		
MLE of Standard Deviation	0.207		

nu star	550.7		
Approximate Chi Square Value (.05)	497.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	1.402
Adjusted Chi Square Value	481.8	95% Jackknife UCL	1.42
		95% Standard Bootstrap UCL	1.394
Anderson-Darling Test Statistic	0.373	95% Bootstrap-t UCL	1.4
Anderson-Darling 5% Critical Value	0.708	95% Hall's Bootstrap UCL	1.382
Kolmogorov-Smirnov Test Statistic	0.23	95% Percentile Bootstrap UCL	1.386
Kolmogorov-Smirnov 5% Critical Value	0.311	95% BCA Bootstrap UCL	1.371
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.569
		97.5% Chebyshev(Mean, Sd) UCL	1.685
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.914
95% Approximate Gamma UCL	1.44		
95% Adjusted Gamma UCL	1.486		
Potential UCL to Use		Use 95% Student's-t UCL	1.42

Basin Largemouth Bass Whole Body Mercury UCL for 2008

Sample ID	Date	Detect	Mercury (mg/kg)
MCI-0021-08WB-NE	10/15/2008	1	1.8
MCI-0022-08WB-NE	10/15/2008	1	1.4
MCI-0023-08WB-NE	10/15/2008	1	1.4
MCI-0024-08WB-NE	10/15/2008	1	1.8
MCI-0043-08WB-NE	10/15/2008	1	1.7
MCI-0054-08WB-NE	10/15/2008	1	1.5
MCI-0055-08WB-NE	10/15/2008	1	1.3
MCI-0056-08WB-NE	10/15/2008	1	1.3
MCI-0057-08WB-NE	10/15/2008	1	1.3
MCI-0058-08WB-NE	10/15/2008	1	1.4
MCI-0025-08WB-NW	10/15/2008	1	1.8
MCI-0026-08WB-NW	10/15/2008	1	1.7
MCI-0027-08WB-NW	10/15/2008	1	1.2
MCI-0028-08WB-NW	10/15/2008	1	1.4
MCI-0029-08WB-NW	10/15/2008	1	1.9
MCI-0044-08WB-NW	10/15/2008	1	1.3
MCI-0045-08WB-NW	10/15/2008	1	1.2
MCI-0046-08WB-NW	10/15/2008	1	1.5
MCI-0047-08WB-NW	10/15/2008	1	1.7
MCI-0048-08WB-NW	10/15/2008	1	1.4
MCI-0035-08WB-SE	10/15/2008	1	1.4
MCI-0036-08WB-SE	10/15/2008	1	1.4
MCI-0037-08WB-SE	10/15/2008	1	1.2
MCI-0038-08WB-SE	10/15/2008	1	1.8
MCI-0039-08WB-SE	10/15/2008	1	1.5
MCI-0040-08WB-SE	10/15/2008	1	1.5
MCI-0041-08WB-SE	10/15/2008	1	1.4
MCI-0042-08WB-SE	10/15/2008	1	1.6
MCI-0059-08WB-SE	10/15/2008	1	1.1
MCI-0060-08WB-SE	10/15/2008	1	1.6
MCI-0030-08WB-SW	10/15/2008	1	2
MCI-0031-08WB-SW	10/15/2008	1	1.6
MCI-0032-08WB-SW	10/15/2008	1	1.8
MCI-0033-08WB-SW	10/15/2008	1	1.9
MCI-0034-08WB-SW	10/15/2008	1	1.6
MCI-0049-08WB-SW	10/15/2008	1	1.5
MCI-0050-08WB-SW	10/15/2008	1	1.6
MCI-0051-08WB-SW	10/15/2008	1	1.8
MCI-0052-08WB-SW	10/15/2008	1	1.6
MCI-0053-08WB-SW	10/15/2008	1	1.5

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

LMB WB Mercury 2008

General Statistics			
Number of Valid Observations	40	Number of Distinct Observations	10
Raw Statistics		Log-transformed Statistics	
Minimum	1.1	Minimum of Log Data	0.0953
Maximum	2	Maximum of Log Data	0.693
Mean	1.535	Mean of log Data	0.418
Median	1.5	SD of log Data	0.145
SD	0.221		
Coefficient of Variation	0.144		
Skewness	0.143		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.94	Shapiro Wilk Critical Value	0.94
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.594	95% H-UCL	1.598
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.69
95% Adjusted-CLT UCL	1.593	97.5% Chebyshev (MVUE) UCL	1.757
95% Modified-t UCL	1.594	99% Chebyshev (MVUE) UCL	1.888
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	45.35	Data appear Normal at 5% Significance Level	
Theta Star	0.0338		
MLE of Mean	1.535		
MLE of Standard Deviation	0.228		
nu star	3628		
Approximate Chi Square Value (.05)	3489	Nonparametric Statistics	
Adjusted Level of Significance	0.044	95% CLT UCL	1.593
Adjusted Chi Square Value	3484	95% Jackknife UCL	1.594
		95% Standard Bootstrap UCL	1.592
Anderson-Darling Test Statistic	0.526	95% Bootstrap-t UCL	1.594
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL	1.593
Kolmogorov-Smirnov Test Statistic	0.121	95% Percentile Bootstrap UCL	1.595
Kolmogorov-Smirnov 5% Critical Value	0.139	95% BCA Bootstrap UCL	1.595
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.688
		97.5% Chebyshev(Mean, Sd) UCL	1.754
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.883
95% Approximate Gamma UCL	1.596		

95% Adjusted Gamma UCL	1.598		
Potential UCL to Use		Use 95% Student's-t UCL	1.594

Basin Largemouth Bass Whole Body HCB UCL for 2008

Sample ID	Date	Detect	HCB (mg/kg)
MCI-0021-08WB-NE	10/15/2008	1	1.8
MCI-0022-08WB-NE	10/15/2008	1	1.4
MCI-0023-08WB-NE	10/15/2008	1	1.4
MCI-0024-08WB-NE	10/15/2008	1	1.8
MCI-0043-08WB-NE	10/15/2008	1	1.7
MCI-0054-08WB-NE	10/15/2008	1	1.5
MCI-0055-08WB-NE	10/15/2008	1	1.3
MCI-0056-08WB-NE	10/15/2008	1	1.3
MCI-0057-08WB-NE	10/15/2008	1	1.3
MCI-0058-08WB-NE	10/15/2008	1	1.4
MCI-0025-08WB-NW	10/15/2008	1	1.8
MCI-0026-08WB-NW	10/15/2008	1	1.7
MCI-0027-08WB-NW	10/15/2008	1	1.2
MCI-0028-08WB-NW	10/15/2008	1	1.4
MCI-0029-08WB-NW	10/15/2008	1	1.9
MCI-0044-08WB-NW	10/15/2008	1	1.3
MCI-0045-08WB-NW	10/15/2008	1	1.2
MCI-0046-08WB-NW	10/15/2008	1	1.5
MCI-0047-08WB-NW	10/15/2008	1	1.7
MCI-0048-08WB-NW	10/15/2008	1	1.4
MCI-0035-08WB-SE	10/15/2008	1	1.4
MCI-0036-08WB-SE	10/15/2008	1	1.4
MCI-0037-08WB-SE	10/15/2008	1	1.2
MCI-0038-08WB-SE	10/15/2008	1	1.8
MCI-0039-08WB-SE	10/15/2008	1	1.5
MCI-0040-08WB-SE	10/15/2008	1	1.5
MCI-0041-08WB-SE	10/15/2008	1	1.4
MCI-0042-08WB-SE	10/15/2008	1	1.6
MCI-0059-08WB-SE	10/15/2008	1	1.1
MCI-0060-08WB-SE	10/15/2008	1	1.6
MCI-0030-08WB-SW	10/15/2008	1	2
MCI-0031-08WB-SW	10/15/2008	1	1.6
MCI-0032-08WB-SW	10/15/2008	1	1.8
MCI-0033-08WB-SW	10/15/2008	1	1.9
MCI-0034-08WB-SW	10/15/2008	1	1.6
MCI-0049-08WB-SW	10/15/2008	1	1.5
MCI-0050-08WB-SW	10/15/2008	1	1.6
MCI-0051-08WB-SW	10/15/2008	1	1.8
MCI-0052-08WB-SW	10/15/2008	1	1.6
MCI-0053-08WB-SW	10/15/2008	1	1.5

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

LMB WB HCB

General Statistics			
Number of Valid Observations	56	Number of Distinct Observations	53
Raw Statistics		Log-transformed Statistics	
Minimum	0.034	Minimum of Log Data	-3.381
Maximum	2.5	Maximum of Log Data	0.916
Mean	0.601	Mean of log Data	-0.887
Median	0.557	SD of log Data	0.996
SD	0.478		
Coefficient of Variation	0.795		
Skewness	1.532		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.118	Lilliefors Test Statistic	0.151
Lilliefors Critical Value	0.118	Lilliefors Critical Value	0.118
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.708	95% H-UCL	0.925
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.125
95% Adjusted-CLT UCL	0.72	97.5% Chebyshev (MVUE) UCL	1.322
95% Modified-t UCL	0.71	99% Chebyshev (MVUE) UCL	1.71
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.401	Data appear Normal at 5% Significance Level	
Theta Star	0.429		
MLE of Mean	0.601		
MLE of Standard Deviation	0.508		
nu star	156.9		
Approximate Chi Square Value (.05)	129	Nonparametric Statistics	
Adjusted Level of Significance	0.0457	95% CLT UCL	0.706
Adjusted Chi Square Value	128.3	95% Jackknife UCL	0.708
		95% Standard Bootstrap UCL	0.706
Anderson-Darling Test Statistic	0.452	95% Bootstrap-t UCL	0.726
Anderson-Darling 5% Critical Value	0.769	95% Hall's Bootstrap UCL	0.734
Kolmogorov-Smirnov Test Statistic	0.098	95% Percentile Bootstrap UCL	0.707
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL	0.718
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.88
		97.5% Chebyshev(Mean, Sd) UCL	1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.237
95% Approximate Gamma UCL	0.732		

95% Adjusted Gamma UCL	0.735		
Potential UCL to Use		Use 95% Student's-t UCL	0.708

Basin Mosquitofish Whole Body Mercury UCL for 1994 - 3ft

Sample ID	Date	Detect	Mercury (mg/kg)
OGS0101-0694	6/26/1994	1	0.5
OGS0102-0694	6/26/1994	1	0.41
OGS0103-0694	6/26/1994	1	0.44
OGS0207-0694	6/26/1994	1	0.52
OGS0204-0694	6/26/1994	1	0.55
OGS0205-0694	6/26/1994	1	0.51
OGS0206-0694	6/26/1994	1	0.58

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

1994 Mosquitofish Mercury - 3ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.41	Minimum of Log Data	-0.892
Maximum	0.58	Maximum of Log Data	-0.545
Mean	0.501	Mean of log Data	-0.697
Median	0.51	SD of log Data	0.122
SD	0.0593		
Coefficient of Variation	0.118		
Skewness	-0.436		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.545	95% H-UCL	0.552
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.602
95% Adjusted-CLT UCL	0.534	97.5% Chebyshev (MVUE) UCL	0.645
95% Modified-t UCL	0.544	99% Chebyshev (MVUE) UCL	0.731

Gamma Distribution Test		Data Distribution
k star (bias corrected)	46.16	Data appear Normal at 5% Significance Level
Theta Star	0.0109	
MLE of Mean	0.501	
MLE of Standard Deviation	0.0738	

nu star	646.3
Approximate Chi Square Value (.05)	588.3
Adjusted Level of Significance	0.0158
Adjusted Chi Square Value	571.5
Anderson-Darling Test Statistic	0.283
Anderson-Darling 5% Critical Value	0.708
Kolmogorov-Smirnov Test Statistic	0.219
Kolmogorov-Smirnov 5% Critical Value	0.311
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
95% Approximate Gamma UCL	0.551
95% Adjusted Gamma UCL	0.567
Potential UCL to Use	

Nonparametric Statistics	
95% CLT UCL	0.538
95% Jackknife UCL	0.545
95% Standard Bootstrap UCL	0.536
95% Bootstrap-t UCL	0.539
95% Hall's Bootstrap UCL	0.534
95% Percentile Bootstrap UCL	0.536
95% BCA Bootstrap UCL	0.531
95% Chebyshev(Mean, Sd) UCL	0.599
97.5% Chebyshev(Mean, Sd) UCL	0.641
99% Chebyshev(Mean, Sd) UCL	0.724
Use 95% Student's-t UCL	0.545

Basin Mosquitofish Whole Body Mercury UCL for 1994 - 6ft

Sample ID	Date	Detect	Mercury (mg/kg)
OGS0101-0694	6/26/1994	1	0.5
OGS0102-0694	6/26/1994	1	0.41
OGS0103-0694	6/26/1994	1	0.44
OGS0207-0694	6/26/1994	1	0.52
OGS0204-0694	6/26/1994	1	0.55
OGS0205-0694	6/26/1994	1	0.51
OGS0206-0694	6/26/1994	1	0.58
OGS03-RP	6/26/1994	1	0.28
OGS03-RP	6/26/1994	1	0.27

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

1994 Mosquitofish Mercury - 6ft

General Statistics

Number of Valid Observations	9	Number of Distinct Observations	9

Raw Statistics		Log-transformed Statistics	
Minimum	0.27	Minimum of Log Data	-1.309
Maximum	0.58	Maximum of Log Data	-0.545
Mean	0.451	Mean of log Data	-0.829
Median	0.5	SD of log Data	0.283
SD	0.112		
Coefficient of Variation	0.249		
Skewness	-0.824		

Warning: There are only 9 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.883	Shapiro Wilk Test Statistic	0.834
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.521	95% H-UCL	0.555
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.639
95% Adjusted-CLT UCL	0.502	97.5% Chebyshev (MVUE) UCL	0.72
95% Modified-t UCL	0.519	99% Chebyshev (MVUE) UCL	0.879

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	10.41	Data appear Normal at 5% Significance Level	
Theta Star	0.0434		
MLE of Mean	0.451		
MLE of Standard Deviation	0.14		
nu star	187.3		
Approximate Chi Square Value (.05)	156.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0231	95% CLT UCL	0.513
Adjusted Chi Square Value	150.7	95% Jackknife UCL	0.521
		95% Standard Bootstrap UCL	0.508
Anderson-Darling Test Statistic	0.654	95% Bootstrap-t UCL	0.515
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	0.498

Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	0.507
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	0.501
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.614
		97.5% Chebyshev(Mean, Sd) UCL	0.685
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.824
95% Approximate Gamma UCL	0.539		
95% Adjusted Gamma UCL	0.561		
Potential UCL to Use		Use 95% Student's-t UCL	0.521

Basin Mosquitofish Whole Body HCB for 1994 - 3 ft

Sample ID	Date	Detect	HCB (mg/kg)
OGS0101-0694	6/26/1994	1	0.12
OGS0102-0694	6/26/1994	1	0.1
OGS0103-0694	6/26/1994	1	0.11
OGS0207-0694	6/26/1994	1	0.1
OGS0204-0694	6/26/1994	1	0.108
OGS0205-0694	6/26/1994	1	0.12
OGS0206-0694	6/26/1994	1	0.13

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

1994 Mosquitofish HCB - 3 ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	5

Raw Statistics		Log-transformed Statistics	
Minimum	0.1	Minimum of Log Data	-2.303
Maximum	0.13	Maximum of Log Data	-2.04
Mean	0.113	Mean of log Data	-2.188
Median	0.11	SD of log Data	0.0992
SD	0.0112		
Coefficient of Variation	0.0998		
Skewness	0.333		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Test Statistic	0.924
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.121	95% H-UCL	N/A
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.131
95% Adjusted-CLT UCL	0.12	97.5% Chebyshev (MVUE) UCL	0.139
95% Modified-t UCL	0.121	99% Chebyshev (MVUE) UCL	0.155

Gamma Distribution Test		Data Distribution
k star (bias corrected)	67.65	Data appear Normal at 5% Significance Level
Theta Star	0.00166	
MLE of Mean	0.113	
MLE of Standard Deviation	0.0137	
nu star	947.2	

Approximate Chi Square Value (.05)	876.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	0.12
Adjusted Chi Square Value	856.1	95% Jackknife UCL	0.121
		95% Standard Bootstrap UCL	0.119
Anderson-Darling Test Statistic	0.331	95% Bootstrap-t UCL	0.122
Anderson-Darling 5% Critical Value	0.708	95% Hall's Bootstrap UCL	0.12
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	0.119
Kolmogorov-Smirnov 5% Critical Value	0.311	95% BCA Bootstrap UCL	0.119
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.131
		97.5% Chebyshev(Mean, Sd) UCL	0.139
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.155
95% Approximate Gamma UCL	0.122		
95% Adjusted Gamma UCL	0.125		
Potential UCL to Use		Use 95% Student's-t UCL	0.121

Basin Mosquitofish Whole Body HCB for 1994 - 6 ft

Sample ID	Date	Detect	HCB (mg/kg)
OGS0101-0694	6/26/1994	1	0.12
OGS0102-0694	6/26/1994	1	0.1
OGS0103-0694	6/26/1994	1	0.11
OGS0207-0694	6/26/1994	1	0.1
OGS0204-0694	6/26/1994	1	0.108
OGS0205-0694	6/26/1994	1	0.12
OGS03-RP	6/26/1994	1	0.029
OGS03-RP	6/26/1994	0	0.027
OGS0206-0694	6/26/1994	1	0.13

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

1994 Mosquitofish HCB - 6 ft

General Statistics

Number of Valid Data	9	Number of Detected Data	8
Number of Distinct Detected Data	6	Number of Non-Detect Data	1
		Percent Non-Detects	11.11%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.029	Minimum Detected	-3.54
Maximum Detected	0.13	Maximum Detected	-2.04
Mean of Detected	0.102	Mean of Detected	-2.357
SD of Detected	0.0313	SD of Detected	0.487
Minimum Non-Detect	0.027	Minimum Non-Detect	-3.612
Maximum Non-Detect	0.027	Maximum Non-Detect	-3.612

Warning: There are only 8 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.735	Shapiro Wilk Test Statistic	0.601
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0923	Mean	-2.574
SD	0.0416	SD	0.793
95% DL/2 (t) UCL	0.118	95% H-Stat (DL/2) UCL	0.156

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0919	Mean in Log Scale	-2.454
SD	0.0404	SD in Log Scale	0.54
95% MLE (t) UCL	0.117	Mean in Original Scale	0.0952
95% MLE (Tiku) UCL	0.118	SD in Original Scale	0.0359
		95% Percentile Bootstrap UCL	0.113
		95% BCA Bootstrap UCL	0.111

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	4.305	Data do not follow a Discernable Distribution (0.05)

Theta Star	0.0237
nu star	68.87
A-D Test Statistic	1.361
5% A-D Critical Value	0.718
K-S Test Statistic	0.718
5% K-S Critical Value	0.295
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.029
Maximum	0.13
Mean	0.0959
Median	0.108
SD	0.0347
k star	3.777
Theta star	0.0254
Nu star	67.98
AppChi2	50.01
95% Gamma Approximate UCL	0.13
95% Adjusted Gamma UCL	0.139

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.094
SD	0.0359
SE of Mean	0.0128
95% KM (t) UCL	0.118
95% KM (z) UCL	0.115
95% KM (jackknife) UCL	0.121
95% KM (bootstrap t) UCL	0.112
95% KM (BCA) UCL	0.116
95% KM (Percentile Bootstrap) UCL	0.115
95% KM (Chebyshev) UCL	0.15
97.5% KM (Chebyshev) UCL	0.174
99% KM (Chebyshev) UCL	0.221
Potential UCLs to Use	
95% KM (Chebyshev) UCL	0.15

Basin Mosquitofish Whole Body DDTR (ND=0) for 1994 - 3 ft

Sample ID	Date	Detect	DDTR (mg/kg)
OGS0101-0694	6/26/1994	1	4.464
OGS0102-0694	6/26/1994	1	4.183
OGS0103-0694	6/26/1994	1	4.427
OGS0204-0694	6/26/1994	1	2.803
OGS0205-0694	6/26/1994	1	3.269
OGS0206-0694	6/26/1994	1	3.553
OGS0207-0694	6/26/1994	1	3.48

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

Mosquito Fish - DDTR (ND=0) - 3ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	2.803	Minimum of Log Data	1.031
Maximum	4.464	Maximum of Log Data	1.496
Mean	3.74	Mean of log Data	1.306
Median	3.553	SD of log Data	0.173
SD	0.632		
Coefficient of Variation	0.169		
Skewness	-0.148		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.922
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4.204	95% H-UCL	4.304
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4.81
95% Adjusted-CLT UCL	4.118	97.5% Chebyshev (MVUE) UCL	5.272
95% Modified-t UCL	4.202	99% Chebyshev (MVUE) UCL	6.181

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	22.78	Data appear Normal at 5% Significance Level	
Theta Star	0.164		
MLE of Mean	3.74		
MLE of Standard Deviation	0.784		
nu star	318.9		

Approximate Chi Square Value (.05)	278.5	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	4.133
Adjusted Chi Square Value	267.1	95% Jackknife UCL	4.204
		95% Standard Bootstrap UCL	4.1
Anderson-Darling Test Statistic	0.337	95% Bootstrap-t UCL	4.176
Anderson-Darling 5% Critical Value	0.707	95% Hall's Bootstrap UCL	4.074
Kolmogorov-Smirnov Test Statistic	0.208	95% Percentile Bootstrap UCL	4.112
Kolmogorov-Smirnov 5% Critical Value	0.311	95% BCA Bootstrap UCL	4.102
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4.781
		97.5% Chebyshev(Mean, Sd) UCL	5.231
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6.116
95% Approximate Gamma UCL	4.282		
95% Adjusted Gamma UCL	4.466		
Potential UCL to Use		Use 95% Student's-t UCL	4.204

Basin Mosquitofish Whole Body DDTR (ND=1/2 DL) for 1994 - 3 ft

Sample ID	Date	Detect	DDTR (mg/kg)
OGS0101-0694	6/26/1994	1	4.5015
OGS0102-0694	6/26/1994	1	4.2135
OGS0103-0694	6/26/1994	1	4.4575
OGS0204-0694	6/26/1994	1	2.8355
OGS0205-0694	6/26/1994	1	3.29
OGS0206-0694	6/26/1994	1	3.5795
OGS0207-0694	6/26/1994	1	3.5045

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

Mosquito Fish - DDTR (ND=1/2 DL) - 3ft

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	2.836	Minimum of Log Data	1.042
Maximum	4.502	Maximum of Log Data	1.504
Mean	3.769	Mean of log Data	1.314
Median	3.58	SD of log Data	0.172
SD	0.634		
Coefficient of Variation	0.168		
Skewness	-0.128		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.924
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4.235	95% H-UCL	4.334
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4.841
95% Adjusted-CLT UCL	4.151	97.5% Chebyshev (MVUE) UCL	5.305
95% Modified-t UCL	4.233	99% Chebyshev (MVUE) UCL	6.216

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	22.99	Data appear Normal at 5% Significance Level	
Theta Star	0.164		
MLE of Mean	3.769		
MLE of Standard Deviation	0.786		
nu star	321.8		

Approximate Chi Square Value (.05)	281.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	4.163
Adjusted Chi Square Value	269.7	95% Jackknife UCL	4.235
		95% Standard Bootstrap UCL	4.127
Anderson-Darling Test Statistic	0.335	95% Bootstrap-t UCL	4.241
Anderson-Darling 5% Critical Value	0.707	95% Hall's Bootstrap UCL	4.073
Kolmogorov-Smirnov Test Statistic	0.208	95% Percentile Bootstrap UCL	4.133
Kolmogorov-Smirnov 5% Critical Value	0.311	95% BCA Bootstrap UCL	4.108
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4.814
		97.5% Chebyshev(Mean, Sd) UCL	5.266
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6.155
95% Approximate Gamma UCL	4.312		
95% Adjusted Gamma UCL	4.496		
Potential UCL to Use		Use 95% Student's-t UCL	4.235

Basin Mosquitofish Whole Body DDTR (ND=0) for 1994 - 6 ft

Sample ID	Date	Detect	DDTR (mg/kg)
OGS0101-0694	6/26/1994	1	4.464
OGS0102-0694	6/26/1994	1	4.183
OGS0103-0694	6/26/1994	1	4.427
OGS0204-0694	6/26/1994	1	2.803
OGS0205-0694	6/26/1994	1	3.269
OGS0206-0694	6/26/1994	1	3.553
OGS0207-0694	6/26/1994	1	3.48
OGS0308-0694	6/26/1994	1	15.036
OGS0309-0694	6/26/1994	1	14.758

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

Mosquito Fish - DDTR (ND=0) - 6ft

General Statistics

Number of Valid Observations	9	Number of Distinct Observations	9

Raw Statistics		Log-transformed Statistics	
Minimum	2.803	Minimum of Log Data	1.031
Maximum	15.04	Maximum of Log Data	2.71
Mean	6.219	Mean of log Data	1.616
Median	4.183	SD of log Data	0.633
SD	4.951		
Coefficient of Variation	0.796		
Skewness	1.567		

Warning: There are only 9 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.641	Shapiro Wilk Test Statistic	0.747
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	9.288	95% H-UCL	10.77
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11.63
95% Adjusted-CLT UCL	9.855	97.5% Chebyshev (MVUE) UCL	14.07
95% Modified-t UCL	9.432	99% Chebyshev (MVUE) UCL	18.85

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.754	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.545		
MLE of Mean	6.219		
MLE of Standard Deviation	4.695		
nu star	31.58		
Approximate Chi Square Value (.05)	19.74	Nonparametric Statistics	
Adjusted Level of Significance	0.0231	95% CLT UCL	8.934
Adjusted Chi Square Value	17.79	95% Jackknife UCL	9.288
		95% Standard Bootstrap UCL	8.692
Anderson-Darling Test Statistic	1.355	95% Bootstrap-t UCL	27.08
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	33.18

Kolmogorov-Smirnov Test Statistic	0.389	95% Percentile Bootstrap UCL	8.82
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	8.979
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13.41
		97.5% Chebyshev(Mean, Sd) UCL	16.52
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22.64
95% Approximate Gamma UCL	9.95		
95% Adjusted Gamma UCL	11.04		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	13.41

Basin Mosquitofish Whole Body DDTR (ND=1/2 DL) for 1994 - 6 ft

Sample ID	Date	Detect	DDTR (mg/kg)
OGS0101-0694	6/26/1994	1	4.5015
OGS0102-0694	6/26/1994	1	4.2135
OGS0103-0694	6/26/1994	1	4.4575
OGS0204-0694	6/26/1994	1	2.8355
OGS0205-0694	6/26/1994	1	3.29
OGS0206-0694	6/26/1994	1	3.5795
OGS0207-0694	6/26/1994	1	3.5045
OGS0308-0694	6/26/1994	1	15.096
OGS0309-0694	6/26/1994	1	14.818

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

1994 Mosquito Fish - DDTR (ND=1/2 DL) - 6ft

General Statistics

Number of Valid Observations	9	Number of Distinct Observations	9

Raw Statistics		Log-transformed Statistics	
Minimum	2.836	Minimum of Log Data	1.042
Maximum	15.1	Maximum of Log Data	2.714
Mean	6.255	Mean of log Data	1.623
Median	4.214	SD of log Data	0.631
SD	4.964		
Coefficient of Variation	0.794		
Skewness	1.567		

Warning: There are only 9 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.641	Shapiro Wilk Test Statistic	0.747
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	9.332	95% H-UCL	10.81
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11.68
95% Adjusted-CLT UCL	9.901	97.5% Chebyshev (MVUE) UCL	14.13
95% Modified-t UCL	9.476	99% Chebyshev (MVUE) UCL	18.93

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.764	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.547		
MLE of Mean	6.255		
MLE of Standard Deviation	4.71		
nu star	31.75		
Approximate Chi Square Value (.05)	19.87	Nonparametric Statistics	
Adjusted Level of Significance	0.0231	95% CLT UCL	8.977
Adjusted Chi Square Value	17.92	95% Jackknife UCL	9.332
		95% Standard Bootstrap UCL	8.869
Anderson-Darling Test Statistic	1.355	95% Bootstrap-t UCL	27.27
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	33.9

Kolmogorov-Smirnov Test Statistic	0.388	95% Percentile Bootstrap UCL	8.874
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	9.95
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13.47
		97.5% Chebyshev(Mean, Sd) UCL	16.59
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22.72
95% Approximate Gamma UCL	9.993		
95% Adjusted Gamma UCL	11.08		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	13.47

Basin Mosquitofish Whole Body Mercury UCL for 2001 - 3ft

Sample ID	Date	Detect	Mercury (mg/kg)
GB-B1-100101-01A	10/1/2001	1	0.49
GB-B1-100101-01B	10/1/2001	1	0.48
GB-B1-100101-01C	10/1/2001	1	0.45
GB-B2-100101-02A	10/1/2001	1	0.48
GB-B2-100101-02B	10/1/2001	1	0.41
GB-B2-100101-02C	10/1/2001	1	0.5
GB-B4-100101-03A	10/1/2001	1	0.42
GB-B4-100101-03B	10/1/2001	1	0.47
GB-B4-100101-03C	10/1/2001	1	0.44
GB-B10-100201-07A	10/2/2001	1	0.44
GB-B10-100201-07B	10/2/2001	1	0.51
GB-B10-100201-07C	10/2/2001	1	0.45
GB-B6-100201-06A	10/2/2001	1	0.19
GB-B6-100201-06B	10/2/2001	1	0.47
GB-B6-100201-06C	10/2/2001	1	0.49

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish Mercury - 3ft

General Statistics			
Number of Valid Observations	15	Number of Distinct Observations	10
Raw Statistics		Log-transformed Statistics	
Minimum	0.19	Minimum of Log Data	-1.661
Maximum	0.51	Maximum of Log Data	-0.673
Mean	0.446	Mean of log Data	-0.829
Median	0.47	SD of log Data	0.239
SD	0.0765		
Coefficient of Variation	0.172		
Skewness	-2.971		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.647	Shapiro Wilk Test Statistic	0.533
Shapiro Wilk Critical Value	0.881	Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.481	95% H-UCL	0.505
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.57
95% Adjusted-CLT UCL	0.462	97.5% Chebyshev (MVUE) UCL	0.622
95% Modified-t UCL	0.478	99% Chebyshev (MVUE) UCL	0.725
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	19.02	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0235		
MLE of Mean	0.446		
MLE of Standard Deviation	0.102		
nu star	570.6		
Approximate Chi Square Value (.05)	516.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0324	95% CLT UCL	0.478
Adjusted Chi Square Value	509.8	95% Jackknife UCL	0.481
		95% Standard Bootstrap UCL	0.478
Anderson-Darling Test Statistic	2.325	95% Bootstrap-t UCL	0.471
Anderson-Darling 5% Critical Value	0.735	95% Hall's Bootstrap UCL	0.467
Kolmogorov-Smirnov Test Statistic	0.302	95% Percentile Bootstrap UCL	0.473
Kolmogorov-Smirnov 5% Critical Value	0.221	95% BCA Bootstrap UCL	0.468
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.532
		97.5% Chebyshev(Mean, Sd) UCL	0.569
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.643
95% Approximate Gamma UCL	0.493		
95% Adjusted Gamma UCL	0.499		

Potential UCL to Use	Use 95% Student's-t UCL	0.481
	or 95% Modified-t UCL	0.478

Basin Mosquitofish Whole Body Mercury UCL for 2001 - 6ft

Sample ID	Date	Detect	Mercury (mg/kg)
GB-B1-100101-01A	10/1/2001	1	0.49
GB-B1-100101-01B	10/1/2001	1	0.48
GB-B1-100101-01C	10/1/2001	1	0.45
GB-B2-100101-02A	10/1/2001	1	0.48
GB-B2-100101-02B	10/1/2001	1	0.41
GB-B2-100101-02C	10/1/2001	1	0.5
GB-B4-100101-03A	10/1/2001	1	0.42
GB-B4-100101-03B	10/1/2001	1	0.47
GB-B4-100101-03C	10/1/2001	1	0.44
GB-B10-100201-07A	10/2/2001	1	0.44
GB-B10-100201-07B	10/2/2001	1	0.51
GB-B10-100201-07C	10/2/2001	1	0.45
GB-B6-100201-06A	10/2/2001	1	0.19
GB-B6-100201-06B	10/2/2001	1	0.47
GB-B6-100201-06C	10/2/2001	1	0.49
GB-R1-100201-04A	10/2/2001	1	0.4
GB-R1-100201-04B	10/2/2001	1	0.41
GB-R1-100201-04C	10/2/2001	1	0.42
GB-R2-100201-05A	10/2/2001	1	0.47
GB-R2-100201-05B	10/2/2001	1	0.43
GB-R2-100201-05C	10/2/2001	1	0.21

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish Mercury - 6ft

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	13

Raw Statistics		Log-transformed Statistics	
Minimum	0.19	Minimum of Log Data	-1.661
Maximum	0.51	Maximum of Log Data	-0.673
Mean	0.43	Mean of log Data	-0.87
Median	0.45	SD of log Data	0.257
SD	0.0828		
Coefficient of Variation	0.193		
Skewness	-2.215		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.71	Shapiro Wilk Test Statistic	0.608
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.461	95% H-UCL	0.48
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.539
95% Adjusted-CLT UCL	0.45	97.5% Chebyshev (MVUE) UCL	0.585
95% Modified-t UCL	0.46	99% Chebyshev (MVUE) UCL	0.676

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	16.79	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0256		
MLE of Mean	0.43		
MLE of Standard Deviation	0.105		
nu star	705.2		
Approximate Chi Square Value (.05)	644.5	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	0.46
Adjusted Chi Square Value	640.1	95% Jackknife UCL	0.461
		95% Standard Bootstrap UCL	0.459
Anderson-Darling Test Statistic	2.839	95% Bootstrap-t UCL	0.455
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	0.452
Kolmogorov-Smirnov Test Statistic	0.31	95% Percentile Bootstrap UCL	0.456
Kolmogorov-Smirnov 5% Critical Value	0.189	95% BCA Bootstrap UCL	0.453
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.509
		97.5% Chebyshev(Mean, Sd) UCL	0.543
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.61
95% Approximate Gamma UCL	0.47		
95% Adjusted Gamma UCL	0.474		

Potential UCL to Use	Use 95% Student's-t UCL	0.461
	or 95% Modified-t UCL	0.46

Basin Mosquitofish Whole Body HCB UCL for 2001 - 3ft

Sample ID	Date	Detect	HCB (mg/kg)
GB-B1-100101-01A	10/1/2001	0	0.1
GB-B1-100101-01B	10/1/2001	1	0.12
GB-B1-100101-01C	10/1/2001	0	0.1
GB-B2-100101-02A	10/1/2001	0	0.1
GB-B2-100101-02B	10/1/2001	0	0.1
GB-B2-100101-02C	10/1/2001	0	0.17
GB-B4-100101-03A	10/1/2001	1	0.12
GB-B4-100101-03B	10/1/2001	1	0.06
GB-B4-100101-03C	10/1/2001	0	0.1
GB-B10-100201-07A	10/2/2001	1	0.077
GB-B10-100201-07B	10/2/2001	1	0.087
GB-B10-100201-07C	10/2/2001	1	0.089
GB-B6-100201-06A	10/2/2001	1	0.14
GB-B6-100201-06B	10/2/2001	1	0.14
GB-B6-100201-06C	10/2/2001	1	0.11

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish HCB - 3ft

General Statistics

Number of Valid Data	15	Number of Detected Data	900.00%
Number of Distinct Detected Data	7	Number of Non-Detect Data	6
		Percent Non-Detects	40.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	0.14	Maximum Detected	-1.966
Mean of Detected	0.105	Mean of Detected	-2.291
SD of Detected	0.0281	SD of Detected	0.288
Minimum Non-Detect	0.1	Minimum Non-Detect	-2.303
Maximum Non-Detect	0.17	Maximum Non-Detect	-1.772

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	1500.00%
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.939	Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0852	Mean	-2.537
SD	0.0338	SD	0.402
95% DL/2 (t) UCL	0.101	95% H-Stat (DL/2) UCL	0.124

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.386
		SD in Log Scale	0.267
		Mean in Original Scale	0.0951
		SD in Original Scale	0.0257
		95% Percentile Bootstrap UCL	0.106
		95% BCA Bootstrap UCL	0.107

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	9.704
Theta Star	0.0108
nu star	174.7
A-D Test Statistic	0.313
5% A-D Critical Value	0.721
K-S Test Statistic	0.721
5% K-S Critical Value	0.279
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.06
Maximum	0.14
Mean	0.106
Median	0.11
SD	0.0225
k star	17.28
Theta star	0.00611
Nu star	518.4
AppChi2	466.6
95% Gamma Approximate UCL	0.117
95% Adjusted Gamma UCL	0.119

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.0953
SD	0.0257
SE of Mean	0.00784
95% KM (t) UCL	0.109
95% KM (z) UCL	0.108
95% KM (jackknife) UCL	0.11
95% KM (bootstrap t) UCL	0.109
95% KM (BCA) UCL	0.109
95% KM (Percentile Bootstrap) UCL	0.108
95% KM (Chebyshev) UCL	0.129
97.5% KM (Chebyshev) UCL	0.144
99% KM (Chebyshev) UCL	0.173
Potential UCLs to Use	
95% KM (t) UCL	0.109
95% KM (Percentile Bootstrap) UCL	0.108

Basin Mosquitofish Whole Body HCB UCL for 2001 - 6ft

Sample ID	Date	Detect	HCB (mg/kg)
GB-B1-100101-01A	10/1/2001	0	0.1
GB-B1-100101-01B	10/1/2001	1	0.12
GB-B1-100101-01C	10/1/2001	0	0.1
GB-B2-100101-02A	10/1/2001	0	0.1
GB-B2-100101-02B	10/1/2001	0	0.1
GB-B2-100101-02C	10/1/2001	0	0.17
GB-B4-100101-03A	10/1/2001	1	0.12
GB-B4-100101-03B	10/1/2001	1	0.06
GB-B4-100101-03C	10/1/2001	0	0.1
GB-B10-100201-07A	10/2/2001	1	0.077
GB-B10-100201-07B	10/2/2001	1	0.087
GB-B10-100201-07C	10/2/2001	1	0.089
GB-B6-100201-06A	10/2/2001	1	0.14
GB-B6-100201-06B	10/2/2001	1	0.14
GB-B6-100201-06C	10/2/2001	1	0.11
GB-R1-100201-04A	10/2/2001	0	0.17
GB-R1-100201-04B	*10/2/2001*	*0*	*0.024*
GB-R1-100201-04C	10/2/2001	0	0.024
GB-R2-100201-05A	10/2/2001	0	0.024
GB-R2-100201-05B	10/2/2001	0	0.025
GB-R2-100201-05C	10/2/2001	0	0.024

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish HCB - 6ft

General Statistics

Number of Valid Data	21	Number of Detected Data	9
Number of Distinct Detected Data	7	Number of Non-Detect Data	12
		Percent Non-Detects	57.14%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	0.14	Maximum Detected	-1.966
Mean of Detected	0.105	Mean of Detected	-2.291
SD of Detected	0.0281	SD of Detected	0.288
Minimum Non-Detect	0.024	Minimum Non-Detect	-3.73
Maximum Non-Detect	0.17	Maximum Non-Detect	-1.772

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	21
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.939	Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0678	Mean	-2.981
SD	0.0426	SD	0.888
95% DL/2 (t) UCL	0.0838	95% H-Stat (DL/2) UCL	0.108

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.622
		SD in Log Scale	0.394
		Mean in Original Scale	0.0783
		SD in Original Scale	0.0316
		95% Percentile Bootstrap UCL	0.0896
		95% BCA Bootstrap UCL	0.0912

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	9.704
Theta Star	0.0108
nu star	**174.7**
A-D Test Statistic	0.313
5% A-D Critical Value	0.721
K-S Test Statistic	0.721
5% K-S Critical Value	0.279
nma Distributed at 5% Significance Leve	
suming Gamma Distribution	
)S Statistics using Extrapolated Data	
Minimum	0.0598
Maximum	0.14
Mean	0.102
Median	0.105
SD	0.0249
k star	14.29
Theta star	0.00715
Nu star	600.1
AppChi2	544.3
95% Gamma Approximate UCL	0.113
95% Adjusted Gamma UCL	0.113

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

9.704	Data appear Normal at 5% Significance Level	
0.0108		
174.7		
0.313	Nonparametric Statistics	
0.721	Kaplan-Meier (KM) Method	
0.721	Mean	0.0833
0.279	SD	0.0281
	SE of Mean	0.00709
	95% KM (t) UCL	0.0956
	95% KM (z) UCL	0.095
	95% KM (jackknife) UCL	0.0953
0.0598	95% KM (bootstrap t) UCL	0.0954
0.14	95% KM (BCA) UCL	0.109
0.102	95% KM (Percentile Bootstrap) UCL	0.102
0.105	95% KM (Chebyshev) UCL	0.114
0.0249	97.5% KM (Chebyshev) UCL	0.128
14.29	99% KM (Chebyshev) UCL	0.154
0.00715		
600.1	Potential UCLs to Use	
544.3	95% KM (t) UCL	0.0956
0.113	95% KM (Percentile Bootstrap) UCL	0.102
0.113		

Basin Mosquitofish Whole Body DDTR with Non-detect Isomers Equal to Zero for 2001 - 3ft

Sample ID	Date	Detect	DDT_R (mg/kg)
GB-B1-100101-01A	10/1/2001	1	1.21
GB-B1-100101-01B	10/1/2001	1	1.19
GB-B1-100101-01C	10/1/2001	1	1.75
GB-B2-100101-02A	10/1/2001	1	0.72
GB-B2-100101-02B	10/1/2001	1	0.77
GB-B2-100101-02C	10/1/2001	1	0.57
GB-B4-100101-03A	10/1/2001	1	0.81
GB-B4-100101-03B	10/1/2001	1	0.98
GB-B4-100101-03C	10/1/2001	1	0.49
GB-B10-100201-07A	10/2/2001	1	1.58
GB-B10-100201-07B	10/2/2001	1	1.846
GB-B10-100201-07C	10/2/2001	1	1.71
GB-B6-100201-06A	10/2/2001	1	1.23
GB-B6-100201-06B	10/2/2001	1	1.36
GB-B6-100201-06C	10/2/2001	1	1.21

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish DDT ND=0 - 3ft

General Statistics

Number of Valid Observations	15	Number of Distinct Observations	14

Raw Statistics		Log-transformed Statistics	
Minimum	0.49	Minimum of Log Data	-0.713
Maximum	1.846	Maximum of Log Data	0.613
Mean	1.162	Mean of log Data	0.076
Median	1.21	SD of log Data	0.413
SD	0.435		
Coefficient of Variation	0.374		
Skewness	0.0644		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	0.938
Shapiro Wilk Critical Value	0.881	Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.359	95% H-UCL	1.462
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.722
95% Adjusted-CLT UCL	1.348	97.5% Chebyshev (MVUE) UCL	1.961
95% Modified-t UCL	1.36	99% Chebyshev (MVUE) UCL	2.432

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.586	Data appear Normal at 5% Significance Level	
Theta Star	0.208		
MLE of Mean	1.162		
MLE of Standard Deviation	0.492		
nu star	167.6		
Approximate Chi Square Value (.05)	138.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0324	95% CLT UCL	1.346
Adjusted Chi Square Value	135.4	95% Jackknife UCL	1.359
		95% Standard Bootstrap UCL	1.342
Anderson-Darling Test Statistic	0.334	95% Bootstrap-t UCL	1.365
Anderson-Darling 5% Critical Value	0.738	95% Hall's Bootstrap UCL	1.337
Kolmogorov-Smirnov Test Statistic	0.175	95% Percentile Bootstrap UCL	1.34
Kolmogorov-Smirnov 5% Critical Value	0.222	95% BCA Bootstrap UCL	1.346
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.651
		97.5% Chebyshev(Mean, Sd) UCL	1.863
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.279
95% Approximate Gamma UCL	1.404		
95% Adjusted Gamma UCL	1.438		

Potential UCL to Use	Use 95% Student's-t UCL	1.359

Basin Mosquitofish Whole Body DDTR with Non-detect Isomers Equal to Half the PQL for 2001 - 3 ft

Sample ID	Date	Detect	DDTR (mg/kg)
GB-B10-100201-07A	10/2/2001	1	1.588
GB-B10-100201-07B	10/2/2001	1	1.879
GB-B10-100201-07C	10/2/2001	1	1.7775
GB-B1-100101-01A	10/1/2001	1	1.61
GB-B1-100101-01B	10/1/2001	1	1.59
GB-B1-100101-01C	10/1/2001	1	2.05
GB-B2-100101-02A	10/1/2001	1	1.22
GB-B2-100101-02B	10/1/2001	1	1.27
GB-B2-100101-02C	10/1/2001	1	1.395
GB-B4-100101-03A	10/1/2001	1	1.21
GB-B4-100101-03B	10/1/2001	1	1.052
GB-B4-100101-03C	10/1/2001	1	0.99
GB-B6-100201-06A	10/2/2001	1	0.5825
GB-B6-100201-06B	10/2/2001	1	1.435
GB-B6-100201-06C	10/2/2001	1	1.285

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish DDT DL/2 - 3 ft

General Statistics

Number of Valid Observations	15	Number of Distinct Observations	15

Raw Statistics

Minimum	0.583	Log-transformed Statistics	
Maximum	2.05	Minimum of Log Data	-0.54
Mean	1.396	Maximum of Log Data	0.718
Median	1.395	Mean of log Data	0.293
SD	0.375	SD of log Data	0.31
Coefficient of Variation	0.269		
Skewness	-0.292		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.983	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.881	Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.566	95% H-UCL	1.645
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.896
95% Adjusted-CLT UCL	1.547	97.5% Chebyshev (MVUE) UCL	2.11
95% Modified-t UCL	1.565	99% Chebyshev (MVUE) UCL	2.53

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	10.17	Data appear Normal at 5% Significance Level	
Theta Star	0.137		
MLE of Mean	1.396		
MLE of Standard Deviation	0.438		
nu star	305.2		
Approximate Chi Square Value (.05)	265.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0324	95% CLT UCL	1.555
Adjusted Chi Square Value	261.2	95% Jackknife UCL	1.566
		95% Standard Bootstrap UCL	1.553
Anderson-Darling Test Statistic	0.295	95% Bootstrap-t UCL	1.552
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL	1.56
Kolmogorov-Smirnov Test Statistic	0.144	95% Percentile Bootstrap UCL	1.549
Kolmogorov-Smirnov 5% Critical Value	0.221	95% BCA Bootstrap UCL	1.53
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.817
		97.5% Chebyshev(Mean, Sd) UCL	2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.359
95% Approximate Gamma UCL	1.603		
95% Adjusted Gamma UCL	1.631		

Potential UCL to Use	Use 95% Student's-t UCL	1.566

Basin Mosquitofish Whole Body DDTR with Non-detect Isomers Equal to Zero for 2001 - 6ft

Sample ID	Date	Detect	DDTR (mg/kg)
GB-B1-100101-01A	10/1/2001	1	1.21
GB-B1-100101-01B	10/1/2001	1	1.19
GB-B1-100101-01C	10/1/2001	1	1.75
GB-B2-100101-02A	10/1/2001	1	0.72
GB-B2-100101-02B	10/1/2001	1	0.77
GB-B2-100101-02C	10/1/2001	1	0.57
GB-B4-100101-03A	10/1/2001	1	0.81
GB-B4-100101-03B	10/1/2001	1	0.98
GB-B4-100101-03C	10/1/2001	1	0.49
GB-B10-100201-07A	10/2/2001	1	1.58
GB-B10-100201-07B	10/2/2001	1	1.846
GB-B10-100201-07C	10/2/2001	1	1.71
GB-B6-100201-06A	10/2/2001	1	1.23
GB-B6-100201-06B	10/2/2001	1	1.36
GB-B6-100201-06C	10/2/2001	1	1.21
GB-R1-100201-04A	10/2/2001	1	9.31
GB-R1-100201-04B	10/2/2001	1	10.22
GB-R1-100201-04C	10/2/2001	1	10.82
GB-R2-100201-05A	10/2/2001	1	6.54
GB-R2-100201-05B	10/2/2001	1	6.51
GB-R2-100201-05C	10/2/2001	1	6.79

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish DDT (ND=0) - 6 ft

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	20

Raw Statistics

Minimum	0.49	Log-transformed Statistics	
Maximum	10.82	Minimum of Log Data	-0.713
Mean	3.22	Maximum of Log Data	2.381
Median	1.36	Mean of log Data	0.654
SD	3.497	SD of log Data	1.006
Coefficient of Variation	1.086		
Skewness	1.264		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.721	Shapiro Wilk Test Statistic	0.875
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4.536	95% H-UCL	5.69
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.4
95% Adjusted-CLT UCL	4.7	97.5% Chebyshev (MVUE) UCL	7.835
95% Modified-t UCL	4.571	99% Chebyshev (MVUE) UCL	10.65
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.982	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.28		
MLE of Mean	3.22		
MLE of Standard Deviation	3.25		
nu star	41.22		
Approximate Chi Square Value (.05)	27.51	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	4.475
Adjusted Chi Square Value	26.65	95% Jackknife UCL	4.536
		95% Standard Bootstrap UCL	4.443
Anderson-Darling Test Statistic	1.725	95% Bootstrap-t UCL	4.903
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	4.436
Kolmogorov-Smirnov Test Statistic	0.295	95% Percentile Bootstrap UCL	4.461
Kolmogorov-Smirnov 5% Critical Value	0.194	95% BCA Bootstrap UCL	4.71
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.546
		97.5% Chebyshev(Mean, Sd) UCL	7.986
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10.81
95% Approximate Gamma UCL	4.825		
95% Adjusted Gamma UCL	4.981		

Potential UCL to Use	Use 99% Chebyshev (Mean, Sd) UCL	10.81

Basin Mosquitofish Whole Body DDTR with Non-detect Isomers Equal to Half the PQL for 2001 - 6 ft

Sample ID	Date	Detect	DDTR (mg/kg)
GB-B10-100201-07A	10/2/2001	1	1.588
GB-B10-100201-07B	10/2/2001	1	1.879
GB-B10-100201-07C	10/2/2001	1	1.7775
GB-B1-100101-01A	10/1/2001	1	1.61
GB-B1-100101-01B	10/1/2001	1	1.59
GB-B1-100101-01C	10/1/2001	1	2.05
GB-B2-100101-02A	10/1/2001	1	1.22
GB-B2-100101-02B	10/1/2001	1	1.27
GB-B2-100101-02C	10/1/2001	1	1.395
GB-B4-100101-03A	10/1/2001	1	1.21
GB-B4-100101-03B	10/1/2001	1	1.052
GB-B4-100101-03C	10/1/2001	1	0.99
GB-B6-100201-06A	10/2/2001	1	0.5825
GB-B6-100201-06B	10/2/2001	1	1.435
GB-B6-100201-06C	10/2/2001	1	1.285
GB-R1-100201-04A	10/2/2001	1	9.31
GB-R1-100201-04B	10/2/2001	1	10.22
GB-R1-100201-04C	10/2/2001	1	10.82
GB-R2-100201-05A	10/2/2001	1	6.54
GB-R2-100201-05B	10/2/2001	1	6.51
GB-R2-100201-05C	10/2/2001	1	6.79

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/25/10
CHECKED BY/DATE: HEF 4/1/10

2001 Mosquitofish DDT (ND=1/2 DL) - 6 ft

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	21

Raw Statistics		Log-transformed Statistics	
Minimum	0.583	Minimum of Log Data	-0.54
Maximum	10.82	Maximum of Log Data	2.381
Mean	3.387	Mean of log Data	0.81
Median	1.59	SD of log Data	0.884
SD	3.389		
Coefficient of Variation	1.001		
Skewness	1.289		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.713	Shapiro Wilk Test Statistic	0.846
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4.662	95% H-UCL	5.348
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.241
95% Adjusted-CLT UCL	4.826	97.5% Chebyshev (MVUE) UCL	7.539
95% Modified-t UCL	4.697	99% Chebyshev (MVUE) UCL	10.09

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.199	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2.825		
MLE of Mean	3.387		
MLE of Standard Deviation	3.093		
nu star	50.34		
Approximate Chi Square Value (.05)	35.05	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	4.603
Adjusted Chi Square Value	34.07	95% Jackknife UCL	4.662
		95% Standard Bootstrap UCL	4.574
Anderson-Darling Test Statistic	2.093	95% Bootstrap-t UCL	5.005
Anderson-Darling 5% Critical Value	0.761	95% Hall's Bootstrap UCL	4.515
Kolmogorov-Smirnov Test Statistic	0.31	95% Percentile Bootstrap UCL	4.597
Kolmogorov-Smirnov 5% Critical Value	0.193	95% BCA Bootstrap UCL	4.682
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.611
		97.5% Chebyshev(Mean, Sd) UCL	8.006
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10.75
95% Approximate Gamma UCL	4.864		
95% Adjusted Gamma UCL	5.004		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	6.611

Basin Bluegill Whole Body Mercury UCL for 2008

Sample ID	Date	Detect	Mercury (mg/kg)
MCI-0061-08WB-NE	10/15/2008	1	0.63
MCI-0062-08WB-NE	10/15/2008	1	0.54
MCI-0063-08WB-NE	10/15/2008	1	0.84
MCI-0064-08WB-NE	10/15/2008	1	0.7
MCI-0065-08WB-NE	10/15/2008	1	0.8
MCI-0066-08WB-NW	10/15/2008	1	0.85
MCI-0067-08WB-NW	10/15/2008	1	0.57
MCI-0068-08WB-NW	10/15/2008	1	0.63
MCI-0069-08WB-NW	10/15/2008	1	0.58
MCI-0070-08WB-NW	10/15/2008	1	0.79
MCI-0071-08WB-SE	10/15/2008	1	0.66
MCI-0072-08WB-SE	10/15/2008	1	0.59
MCI-0073-08WB-SE	10/15/2008	1	0.83
MCI-0074-08WB-SE	10/15/2008	1	0.61
MCI-0075-08WB-SE	10/15/2008	1	0.59
MCI-0076-08WB-SW	10/15/2008	1	0.59
MCI-0077-08WB-SW	10/15/2008	1	0.57
MCI-0078-08WB-SW	10/15/2008	1	0.59
MCI-0079-08WB-SW	10/15/2008	1	0.94
MCI-0080-08WB-SW	10/15/2008	1	1.2

Detected: 1=detected, 0 = not detected

Forage fish include bluegill and silverside

PREPARED BY/DATE: EJS 4/29/10

CHECKED BY/DATE: HEF 4/29/10

BG Hg

General Statistics			
Number of Valid Observations	20	Number of Distinct Observations	15
Raw Statistics		Log-transformed Statistics	
Minimum	0.54	Minimum of Log Data	-0.616
Maximum	1.2	Maximum of Log Data	0.182
Mean	0.705	Mean of log Data	-0.372
Median	0.63	SD of log Data	0.212
SD	0.166		
Coefficient of Variation	0.236		
Skewness	1.574		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.818	Shapiro Wilk Test Statistic	0.87
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.769	95% H-UCL	0.769
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.85
95% Adjusted-CLT UCL	0.78	97.5% Chebyshev (MVUE) UCL	0.914
95% Modified-t UCL	0.772	99% Chebyshev (MVUE) UCL	1.038
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	18.79	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0375		
MLE of Mean	0.705		
MLE of Standard Deviation	0.163		
nu star	751.4		
Approximate Chi Square Value (.05)	688.8	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	0.766
Adjusted Chi Square Value	684.1	95% Jackknife UCL	0.769
		95% Standard Bootstrap UCL	0.764
Anderson-Darling Test Statistic	1.114	95% Bootstrap-t UCL	0.792
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	0.797
Kolmogorov-Smirnov Test Statistic	0.223	95% Percentile Bootstrap UCL	0.769
Kolmogorov-Smirnov 5% Critical Value	0.193	95% BCA Bootstrap UCL	0.78
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.867
		97.5% Chebyshev(Mean, Sd) UCL	0.937
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.075
95% Approximate Gamma UCL	0.769		

95% Adjusted Gamma UCL	0.774		
Potential UCL to Use		Use 95% Student's-t UCL	0.769
		or 95% Modified-t UCL	0.772

Basin Bluegill Whole Body HCB UCL for 2008

Sample ID	Date	Detect	HCB (mg/kg)
MCI-0061-08WB-NE	10/15/2008	1	0.231
MCI-0062-08WB-NE	10/15/2008	1	0.19
MCI-0063-08WB-NE	10/15/2008	1	0.171
MCI-0064-08WB-NE	10/15/2008	1	0.14
MCI-0065-08WB-NE	10/15/2008	1	0.163
MCI-0066-08WB-NW	10/15/2008	1	0.118
MCI-0067-08WB-NW	10/15/2008	1	0.281
MCI-0068-08WB-NW	10/15/2008	1	0.364
MCI-0069-08WB-NW	10/15/2008	1	0.239
MCI-0070-08WB-NW	10/15/2008	1	0.223
MCI-0071-08WB-SE	10/15/2008	1	0.0543
MCI-0072-08WB-SE	10/15/2008	1	0.353
MCI-0073-08WB-SE	10/15/2008	1	0.319
MCI-0074-08WB-SE	10/15/2008	1	0.44
MCI-0075-08WB-SE	10/15/2008	1	0.473
MCI-0076-08WB-SW	10/15/2008	1	0.456
MCI-0077-08WB-SW	10/15/2008	1	0.509
MCI-0078-08WB-SW	10/15/2008	1	0.484
MCI-0079-08WB-SW	10/15/2008	1	0.36
MCI-0080-08WB-SW	10/15/2008	1	0.637

Detected: 1=detected, 0 = not detected

Forage fish include bluegill and silverside

PREPARED BY/DATE: EJS 4/29/10

CHECKED BY/DATE: HEF 5/3/10

BG HCB

General Statistics

Number of Valid Observations	20	Number of Distinct Observations	20

Raw Statistics		Log-transformed Statistics	
Minimum	0.0543	Minimum of Log Data	-2.913
Maximum	0.637	Maximum of Log Data	-0.451
Mean	0.31	Mean of log Data	-1.317
Median	0.3	SD of log Data	0.604
SD	0.155		
Coefficient of Variation	0.499		
Skewness	0.314		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.97	Shapiro Wilk Test Statistic	0.94
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.37	95% H-UCL	0.432
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.515
95% Adjusted-CLT UCL	0.37	97.5% Chebyshev (MVUE) UCL	0.6
95% Modified-t UCL	0.371	99% Chebyshev (MVUE) UCL	0.768

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.059	Data appear Normal at 5% Significance Level	
Theta Star	0.101		
MLE of Mean	0.31		
MLE of Standard Deviation	0.177		
nu star	122.3		
Approximate Chi Square Value (.05)	97.8	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	0.367
Adjusted Chi Square Value	96.07	95% Jackknife UCL	0.37
		95% Standard Bootstrap UCL	0.365
Anderson-Darling Test Statistic	0.242	95% Bootstrap-t UCL	0.373
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL	0.372
Kolmogorov-Smirnov Test Statistic	0.114	95% Percentile Bootstrap UCL	0.367
Kolmogorov-Smirnov 5% Critical Value	0.195	95% BCA Bootstrap UCL	0.37
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.461
		97.5% Chebyshev(Mean, Sd) UCL	0.526
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.655
95% Approximate Gamma UCL	0.388		
95% Adjusted Gamma UCL	0.395		

Potential UCL to Use	Use 95% Student's-t UCL	0.37

Basin Silverside Whole Body Mercury UCL for 2008

Sample ID	Date	Detect	Mercury (mg/kg)
MCI-0081-08WB-NE	10/15/2008	1	0.6
MCI-0082-08WB-NE	10/15/2008	1	1.2
MCI-0085-08WB-NW	10/15/2008	1	0.82
MCI-0083-08WB-SE	10/15/2008	1	0.82
MCI-0084-08WB-SW	10/15/2008	1	0.74

Detected: 1=detected, 0 = not detected

Forage fish include bluegill and silverside

PREPARED BY/DATE: EJS 4/29/10

CHECKED BY/DATE: HEF 4/29/10

Basin Silverside Whole Body HCB UCL for 2008

Sample ID	Date	Detect	HCB (mg/kg)
MCI-0081-08WB-NE	10/15/2008	1	1.99
MCI-0082-08WB-NE	10/15/2008	1	0.0868
MCI-0085-08WB-NW	10/15/2008	1	0.199
MCI-0083-08WB-SE	10/15/2008	1	0.183
MCI-0084-08WB-SW	10/15/2008	1	0.291

Detected: 1=detected, 0 = not detected

Forage fish include bluegill and silverside

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

Basin Forage Fish Whole Body Mercury UCL for 2008

Sample ID	Date	Detect	Mercury (mg/kg)
MCI-0061-08WB-NE	10/15/2008	1	0.63
MCI-0062-08WB-NE	10/15/2008	1	0.54
MCI-0063-08WB-NE	10/15/2008	1	0.84
MCI-0064-08WB-NE	10/15/2008	1	0.7
MCI-0065-08WB-NE	10/15/2008	1	0.8
MCI-0066-08WB-NW	10/15/2008	1	0.85
MCI-0067-08WB-NW	10/15/2008	1	0.57
MCI-0068-08WB-NW	10/15/2008	1	0.63
MCI-0069-08WB-NW	10/15/2008	1	0.58
MCI-0070-08WB-NW	10/15/2008	1	0.79
MCI-0071-08WB-SE	10/15/2008	1	0.66
MCI-0072-08WB-SE	10/15/2008	1	0.59
MCI-0073-08WB-SE	10/15/2008	1	0.83
MCI-0074-08WB-SE	10/15/2008	1	0.61
MCI-0075-08WB-SE	10/15/2008	1	0.59
MCI-0076-08WB-SW	10/15/2008	1	0.59
MCI-0077-08WB-SW	10/15/2008	1	0.57
MCI-0078-08WB-SW	10/15/2008	1	0.59
MCI-0079-08WB-SW	10/15/2008	1	0.94
MCI-0080-08WB-SW	10/15/2008	1	1.2
MCI-0081-08WB-NE	10/15/2008	1	0.6
MCI-0082-08WB-NE	10/15/2008	1	1.2
MCI-0085-08WB-NW	10/15/2008	1	0.82
MCI-0083-08WB-SE	10/15/2008	1	0.82
MCI-0084-08WB-SW	10/15/2008	1	0.74

Detected: 1=detected, 0 = not detected

Forage fish include bluegill and silverside

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

Forage Mercury

General Statistics			
Number of Valid Observations	25	Number of Distinct Observations	18

Raw Statistics		Log-transformed Statistics	
Minimum	0.54	Minimum of Log Data	-0.616
Maximum	1.2	Maximum of Log Data	0.182
Mean	0.731	Mean of log Data	-0.339
Median	0.66	SD of log Data	0.225
SD	0.182		
Coefficient of Variation	0.249		
Skewness	1.392		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.825	Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.918	Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.793	95% H-UCL	0.793
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.875
95% Adjusted-CLT UCL	0.802	97.5% Chebyshev (MVUE) UCL	0.937
95% Modified-t UCL	0.795	99% Chebyshev (MVUE) UCL	1.06
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	17.16	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0426		
MLE of Mean	0.731		
MLE of Standard Deviation	0.177		
nu star	857.8		
Approximate Chi Square Value (.05)	790.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0395	95% CLT UCL	0.791
Adjusted Chi Square Value	786.5	95% Jackknife UCL	0.793
		95% Standard Bootstrap UCL	0.79
Anderson-Darling Test Statistic	1.16	95% Bootstrap-t UCL	0.807
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	0.814
Kolmogorov-Smirnov Test Statistic	0.194	95% Percentile Bootstrap UCL	0.794
Kolmogorov-Smirnov 5% Critical Value	0.174	95% BCA Bootstrap UCL	0.803
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.89
		97.5% Chebyshev(Mean, Sd) UCL	0.958
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.093
95% Approximate Gamma UCL	0.793		

95% Adjusted Gamma UCL	0.798		
Potential UCL to Use		Use 95% Student's-t UCL	0.793
		or 95% Modified-t UCL	0.795

Basin Forage Fish Whole Body HCB UCL for 2008

Sample ID	Date	Detect	HCB (mg/kg)
MCI-0061-08WB-NE	10/15/2008	1	0.231
MCI-0062-08WB-NE	10/15/2008	1	0.19
MCI-0063-08WB-NE	10/15/2008	1	0.171
MCI-0064-08WB-NE	10/15/2008	1	0.14
MCI-0065-08WB-NE	10/15/2008	1	0.163
MCI-0066-08WB-NW	10/15/2008	1	0.118
MCI-0067-08WB-NW	10/15/2008	1	0.281
MCI-0068-08WB-NW	10/15/2008	1	0.364
MCI-0069-08WB-NW	10/15/2008	1	0.239
MCI-0070-08WB-NW	10/15/2008	1	0.223
MCI-0071-08WB-SE	10/15/2008	1	0.0543
MCI-0072-08WB-SE	10/15/2008	1	0.353
MCI-0073-08WB-SE	10/15/2008	1	0.319
MCI-0074-08WB-SE	10/15/2008	1	0.44
MCI-0075-08WB-SE	10/15/2008	1	0.473
MCI-0076-08WB-SW	10/15/2008	1	0.456
MCI-0077-08WB-SW	10/15/2008	1	0.509
MCI-0078-08WB-SW	10/15/2008	1	0.484
MCI-0079-08WB-SW	10/15/2008	1	0.36
MCI-0080-08WB-SW	10/15/2008	1	0.637
MCI-0081-08WB-NE	10/15/2008	1	1.99
MCI-0082-08WB-NE	10/15/2008	1	0.0868
MCI-0085-08WB-NW	10/15/2008	1	0.199
MCI-0083-08WB-SE	10/15/2008	1	0.183
MCI-0084-08WB-SW	10/15/2008	1	0.291

Detected: 1=detected, 0 = not detected

Forage fish include bluegill and silverside

PREPARED BY/DATE: EJS 3/25/10

CHECKED BY/DATE: HEF 4/1/10

Forage HCB

General Statistics			
Number of Valid Observations	25	Number of Distinct Observations	25
Raw Statistics		Log-transformed Statistics	
Minimum	0.0543	Minimum of Log Data	-2.913
Maximum	1.99	Maximum of Log Data	0.688
Mean	0.358	Mean of log Data	-1.306
Median	0.281	SD of log Data	0.721
SD	0.371		
Coefficient of Variation	1.035		
Skewness	3.794		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.578	Shapiro Wilk Test Statistic	0.967
Shapiro Wilk Critical Value	0.918	Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.485	95% H-UCL	0.483
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.582
95% Adjusted-CLT UCL	0.54	97.5% Chebyshev (MVUE) UCL	0.684
95% Modified-t UCL	0.494	99% Chebyshev (MVUE) UCL	0.883
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.734	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.207		
MLE of Mean	0.358		
MLE of Standard Deviation	0.272		
nu star	86.69		
Approximate Chi Square Value (.05)	66.23	Nonparametric Statistics	
Adjusted Level of Significance	0.0395	95% CLT UCL	0.48
Adjusted Chi Square Value	65.01	95% Jackknife UCL	0.485
		95% Standard Bootstrap UCL	0.476
Anderson-Darling Test Statistic	0.684	95% Bootstrap-t UCL	0.637
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.989
Kolmogorov-Smirnov Test Statistic	0.145	95% Percentile Bootstrap UCL	0.491
Kolmogorov-Smirnov 5% Critical Value	0.177	95% BCA Bootstrap UCL	0.575
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.681
		97.5% Chebyshev(Mean, Sd) UCL	0.821
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.096
95% Approximate Gamma UCL	0.469		

95% Adjusted Gamma UCL	0.478

Potential UCL to Use	Use 95% Approximate Gamma UCL 0.469

Appendix M Index
(Titles below are active links to the Appendix M data files)

Surface Water, 1993, 1994, Mercury, Elevation Independent

Surface Water – Shallow, 2008, 2009, Mercury, 3ft

Surface Water – Shallow, 2008, 2009, Filtered Mercury, 3ft

Surface Water – Shallow, 2008, 2009, Mercury, 6ft

Surface Water – Shallow, 2008, 2009, Filtered Mercury, 6ft

Surface Water – Deep, 2008, 2009, Mercury, 3ft

Surface Water – Deep, 2008, 2009, Filtered Mercury, 3ft

Surface Water – Deep, 2008, 2009, Mercury, 6ft

Surface Water – Deep, 2008, 2009, Filtered Mercury, 6 ft

Surface Water – Deep and Shallow, 2008, 2009, Mercury, 3 ft

Surface Water – Deep and Shallow, 2008, 2009, Filtered Mercury, 3 ft

Surface Water – Deep and Shallow, 2008, 2009, Mercury, 6 ft

Surface Water – Deep and Shallow, 2008, 2009, Filtered Mercury, 6 ft

Surface Water – Deep and Shallow, 1991, 1994, 2008, 2009, Mercury, 3 ft

Surface Water – Deep and Shallow, 1991, 1994, 2008, 2009, Filtered Mercury, 3 ft

Surface Water – Deep and Shallow, 1991, 1994, 2008, 2009, Mercury, 6 ft

Surface Water – Deep and Shallow, 1991, 1994, 2008, 2009, Filtered Mercury, 6 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, Mercury, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, Mercury, 6 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, Mercury, 3 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, Mercury, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, Mercury, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, Mercury, 6 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, Mercury, 3 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, Mercury, 6 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 6 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 3 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 6 ft

Sediment Basin, Average, Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 3 ft

Sediment Basin, Average, Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, Mercury, 6 ft

Sediment Round Pond, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, Starting at 0, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, Average, Starting at 0, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, 0-2, 0-4, 4-8 and 0-12, 1994, 2001, 2006, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, Starting at 0, 1994, 2001, 2006, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, Average, 0-2, 0-4, 4-8 and 0-12, 1994, 2001, 2006, 2008, 2009, Mercury, Elevation Independent

Sediment Round Pond, Average, Starting at 0, 1994, 2001, 2006, 2008, 2009, Mercury, Elevation Independent

Note: 3 ft and 6 ft elevations correspond to 3 ft of 6 ft NAVD88

Basin Surface Water Total Mercury UCL 1991 and 1994

Sample ID	Date	Detected	Mercury (ng/L)
OWG0101-0694	6/27/1994	1	280
OWG0107-0894	8/18/1994	1	62
OWG0202-0694	6/27/1994	1	250
OWG0208-0894	8/18/1994	1	56
OWG0303-0694	6/27/1994	1	360
OWG0309-0894	8/18/1994	1	110
WGC901-0891	8/29/1991	1	26
WGC902-0891	8/29/1991	1	45
WGF201-0891	8/29/1991	1	150
WGG601-0891	8/30/1991	1	110
WGG602-0891	8/30/1991	1	83
WGH501-0891	8/30/1991	1	150
WGH502-0891	8/30/1991	1	180
WGH901-0891	8/29/1991	1	110
WGH902-0891	8/29/1991	1	120

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10

CHECKED BY/DATE: HEF 5/4/10

1991-94 SW TMercury

General Statistics			
Number of Valid Observations	15	Number of Distinct Observations	12
Raw Statistics		Log-transformed Statistics	
Minimum	26	Minimum of Log Data	3.258
Maximum	360	Maximum of Log Data	5.886
Mean	139.5	Mean of log Data	4.719
Median	110	SD of log Data	0.714
SD	93.89		
Coefficient of Variation	0.673		
Skewness	1.126		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.9	Shapiro Wilk Test Statistic	0.979
Shapiro Wilk Critical Value	0.881	Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	182.2	95% H-UCL	225.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	261.7
95% Adjusted-CLT UCL	186.9	97.5% Chebyshev (MVUE) UCL	313.7
95% Modified-t UCL	183.3	99% Chebyshev (MVUE) UCL	415.8
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.993	Data appear Normal at 5% Significance Level	
Theta Star	69.96		
MLE of Mean	139.5		
MLE of Standard Deviation	98.78		
nu star	59.8		
Approximate Chi Square Value (.05)	43.02	Nonparametric Statistics	
Adjusted Level of Significance	0.0324	95% CLT UCL	179.3
Adjusted Chi Square Value	41.27	95% Jackknife UCL	182.2
		95% Standard Bootstrap UCL	178.5
Anderson-Darling Test Statistic	0.192	95% Bootstrap-t UCL	194.9
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL	196.8
Kolmogorov-Smirnov Test Statistic	0.112	95% Percentile Bootstrap UCL	180
Kolmogorov-Smirnov 5% Critical Value	0.224	95% BCA Bootstrap UCL	185.1

Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	245.1
		97.5% Chebyshev(Mean, Sd) UCL	290.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	380.7
95% Approximate Gamma UCL	193.9		
95% Adjusted Gamma UCL	202.1		
Potential UCL to Use		Use 95% Student's-t UCL	182.2

Basin Surface Water-Shallow Total Mercury UCL 2008 and 2009

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	91.4	1
OU2B-SW-205DS-08	6/3/2008	1	94.2	1
OU2B-SW-301DS-08	6/3/2008	1	181	0.8
OU2B-SW-303DS-08	6/3/2008	1	131	1
OU2B-SW-304DS-08	6/3/2008	1	83.8	1
OU2B-SW-101DS-08	6/4/2008	1	137	2
OU2B-SW-103DS-08	6/4/2008	1	264	3
OU2B-SW-201DS-08	6/4/2008	1	180	1
OU2B-SW-203DS-08	6/4/2008	1	360	2
OU2B-SW-301DS-09	6/3/2009	1	9.61	2
OU2B-SW-201DS-09	6/3/2009	1	8.7	2.2
OU2B-SW-303DS-09	6/3/2009	1	11.4	2
OU2B-SW-304DS-09	6/3/2009	1	12.1	2
OU2B-SW-DHDS-09	6/4/2009	1	34.7	9
OU2B-SW-103DS-09	6/4/2009	1	12.8	4
OU2B-SW-101DS-09	6/4/2009	1	10.6	3.5
OU2B-SW-203DS-09	6/4/2009	1	11.9	3
OU2B-SW-105DS-09	6/8/2009	1	87.9	1.2
OU2B-SW-205DS-09	6/8/2009	1	56.3	1

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 3/29/10

2008-09 shallow TMercury

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	19
Raw Statistics		**Log-transformed Statistics**	
Minimum	8.7	Minimum of Log Data	2.163
Maximum	360	Maximum of Log Data	5.886
Mean	93.6	Mean of log Data	3.891
Median	83.8	SD of log Data	1.284
SD	97.51		
Coefficient of Variation	1.042		
Skewness	1.413		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.831	Shapiro Wilk Test Statistic	0.882
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	132.4	95% H-UCL	280.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	258.9
95% Adjusted-CLT UCL	138.1	97.5% Chebyshev (MVUE) UCL	325.9
95% Modified-t UCL	133.6	99% Chebyshev (MVUE) UCL	457.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.795	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	117.8		
MLE of Mean	93.6		
MLE of Standard Deviation	105		
nu star	30.2		
Approximate Chi Square Value (.05)	18.65	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0369	95% CLT UCL	130.4
Adjusted Chi Square Value	17.86	95% Jackknife UCL	132.4
		95% Standard Bootstrap UCL	129.5

Anderson-Darling Test Statistic	0.724	95% Bootstrap-t UCL	145.2
Anderson-Darling 5% Critical Value	0.773	95% Hall's Bootstrap UCL	155.1
Kolmogorov-Smirnov Test Statistic	0.22	95% Percentile Bootstrap UCL	132.8
Kolmogorov-Smirnov 5% Critical Value	0.205	95% BCA Bootstrap UCL	136.8
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	191.1
		97.5% Chebyshev(Mean, Sd) UCL	233.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	316.2
95% Approximate Gamma UCL	151.6		
95% Adjusted Gamma UCL	158.3		
Potential UCL to Use		Use 95% Approximate Gamma UCL	151.6

Basin Surface Water-Shallow Filtered Mercury UCL 2008 and 2009 at 3ft NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2B-SW-101DS-08	6/4/2008	1	14	2
OU2B-SW-101DS-09	6/4/2009	1	4.57	3.5
OU2B-SW-103DS-08	6/4/2008	1	18.3	3
OU2B-SW-103DS-09	6/4/2009	1	4.27	4
OU2B-SW-105DS-08	6/3/2008	1	12.4	1
OU2B-SW-105DS-09	6/8/2009	1	11.6	1.2
OU2B-SW-201DS-08	6/4/2008	1	14.3	1
OU2B-SW-201DS-09	6/3/2009	1	5.3	2.2
OU2B-SW-203DS-08	6/4/2008	1	22.7	2
OU2B-SW-203DS-09	6/4/2009	1	4.58	3
OU2B-SW-205DS-08	6/3/2008	1	12.3	1.0
OU2B-SW-205DS-09	6/8/2009	1	11.6	1
OU2B-SW-301DS-08	6/3/2008	1	14.6	0.8
OU2B-SW-301DS-09	6/3/2009	1	3.58	2
OU2B-SW-303DS-08	6/3/2008	1	13.8	1
OU2B-SW-303DS-09	6/3/2009	1	4.05	2
OU2B-SW-304DS-08	6/3/2008	1	11.4	1
OU2B-SW-304DS-09	6/3/2009	1	4.16	2.0
OU2B-SW-DHDS-09	6/4/2009	1	5.88	9

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 3/29/10

2008-09 shallow DMercury

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	18
Raw Statistics		**Log-transformed Statistics**	
Minimum	3.58	Minimum of Log Data	1.275
Maximum	22.7	Maximum of Log Data	3.122
Mean	10.18	Mean of log Data	2.159
Median	11.6	SD of log Data	0.604
SD	5.574		
Coefficient of Variation	0.548		
Skewness	0.465		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.874
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	12.4	95% H-UCL	14.05
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	16.8
95% Adjusted-CLT UCL	12.43	97.5% Chebyshev (MVUE) UCL	19.62
95% Modified-t UCL	12.42	99% Chebyshev (MVUE) UCL	25.17
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.785	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.655		
MLE of Mean	10.18		
MLE of Standard Deviation	6.099		
nu star	105.8		
Approximate Chi Square Value (.05)	83.09	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0369	95% CLT UCL	12.28
Adjusted Chi Square Value	81.33	95% Jackknife UCL	12.4
		95% Standard Bootstrap UCL	12.26

Anderson-Darling Test Statistic	1.062	95% Bootstrap-t UCL	12.48
Anderson-Darling 5% Critical Value	0.747	95% Hall's Bootstrap UCL	12.5
Kolmogorov-Smirnov Test Statistic	0.232	95% Percentile Bootstrap UCL	12.2
Kolmogorov-Smirnov 5% Critical Value	0.2	95% BCA Bootstrap UCL	12.28
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.75
		97.5% Chebyshev(Mean, Sd) UCL	18.16
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22.9
95% Approximate Gamma UCL	12.96		
95% Adjusted Gamma UCL	13.24		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	15.75

Basin Surface Water-Shallow Total Mercury UCL 2008 and 2009 at 6 ft.
NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	44.3	1
OU2R-SW-101DS-09	6/3/2009	1	7.31	2.2
OU2B-SW-105DS-08	6/3/2008	1	91.4	1
OU2B-SW-205DS-08	6/3/2008	1	94.2	1
OU2B-SW-301DS-08	6/3/2008	1	181	0.8
OU2B-SW-303DS-08	6/3/2008	1	131	1
OU2B-SW-304DS-08	6/3/2008	1	83.8	1
OU2B-SW-101DS-08	6/4/2008	1	137	2
OU2B-SW-103DS-08	6/4/2008	1	264	3
OU2B-SW-201DS-08	6/4/2008	1	180	1
OU2B-SW-203DS-08	6/4/2008	1	360	2
OU2B-SW-301DS-09	6/3/2009	1	9.61	2
OU2B-SW-201DS-09	6/3/2009	1	8.7	2.2
OU2B-SW-303DS-09	6/3/2009	1	11.4	2
OU2B-SW-304DS-09	6/3/2009	1	12.1	2
OU2B-SW-DHDS-09	6/4/2009	1	34.7	9
OU2B-SW-103DS-09	6/4/2009	1	12.8	4
OU2B-SW-101DS-09	6/4/2009	1	10.6	3.5
OU2B-SW-203DS-09	6/4/2009	1	11.9	3
OU2B-SW-105DS-09	6/8/2009	1	87.9	1.2
OU2B-SW-205DS-09	6/8/2009	1	56.3	1

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

THg Shallow 08-09

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	21

Raw Statistics		Log-transformed Statistics	
Minimum	7.31	Minimum of Log Data	1.989
Maximum	360	Maximum of Log Data	5.886
Mean	87.14	Mean of log Data	3.796
Median	56.3	SD of log Data	1.287
SD	94.91		
Coefficient of Variation	1.089		
Skewness	1.541		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.813	Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	122.9	95% H-UCL	240.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	232.5
95% Adjusted-CLT UCL	128.6	97.5% Chebyshev (MVUE) UCL	291.8
95% Modified-t UCL	124	99% Chebyshev (MVUE) UCL	408.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.78	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	111.7		
MLE of Mean	87.14		
MLE of Standard Deviation	98.64		
nu star	32.78		
Approximate Chi Square Value (.05)	20.69	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	121.2
Adjusted Chi Square Value	19.95	95% Jackknife UCL	122.9
		95% Standard Bootstrap UCL	120

Anderson-Darling Test Statistic	0.713	95% Bootstrap-t UCL	135.6
Anderson-Darling 5% Critical Value	0.776	95% Hall's Bootstrap UCL	140.7
Kolmogorov-Smirnov Test Statistic	0.216	95% Percentile Bootstrap UCL	121.5
Kolmogorov-Smirnov 5% Critical Value	0.196	95% BCA Bootstrap UCL	127.9
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	177.4
		97.5% Chebyshev(Mean, Sd) UCL	216.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	293.2
95% Approximate Gamma UCL	138.1		
95% Adjusted Gamma UCL	143.2		
Potential UCL to Use		Use 95% Approximate Gamma UCL	138.1

Basin Surface Water-Shallow Filtered Mercury UCL 2008 and 2009 at 6ft NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	8.58	1
OU2R-SW-101DS-09	6/3/2009	1	3.57	2.2
OU2B-SW-101DS-08	6/4/2008	1	14	2
OU2B-SW-101DS-09	6/4/2009	1	4.57	3.5
OU2B-SW-103DS-08	6/4/2008	1	18.3	3
OU2B-SW-103DS-09	6/4/2009	1	4.27	4
OU2B-SW-105DS-08	6/3/2008	1	12.4	1
OU2B-SW-105DS-09	6/8/2009	1	11.6	1.2
OU2B-SW-201DS-08	6/4/2008	1	14.3	1
OU2B-SW-201DS-09	6/3/2009	1	5.3	2.2
OU2B-SW-203DS-08	6/4/2008	1	22.7	2
OU2B-SW-203DS-09	6/4/2009	1	4.58	3
OU2B-SW-205DS-08	6/3/2008	1	12.3	1.0
OU2B-SW-205DS-09	6/8/2009	1	11.6	1
OU2B-SW-301DS-08	6/3/2008	1	14.6	0.8
OU2B-SW-301DS-09	6/3/2009	1	3.58	2
OU2B-SW-303DS-08	6/3/2008	1	13.8	1
OU2B-SW-303DS-09	6/3/2009	1	4.05	2
OU2B-SW-304DS-08	6/3/2008	1	11.4	1
OU2B-SW-304DS-09	6/3/2009	1	4.16	2.0
OU2B-SW-DHDS-09	6/4/2009	1	5.88	9

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

DHg Shallow 08-09

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	20

Raw Statistics		Log-transformed Statistics	
Minimum	3.57	Minimum of Log Data	1.273
Maximum	22.7	Maximum of Log Data	3.122
Mean	9.788	Mean of log Data	2.117
Median	11.4	SD of log Data	0.604
SD	5.488		
Coefficient of Variation	0.561		
Skewness	0.573		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.895	Shapiro Wilk Test Statistic	0.891
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	11.85	95% H-UCL	13.22
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15.85
95% Adjusted-CLT UCL	11.92	97.5% Chebyshev (MVUE) UCL	18.43
95% Modified-t UCL	11.88	99% Chebyshev (MVUE) UCL	23.51

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.773	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.53		
MLE of Mean	9.788		
MLE of Standard Deviation	5.878		
nu star	116.5		
Approximate Chi Square Value (.05)	92.55	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	11.76
Adjusted Chi Square Value	90.91	95% Jackknife UCL	11.85
		95% Standard Bootstrap UCL	11.69

Anderson-Darling Test Statistic	0.974	95% Bootstrap-t UCL	12.05
Anderson-Darling 5% Critical Value	0.749	95% Hall's Bootstrap UCL	11.89
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	11.77
Kolmogorov-Smirnov 5% Critical Value	0.191	95% BCA Bootstrap UCL	11.91
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.01
		97.5% Chebyshev(Mean, Sd) UCL	17.27
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	21.7
95% Approximate Gamma UCL	12.32		
95% Adjusted Gamma UCL	12.54		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	15.01

Basin Surface Water-Deep Total Mercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DD-08	6/3/2008	1	91.8	4
OU2B-SW-205DD-08	6/3/2008	1	319	4
OU2B-SW-301DD-08	6/3/2008	1	471	3.2
OU2B-SW-303DD-08	6/3/2008	1	909	4
OU2B-SW-304DD-08	6/3/2008	1	335	4
OU2B-SW-101DD-08	6/4/2008	1	292	9
OU2B-SW-103DD-08	6/4/2008	1	269	10
OU2B-SW-201DD-08	6/4/2008	1	275	4
OU2B-SW-203DD-08	6/4/2008	1	308	7
OU2B-SW-301DD-09	6/3/2009	1	14.2	8
OU2B-SW-201DD-09	6/3/2009	1	95.7	8.8
OU2B-SW-303DD-09	6/3/2009	1	60.8	8
OU2B-SW-304DD-09	6/3/2009	1	22.3	8
OU2B-SW-DHDD-09	6/4/2009	1	110	36
OU2B-SW-103DD-09	6/4/2009	1	95	15
OU2B-SW-101DD-09	6/4/2009	1	54.7	13
OU2B-SW-203DD-09	6/4/2009	1	92.5	12
OU2B-SW-105DD-09	6/8/2009	1	155	4.8
OU2B-SW-205DD-09	6/8/2009	1	62.3	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 3/29/10

2008-09 Deep TMercury

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	19
Raw Statistics		**Log-transformed Statistics**	
Minimum	14.2	Minimum of Log Data	2.653
Maximum	909	Maximum of Log Data	6.812
Mean	212.2	Mean of log Data	4.898
Median	110	SD of log Data	1.054
SD	213		
Coefficient of Variation	1.004		
Skewness	2.101		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.774	Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	297	95% H-UCL	455.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	488.9
95% Adjusted-CLT UCL	317.8	97.5% Chebyshev (MVUE) UCL	603.5
95% Modified-t UCL	300.9	99% Chebyshev (MVUE) UCL	828.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.07	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	198.4		
MLE of Mean	212.2		
MLE of Standard Deviation	205.2		
nu star	40.65		
Approximate Chi Square Value (.05)	27.04	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0369	95% CLT UCL	292.6
Adjusted Chi Square Value	26.07	95% Jackknife UCL	297
		95% Standard Bootstrap UCL	290.9

Anderson-Darling Test Statistic	0.42	95% Bootstrap-t UCL	337.9
Anderson-Darling 5% Critical Value	0.764	95% Hall's Bootstrap UCL	630.2
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	290.5
Kolmogorov-Smirnov 5% Critical Value	0.203	95% BCA Bootstrap UCL	320
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	425.3
		97.5% Chebyshev(Mean, Sd) UCL	517.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	698.5
95% Approximate Gamma UCL	319		
95% Adjusted Gamma UCL	330.9		
Potential UCL to Use		Use 95% Approximate Gamma UCL	319

Basin Surface Water-Deep Filtered MercuryUCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2
OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 3/29/10

2008-09 Deep DMercury

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	18
Raw Statistics		**Log-transformed Statistics**	
Minimum	4.44	Minimum of Log Data	1.491
Maximum	24.9	Maximum of Log Data	3.215
Mean	12.89	Mean of log Data	2.479
Median	12.4	SD of log Data	0.422
SD	4.998		
Coefficient of Variation	0.388		
Skewness	0.606		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.951	Shapiro Wilk Test Statistic	0.942
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	14.88	95% H-UCL	15.82
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18.59
95% Adjusted-CLT UCL	14.95	97.5% Chebyshev (MVUE) UCL	21.03
95% Modified-t UCL	14.9	99% Chebyshev (MVUE) UCL	25.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.593	Data appear Normal at 5% Significance Level	
Theta Star	2.304		
MLE of Mean	12.89		
MLE of Standard Deviation	5.45		
nu star	212.5		
Approximate Chi Square Value (.05)	179.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0369	95% CLT UCL	14.78
Adjusted Chi Square Value	177.2	95% Jackknife UCL	14.88
		95% Standard Bootstrap UCL	14.75

Anderson-Darling Test Statistic	0.434	95% Bootstrap-t UCL	15.03
Anderson-Darling 5% Critical Value	0.742	95% Hall's Bootstrap UCL	15.48
Kolmogorov-Smirnov Test Statistic	0.176	95% Percentile Bootstrap UCL	14.87
Kolmogorov-Smirnov 5% Critical Value	0.199	95% BCA Bootstrap UCL	15.03
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17.89
		97.5% Chebyshev(Mean, Sd) UCL	20.05
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	24.3
95% Approximate Gamma UCL	15.24		
95% Adjusted Gamma UCL	15.46		
Potential UCL to Use		Use 95% Student's-t UCL	14.88

Basin Surface Water-Deep Total Mercury UCL 2008 and 2009 at 6 ft.
NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DD-08	6/3/2008	1	83.4	4.5
OU2R-SW-101DD-09	6/3/2009	1	13.9	8.8
OU2B-SW-105DD-08	6/3/2008	1	91.8	4
OU2B-SW-205DD-08	6/3/2008	1	319	4
OU2B-SW-301DD-08	6/3/2008	1	471	3.2
OU2B-SW-303DD-08	6/3/2008	1	909	4
OU2B-SW-304DD-08	6/3/2008	1	335	4
OU2B-SW-101DD-08	6/4/2008	1	292	9
OU2B-SW-103DD-08	6/4/2008	1	269	10
OU2B-SW-201DD-08	6/4/2008	1	275	4
OU2B-SW-203DD-08	6/4/2008	1	308	7
OU2B-SW-301DD-09	6/3/2009	1	14.2	8
OU2B-SW-201DD-09	6/3/2009	1	95.7	8.8
OU2B-SW-303DD-09	6/3/2009	1	60.8	8
OU2B-SW-304DD-09	6/3/2009	1	22.3	8
OU2B-SW-DHDD-09	6/4/2009	1	110	36
OU2B-SW-103DD-09	6/4/2009	1	95	15
OU2B-SW-101DD-09	6/4/2009	1	54.7	13
OU2B-SW-203DD-09	6/4/2009	1	92.5	12
OU2B-SW-105DD-09	6/8/2009	1	155	4.8
OU2B-SW-205DD-09	6/8/2009	1	62.3	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

THg deep 08-09

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	21

Raw Statistics		Log-transformed Statistics	
Minimum	13.9	Minimum of Log Data	2.632
Maximum	909	Maximum of Log Data	6.812
Mean	196.6	Mean of log Data	4.768
Median	95.7	SD of log Data	1.118
SD	208.3		
Coefficient of Variation	1.059		
Skewness	2.188		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.759	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	275	95% H-UCL	434.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	465.7
95% Adjusted-CLT UCL	294.6	97.5% Chebyshev (MVUE) UCL	576.3
95% Modified-t UCL	278.7	99% Chebyshev (MVUE) UCL	793.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.984	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	199.9		
MLE of Mean	196.6		
MLE of Standard Deviation	198.3		
nu star	41.32		
Approximate Chi Square Value (.05)	27.58	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	271.4
Adjusted Chi Square Value	26.72	95% Jackknife UCL	275
		95% Standard Bootstrap UCL	270

Anderson-Darling Test Statistic	0.451	95% Bootstrap-t UCL	320.1
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	597.9
Kolmogorov-Smirnov Test Statistic	0.161	95% Percentile Bootstrap UCL	278.4
Kolmogorov-Smirnov 5% Critical Value	0.194	95% BCA Bootstrap UCL	297.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	394.8
		97.5% Chebyshev(Mean, Sd) UCL	480.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	648.9
95% Approximate Gamma UCL	294.5		
95% Adjusted Gamma UCL	304		
Potential UCL to Use		Use 95% Approximate Gamma UCL	294.5

Basin Surface Water-Deep Filtered Mercury UCL 2008 and 2009 at 6 ft.
NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DD-08	6/3/2008	1	10.9	4.5
OU2R-SW-101DD-09	6/3/2009	1	4.63	8.8
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2
OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: RMP 5/6/10

DHg deep 08-09

General Statistics			
Number of Valid Observations	21	Number of Distinct Observations	19

Raw Statistics		Log-transformed Statistics	
Minimum	4.44	Minimum of Log Data	1.491
Maximum	24.9	Maximum of Log Data	3.215
Mean	12.4	Mean of log Data	2.429
Median	12.1	SD of log Data	0.451
SD	5.084		
Coefficient of Variation	0.41		
Skewness	0.592		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.945	Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14.31	95% H-UCL	15.29
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18.02
95% Adjusted-CLT UCL	14.38	97.5% Chebyshev (MVUE) UCL	20.42
95% Modified-t UCL	14.34	99% Chebyshev (MVUE) UCL	25.11
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.018	Data appear Normal at 5% Significance Level	
Theta Star	2.471		
MLE of Mean	12.4		
MLE of Standard Deviation	5.536		
nu star	210.8		
Approximate Chi Square Value (.05)	178.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	14.23
Adjusted Chi Square Value	175.9	95% Jackknife UCL	14.31
		95% Standard Bootstrap UCL	14.12

Anderson-Darling Test Statistic	0.512	95% Bootstrap-t UCL	14.53
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	14.78
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	14.26
Kolmogorov-Smirnov 5% Critical Value	0.19	95% BCA Bootstrap UCL	14.36
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17.24
		97.5% Chebyshev(Mean, Sd) UCL	19.33
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	23.44
95% Approximate Gamma UCL	14.67		
95% Adjusted Gamma UCL	14.86		
Potential UCL to Use		Use 95% Student's-t UCL	14.31

Basin Surface Water-Deep and Shallow Total Mercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	91.4	1
OU2B-SW-205DS-08	6/3/2008	1	94.2	1
OU2B-SW-301DS-08	6/3/2008	1	181	0.8
OU2B-SW-303DS-08	6/3/2008	1	131	1
OU2B-SW-304DS-08	6/3/2008	1	83.8	1
OU2B-SW-101DS-08	6/4/2008	1	137	2
OU2B-SW-103DS-08	6/4/2008	1	264	3
OU2B-SW-201DS-08	6/4/2008	1	180	1
OU2B-SW-203DS-08	6/4/2008	1	360	2
OU2B-SW-301DS-09	6/3/2009	1	9.61	2
OU2B-SW-201DS-09	6/3/2009	1	8.7	2.2
OU2B-SW-303DS-09	6/3/2009	1	11.4	2
OU2B-SW-304DS-09	6/3/2009	1	12.1	2
OU2B-SW-DHDS-09	6/4/2009	1	34.7	9
OU2B-SW-103DS-09	6/4/2009	1	12.8	4
OU2B-SW-101DS-09	6/4/2009	1	10.6	3.5
OU2B-SW-203DS-09	6/4/2009	1	11.9	3
OU2B-SW-105DS-09	6/8/2009	1	87.9	1.2
OU2B-SW-205DS-09	6/8/2009	1	56.3	1
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2

OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 3/29/10

2008-09 combined Tmecury

General Statistics			
Number of Valid Observations	38	Number of Distinct Observations	36
Raw Statistics		Log-transformed Statistics	
Minimum	4.44	Minimum of Log Data	1.491
Maximum	360	Maximum of Log Data	5.886
Mean	53.25	Mean of log Data	3.185
Median	13.5	SD of log Data	1.184
SD	79.44		
Coefficient of Variation	1.492		
Skewness	2.377		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.637	Shapiro Wilk Test Statistic	0.854
Shapiro Wilk Critical Value	0.938	Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	74.99	95% H-UCL	81.01
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	95.23
95% Adjusted-CLT UCL	79.75	97.5% Chebyshev (MVUE) UCL	116
95% Modified-t UCL	75.81	99% Chebyshev (MVUE) UCL	156.7
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.715	Data do not follow a Discernable Distribution (0.05)	
Theta Star	74.5		
MLE of Mean	53.25		
MLE of Standard Deviation	62.98		
nu star	54.31		
Approximate Chi Square Value (.05)	38.38	Nonparametric Statistics	
Adjusted Level of Significance	0.0434	95% CLT UCL	74.44
Adjusted Chi Square Value	37.82	95% Jackknife UCL	74.99
		95% Standard Bootstrap UCL	74.26

Anderson-Darling Test Statistic	3.537	95% Bootstrap-t UCL	86.25
Anderson-Darling 5% Critical Value	0.788	95% Hall's Bootstrap UCL	85.42
Kolmogorov-Smirnov Test Statistic	0.286	95% Percentile Bootstrap UCL	74
Kolmogorov-Smirnov 5% Critical Value	0.149	95% BCA Bootstrap UCL	80.47
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	109.4
		97.5% Chebyshev(Mean, Sd) UCL	133.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	181.5
95% Approximate Gamma UCL	75.35		
95% Adjusted Gamma UCL	76.46		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	181.5

Basin Surface Water-Deep and Shallow Filtered Mercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2B-SW-101DS-08	6/4/2008	1	14	2
OU2B-SW-101DS-09	6/4/2009	1	4.57	3.5
OU2B-SW-103DS-08	6/4/2008	1	18.3	3
OU2B-SW-103DS-09	6/4/2009	1	4.27	4
OU2B-SW-105DS-08	6/3/2008	1	12.4	1
OU2B-SW-105DS-09	6/8/2009	1	11.6	1.2
OU2B-SW-201DS-08	6/4/2008	1	14.3	1
OU2B-SW-201DS-09	6/3/2009	1	5.3	2.2
OU2B-SW-203DS-08	6/4/2008	1	22.7	2
OU2B-SW-203DS-09	6/4/2009	1	4.58	3
OU2B-SW-205DS-08	6/3/2008	1	12.3	1.0
OU2B-SW-205DS-09	6/8/2009	1	11.6	1
OU2B-SW-301DS-08	6/3/2008	1	14.6	0.8
OU2B-SW-301DS-09	6/3/2009	1	3.58	2
OU2B-SW-303DS-08	6/3/2008	1	13.8	1
OU2B-SW-303DS-09	6/3/2009	1	4.05	2
OU2B-SW-304DS-08	6/3/2008	1	11.4	1
OU2B-SW-304DS-09	6/3/2009	1	4.16	2.0
OU2B-SW-DHDS-09	6/4/2009	1	5.88	9
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2

OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 3/29/10

2008-09 combined Dmecury

General Statistics			
Number of Valid Observations	38	Number of Distinct Observations	35
Raw Statistics		**Log-transformed Statistics**	
Minimum	3.58	Minimum of Log Data	1.275
Maximum	24.9	Maximum of Log Data	3.215
Mean	11.53	Mean of log Data	2.319
Median	12.1	SD of log Data	0.539
SD	5.4		
Coefficient of Variation	0.468		
Skewness	0.375		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.929	Shapiro Wilk Test Statistic	0.894
Shapiro Wilk Critical Value	0.938	Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	13.01	95% H-UCL	13.96
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	16.4
95% Adjusted-CLT UCL	13.03	97.5% Chebyshev (MVUE) UCL	18.44
95% Modified-t UCL	13.02	99% Chebyshev (MVUE) UCL	22.43
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.813	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.025		
MLE of Mean	11.53		
MLE of Standard Deviation	5.907		
nu star	289.8		
Approximate Chi Square Value (.05)	251.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0434	95% CLT UCL	12.97
Adjusted Chi Square Value	249.9	95% Jackknife UCL	13.01
		95% Standard Bootstrap UCL	12.96

Anderson-Darling Test Statistic	1.356	95% Bootstrap-t UCL	13.14
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	13.11
Kolmogorov-Smirnov Test Statistic	0.205	95% Percentile Bootstrap UCL	13
Kolmogorov-Smirnov 5% Critical Value	0.144	95% BCA Bootstrap UCL	12.92
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.35
		97.5% Chebyshev(Mean, Sd) UCL	17
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	20.25
95% Approximate Gamma UCL	13.3		
95% Adjusted Gamma UCL	13.38		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	15.35

Basin Surface Water-Deep and Shallow Total Mercury UCL 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DD-08	6/3/2008	1	83.4	4.5
OU2R-SW-101DD-09	6/3/2009	1	13.9	8.8
OU2R-SW-101DS-08	6/3/2008	1	44.3	1
OU2R-SW-101DS-09	6/3/2009	1	7.31	2.2
OU2B-SW-105DS-08	6/3/2008	1	91.4	1
OU2B-SW-205DS-08	6/3/2008	1	94.2	1
OU2B-SW-301DS-08	6/3/2008	1	181	0.8
OU2B-SW-303DS-08	6/3/2008	1	131	1
OU2B-SW-304DS-08	6/3/2008	1	83.8	1
OU2B-SW-101DS-08	6/4/2008	1	137	2
OU2B-SW-103DS-08	6/4/2008	1	264	3
OU2B-SW-201DS-08	6/4/2008	1	180	1
OU2B-SW-203DS-08	6/4/2008	1	360	2
OU2B-SW-301DS-09	6/3/2009	1	9.61	2
OU2B-SW-201DS-09	6/3/2009	1	8.7	2.2
OU2B-SW-303DS-09	6/3/2009	1	11.4	2
OU2B-SW-304DS-09	6/3/2009	1	12.1	2
OU2B-SW-DHDS-09	6/4/2009	1	34.7	9
OU2B-SW-103DS-09	6/4/2009	1	12.8	4
OU2B-SW-101DS-09	6/4/2009	1	10.6	3.5
OU2B-SW-203DS-09	6/4/2009	1	11.9	3
OU2B-SW-105DS-09	6/8/2009	1	87.9	1.2
OU2B-SW-205DS-09	6/8/2009	1	56.3	1
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2

OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

THg combined 08-09

General Statistics			
Number of Valid Observations	42	Number of Distinct Observations	40
Raw Statistics		Log-transformed Statistics	
Minimum	4.44	Minimum of Log Data	1.491
Maximum	360	Maximum of Log Data	5.886
Mean	51.72	Mean of log Data	3.187
Median	14	SD of log Data	1.163
SD	76.19		
Coefficient of Variation	1.473		
Skewness	2.473		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.623	Shapiro Wilk Test Statistic	0.828
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	71.51	95% H-UCL	75.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	90.54
95% Adjusted-CLT UCL	75.85	97.5% Chebyshev (MVUE) UCL	109.6
95% Modified-t UCL	72.25	99% Chebyshev (MVUE) UCL	147.1
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.744	Data do not follow a Discernable Distribution (0.05)	
Theta Star	69.49		
MLE of Mean	51.72		
MLE of Standard Deviation	59.95		
nu star	62.51		
Approximate Chi Square Value (.05)	45.33	Nonparametric Statistics	
Adjusted Level of Significance	0.0443	95% CLT UCL	71.06
Adjusted Chi Square Value	44.81	95% Jackknife UCL	71.51
		95% Standard Bootstrap UCL	70.73

Anderson-Darling Test Statistic	3.515	95% Bootstrap-t UCL	81.84
Anderson-Darling 5% Critical Value	0.788	95% Hall's Bootstrap UCL	79.44
Kolmogorov-Smirnov Test Statistic	0.278	95% Percentile Bootstrap UCL	72.73
Kolmogorov-Smirnov 5% Critical Value	0.142	95% BCA Bootstrap UCL	75.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	103
		97.5% Chebyshev(Mean, Sd) UCL	125.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	168.7
95% Approximate Gamma UCL	71.33		
95% Adjusted Gamma UCL	72.16		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	168.7

Basin Surface Water-Deep and Shallow Filtered MercuryUCL 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DD-08	6/3/2008	1	10.9	4.5
OU2R-SW-101DD-09	6/3/2009	1	4.63	8.8
OU2R-SW-101DS-08	6/3/2008	1	8.58	1
OU2R-SW-101DS-09	6/3/2009	1	3.57	2.2
OU2B-SW-101DS-08	6/4/2008	1	14	2
OU2B-SW-101DS-09	6/4/2009	1	4.57	3.5
OU2B-SW-103DS-08	6/4/2008	1	18.3	3
OU2B-SW-103DS-09	6/4/2009	1	4.27	4
OU2B-SW-105DS-08	6/3/2008	1	12.4	1
OU2B-SW-105DS-09	6/8/2009	1	11.6	1.2
OU2B-SW-201DS-08	6/4/2008	1	14.3	1
OU2B-SW-201DS-09	6/3/2009	1	5.3	2.2
OU2B-SW-203DS-08	6/4/2008	1	22.7	2
OU2B-SW-203DS-09	6/4/2009	1	4.58	3
OU2B-SW-205DS-08	6/3/2008	1	12.3	1.0
OU2B-SW-205DS-09	6/8/2009	1	11.6	1
OU2B-SW-301DS-08	6/3/2008	1	14.6	0.8
OU2B-SW-301DS-09	6/3/2009	1	3.58	2
OU2B-SW-303DS-08	6/3/2008	1	13.8	1
OU2B-SW-303DS-09	6/3/2009	1	4.05	2
OU2B-SW-304DS-08	6/3/2008	1	11.4	1
OU2B-SW-304DS-09	6/3/2009	1	4.16	2.0
OU2B-SW-DHDS-09	6/4/2009	1	5.88	9
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2

OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

DHg combined 08-09

General Statistics

Number of Valid Observations	42	Number of Distinct Observations	38

Raw Statistics		Log-transformed Statistics	
Minimum	3.57	Minimum of Log Data	1.273
Maximum	24.9	Maximum of Log Data	3.215
Mean	11.09	Mean of log Data	2.273
Median	11.65	SD of log Data	0.55
SD	5.39		
Coefficient of Variation	0.486		
Skewness	0.456		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.858
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12.49	95% H-UCL	13.34
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15.65
95% Adjusted-CLT UCL	12.52	97.5% Chebyshev (MVUE) UCL	17.55
95% Modified-t UCL	12.5	99% Chebyshev (MVUE) UCL	21.29

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.644	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.045		
MLE of Mean	11.09		
MLE of Standard Deviation	5.812		
nu star	306.1		
Approximate Chi Square Value (.05)	266.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0443	95% CLT UCL	12.46
Adjusted Chi Square Value	265.3	95% Jackknife UCL	12.49
		95% Standard Bootstrap UCL	12.43

Anderson-Darling Test Statistic	1.324	95% Bootstrap-t UCL	12.54
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	12.54
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	12.44
Kolmogorov-Smirnov 5% Critical Value	0.137	95% BCA Bootstrap UCL	12.56
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14.72
		97.5% Chebyshev(Mean, Sd) UCL	16.29
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19.37
95% Approximate Gamma UCL	12.74		
95% Adjusted Gamma UCL	12.8		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	14.72

Basin Surface Water-Deep and Shallow Total Mercury UCL for 1991, 1994, 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OWG0101-0694	6/27/1994	1	280	NA
OWG0107-0894	8/18/1994	1	62	NA
OWG0202-0694	6/27/1994	1	250	NA
OWG0208-0894	8/18/1994	1	56	NA
OWG0303-0694	6/27/1994	1	360	NA
OWG0309-0894	8/18/1994	1	110	NA
WGC901-0891	8/29/1991	1	26	NA
WGC902-0891	8/29/1991	1	45	NA
WGF201-0891	8/29/1991	1	150	NA
WGG601-0891	8/30/1991	1	110	NA
WGG602-0891	8/30/1991	1	83	NA
WGH501-0891	8/30/1991	1	150	NA
WGH502-0891	8/30/1991	1	180	NA
WGH901-0891	8/29/1991	1	110	NA
WGH902-0891	8/29/1991	1	120	NA
OU2B-SW-105DS-08	6/3/2008	1	91.4	1
OU2B-SW-205DS-08	6/3/2008	1	94.2	1
OU2B-SW-301DS-08	6/3/2008	1	181	0.8
OU2B-SW-303DS-08	6/3/2008	1	131	1
OU2B-SW-304DS-08	6/3/2008	1	83.8	1
OU2B-SW-101DS-08	6/4/2008	1	137	2
OU2B-SW-103DS-08	6/4/2008	1	264	3
OU2B-SW-201DS-08	6/4/2008	1	180	1
OU2B-SW-203DS-08	6/4/2008	1	360	2
OU2B-SW-301DS-09	6/3/2009	1	9.61	2
OU2B-SW-201DS-09	6/3/2009	1	8.7	2.2
OU2B-SW-303DS-09	6/3/2009	1	11.4	2
OU2B-SW-304DS-09	6/3/2009	1	12.1	2
OU2B-SW-DHDS-09	6/4/2009	1	34.7	9
OU2B-SW-103DS-09	6/4/2009	1	12.8	4
OU2B-SW-101DS-09	6/4/2009	1	10.6	3.5
OU2B-SW-203DS-09	6/4/2009	1	11.9	3
OU2B-SW-105DS-09	6/8/2009	1	87.9	1.2
OU2B-SW-205DS-09	6/8/2009	1	56.3	1
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8

OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2
OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10

CHECKED BY/DATE: HEF 5/4/10

all Tmercury

General Statistics

Number of Valid Observations	53	Number of Distinct Observations	46

Raw Statistics		Log-transformed Statistics	
Minimum	4.44	Minimum of Log Data	1.491
Maximum	360	Maximum of Log Data	5.886
Mean	77.65	Mean of log Data	3.619
Median	26	SD of log Data	1.273
SD	91.65		
Coefficient of Variation	1.18		
Skewness	1.606		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.223	Lilliefors Test Statistic	0.184
Lilliefors Critical Value	0.122	Lilliefors Critical Value	0.122
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	98.73	95% H-UCL	134.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	160.3
95% Adjusted-CLT UCL	101.3	97.5% Chebyshev (MVUE) UCL	194.4
95% Modified-t UCL	99.19	99% Chebyshev (MVUE) UCL	261.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.775	Data do not follow a Discernable Distribution (0.05)	
Theta Star	100.2		
MLE of Mean	77.65		
MLE of Standard Deviation	88.19		
nu star	82.17		
Approximate Chi Square Value (.05)	62.28	Nonparametric Statistics	
Adjusted Level of Significance	0.0455	95% CLT UCL	98.36
Adjusted Chi Square Value	61.8	95% Jackknife UCL	98.73
		95% Standard Bootstrap UCL	97.91

Anderson-Darling Test Statistic	2.238	95% Bootstrap-t UCL	102.4
Anderson-Darling 5% Critical Value	0.79	95% Hall's Bootstrap UCL	101.2
Kolmogorov-Smirnov Test Statistic	0.202	95% Percentile Bootstrap UCL	99.04
Kolmogorov-Smirnov 5% Critical Value	0.127	95% BCA Bootstrap UCL	99.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	132.5
		97.5% Chebyshev(Mean, Sd) UCL	156.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	202.9
95% Approximate Gamma UCL	102.4		
95% Adjusted Gamma UCL	103.2		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	156.3

Basin Surface Water-Deep and Shallow Filtered MercuryUCL for 1991, 1994, 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
WGC901-0891	8/29/1991	0	200	NA
WGC902-0891	8/29/1991	0	200	NA
WGF201-0891	8/29/1991	0	200	NA
WGG601-0891	8/30/1991	0	200	NA
WGG602-0891	8/30/1991	0	200	NA
WGH501-0891	8/30/1991	0	200	NA
WGH502-0891	8/30/1991	0	200	NA
WGH901-0891	8/29/1991	0	200	NA
WGH902-0891	8/29/1991	0	200	NA
OU2B-SW-101DS-08	6/4/2008	1	14	2
OU2B-SW-101DS-09	6/4/2009	1	4.57	3.5
OU2B-SW-103DS-08	6/4/2008	1	18.3	3
OU2B-SW-103DS-09	6/4/2009	1	4.27	4
OU2B-SW-105DS-08	6/3/2008	1	12.4	1
OU2B-SW-105DS-09	6/8/2009	1	11.6	1.2
OU2B-SW-201DS-08	6/4/2008	1	14.3	1
OU2B-SW-201DS-09	6/3/2009	1	5.3	2.2
OU2B-SW-203DS-08	6/4/2008	1	22.7	2
OU2B-SW-203DS-09	6/4/2009	1	4.58	3
OU2B-SW-205DS-08	6/3/2008	1	12.3	1.0
OU2B-SW-205DS-09	6/8/2009	1	11.6	1
OU2B-SW-301DS-08	6/3/2008	1	14.6	0.8
OU2B-SW-301DS-09	6/3/2009	1	3.58	2
OU2B-SW-303DS-08	6/3/2008	1	13.8	1
OU2B-SW-303DS-09	6/3/2009	1	4.05	2
OU2B-SW-304DS-08	6/3/2008	1	11.4	1
OU2B-SW-304DS-09	6/3/2009	1	4.16	2.0
OU2B-SW-DHDS-09	6/4/2009	1	5.88	9
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0

OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2
OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

all Dmercury

General Statistics			
Number of Valid Observations	47	Number of Distinct Observations	36
Raw Statistics		Log-transformed Statistics	
Minimum	3.58	Minimum of Log Data	1.275
Maximum	200	Maximum of Log Data	5.298
Mean	47.62	Mean of log Data	2.89
Median	12.7	SD of log Data	1.28
SD	75.11		
Coefficient of Variation	1.577		
Skewness	1.604		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.531	Shapiro Wilk Test Statistic	0.787
Shapiro Wilk Critical Value	0.946	Shapiro Wilk Critical Value	0.946
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	66.02	95% H-UCL	67.21
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	80
95% Adjusted-CLT UCL	68.38	97.5% Chebyshev (MVUE) UCL	97.5
95% Modified-t UCL	66.44	99% Chebyshev (MVUE) UCL	131.9
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.604	Data do not follow a Discernable Distribution (0.05)	
Theta Star	78.85		
MLE of Mean	47.62		
MLE of Standard Deviation	61.28		
nu star	56.77		
Approximate Chi Square Value (.05)	40.46	Nonparametric Statistics	
Adjusted Level of Significance	0.0449	95% CLT UCL	65.65
Adjusted Chi Square Value	40.02	95% Jackknife UCL	66.02
		95% Standard Bootstrap UCL	66.28

Anderson-Darling Test Statistic	6.608	95% Bootstrap-t UCL	68.55
Anderson-Darling 5% Critical Value	0.802	95% Hall's Bootstrap UCL	65.96
Kolmogorov-Smirnov Test Statistic	0.32	95% Percentile Bootstrap UCL	66.88
Kolmogorov-Smirnov 5% Critical Value	0.135	95% BCA Bootstrap UCL	67.61
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	95.38
		97.5% Chebyshev(Mean, Sd) UCL	116
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	156.6
95% Approximate Gamma UCL	66.83		
95% Adjusted Gamma UCL	67.56		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	156.6

Basin Surface Water-Deep and Shallow Total Mercury UCL for 1991, 1994, 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
OWG0101-0694	6/27/1994	1	280	NA
OWG0107-0894	8/18/1994	1	62	NA
OWG0202-0694	6/27/1994	1	250	NA
OWG0208-0894	8/18/1994	1	56	NA
OWG0303-0694	6/27/1994	1	360	NA
OWG0309-0894	8/18/1994	1	110	NA
WGC901-0891	8/29/1991	1	26	NA
WGC902-0891	8/29/1991	1	45	NA
WGF201-0891	8/29/1991	1	150	NA
WGG601-0891	8/30/1991	1	110	NA
WGG602-0891	8/30/1991	1	83	NA
WGH501-0891	8/30/1991	1	150	NA
WGH502-0891	8/30/1991	1	180	NA
WGH901-0891	8/29/1991	1	110	NA
WGH902-0891	8/29/1991	1	120	NA
OU2R-SW-101DD-08	6/3/2008	1	83.4	4.5
OU2R-SW-101DD-09	6/3/2009	1	13.9	8.8
OU2R-SW-101DS-08	6/3/2008	1	44.3	1
OU2R-SW-101DS-09	6/3/2009	1	7.31	2.2
OU2B-SW-105DS-08	6/3/2008	1	91.4	1
OU2B-SW-205DS-08	6/3/2008	1	94.2	1
OU2B-SW-301DS-08	6/3/2008	1	181	0.8
OU2B-SW-303DS-08	6/3/2008	1	131	1
OU2B-SW-304DS-08	6/3/2008	1	83.8	1
OU2B-SW-101DS-08	6/4/2008	1	137	2
OU2B-SW-103DS-08	6/4/2008	1	264	3
OU2B-SW-201DS-08	6/4/2008	1	180	1
OU2B-SW-203DS-08	6/4/2008	1	360	2
OU2B-SW-301DS-09	6/3/2009	1	9.61	2
OU2B-SW-201DS-09	6/3/2009	1	8.7	2.2
OU2B-SW-303DS-09	6/3/2009	1	11.4	2
OU2B-SW-304DS-09	6/3/2009	1	12.1	2
OU2B-SW-DHDS-09	6/4/2009	1	34.7	9
OU2B-SW-103DS-09	6/4/2009	1	12.8	4
OU2B-SW-101DS-09	6/4/2009	1	10.6	3.5
OU2B-SW-203DS-09	6/4/2009	1	11.9	3
OU2B-SW-105DS-09	6/8/2009	1	87.9	1.2
OU2B-SW-205DS-09	6/8/2009	1	56.3	1
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10

OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8
OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2
OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10

CHECKED BY/DATE: RMP 5/6/10

all THg combined

General Statistics			
Number of Valid Observations	57	Number of Distinct Observations	50
Raw Statistics		Log-transformed Statistics	
Minimum	4.44	Minimum of Log Data	1.491
Maximum	360	Maximum of Log Data	5.886
Mean	74.81	Mean of log Data	3.59
Median	26	SD of log Data	1.257
SD	89.3		
Coefficient of Variation	1.194		
Skewness	1.69		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.216	Lilliefors Test Statistic	0.185
Lilliefors Critical Value	0.117	Lilliefors Critical Value	0.117
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	94.59	95% H-UCL	127.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	149.6
95% Adjusted-CLT UCL	97.09	97.5% Chebyshev (MVUE) UCL	180.5
95% Modified-t UCL	95.03	99% Chebyshev (MVUE) UCL	241.3
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.785	Data do not follow a Discernable Distribution (0.05)	
Theta Star	95.25		
MLE of Mean	74.81		
MLE of Standard Deviation	84.41		
nu star	89.54		
Approximate Chi Square Value (.05)	68.72	Nonparametric Statistics	
Adjusted Level of Significance	0.0458	95% CLT UCL	94.27
Adjusted Chi Square Value	68.25	95% Jackknife UCL	94.59
		95% Standard Bootstrap UCL	93.71

Anderson-Darling Test Statistic	2.315	95% Bootstrap-t UCL	99.45
Anderson-Darling 5% Critical Value	0.789	95% Hall's Bootstrap UCL	97.67
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	94.92
Kolmogorov-Smirnov 5% Critical Value	0.122	95% BCA Bootstrap UCL	97.92
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	126.4
		97.5% Chebyshev(Mean, Sd) UCL	148.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	192.5
95% Approximate Gamma UCL	97.47		
95% Adjusted Gamma UCL	98.15		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	148.7

Basin Surface Water-Deep and Shallow Filtered MercuryUCL for 1991, 1994, 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Mercury (ng/L)	Sample Depth (ft)
WGC901-0891	8/29/1991	0	200	NA
WGC902-0891	8/29/1991	0	200	NA
WGF201-0891	8/29/1991	0	200	NA
WGG601-0891	8/30/1991	0	200	NA
WGG602-0891	8/30/1991	0	200	NA
WGH501-0891	8/30/1991	0	200	NA
WGH502-0891	8/30/1991	0	200	NA
WGH901-0891	8/29/1991	0	200	NA
WGH902-0891	8/29/1991	0	200	NA
OU2R-SW-101DD-08	6/3/2008	1	10.9	4.5
OU2R-SW-101DD-09	6/3/2009	1	4.63	8.8
OU2R-SW-101DS-08	6/3/2008	1	8.58	1
OU2R-SW-101DS-09	6/3/2009	1	3.57	2.2
OU2B-SW-101DS-08	6/4/2008	1	14	2
OU2B-SW-101DS-09	6/4/2009	1	4.57	3.5
OU2B-SW-103DS-08	6/4/2008	1	18.3	3
OU2B-SW-103DS-09	6/4/2009	1	4.27	4
OU2B-SW-105DS-08	6/3/2008	1	12.4	1
OU2B-SW-105DS-09	6/8/2009	1	11.6	1.2
OU2B-SW-201DS-08	6/4/2008	1	14.3	1
OU2B-SW-201DS-09	6/3/2009	1	5.3	2.2
OU2B-SW-203DS-08	6/4/2008	1	22.7	2
OU2B-SW-203DS-09	6/4/2009	1	4.58	3
OU2B-SW-205DS-08	6/3/2008	1	12.3	1.0
OU2B-SW-205DS-09	6/8/2009	1	11.6	1
OU2B-SW-301DS-08	6/3/2008	1	14.6	0.8
OU2B-SW-301DS-09	6/3/2009	1	3.58	2
OU2B-SW-303DS-08	6/3/2008	1	13.8	1
OU2B-SW-303DS-09	6/3/2009	1	4.05	2
OU2B-SW-304DS-08	6/3/2008	1	11.4	1
OU2B-SW-304DS-09	6/3/2009	1	4.16	2.0
OU2B-SW-DHDS-09	6/4/2009	1	5.88	9
OU2B-SW-101DD-08	6/4/2008	1	12.1	9
OU2B-SW-101DD-09	6/4/2009	1	14.2	13
OU2B-SW-103DD-08	6/4/2008	1	10.9	10
OU2B-SW-103DD-09	6/4/2009	1	12.4	15
OU2B-SW-105DD-08	6/3/2008	1	12.1	4
OU2B-SW-105DD-09	6/8/2009	1	12.9	4.8
OU2B-SW-201DD-08	6/4/2008	1	19	4
OU2B-SW-201DD-09	6/3/2009	1	12.7	8.8

OU2B-SW-203DD-08	6/4/2008	1	15.8	7
OU2B-SW-203DD-09	6/4/2009	1	14.7	12
OU2B-SW-205DD-08	6/3/2008	1	11.1	4.0
OU2B-SW-205DD-09	6/8/2009	1	8.24	4
OU2B-SW-301DD-08	6/3/2008	1	20.9	3.2
OU2B-SW-301DD-09	6/3/2009	1	4.44	8
OU2B-SW-303DD-08	6/3/2008	1	24.9	4
OU2B-SW-303DD-09	6/3/2009	1	6.93	8
OU2B-SW-304DD-08	6/3/2008	1	14.1	4
OU2B-SW-304DD-09	6/3/2009	1	5.79	8.0
OU2B-SW-DHDD-09	6/4/2009	1	11.7	36

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10

CHECKED BY/DATE: RMP 5/6/10

all DHg combined

General Statistics			
Number of Valid Data	51	Number of Detected Data	42
Number of Distinct Detected Data	38	Number of Non-Detect Data	9
		Percent Non-Detects	17.65%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	3.57	Minimum Detected	1.273
Maximum Detected	24.9	Maximum Detected	3.215
Mean of Detected	11.09	Mean of Detected	2.273
SD of Detected	5.39	SD of Detected	0.55
Minimum Non-Detect	200	Minimum Non-Detect	5.298
Maximum Non-Detect	200	Maximum Non-Detect	5.298

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.858
5% Shapiro Wilk Critical Value	0.942	5% Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	26.78	Mean	2.685
SD	34.58	SD	1.027
95% DL/2 (t) UCL	34.9	95% H-Stat (DL/2) UCL	70.33
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.273
		SD in Log Scale	0.531
		Mean in Original Scale	11.02
		SD in Original Scale	5.264
		95% Percentile Bootstrap UCL	12.22
		95% BCA Bootstrap UCL	12.34

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	3.644	Data do not follow a Discernable Distribution (0.05)
Theta Star	3.045	
nu star	306.1	
A-D Test Statistic	1.324	Nonparametric Statistics
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method

K-S Test Statistic	0.753	Mean	11.09
5% K-S Critical Value	0.137	SD	5.325
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.832
		95% KM (t) UCL	12.49
Assuming Gamma Distribution		95% KM (z) UCL	12.46
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12.49
Minimum	3.406	95% KM (bootstrap t) UCL	12.61
Maximum	24.9	95% KM (BCA) UCL	12.51
Mean	11.14	95% KM (Percentile Bootstrap) UCL	12.4
Median	11.7	95% KM (Chebyshev) UCL	14.72
SD	5.195	97.5% KM (Chebyshev) UCL	16.29
k star	3.875	99% KM (Chebyshev) UCL	19.37
Theta star	2.875		
Nu star	395.2	Potential UCLs to Use	
AppChi2	350.1	95% KM (Chebyshev) UCL	14.72
95% Gamma Approximate UCL	12.57		
95% Adjusted Gamma UCL	12.62		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 3ft. NAVD88 Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4

OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
SDCR-1-FB-060309	6/3/2009	1	128	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	96.6	4.8-9.6
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4
OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4

OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR2-FSB-092309	9/23/2009	1	7.7	2-4
SDCR2-FSC-092309	9/23/2009	1	28	4-8
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR3-FSB-092309	9/23/2009	1	110	2-4
SDCR3-FSC-092309	9/23/2009	1	0.41	4-8
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR8-FSB-092409	9/24/2009	1	26	2-4
SDCR8-FSC-092409	9/24/2009	1	26	4-8
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR11-FSB-092509	9/25/2009	1	40	2-4
SDCR11-FSC-092509	9/25/2009	1	36	4-8
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

SED Hg A 08-09

General Statistics			
Number of Valid Observations	123	Number of Distinct Observations	110
Raw Statistics		Log-transformed Statistics	
Minimum	0.41	Minimum of Log Data	-0.892
Maximum	213	Maximum of Log Data	5.361
Mean	43.57	Mean of log Data	3.439
Median	32.2	SD of log Data	0.94
SD	36.06		
Coefficient of Variation	0.828		
Skewness	1.879		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.247	Lilliefors Test Statistic	0.16
Lilliefors Critical Value	0.0799	Lilliefors Critical Value	0.0799
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	48.96	95% H-UCL	58.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	69.26
95% Adjusted-CLT UCL	49.51	97.5% Chebyshev (MVUE) UCL	78.38
95% Modified-t UCL	49.05	99% Chebyshev (MVUE) UCL	96.28
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.602	Data do not follow a Discernable Distribution (0.05)	
Theta Star	27.2		
MLE of Mean	43.57		
MLE of Standard Deviation	34.43		
nu star	394		
Approximate Chi Square Value (.05)	349	Nonparametric Statistics	
Adjusted Level of Significance	0.048	95% CLT UCL	48.92
Adjusted Chi Square Value	348.5	95% Jackknife UCL	48.96
		95% Standard Bootstrap UCL	48.84
Anderson-Darling Test Statistic	2.637	95% Bootstrap-t UCL	49.51
Anderson-Darling 5% Critical Value	0.769	95% Hall's Bootstrap UCL	49.66
Kolmogorov-Smirnov Test Statistic	0.145	95% Percentile Bootstrap UCL	49.21
Kolmogorov-Smirnov 5% Critical Value	0.0849	95% BCA Bootstrap UCL	49.25
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	57.75
		97.5% Chebyshev(Mean, Sd) UCL	63.88
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	75.93
95% Approximate Gamma UCL	49.19		
95% Adjusted Gamma UCL	49.26		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	57.75

Basin Sediment Mercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths for 6ft NAVD88 Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4

OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
SDCR-1-FB-060309	6/3/2009	1	128	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	96.6	4.8-9.6
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4
OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4

OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR2-FSB-092309	9/23/2009	1	7.7	2-4
SDCR2-FSC-092309	9/23/2009	1	28	4-8
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR3-FSB-092309	9/23/2009	1	110	2-4
SDCR3-FSC-092309	9/23/2009	1	0.41	4-8
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR8-FSB-092409	9/24/2009	1	26	2-4
SDCR8-FSC-092409	9/24/2009	1	26	4-8
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR11-FSB-092509	9/25/2009	1	40	2-4
SDCR11-FSC-092509	9/25/2009	1	36	4-8
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR12-FSC-092509	9/25/2009	1	19	4-8
SDCR12-FSB-092509	9/25/2009	1	17	2-4
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12

SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/4/10

08-09 Hg A

General Statistics			
Number of Valid Observations	139	Number of Distinct Observations	122

Raw Statistics		Log-transformed Statistics	
Minimum	0.41	Minimum of Log Data	-0.892
Maximum	213	Maximum of Log Data	5.361
Mean	40.92	Mean of log Data	3.387
Median	28.9	SD of log Data	0.899
SD	34.75		
Coefficient of Variation	0.849		
Skewness	2.047		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.252	Lilliefors Test Statistic	0.146
Lilliefors Critical Value	0.0751	Lilliefors Critical Value	0.0751
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	45.8	95% H-UCL	52.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	61.34
95% Adjusted-CLT UCL	46.31	97.5% Chebyshev (MVUE) UCL	68.78
95% Modified-t UCL	45.89	99% Chebyshev (MVUE) UCL	83.38

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.657	Data do not follow a Discernable Distribution (0.05)	
Theta Star	24.7		
MLE of Mean	40.92		
MLE of Standard Deviation	31.79		
nu star	460.6		
Approximate Chi Square Value (.05)	411.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0483	95% CLT UCL	45.77
Adjusted Chi Square Value	411.4	95% Jackknife UCL	45.8
		95% Standard Bootstrap UCL	45.74
Anderson-Darling Test Statistic	3.481	95% Bootstrap-t UCL	46.78
Anderson-Darling 5% Critical Value	0.769	95% Hall's Bootstrap UCL	46.16
Kolmogorov-Smirnov Test Statistic	0.152	95% Percentile Bootstrap UCL	46.09
Kolmogorov-Smirnov 5% Critical Value	0.0807	95% BCA Bootstrap UCL	46

Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	53.77
		97.5% Chebyshev(Mean, Sd) UCL	59.33
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	70.24
95% Approximate Gamma UCL	45.76		
95% Adjusted Gamma UCL	45.82		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	53.77

Basin Sediment Mercury UCL for 2008 and 2009 for All Sample Depths Starting at Zero Inches at 3 ft. NAVD88 Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4

OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4
OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4

OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

Sed Hg B 08-09

General Statistics			
Number of Valid Observations	113	Number of Distinct Observations	101
Raw Statistics		Log-transformed Statistics	
Minimum	0.965	Minimum of Log Data	-0.0356
Maximum	213	Maximum of Log Data	5.361
Mean	43.02	Mean of log Data	3.456
Median	32.2	SD of log Data	0.856
SD	35.38		
Coefficient of Variation	0.823		
Skewness	2.033		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.248	Lilliefors Test Statistic	0.141
Lilliefors Critical Value	0.0833	Lilliefors Critical Value	0.0833
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	48.54	95% H-UCL	54.14
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	63.94
95% Adjusted-CLT UCL	49.17	97.5% Chebyshev (MVUE) UCL	71.91
95% Modified-t UCL	48.64	99% Chebyshev (MVUE) UCL	87.57
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.745	Data do not follow a Discernable Distribution (0.05)	
Theta Star	24.65		
MLE of Mean	43.02		
MLE of Standard Deviation	32.56		
nu star	394.4		
Approximate Chi Square Value (.05)	349.4	Nonparametric Statistics	
Adjusted Level of Significance	0.0479	95% CLT UCL	48.49
Adjusted Chi Square Value	348.9	95% Jackknife UCL	48.54
		95% Standard Bootstrap UCL	48.58
Anderson-Darling Test Statistic	2.422	95% Bootstrap-t UCL	49.15
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	49.19
Kolmogorov-Smirnov Test Statistic	0.153	95% Percentile Bootstrap UCL	48.53
Kolmogorov-Smirnov 5% Critical Value	0.0874	95% BCA Bootstrap UCL	48.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	57.52
		97.5% Chebyshev(Mean, Sd) UCL	63.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	76.13
95% Approximate Gamma UCL	48.56		
95% Adjusted Gamma UCL	48.64		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	57.52

Basin Sediment Mercury UCL for 2008 and 2009 for All Sample Depths Starting at Zero Inches for 6 ft. NAVD88 Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4

OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4

OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/4/10

08-09 Hg B

General Statistics			
Number of Valid Observations	127	Number of Distinct Observations	112
Raw Statistics		Log-transformed Statistics	
Minimum	0.965	Minimum of Log Data	-0.0356
Maximum	213	Maximum of Log Data	5.361
Mean	40.58	Mean of log Data	3.407
Median	29	SD of log Data	0.824
SD	34.12		
Coefficient of Variation	0.841		
Skewness	2.193		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.254	Lilliefors Test Statistic	0.132
Lilliefors Critical Value	0.0786	Lilliefors Critical Value	0.0786
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	45.59	95% H-UCL	49.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	57.6
95% Adjusted-CLT UCL	46.19	97.5% Chebyshev (MVUE) UCL	64.26
95% Modified-t UCL	45.69	99% Chebyshev (MVUE) UCL	77.34
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.797	Data do not follow a Discernable Distribution (0.05)	
Theta Star	22.58		
MLE of Mean	40.58		
MLE of Standard Deviation	30.27		
nu star	456.5		
Approximate Chi Square Value (.05)	407.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0481	95% CLT UCL	45.56
Adjusted Chi Square Value	407.4	95% Jackknife UCL	45.59
		95% Standard Bootstrap UCL	45.52
Anderson-Darling Test Statistic	3.205	95% Bootstrap-t UCL	46.55
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	46.49
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	45.69
Kolmogorov-Smirnov 5% Critical Value	0.0837	95% BCA Bootstrap UCL	46.34

Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	53.77
		97.5% Chebyshev(Mean, Sd) UCL	59.49
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	70.7
95% Approximate Gamma UCL	45.4		
95% Adjusted Gamma UCL	45.46		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	53.77

Basin Sediment Mercury UCL Average of Multiple Samples for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 3 ft. NAVE88 Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-ave0-6-060309	6/3/2009	1	91.975	0-9.6
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-ave0-6-092309	9/23/2009	1	16.55	0-8
SDCR3-ave0-6-092309	9/23/2009	1	34.955	0-8

SDCR8-ave0-6-092409	9/24/2009	1	25.5	0-8
SDCR11-ave0-6-092509	9/25/2009	1	36.25	0-8
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

SED Hg Average 08-09 A

General Statistics			
Number of Valid Observations	56	Number of Distinct Observations	55
Raw Statistics		Log-transformed Statistics	
Minimum	0.965	Minimum of Log Data	-0.0356
Maximum	120	Maximum of Log Data	4.787
Mean	37.24	Mean of log Data	3.311
Median	29.87	SD of log Data	0.912
SD	27.75		
Coefficient of Variation	0.745		
Skewness	1.375		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.25	Lilliefors Test Statistic	0.184
Lilliefors Critical Value	0.118	Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	43.44	95% H-UCL	54.67
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	66.34
95% Adjusted-CLT UCL	44.06	97.5% Chebyshev (MVUE) UCL	77.25
95% Modified-t UCL	43.55	99% Chebyshev (MVUE) UCL	98.69
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.697	Data do not follow a Discernable Distribution (0.05)	
Theta Star	21.95		
MLE of Mean	37.24		
MLE of Standard Deviation	28.59		
nu star	190		
Approximate Chi Square Value (.05)	159.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0457	95% CLT UCL	43.34
Adjusted Chi Square Value	158.4	95% Jackknife UCL	43.44
		95% Standard Bootstrap UCL	43.33
Anderson-Darling Test Statistic	1.32	95% Bootstrap-t UCL	44.44
Anderson-Darling 5% Critical Value	0.765	95% Hall's Bootstrap UCL	44.06
Kolmogorov-Smirnov Test Statistic	0.154	95% Percentile Bootstrap UCL	43.29
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL	44.35
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	53.4
		97.5% Chebyshev(Mean, Sd) UCL	60.39
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	74.13
95% Approximate Gamma UCL	44.47		
95% Adjusted Gamma UCL	44.68		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	53.4

Basin Sediment Mercury UCL Average of Multiple Samples for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 6 ft. NAVD88

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-ave0-6-060309	6/3/2009	1	91.975	0-8
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4

OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-ave0-6-092309	9/23/2009	1	16.55	0-8
SDCR3-ave0-6-092309	9/23/2009	1	34.955	0-8
SDCR8-ave0-6-092409	9/24/2009	1	25.5	0-8
SDCR11-ave0-6-092509	9/25/2009	1	36.25	0-8
SDCR12-ave0-6-092509	9/25/2009	1	16.75	0-8
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/4/10

08-09 Hg A average

General Statistics			
Number of Valid Observations	63	Number of Distinct Observations	62
Raw Statistics		Log-transformed Statistics	
Minimum	0.965	Minimum of Log Data	-0.0356
Maximum	120	Maximum of Log Data	4.787
Mean	36.07	Mean of log Data	3.288
Median	26.5	SD of log Data	0.88
SD	27.22		
Coefficient of Variation	0.755		
Skewness	1.431		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.241	Lilliefors Test Statistic	0.151
Lilliefors Critical Value	0.112	Lilliefors Critical Value	0.112
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	41.8	95% H-UCL	50.23
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	60.82
95% Adjusted-CLT UCL	42.37	97.5% Chebyshev (MVUE) UCL	70.21
95% Modified-t UCL	41.9	99% Chebyshev (MVUE) UCL	88.66
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.753	Data do not follow a Discernable Distribution (0.05)	
Theta Star	20.58		
MLE of Mean	36.07		
MLE of Standard Deviation	27.24		
nu star	220.8		
Approximate Chi Square Value (.05)	187.4	Nonparametric Statistics	
Adjusted Level of Significance	0.0462	95% CLT UCL	41.71
Adjusted Chi Square Value	186.7	95% Jackknife UCL	41.8
		95% Standard Bootstrap UCL	41.7
Anderson-Darling Test Statistic	1.356	95% Bootstrap-t UCL	42.32
Anderson-Darling 5% Critical Value	0.765	95% Hall's Bootstrap UCL	42.37
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	41.68

Kolmogorov-Smirnov 5% Critical Value	0.114	95% BCA Bootstrap UCL	42.75
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	51.02
		97.5% Chebyshev(Mean, Sd) UCL	57.49
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	70.19
95% Approximate Gamma UCL	42.49		
95% Adjusted Gamma UCL	42.66		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	51.02

Basin Sediment Mercury UCL Average of Multiple Samples for 2008 and 2009 for Samples Starting at Zero Inches

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2

SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

SED Hg Average 08-09 B

General Statistics			
Number of Valid Observations	56	Number of Distinct Observations	54
Raw Statistics		Log-transformed Statistics	
Minimum	0.965	Minimum of Log Data	-0.0356
Maximum	120	Maximum of Log Data	4.787
Mean	35.99	Mean of log Data	3.259
Median	29.05	SD of log Data	0.952
SD	27.05		
Coefficient of Variation	0.752		
Skewness	1.439		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.231	Lilliefors Test Statistic	0.211
Lilliefors Critical Value	0.118	Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	42.04	95% H-UCL	54.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	66.61
95% Adjusted-CLT UCL	42.68	97.5% Chebyshev (MVUE) UCL	77.93
95% Modified-t UCL	42.15	99% Chebyshev (MVUE) UCL	100.2
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.611	Data do not follow a Discernable Distribution (0.05)	
Theta Star	22.34		
MLE of Mean	35.99		
MLE of Standard Deviation	28.35		
nu star	180.4		
Approximate Chi Square Value (.05)	150.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0457	95% CLT UCL	41.93
Adjusted Chi Square Value	149.6	95% Jackknife UCL	42.04
		95% Standard Bootstrap UCL	41.82
Anderson-Darling Test Statistic	1.338	95% Bootstrap-t UCL	43.27
Anderson-Darling 5% Critical Value	0.766	95% Hall's Bootstrap UCL	43.04
Kolmogorov-Smirnov Test Statistic	0.157	95% Percentile Bootstrap UCL	41.63
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL	42.69
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	51.74
		97.5% Chebyshev(Mean, Sd) UCL	58.56
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	71.95
95% Approximate Gamma UCL	43.18		
95% Adjusted Gamma UCL	43.39		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	51.74

Basin Sediment Mercury UCL Average of Multiple Samples for 2008 and 2009
for Samples Starting at Zero Inches at 6 ft. NAVD88

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4

OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/4/10

08-09 Hg B average

General Statistics			
Number of Valid Observations	62	Number of Distinct Observations	60
Raw Statistics		Log-transformed Statistics	
Minimum	0.965	Minimum of Log Data	-0.0356
Maximum	120	Maximum of Log Data	4.787
Mean	34.22	Mean of log Data	3.219
Median	26.11	SD of log Data	0.915
SD	26.29		
Coefficient of Variation	0.768		
Skewness	1.577		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.224	Lilliefors Test Statistic	0.182
Lilliefors Critical Value	0.113	Lilliefors Critical Value	0.113
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	39.8	95% H-UCL	49.13
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	59.75
95% Adjusted-CLT UCL	40.43	97.5% Chebyshev (MVUE) UCL	69.32
95% Modified-t UCL	39.91	99% Chebyshev (MVUE) UCL	88.1
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.667	Data do not follow a Discernable Distribution (0.05)	
Theta Star	20.53		
MLE of Mean	34.22		
MLE of Standard Deviation	26.51		
nu star	206.7		
Approximate Chi Square Value (.05)	174.4	Nonparametric Statistics	
Adjusted Level of Significance	0.0461	95% CLT UCL	39.71
Adjusted Chi Square Value	173.7	95% Jackknife UCL	39.8
		95% Standard Bootstrap UCL	39.7

Anderson-Darling Test Statistic	1.274	95% Bootstrap-t UCL	40.48
Anderson-Darling 5% Critical Value	0.766	95% Hall's Bootstrap UCL	40.86
Kolmogorov-Smirnov Test Statistic	0.132	95% Percentile Bootstrap UCL	40.03
Kolmogorov-Smirnov 5% Critical Value	0.115	95% BCA Bootstrap UCL	40.45
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	48.77
		97.5% Chebyshev(Mean, Sd) UCL	55.07
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	67.44
95% Approximate Gamma UCL	40.55		
95% Adjusted Gamma UCL	40.71		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	48.77

Basin Sediment Mercury UCL for 1991, 1994, 2001, 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths 3ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	*8/13/1991*	*1*	*10.2*	*0-6*
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6
SGF06-081391	8/13/1991	1	79	0-6
SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	8/13/1991	1	24.6	0-6
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6

SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP11-083192	8/31/1992	1	1.1	0-6
ODG0101-0694	6/30/1994	1	53	0-6
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6
ODG0302-0694	6/30/1994	1	0.074	0-6
ODG0303-0694	6/30/1994	1	85	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6

SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202DC-06	5/20/2006	1	22.3	0-4
OU2B-SED-202DNE-06	5/20/2006	1	26	0-4
OU2B-SED-202DNW-06	5/20/2006	1	12.3	0-4
OU2B-SED-202DSE-06	5/20/2006	1	17	0-4
OU2B-SED-202DSW-06	5/20/2006	1	21.3	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203DC-06	5/21/2006	1	53.3	0-4
OU2B-SED-203DNE-06	5/21/2006	1	33.1	0-4
OU2B-SED-203DNW-06	5/21/2006	1	32	0-4
OU2B-SED-203DSE-06	5/21/2006	1	38.9	0-4
OU2B-SED-203DSW-06	5/21/2006	1	41.5	0-4
OU2B-SED-303DC-06	5/21/2006	1	6.81	0-4
OU2B-SED-303DNE-06	5/21/2006	1	8.2	0-4
OU2B-SED-303DNW-06	5/21/2006	1	7.35	0-4
OU2B-SED-303DSE-06	5/21/2006	1	6.45	0-4

OU2B-SED-303DSW-06	5/21/2006	1	14.6	0-4
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2B-SED-103DC-06	5/23/2006	1	16.2	0-4
OU2B-SED-103DNE-06	5/23/2006	1	13.9	0-4
OU2B-SED-103DNW-06	5/23/2006	1	13.4	0-4
OU2B-SED-103DSE-06	5/23/2006	1	19.6	0-4
OU2B-SED-103DSW-06	5/23/2006	1	17.7	0-4
OU2B-SED-104DC-06	5/24/2006	1	21.7	0-4
OU2B-SED-104DNE-06	5/24/2006	1	17.5	0-4
OU2B-SED-104DNW-06	5/24/2006	1	18.5	0-4
OU2B-SED-104DSE-06	5/24/2006	1	21.1	0-4
OU2B-SED-104DSW-06	5/24/2006	1	20.3	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4

OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
SDCR-1-FB-060309	6/3/2009	1	128	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	96.6	4.8-9.6
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4

OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR2-FSB-092309	9/23/2009	1	7.7	2-4
SDCR2-FSC-092309	9/23/2009	1	28	4-8
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR3-FSB-092309	9/23/2009	1	110	2-4
SDCR3-FSC-092309	9/23/2009	1	0.41	4-8
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR8-FSB-092409	9/24/2009	1	26	2-4
SDCR8-FSC-092409	9/24/2009	1	26	4-8
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR11-FSB-092509	9/25/2009	1	40	2-4
SDCR11-FSC-092509	9/25/2009	1	36	4-8
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

Sed Hg all A

General Statistics			
Number of Valid Data	295	Number of Detected Data	294
Number of Distinct Detected Data	233	Number of Non-Detect Data	1
		Percent Non-Detects	0.34%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	48.14	Mean of Detected	3.338
SD of Detected	62.26	SD of Detected	1.143
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.237	Lilliefors Test Statistic	0.122
5% Lilliefors Critical Value	0.0517	5% Lilliefors Critical Value	0.0517
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	47.97	Mean	3.319
SD	62.22	SD	1.188
95% DL/2 (t) UCL	53.95	95% H-Stat (DL/2) UCL	65.55
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	47.73	Mean in Log Scale	3.328
SD	62.42	SD in Log Scale	1.155
95% MLE (t) UCL	53.73	Mean in Original Scale	47.98
95% MLE (Tiku) UCL	53.23	SD in Original Scale	62.21
		95% Percentile Bootstrap UCL	54.38
		95% BCA Bootstrap UCL	55.12

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.06	Data do not follow a Discernable Distribution (0.05)	
Theta Star	45.4		
nu star	623.4		
A-D Test Statistic	4.604	Nonparametric Statistics	
5% A-D Critical Value	0.782	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.782	Mean	47.97
5% K-S Critical Value	0.0543	SD	62.11
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.622
		95% KM (t) UCL	53.95
Assuming Gamma Distribution		95% KM (z) UCL	53.93
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	53.95
Minimum	1.00E-09	95% KM (bootstrap t) UCL	55.57
Maximum	590	95% KM (BCA) UCL	54.16
Mean	47.97	95% KM (Percentile Bootstrap) UCL	53.96
Median	28	95% KM (Chebyshev) UCL	63.76

SD	62.22	97.5% KM (Chebyshev) UCL	70.59
k star	0.939	99% KM (Chebyshev) UCL	84.02
Theta star	51.1		
Nu star	553.9	Potential UCLs to Use	
AppChi2	500.3	95% KM (Chebyshev) UCL	63.76
95% Gamma Approximate UCL	53.11		
95% Adjusted Gamma UCL	53.14		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL for 1991, 1994, 2001, 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths 6ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	8/13/1991	1	10.2	0-6
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6
SGF06-081391	8/13/1991	1	79	0-6

SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	*8/13/1991*	*1*	*24.6*	*0-6*
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6
SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP30-082992	8/29/1992	1	2.1	0-6
SGFP11-083192	8/31/1992	1	1.1	0-6
SGFP23-083192	8/31/1992	1	6.6	0-6
ODG0101-0694	*6/30/1994*	*1*	*53*	*0-6*
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6
ODG0302-0694	6/30/1994	1	0.074	0-6

ODG0303-0694	6/30/1994	1	85	0-6
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
OSG0701-0694	6/30/1994	1	4	0-6
OSG0702-0694	6/30/1994	1	2.7	0-6
OSG0703-0694	6/30/1994	1	4.1	0-6
OSG0801-0694	6/30/1994	1	20	0-6
OSG0802-0694	6/30/1994	1	10	0-6
OSG0803-0694	6/30/1994	1	15	0-6
OSG0901-0694	6/30/1994	1	25	0-6
OSG0902-0694	6/30/1994	1	18	0-6
OSG0903-0694	6/30/1994	1	7.1	0-6
OSG1001-0694	6/30/1994	1	11	0-6
OSG1002-0694	6/30/1994	1	15	0-6
OSG1003-0694	6/30/1994	1	21	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6
SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6
SE-R2-101101-03	10/4/2001	1	15	0-6

SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202DC-06	5/20/2006	1	22.3	0-4
OU2B-SED-202DNE-06	5/20/2006	1	26	0-4
OU2B-SED-202DNW-06	5/20/2006	1	12.3	0-4
OU2B-SED-202DSE-06	5/20/2006	1	17	0-4
OU2B-SED-202DSW-06	5/20/2006	1	21.3	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203DC-06	5/21/2006	1	53.3	0-4
OU2B-SED-203DNE-06	5/21/2006	1	33.1	0-4
OU2B-SED-203DNW-06	5/21/2006	1	32	0-4
OU2B-SED-203DSE-06	5/21/2006	1	38.9	0-4
OU2B-SED-203DSW-06	5/21/2006	1	41.5	0-4
OU2B-SED-303DC-06	5/21/2006	1	6.81	0-4
OU2B-SED-303DNE-06	5/21/2006	1	8.2	0-4
OU2B-SED-303DNW-06	5/21/2006	1	7.35	0-4

OU2B-SED-303DSE-06	5/21/2006	1	6.45	0-4
OU2B-SED-303DSW-06	5/21/2006	1	14.6	0-4
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2R-SED-101DC-06	5/23/2006	1	8.61	0-4
OU2R-SED-101DNE-06	5/23/2006	1	8.42	0-4
OU2R-SED-101DNW-06	5/23/2006	1	7.96	0-4
OU2R-SED-101DSE-06	5/23/2006	1	7.77	0-4
OU2R-SED-101DSW-06	5/23/2006	1	8.58	0-4
OU2B-SED-103DC-06	5/23/2006	1	16.2	0-4
OU2B-SED-103DNE-06	5/23/2006	1	13.9	0-4
OU2B-SED-103DNW-06	5/23/2006	1	13.4	0-4
OU2B-SED-103DSE-06	5/23/2006	1	19.6	0-4
OU2B-SED-103DSW-06	5/23/2006	1	17.7	0-4
OU2B-SED-104DC-06	5/24/2006	1	21.7	0-4
OU2B-SED-104DNE-06	5/24/2006	1	17.5	0-4
OU2B-SED-104DNW-06	5/24/2006	1	18.5	0-4
OU2B-SED-104DSE-06	5/24/2006	1	21.1	0-4
OU2B-SED-104DSW-06	5/24/2006	1	20.3	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4

OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-4
SDCR-1-FB-060309	6/3/2009	1	128	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	96.6	4.8-9.6
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4

OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4
OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4

OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR2-FSB-092309	9/23/2009	1	7.7	2-4
SDCR2-FSC-092309	9/23/2009	1	28	4-8
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR3-FSB-092309	9/23/2009	1	110	2-4
SDCR3-FSC-092309	9/23/2009	1	0.41	4-8
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR8-FSB-092409	9/24/2009	1	26	2-4
SDCR8-FSC-092409	9/24/2009	1	26	4-8
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR11-FSB-092509	9/25/2009	1	40	2-4
SDCR11-FSC-092509	9/25/2009	1	36	4-8
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR12-FSC-092509	9/25/2009	1	19	4-8
SDCR12-FSB-092509	9/25/2009	1	17	2-4
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/4/10

Sed Hg all years A 6ft

General Statistics

Number of Valid Data	342	Number of Detected Data	341
Number of Distinct Detected Data	252	Number of Non-Detect Data	1
		Percent Non-Detects	0.29%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	43.77	Mean of Detected	3.244
SD of Detected	58.89	SD of Detected	1.111
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.251	Lilliefors Test Statistic	0.112
5% Lilliefors Critical Value	0.048	5% Lilliefors Critical Value	0.048
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	43.64	Mean	3.228
SD	58.85	SD	1.15
95% DL/2 (t) UCL	48.89	95% H-Stat (DL/2) UCL	56.11

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	43.44	Mean in Log Scale	3.235
SD	59.01	SD in Log Scale	1.121
95% MLE (t) UCL	48.71	Mean in Original Scale	43.65
95% MLE (Tiku) UCL	48.26	SD in Original Scale	58.84
		95% Percentile Bootstrap UCL	49.06
		95% BCA Bootstrap UCL	50.05

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.063	Data do not follow a Discernable Distribution (0.05)	
Theta Star	41.18		
nu star	725		
A-D Test Statistic	6.628	Nonparametric Statistics	
5% A-D Critical Value	0.783	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.783	Mean	43.64
5% K-S Critical Value	0.0507	SD	58.76
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.182

		95% KM (t) UCL	48.89
Assuming Gamma Distribution		95% KM (z) UCL	48.88
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	48.89
Minimum	1.00E-09	95% KM (bootstrap t) UCL	49.93
Maximum	590	95% KM (BCA) UCL	49.57
Mean	43.64	95% KM (Percentile Bootstrap) UCL	48.96
Median	26	95% KM (Chebyshev) UCL	57.51
SD	58.85	97.5% KM (Chebyshev) UCL	63.52
k star	0.956	99% KM (Chebyshev) UCL	75.31
Theta star	45.63		
Nu star	654.2	Potential UCLs to Use	
AppChi2	595.9	95% KM (Chebyshev) UCL	57.51
95% Gamma Approximate UCL	47.92		
95% Adjusted Gamma UCL	47.94		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL for 1991, 1994, 2001, 2006, 2008 and 2009 for All Samples
Starting at 0 Inches 3ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	*8/13/1991*	*1*	*10.2*	*0-6*
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6
SGF06-081391	8/13/1991	1	79	0-6
SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	8/13/1991	1	24.6	0-6
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6

SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP11-083192	8/31/1992	1	1.1	0-6
ODG0101-0694	6/30/1994	1	53	0-6
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6
ODG0302-0694	6/30/1994	1	0.074	0-6
ODG0303-0694	6/30/1994	1	85	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6

SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202DC-06	5/20/2006	1	22.3	0-4
OU2B-SED-202DNE-06	5/20/2006	1	26	0-4
OU2B-SED-202DNW-06	5/20/2006	1	12.3	0-4
OU2B-SED-202DSE-06	5/20/2006	1	17	0-4
OU2B-SED-202DSW-06	5/20/2006	1	21.3	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203DC-06	5/21/2006	1	53.3	0-4
OU2B-SED-203DNE-06	5/21/2006	1	33.1	0-4
OU2B-SED-203DNW-06	5/21/2006	1	32	0-4
OU2B-SED-203DSE-06	5/21/2006	1	38.9	0-4
OU2B-SED-203DSW-06	5/21/2006	1	41.5	0-4
OU2B-SED-303DC-06	5/21/2006	1	6.81	0-4
OU2B-SED-303DNE-06	5/21/2006	1	8.2	0-4
OU2B-SED-303DNW-06	5/21/2006	1	7.35	0-4

OU2B-SED-303DSE-06	5/21/2006	1	6.45	0-4
OU2B-SED-303DSW-06	5/21/2006	1	14.6	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2B-SED-103DC-06	5/23/2006	1	16.2	0-4
OU2B-SED-103DNE-06	5/23/2006	1	13.9	0-4
OU2B-SED-103DNW-06	5/23/2006	1	13.4	0-4
OU2B-SED-103DSE-06	5/23/2006	1	19.6	0-4
OU2B-SED-103DSW-06	5/23/2006	1	17.7	0-4
OU2B-SED-104DC-06	5/24/2006	1	21.7	0-4
OU2B-SED-104DNE-06	5/24/2006	1	17.5	0-4
OU2B-SED-104DNW-06	5/24/2006	1	18.5	0-4
OU2B-SED-104DSE-06	5/24/2006	1	21.1	0-4
OU2B-SED-104DSW-06	5/24/2006	1	20.3	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4

OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4
OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4

OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/5/10

SED Hg B all

General Statistics			
Number of Valid Data	292	Number of Detected Data	291
Number of Distinct Detected Data	233	Number of Non-Detect Data	1
		Percent Non-Detects	0.34%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	47.15	Mean of Detected	3.315
SD of Detected	62.36	SD of Detected	1.124
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.239	Lilliefors Test Statistic	0.107
5% Lilliefors Critical Value	0.0519	5% Lilliefors Critical Value	0.0519
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	46.99	Mean	3.296
SD	62.32	SD	1.17
95% DL/2 (t) UCL	53	95% H-Stat (DL/2) UCL	62.47
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	46.74	Mean in Log Scale	3.305
SD	62.52	SD in Log Scale	1.136
95% MLE (t) UCL	52.78	Mean in Original Scale	46.99
95% MLE (Tiku) UCL	52.27	SD in Original Scale	62.31
		95% Percentile Bootstrap UCL	53.67
		95% BCA Bootstrap UCL	54.18

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.056	Data do not follow a Discernable Distribution (0.05)	
Theta Star	44.65		
nu star	614.5		
A-D Test Statistic	4.583	Nonparametric Statistics	
5% A-D Critical Value	0.782	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.782	Mean	46.99
5% K-S Critical Value	0.0547	SD	62.21
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.647
		95% KM (t) UCL	53
Assuming Gamma Distribution		95% KM (z) UCL	52.98
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	53
Minimum	1.00E-09	95% KM (bootstrap t) UCL	54.28
Maximum	590	95% KM (BCA) UCL	53.12
Mean	46.99	95% KM (Percentile Bootstrap) UCL	53.18

Median	27.1	95% KM (Chebyshev) UCL	62.88
SD	62.32	97.5% KM (Chebyshev) UCL	69.76
k star	0.934	99% KM (Chebyshev) UCL	83.27
Theta star	50.28		
Nu star	545.7	Potential UCLs to Use	
AppChi2	492.6	95% KM (Chebyshev) UCL	62.88
95% Gamma Approximate UCL	52.06		
95% Adjusted Gamma UCL	52.09		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL for 1991, 1994, 2001, 2006, 2008 and 2009 for All Samples Starting at 0 Inches 6ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	8/13/1991	1	10.2	0-6
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6
SGF06-081391	8/13/1991	1	79	0-6

SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	*8/13/1991*	*1*	*24.6*	*0-6*
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6
SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP30-082992	8/29/1992	1	2.1	0-6
SGFP11-083192	8/31/1992	1	1.1	0-6
SGFP23-083192	8/31/1992	1	6.6	0-6
ODG0101-0694	*6/30/1994*	*1*	*53*	*0-6*
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6
ODG0302-0694	6/30/1994	1	0.074	0-6

ODG0303-0694	6/30/1994	1	85	0-6
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
OSG0701-0694	6/30/1994	1	4	0-6
OSG0702-0694	6/30/1994	1	2.7	0-6
OSG0703-0694	6/30/1994	1	4.1	0-6
OSG0801-0694	6/30/1994	1	20	0-6
OSG0802-0694	6/30/1994	1	10	0-6
OSG0803-0694	6/30/1994	1	15	0-6
OSG0901-0694	6/30/1994	1	25	0-6
OSG0902-0694	6/30/1994	1	18	0-6
OSG0903-0694	6/30/1994	1	7.1	0-6
OSG1001-0694	6/30/1994	1	11	0-6
OSG1002-0694	6/30/1994	1	15	0-6
OSG1003-0694	6/30/1994	1	21	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6
SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6
SE-R2-101101-03	10/4/2001	1	15	0-6

SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202DC-06	5/20/2006	1	22.3	0-4
OU2B-SED-202DNE-06	5/20/2006	1	26	0-4
OU2B-SED-202DNW-06	5/20/2006	1	12.3	0-4
OU2B-SED-202DSE-06	5/20/2006	1	17	0-4
OU2B-SED-202DSW-06	5/20/2006	1	21.3	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203DC-06	5/21/2006	1	53.3	0-4
OU2B-SED-203DNE-06	5/21/2006	1	33.1	0-4
OU2B-SED-203DNW-06	5/21/2006	1	32	0-4
OU2B-SED-203DSE-06	5/21/2006	1	38.9	0-4
OU2B-SED-203DSW-06	5/21/2006	1	41.5	0-4
OU2B-SED-303DC-06	5/21/2006	1	6.81	0-4
OU2B-SED-303DNE-06	5/21/2006	1	8.2	0-4
OU2B-SED-303DNW-06	5/21/2006	1	7.35	0-4

OU2B-SED-303DSE-06	5/21/2006	1	6.45	0-4
OU2B-SED-303DSW-06	5/21/2006	1	14.6	0-4
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2R-SED-101DC-06	5/23/2006	1	8.61	0-4
OU2R-SED-101DNE-06	5/23/2006	1	8.42	0-4
OU2R-SED-101DNW-06	5/23/2006	1	7.96	0-4
OU2R-SED-101DSE-06	5/23/2006	1	7.77	0-4
OU2R-SED-101DSW-06	5/23/2006	1	8.58	0-4
OU2B-SED-103DC-06	5/23/2006	1	16.2	0-4
OU2B-SED-103DNE-06	5/23/2006	1	13.9	0-4
OU2B-SED-103DNW-06	5/23/2006	1	13.4	0-4
OU2B-SED-103DSE-06	5/23/2006	1	19.6	0-4
OU2B-SED-103DSW-06	5/23/2006	1	17.7	0-4
OU2B-SED-104DC-06	5/24/2006	1	21.7	0-4
OU2B-SED-104DNE-06	5/24/2006	1	17.5	0-4
OU2B-SED-104DNW-06	5/24/2006	1	18.5	0-4
OU2B-SED-104DSE-06	5/24/2006	1	21.1	0-4
OU2B-SED-104DSW-06	5/24/2006	1	20.3	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502DC-08	6/5/2008	1	22.4	0-4
OU2B-SED-502DNE-08	6/5/2008	1	213	0-4
OU2B-SED-502DNW-08	6/5/2008	1	59.2	0-4
OU2B-SED-502DSE-08	6/5/2008	1	72	0-4
OU2B-SED-502DSW-08	6/5/2008	1	96.9	0-4
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501DC-08	6/6/2008	1	18.1	0-4
OU2B-SED-501DNE-08	6/6/2008	1	27.4	0-4
OU2B-SED-501DNW-08	6/6/2008	1	17.5	0-4
OU2B-SED-501DSE-08	6/6/2008	1	23.4	0-4
OU2B-SED-501DSW-08	6/6/2008	1	18.2	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4

OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DNE-08	6/7/2008	1	24.6	0-4
OU2B-SED-103DNW-08	6/7/2008	1	25.3	0-4
OU2B-SED-103DSE-08	6/7/2008	1	26.3	0-4
OU2B-SED-103DSW-08	6/7/2008	1	26.5	0-4
OU2B-SED-103DC-08	6/7/2008	1	25.9	0-4
OU2B-SED-104DC-08	6/8/2008	1	33.5	0-4
OU2B-SED-104DNE-08	6/8/2008	1	35.9	0-4
OU2B-SED-104DNW-08	6/8/2008	1	38.4	0-4
OU2B-SED-104DSE-08	6/8/2008	1	47	0-4
OU2B-SED-104DSW-08	6/8/2008	1	99.4	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202DC-08	6/9/2008	1	79.9	0-4
OU2B-SED-202DNE-08	6/9/2008	1	100	0-4
OU2B-SED-202DNW-08	6/9/2008	1	172	0-4
OU2B-SED-202DSE-08	6/9/2008	1	139	0-4
OU2B-SED-202DSW-08	6/9/2008	1	31.2	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-203DNE-08	6/10/2008	1	37.6	0-4
OU2B-SED-203DNW-08	6/10/2008	1	37	0-4
OU2B-SED-203DSE-08	6/10/2008	1	34.8	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-303DNE-08	6/10/2008	1	19.8	0-4
OU2B-SED-303DNW-08	6/10/2008	1	22.8	0-4
OU2B-SED-303DSE-08	6/10/2008	1	37	0-4
OU2B-SED-303DSW-08	6/10/2008	1	18.3	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203DSW-08	6/10/2008	1	31.7	0-4
OU2B-SED-203DC-08	6/10/2008	1	37.8	0-4
OU2B-SED-303DC-08	6/10/2008	1	19.8	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4

OU2B-SED-103DC-09	6/6/2009	1	30.9	0-4
OU2B-SED-103DNE-09	6/6/2009	1	28.9	0-4
OU2B-SED-103DSE-09	6/6/2009	1	32.2	0-4
OU2B-SED-103DNW-09	6/6/2009	1	29	0-4
OU2B-SED-103DSW-09	6/6/2009	1	32.2	0-4
OU2B-SED-104DC-09	6/6/2009	1	77.6	0-4
OU2B-SED-104DNE-09	6/6/2009	1	46.3	0-4
OU2B-SED-104DNW-09	6/6/2009	1	46.8	0-4
OU2B-SED-104DSE-09	6/6/2009	1	47.7	0-4
OU2B-SED-104DSW-09	6/6/2009	1	47.4	0-4
OU2B-SED-202DC-09	6/6/2009	1	34	0-4
OU2B-SED-202DNE-09	6/6/2009	1	22.5	0-4
OU2B-SED-202DNW-09	6/6/2009	1	12.6	0-4
OU2B-SED-202DSE-09	6/6/2009	1	60.5	0-4
OU2B-SED-202DSW-09	6/6/2009	1	46.4	0-4
OU2B-SED-501DC-09	6/7/2009	1	24.9	0-4
OU2B-SED-501DNE-09	6/7/2009	1	24.7	0-4
OU2B-SED-501DNW-09	6/7/2009	1	26.2	0-4
OU2B-SED-501DSE-09	6/7/2009	1	25.5	0-4
OU2B-SED-501DSW-09	6/7/2009	1	26.5	0-4
OU2B-SED-502DC-09	6/7/2009	1	88.7	0-4
OU2B-SED-502DNE-09	6/7/2009	1	86.2	0-4
OU2B-SED-502DNW-09	6/7/2009	1	112	0-4
OU2B-SED-502DSE-09	6/7/2009	1	90.8	0-4
OU2B-SED-502DSW-09	6/7/2009	1	37.9	0-4
OU2B-SED-303DC-09	6/7/2009	1	18.1	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303DNE-09	6/7/2009	1	13.2	0-4
OU2B-SED-303DNW-09	6/7/2009	1	14.8	0-4
OU2B-SED-303DSE-09	6/7/2009	1	15.4	0-4
OU2B-SED-303DSW-09	6/7/2009	1	7.5	0-4
OU2B-SED-203DC-09	6/7/2009	1	85.1	0-4
OU2B-SED-203DNE-09	6/7/2009	1	96.5	0-4
OU2B-SED-203DNW-09	6/7/2009	1	116	0-4
OU2B-SED-203DSE-09	6/7/2009	1	103	0-4
OU2B-SED-203DSW-09	6/7/2009	1	84.2	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4

SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/4/10

Sed Hg all years B 6ft

General Statistics

Number of Valid Data	330	Number of Detected Data	329
Number of Distinct Detected Data	248	Number of Non-Detect Data	1
		Percent Non-Detects	0.30%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	43.74	Mean of Detected	3.246
SD of Detected	59.45	SD of Detected	1.096
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.252	Lilliefors Test Statistic	0.107
5% Lilliefors Critical Value	0.0488	5% Lilliefors Critical Value	0.0488
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	43.61	Mean	3.229
SD	59.41	SD	1.137
95% DL/2 (t) UCL	49	95% H-Stat (DL/2) UCL	55.39

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	43.4	Mean in Log Scale	3.237
SD	59.57	SD in Log Scale	1.107
95% MLE (t) UCL	48.81	Mean in Original Scale	43.61
95% MLE (Tiku) UCL	48.34	SD in Original Scale	59.4
		95% Percentile Bootstrap UCL	49.2
		95% BCA Bootstrap UCL	49.7

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.068	Data do not follow a Discernable Distribution (0.05)	
Theta Star	40.95		
nu star	702.8		
A-D Test Statistic	6.558	Nonparametric Statistics	
5% A-D Critical Value	0.782	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.782	Mean	43.61
5% K-S Critical Value	0.0515	SD	59.32
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.27

		95% KM (t) UCL	49
Assuming Gamma Distribution		95% KM (z) UCL	48.99
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	49
Minimum	1.00E-09	95% KM (bootstrap t) UCL	50.27
Maximum	590	95% KM (BCA) UCL	49.16
Mean	43.61	95% KM (Percentile Bootstrap) UCL	49.18
Median	25.95	95% KM (Chebyshev) UCL	57.87
SD	59.41	97.5% KM (Chebyshev) UCL	64.03
k star	0.957	99% KM (Chebyshev) UCL	76.15
Theta star	45.57		
Nu star	631.6	Potential UCLs to Use	
AppChi2	574.3	95% KM (Chebyshev) UCL	57.87
95% Gamma Approximate UCL	47.96		
95% Adjusted Gamma UCL	47.98		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL Average of Multiple Samples for 1991, 1994, 2001, 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths 3ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	8/13/1991	1	10.2	0-6
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6
SGF06-081391	8/13/1991	1	79	0-6
SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	8/13/1991	1	24.6	0-6
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6

SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP11-083192	8/31/1992	1	1.1	0-6
ODG0101-0694	6/30/1994	1	53	0-6
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6
ODG0302-0694	6/30/1994	1	0.074	0-6
ODG0303-0694	6/30/1994	1	85	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6

SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202-average-06	5/20/2006	1	19.78	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203D-average-06	5/21/2006	1	39.76	0-4
OU2B-SED-303D-average-06	5/21/2006	1	8.682	0-4
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2B-SED-103D-average-06	5/23/2006	1	16.16	0-4
OU2B-SED-104D-average-06	5/24/2006	1	19.82	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4

OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-ave0-6-060309	6/3/2009	1	92.0	0-8
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-ave0-6-092309	9/23/2009	1	16.55	0-8
SDCR3-ave0-6-092309	9/23/2009	1	34.955	0-8
SDCR8-ave0-6-092409	9/24/2009	1	25.5	0-8
SDCR11-ave0-6-092509	9/25/2009	1	36.25	0-8
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12

SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/5/10

Sed Hg Average All A

General Statistics			
Number of Valid Data	211	Number of Detected Data	210
Number of Distinct Detected Data	182	Number of Non-Detect Data	1
		Percent Non-Detects	0.47%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	50.08	Mean of Detected	3.305
SD of Detected	69.46	SD of Detected	1.223
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.237	Lilliefors Test Statistic	0.112
5% Lilliefors Critical Value	0.0611	5% Lilliefors Critical Value	0.0611
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	49.85	Mean	3.278
SD	69.38	SD	1.28
95% DL/2 (t) UCL	57.74	95% H-Stat (DL/2) UCL	74.22
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	49.46	Mean in Log Scale	3.29
SD	69.69	SD in Log Scale	1.239
95% MLE (t) UCL	57.39	Mean in Original Scale	49.85
95% MLE (Tiku) UCL	56.7	SD in Original Scale	69.38
		95% Percentile Bootstrap UCL	58.35
		95% BCA Bootstrap UCL	59.53
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.943	Data do not follow a Discernable Distribution (0.05)	
Theta Star	53.13		
nu star	396		
A-D Test Statistic	2.957	Nonparametric Statistics	
5% A-D Critical Value	0.786	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.786	Mean	49.85
5% K-S Critical Value	0.0644	SD	69.22
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.777
		95% KM (t) UCL	57.74
Assuming Gamma Distribution		95% KM (z) UCL	57.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	57.74
Minimum	1.00E-09	95% KM (bootstrap t) UCL	60.14
Maximum	590	95% KM (BCA) UCL	57.73
Mean	49.85	95% KM (Percentile Bootstrap) UCL	57.88

Median	27.4	95% KM (Chebyshev) UCL	70.67
SD	69.38	97.5% KM (Chebyshev) UCL	79.68
k star	0.815	99% KM (Chebyshev) UCL	97.37
Theta star	61.18		
Nu star	343.8	Potential UCLs to Use	
AppChi2	301.9	95% KM (Chebyshev) UCL	70.67
95% Gamma Approximate UCL	56.78		
95% Adjusted Gamma UCL	56.83		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL Average of Multiple Samples for 1991, 1994, 2001, 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths 6ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	8/13/1991	1	10.2	0-6
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6

SGF06-081391	8/13/1991	1	79	0-6
SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	8/13/1991	1	24.6	0-6
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6
SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP30-082992	8/29/1992	1	2.1	0-6
SGFP11-083192	8/31/1992	1	1.1	0-6
SGFP23-083192	8/31/1992	1	6.6	0-6
ODG0101-0694	6/30/1994	1	53	0-6
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6

ODG0302-0694	6/30/1994	1	0.074	0-6
ODG0303-0694	6/30/1994	1	85	0-6
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
OSG0701-0694	6/30/1994	1	4	0-6
OSG0702-0694	6/30/1994	1	2.7	0-6
OSG0703-0694	6/30/1994	1	4.1	0-6
OSG0801-0694	6/30/1994	1	20	0-6
OSG0802-0694	6/30/1994	1	10	0-6
OSG0803-0694	6/30/1994	1	15	0-6
OSG0901-0694	6/30/1994	1	25	0-6
OSG0902-0694	6/30/1994	1	18	0-6
OSG0903-0694	6/30/1994	1	7.1	0-6
OSG1001-0694	6/30/1994	1	11	0-6
OSG1002-0694	6/30/1994	1	15	0-6
OSG1003-0694	6/30/1994	1	21	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6
SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6

SE-R2-101101-03	10/4/2001	1	15	0-6
SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202-average-06	5/20/2006	1	19.78	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203D-average-06	5/21/2006	1	39.76	0-4
OU2B-SED-303D-average-06	5/21/2006	1	8.682	0-4
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2R-SED-101D-average-06	5/23/2006	1	8.268	0-4
OU2B-SED-103D-average-06	5/23/2006	1	16.16	0-4
OU2B-SED-104D-average-06	5/24/2006	1	19.82	0-4

OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-ave0-6-060309	6/3/2009	1	92.0	0-8
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4

OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-ave0-6-092309	9/23/2009	1	16.55	0-8
SDCR3-ave0-6-092309	9/23/2009	1	34.955	0-8
SDCR8-ave0-6-092409	9/24/2009	1	25.5	0-8
SDCR11-ave0-6-092509	9/25/2009	1	36.25	0-8
SDCR12-ave0-6-092509	9/25/2009	1	16.75	0-8
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/4/10

Sed Hg all years Ave 6ft A

General Statistics			
Number of Valid Data	242	Number of Detected Data	241
Number of Distinct Detected Data	196	Number of Non-Detect Data	1
		Percent Non-Detects	0.41%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	45.9	Mean of Detected	3.221
SD of Detected	65.88	SD of Detected	1.189
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.251	Lilliefors Test Statistic	0.105
5% Lilliefors Critical Value	0.0571	5% Lilliefors Critical Value	0.0571
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	45.71	Mean	3.198
SD	65.81	SD	1.24
95% DL/2 (t) UCL	52.69	95% H-Stat (DL/2) UCL	63.66
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	45.38	Mean in Log Scale	3.208
SD	66.06	SD in Log Scale	1.204
95% MLE (t) UCL	52.39	Mean in Original Scale	45.71
95% MLE (Tiku) UCL	51.77	SD in Original Scale	65.81
		95% Percentile Bootstrap UCL	52.97
		95% BCA Bootstrap UCL	54.41

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.949	Data do not follow a Discernable Distribution (0.05)	
Theta Star	48.36		
nu star	457.5		
A-D Test Statistic	4.337	Nonparametric Statistics	
5% A-D Critical Value	0.786	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.786	Mean	45.71
5% K-S Critical Value	0.0607	SD	65.67
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.23

		95% KM (t) UCL	52.69
Assuming Gamma Distribution		95% KM (z) UCL	52.66
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	52.69
Minimum	1.00E-09	95% KM (bootstrap t) UCL	54.27
Maximum	590	95% KM (BCA) UCL	53.25
Mean	45.71	95% KM (Percentile Bootstrap) UCL	52.91
Median	25.53	95% KM (Chebyshev) UCL	64.15
SD	65.81	97.5% KM (Chebyshev) UCL	72.12
k star	0.834	99% KM (Chebyshev) UCL	87.8
Theta star	54.79		
Nu star	403.8	Potential UCLs to Use	
AppChi2	358.2	95% KM (Chebyshev) UCL	64.15
95% Gamma Approximate UCL	51.52		
95% Adjusted Gamma UCL	51.56		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL Average of Multiple Samples for 1991, 1994, 2001, 2006, 2008 and 2009 for Samples Starting at Zero Inches 3ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	8/13/1991	1	10.2	0-6
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6
SGF06-081391	8/13/1991	1	79	0-6
SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	8/13/1991	1	24.6	0-6
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6

SGH06-081391	8/13/1991	1	200	0-6
SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP11-083192	8/31/1992	1	1.1	0-6
ODG0101-0694	6/30/1994	1	53	0-6
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6
ODG0302-0694	6/30/1994	1	0.074	0-6
ODG0303-0694	6/30/1994	1	85	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6

SE-FP17-0901	9/8/2001	1	24	0-6
SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202-average-06	5/20/2006	1	19.78	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203D-average-06	5/21/2006	1	39.76	0-4
OU2B-SED-303D-average-06	5/21/2006	1	8.682	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2B-SED-103D-average-06	5/23/2006	1	16.16	0-4
OU2B-SED-104D-average-06	5/24/2006	1	19.82	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4

OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-FA-060309	6/3/2009	1	46.7	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4
OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2

SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/5/10

Sed Hg Average All B

General Statistics			
Number of Valid Data	210	Number of Detected Data	########
Number of Distinct Detected Data	179	Number of Non-Detect Data	1
		Percent Non-Detects	0.48%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	49.8	Mean of Detected	3.289
SD of Detected	69.62	SD of Detected	1.233
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.238	Lilliefors Test Statistic	0.117
5% Lilliefors Critical Value	0.0613	5% Lilliefors Critical Value	0.0613
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	49.56	Mean	3.262
SD	69.54	SD	1.291
95% DL/2 (t) UCL	57.49	95% H-Stat (DL/2) UCL	74.23
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	49.17	Mean in Log Scale	3.274
SD	69.84	SD in Log Scale	1.25
95% MLE (t) UCL	57.13	Mean in Original Scale	49.57
95% MLE (Tiku) UCL	56.44	SD in Original Scale	69.53
		95% Percentile Bootstrap UCL	57.66
		95% BCA Bootstrap UCL	59.19
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.929	Data do not follow a Discernable Distribution (0.05)	
Theta Star	53.6		
nu star	388.4		
A-D Test Statistic	2.909	Nonparametric Statistics	
5% A-D Critical Value	0.787	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.787	Mean	49.56
5% K-S Critical Value	0.0646	SD	69.37

Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.799
		95% KM (t) UCL	57.49
Assuming Gamma Distribution		95% KM (z) UCL	57.45
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	57.49
Minimum	1.00E-09	95% KM (bootstrap t) UCL	59.74
Maximum	590	95% KM (BCA) UCL	58.27
Mean	49.56	95% KM (Percentile Bootstrap) UCL	57.97
Median	27.25	95% KM (Chebyshev) UCL	70.48
SD	69.54	97.5% KM (Chebyshev) UCL	79.53
k star	0.804	99% KM (Chebyshev) UCL	97.31
Theta star	61.61		
Nu star	337.9	Potential UCLs to Use	
AppChi2	296.3	95% KM (Chebyshev) UCL	70.48
95% Gamma Approximate UCL	56.52		
95% Adjusted Gamma UCL	56.57		

Note: DL/2 is not a recommended method.

Basin Sediment Mercury UCL Average of Multiple Samples for 1991, 1994, 2001, 2006, 2008 and 2009 for Samples Starting at Zero Inches 6ft Elevation

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	18.8	0-6
SGD10-080891	8/8/1991	1	30.7	0-6
SGB10-080991	8/9/1991	0	0.19	0-6
SGE10-080991	8/9/1991	1	8	0-6
SGF08-080991	8/9/1991	1	4.4	0-6
SGF09-080991	8/9/1991	1	8.7	0-6
SGF10-080991	8/9/1991	1	25.4	0-6
SGG09-080991	8/9/1991	1	31.2	0-6
SGB09-081091	8/10/1991	1	13.7	0-6
SGC09-081091	8/10/1991	1	9.8	0-6
SGD09-081091	8/10/1991	1	10.7	0-6
SGE09-081091	8/10/1991	1	7.8	0-6
SGH09-081091	8/10/1991	1	25.2	0-6
SGI09-081091	8/10/1991	1	14.8	0-6
SGJ09-081091	8/10/1991	1	30.9	0-6
SGC06-081191	8/11/1991	1	26.9	0-6
SGD06-081191	8/11/1991	1	22.4	0-6
SGF07-081191	8/11/1991	1	34	0-6
SGG08-081191	8/11/1991	1	30.2	0-6
SGH08-081191	8/11/1991	1	39	0-6
SGI10-081191	8/11/1991	1	290	0-6
SGJ06-081191	8/11/1991	1	135	0-6
SGJ07-081191	8/11/1991	1	37.4	0-6
SGA07-081391	8/13/1991	1	0.34	0-6
SGB05-081391	8/13/1991	1	246	0-6
SGB06-081391	8/13/1991	1	57.8	0-6
SGB07-081391	8/13/1991	1	84	0-6
SGB08-081391	8/13/1991	1	10.2	0-6
SGC05-081391	8/13/1991	1	7.1	0-6
SGC07-081391	8/13/1991	1	21.3	0-6
SGC08-081391	8/13/1991	1	18.8	0-6
SGD05-081391	8/13/1991	1	26.2	0-6
SGD07-081391	8/13/1991	1	12.9	0-6
SGD08-081391	8/13/1991	1	18.4	0-6
SGD11-081391	8/13/1991	1	15.6	0-6
SGE05-081391	8/13/1991	1	97.5	0-6
SGE06-081391	8/13/1991	1	17.1	0-6
SGE07-081391	8/13/1991	1	22.6	0-6
SGE08-081391	8/13/1991	1	17.4	0-6
SGF05-081391	8/13/1991	1	66.3	0-6

SGF06-081391	8/13/1991	1	79	0-6
SGG03-081391	8/13/1991	1	20.1	0-6
SGG05-081391	8/13/1991	1	24.6	0-6
SGG06-081391	8/13/1991	1	63.7	0-6
SGG07-081391	8/13/1991	1	29.5	0-6
SGH04-081391	8/13/1991	1	63.1	0-6
SGH05-081391	8/13/1991	1	6.8	0-6
SGH06-081391	8/13/1991	1	200	0-6
SGH07-081391	8/13/1991	1	26	0-6
SGH10-081391	8/13/1991	1	0.39	0-6
SGI05-081391	8/13/1991	1	13.1	0-6
SGI06-081391	8/13/1991	1	137	0-6
SGI07-081391	8/13/1991	1	227	0-6
SGI08-081391	8/13/1991	1	29	0-6
SGJ05-081391	8/13/1991	1	9.8	0-6
SGK04-081391	8/13/1991	1	5.7	0-6
SGB04-081491	8/14/1991	1	21.6	0-6
SGC04-081491	8/14/1991	1	17	0-6
SGD03-081491	8/14/1991	1	128	0-6
SGD04-081491	8/14/1991	1	18.1	0-6
SGE02-081491	8/14/1991	1	17.4	0-6
SGE03-081491	8/14/1991	1	9.3	0-6
SGE04-081491	8/14/1991	1	3.2	0-6
SGF01-081491	8/14/1991	1	3.1	0-6
SGF02-081491	8/14/1991	1	27.4	0-6
SGF03-081491	8/14/1991	1	3.7	0-6
SGF04-081491	8/14/1991	1	12.5	0-6
SGG01-081491	8/14/1991	1	5.3	0-6
SGG02-081491	8/14/1991	1	26.5	0-6
SGG04-081491	8/14/1991	1	90	0-6
SGH02-081491	8/14/1991	1	27.4	0-6
SGH03-081491	8/14/1991	1	80.8	0-6
SGI03-081491	8/14/1991	1	77.2	0-6
SGI04-081491	8/14/1991	1	116	0-6
SGJ03-081491	8/14/1991	1	20.2	0-6
SGJ04-081491	8/14/1991	1	14.8	0-6
SGK05-081491	8/14/1991	1	1.3	0-6
SCI701-1191	11/13/1991	1	214	0-2.04
SCE201-1191	11/14/1991	1	5.1	0-2.04
SGFP30-082992	8/29/1992	1	2.1	0-6
SGFP11-083192	8/31/1992	1	1.1	0-6
SGFP23-083192	8/31/1992	1	6.6	0-6
ODG0101-0694	6/30/1994	1	53	0-6
ODG0102-0694	6/30/1994	1	62	0-6
ODG0103-0694	6/30/1994	1	63	0-6
ODG0301-0694	6/30/1994	1	113	0-6

ODG0302-0694	6/30/1994	1	0.074	0-6
ODG0303-0694	6/30/1994	1	85	0-6
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
OSG0701-0694	6/30/1994	1	4	0-6
OSG0702-0694	6/30/1994	1	2.7	0-6
OSG0703-0694	6/30/1994	1	4.1	0-6
OSG0801-0694	6/30/1994	1	20	0-6
OSG0802-0694	6/30/1994	1	10	0-6
OSG0803-0694	6/30/1994	1	15	0-6
OSG0901-0694	6/30/1994	1	25	0-6
OSG0902-0694	6/30/1994	1	18	0-6
OSG0903-0694	6/30/1994	1	7.1	0-6
OSG1001-0694	6/30/1994	1	11	0-6
OSG1002-0694	6/30/1994	1	15	0-6
OSG1003-0694	6/30/1994	1	21	0-6
SE-H2-0901	9/7/2001	1	26	0-6
SE-H6-0901	9/7/2001	1	42	0-6
SE-J3-0901	9/7/2001	1	30	0-6
SE-J6-0901	9/7/2001	1	47	0-6
SE-K4-0901	9/7/2001	1	9.1	0-6
SE-K5-0901	9/7/2001	1	18	0-6
SE-B4-0901	9/8/2001	1	200	0-6
SE-B5-0901	9/8/2001	1	590	0-6
SE-C6-0901	9/8/2001	1	33	0-6
SE-D10-0901	9/8/2001	1	330	0-6
SE-D3-0901	9/8/2001	1	8.6	0-6
SE-E2-0901	9/8/2001	1	4.4	0-6
SE-E3-0901	9/8/2001	1	3.4	0-6
SE-F7-0901	9/8/2001	1	42	0-6
SE-FP17-0901	9/8/2001	1	24	0-6
SE-FP22-0901	9/8/2001	1	480	0-6
SE-G3-0901	9/8/2001	1	4.3	0-6
SE-H4-0901	9/8/2001	1	37	0-6
SE-H8-0901	9/8/2001	1	44	0-6
SE-I10-0901	9/8/2001	1	32	0-6
SE-C-E2-100101-01	10/1/2001	1	47	0-2
SE-C-I10-100101-01	10/1/2001	1	56	0-2
SE-C-I7-100101-01	10/1/2001	1	68	0-2
SE-C-E2-100201-08	10/2/2001	1	34	0-2
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6

SE-R2-101101-03	10/4/2001	1	15	0-6
SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6
SE-B10-101101-01	10/11/2001	1	41	0-6
SE-B10-101101-02	10/11/2001	1	46	0-6
SE-B10-101101-03	10/11/2001	1	52	0-6
SE-B10-101101-04	10/11/2001	1	86	0-6
SE-B10-101101-05	10/11/2001	1	93	0-6
SE-B10-101101-06	10/11/2001	1	32	0-6
SE-B1-101101-01	10/11/2001	1	91	0-6
SE-B1-101101-02	10/11/2001	1	67	0-6
SE-B1-101101-03	10/11/2001	1	78	0-6
SE-B2-101101-01	10/11/2001	1	130	0-6
SE-B2-101101-02	10/11/2001	1	150	0-6
SE-B2-101101-03	10/11/2001	1	110	0-6
SE-B3-101101-01	10/11/2001	1	140	0-6
SE-B3-101101-02	10/11/2001	1	93	0-6
SE-B3-101101-03	10/11/2001	1	96	0-6
SE-B4-101101-01	10/11/2001	1	110	0-6
SE-B4-101101-02	10/11/2001	1	110	0-6
SE-B4-101101-03	10/11/2001	1	130	0-6
SE-B5-101101-01	10/11/2001	1	36	0-6
SE-B5-101101-02	10/11/2001	1	51	0-6
SE-B5-101101-03	10/11/2001	1	43	0-6
SE-B6-101101-01	10/11/2001	1	25	0-6
SE-B6-101101-02	10/11/2001	1	24	0-6
SE-B6-101101-03	10/11/2001	1	27	0-6
SE-B6-101101-04	10/11/2001	1	22	0-6
SE-B6-101101-05	10/11/2001	1	21	0-6
SE-B6-101101-06	10/11/2001	1	22	0-6
OU2B-SED-102C-06	5/20/2006	1	10	0-4
OU2B-SED-204C-06	5/20/2006	1	25.8	0-4
OU2B-SED-202-average-06	5/20/2006	1	19.78	0-4
OU2B-SED-302C-06	5/20/2006	1	27.1	0-4
OU2B-SED-203D-average-06	5/21/2006	1	39.76	0-4
OU2B-SED-303D-average-06	5/21/2006	1	8.682	0-4
OU2B-SED-101C-06	5/21/2006	1	17.3	0-4
OU2B-SED-201C-06	5/21/2006	1	51.8	0-4
OU2B-SED-205C-06	5/21/2006	1	7.04	0-4
OU2B-SED-304C-06	5/22/2006	1	10.9	0-4
OU2B-SED-301C-06	5/23/2006	1	11	0-4
OU2B-SED-105C-06	5/23/2006	1	32.9	0-4
OU2R-SED-101D-average-06	5/23/2006	1	8.268	0-4
OU2B-SED-103D-average-06	5/23/2006	1	16.16	0-4
OU2B-SED-104D-average-06	5/24/2006	1	19.82	0-4

OU2B-SED-204C-06-RS	6/29/2006	1	95.3	0-4
OU2B-SED-502D-08	6/5/2008	1	92.7	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2B-SED-401C-08	6/6/2008	1	33.6	0-4
OU2B-SED-403C-08	6/6/2008	1	33.1	0-4
OU2B-SED-404C-08	6/6/2008	1	0.965	0-4
OU2B-SED-501D-08	6/6/2008	1	20.92	0-4
OU2B-SED-402C-08	6/6/2008	1	18.2	0-4
OU2B-SED-004C-08	6/7/2008	1	37.8	0-4
OU2B-SED-101C-08	6/7/2008	1	21.8	0-4
OU2B-SED-102C-08	6/7/2008	1	26.5	0-4
OU2B-SED-103D-08	6/7/2008	1	25.72	0-4
OU2B-SED-104D-08	6/8/2008	1	50.84	0-4
OU2B-SED-105C-08	6/8/2008	1	35.6	0-4
OU2B-SED-106C-08	6/8/2008	1	37.3	0-4
OU2B-SED-201C-08	6/8/2008	1	63.9	0-4
OU2B-SED-202D-08	6/9/2008	1	104.42	0-4
OU2B-SED-204C-08	6/9/2008	1	93.2	0-4
OU2B-SED-205C-08	6/9/2008	1	7.98	0-4
OU2B-SED-301C-08	6/10/2008	1	5.82	0-4
OU2B-SED-302C-08	6/10/2008	1	3.46	0-4
OU2B-SED-304C-08	6/10/2008	1	25	0-4
OU2B-SED-203D-08	6/10/2008	1	35.78	0-4
OU2B-SED-303D-08	6/10/2008	1	23.54	0-4
SDCR-1-FA-060309	6/3/2009	1	0.0467	0-2.4
OU2B-SED-301C-09	6/3/2009	1	20.9	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2B-SED-004C-09	6/5/2009	1	38.3	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
OU2B-SED-101C-09	6/5/2009	1	22.6	0-4
OU2B-SED-DHC-09	6/5/2009	1	29.1	0-4
OU2B-SED-102C-09	6/5/2009	1	33.1	0-4
OU2B-SED-103D-09	6/6/2009	1	30.64	0-4
OU2B-SED-104D-09	6/6/2009	1	53.16	0-4
OU2B-SED-202D-09	6/6/2009	1	35.2	0-4
OU2B-SED-501D-09	6/7/2009	1	25.56	0-4
OU2B-SED-502D-09	6/7/2009	1	83.12	0-4
OU2B-SED-402C-09	6/7/2009	1	27.1	0-4
OU2B-SED-303D-09	6/7/2009	1	13.8	0-4
OU2B-SED-203D-09	6/7/2009	1	96.96	0-4
OU2B-SED-204C-09	6/7/2009	1	39.7	0-4
OU2B-SED-106C-09	6/8/2009	1	38.7	0-4
OU2B-SED-105C-09	6/8/2009	1	23.1	0-4
OU2B-SED-205C-09	6/8/2009	1	7.1	0-4
OU2B-SED-201C-09	6/8/2009	1	33	0-4

OU2B-SED-302C-09	6/8/2009	1	2.01	0-4
OU2B-SED-304C-09	6/9/2009	1	18.6	0-4
OU2B-SED-401C-09	6/9/2009	1	24.6	0-4
OU2B-SED-403C-09	6/9/2009	1	35.7	0-4
OU2B-SED-404C-09	6/9/2009	1	18.9	0-4
SDCR2-FSA-092309	9/23/2009	1	2.5	0-2
SDCR3-FSA-092309	9/23/2009	1	29	0-2
SDCR8-FSA-092409	9/24/2009	1	24	0-2
SDCR11-FSA-092509	9/25/2009	1	33	0-2
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
SDCR9-CA-092609	9/26/2009	1	120	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR10-CA-092609	9/26/2009	1	19	0-12
SDCR4-CA-092709	9/27/2009	1	23	0-12
SDCR5-CA-092709	9/27/2009	1	20	0-12
SDCR6-CA-092709	9/27/2009	1	61	0-12
SDCR7-CA-092709	9/27/2009	1	88	0-12
SDCR3-CA-092709	9/27/2009	1	76	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/4/10

Sed Hg all years Ave 6ft B

General Statistics			
Number of Valid Data	244	Number of Detected Data	243
Number of Distinct Detected Data	192	Number of Non-Detect Data	1
		Percent Non-Detects	0.41%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0467	Minimum Detected	-3.064
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	45.15	Mean of Detected	3.175
SD of Detected	65.71	SD of Detected	1.258
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.253	Lilliefors Test Statistic	0.117
5% Lilliefors Critical Value	0.0568	5% Lilliefors Critical Value	0.0568
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	44.96	Mean	3.152
SD	65.64	SD	1.304
95% DL/2 (t) UCL	51.9	95% H-Stat (DL/2) UCL	67.08
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	44.48	Mean in Log Scale	3.162
SD	66.08	SD in Log Scale	1.271
95% MLE (t) UCL	51.46	Mean in Original Scale	44.96
95% MLE (Tiku) UCL	50.84	SD in Original Scale	65.64
		95% Percentile Bootstrap UCL	52.33
		95% BCA Bootstrap UCL	53.47

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.91	Data do not follow a Discernable Distribution (0.05)	
Theta Star	49.62		
nu star	442.2		
A-D Test Statistic	4.288	Nonparametric Statistics	
5% A-D Critical Value	0.788	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.788	Mean	44.96
5% K-S Critical Value	0.0606	SD	65.51

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	1.00E-09
Maximum	590
Mean	44.96
Median	25.1
SD	65.64
k star	0.805
Theta star	55.82
Nu star	393.1
AppChi2	348.1
95% Gamma Approximate UCL	50.77
95% Adjusted Gamma UCL	50.8

Note: DL/2 is not a recommended method.

SE of Mean	4.202
95% KM (t) UCL	51.9
95% KM (z) UCL	51.87
95% KM (jackknife) UCL	51.9
95% KM (bootstrap t) UCL	54.01
95% KM (BCA) UCL	52.31
95% KM (Percentile Bootstrap) UCL	52.32
95% KM (Chebyshev) UCL	63.28
97.5% KM (Chebyshev) UCL	71.2
99% KM (Chebyshev) UCL	86.77
Potential UCLs to Use	
95% KM (Chebyshev) UCL	63.28

Round Pond Sediment Mercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inches in Depth

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR12-FSB-092509	9/25/2009	1	17	2-4
SDCR12-FSC-092509	9/25/2009	1	19	4-8
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

RP Sed Hg 08-09 A

General Statistics			
Number of Valid Observations	16	Number of Distinct Observations	15
Raw Statistics		Log-transformed Statistics	
Minimum	12	Minimum of Log Data	2.485
Maximum	32.1	Maximum of Log Data	3.469
Mean	20.53	Mean of log Data	2.991
Median	20.2	SD of log Data	0.259
SD	5.257		
Coefficient of Variation	0.256		
Skewness	0.472		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.98	Shapiro Wilk Test Statistic	0.992
Shapiro Wilk Critical Value	0.887	Shapiro Wilk Critical Value	0.887
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	22.83	95% H-UCL	23.27
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	26.37
95% Adjusted-CLT UCL	22.85	97.5% Chebyshev (MVUE) UCL	28.89
95% Modified-t UCL	22.85	99% Chebyshev (MVUE) UCL	33.86
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.31	Data appear Normal at 5% Significance Level	
Theta Star	1.542		
MLE of Mean	20.53		
MLE of Standard Deviation	5.626		
nu star	425.9		
Approximate Chi Square Value (.05)	379.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0335	95% CLT UCL	22.69
Adjusted Chi Square Value	374	95% Jackknife UCL	22.83
		95% Standard Bootstrap UCL	22.65

Anderson-Darling Test Statistic	0.106	95% Bootstrap-t UCL	23.05
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL	23.04
Kolmogorov-Smirnov Test Statistic	0.0735	95% Percentile Bootstrap UCL	22.71
Kolmogorov-Smirnov 5% Critical Value	0.215	95% BCA Bootstrap UCL	22.77
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.25
		97.5% Chebyshev(Mean, Sd) UCL	28.73
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	33.6
95% Approximate Gamma UCL	23.06		
95% Adjusted Gamma UCL	23.37		
Potential UCL to Use		Use 95% Student's-t UCL	22.83

Round Pond Sediment Mercury UCL for 2008 and 2009 for Samples Starting at 0 Inches in Depth

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

RP Sed Hg 08-09 B

General Statistics			
Number of Valid Observations	14	Number of Distinct Observations	13

Raw Statistics		Log-transformed Statistics	
Minimum	12	Minimum of Log Data	2.485
Maximum	32.1	Maximum of Log Data	3.469
Mean	20.89	Mean of log Data	3.005
Median	21.1	SD of log Data	0.274
SD	5.533		
Coefficient of Variation	0.265		
Skewness	0.274		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.98	Shapiro Wilk Test Statistic	0.979
Shapiro Wilk Critical Value	0.874	Shapiro Wilk Critical Value	0.874
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	23.5	95% H-UCL	24.16
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	27.63
95% Adjusted-CLT UCL	23.43	97.5% Chebyshev (MVUE) UCL	30.53
95% Modified-t UCL	23.52	99% Chebyshev (MVUE) UCL	36.25
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.8	Data appear Normal at 5% Significance Level	
Theta Star	1.77		
MLE of Mean	20.89		
MLE of Standard Deviation	6.08		
nu star	330.4		
Approximate Chi Square Value (.05)	289.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0312	95% CLT UCL	23.32
Adjusted Chi Square Value	284.2	95% Jackknife UCL	23.5
		95% Standard Bootstrap UCL	23.26

Anderson-Darling Test Statistic	0.174	95% Bootstrap-t UCL	23.67
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	23.68
Kolmogorov-Smirnov Test Statistic	0.119	95% Percentile Bootstrap UCL	23.37
Kolmogorov-Smirnov 5% Critical Value	0.228	95% BCA Bootstrap UCL	23.29
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.33
		97.5% Chebyshev(Mean, Sd) UCL	30.12
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	35.6
95% Approximate Gamma UCL	23.85		
95% Adjusted Gamma UCL	24.28		
Potential UCL to Use		Use 95% Student's-t UCL	23.5

Round Pond Sediment Average Mercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inches in Depth

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
SDCR12-ave0-6-092509	9/25/2009	1	16.75	0-8
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 4/1/10

RP Sed Hg average 08-09 A

General Statistics

Number of Valid Observations	8	Number of Distinct Observations	8

Raw Statistics		Log-transformed Statistics	
Minimum	12	Minimum of Log Data	2.485
Maximum	24.34	Maximum of Log Data	3.192
Mean	17.78	Mean of log Data	2.855
Median	17.5	SD of log Data	0.232
SD	4.078		
Coefficient of Variation	0.229		
Skewness	0.328		

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.98	Shapiro Wilk Test Statistic	0.988
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20.51	95% H-UCL	21.22
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.15
95% Adjusted-CLT UCL	20.33	97.5% Chebyshev (MVUE) UCL	26.9
95% Modified-t UCL	20.54	99% Chebyshev (MVUE) UCL	32.31

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.63	Data appear Normal at 5% Significance Level	
Theta Star	1.305		
MLE of Mean	17.78		
MLE of Standard Deviation	4.816		
nu star	218		
Approximate Chi Square Value (.05)	184.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0195	95% CLT UCL	20.15

Adjusted Chi Square Value	177.1	95% Jackknife UCL	20.51
		95% Standard Bootstrap UCL	20.05
Anderson-Darling Test Statistic	0.137	95% Bootstrap-t UCL	20.94
Anderson-Darling 5% Critical Value	0.716	95% Hall's Bootstrap UCL	21.56
Kolmogorov-Smirnov Test Statistic	0.124	95% Percentile Bootstrap UCL	19.97
Kolmogorov-Smirnov 5% Critical Value	0.294	95% BCA Bootstrap UCL	20.12
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.06
		97.5% Chebyshev(Mean, Sd) UCL	26.78
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	32.13
95% Approximate Gamma UCL	20.97		
95% Adjusted Gamma UCL	21.89		
Potential UCL to Use		Use 95% Student's-t UCL	20.51

Round Pond Sediment Average Mercury UCL for 2008 and 2009 for Samples Starting at 0 Inches in Depth

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
SDCR12-FSA-092509	9/25/2009	1	12	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 4/1/10

RP Sed Hg average 08-09 B

General Statistics

Number of Valid Observations	6	Number of Distinct Observations	6

Raw Statistics		Log-transformed Statistics	
Minimum	12	Minimum of Log Data	2.485
Maximum	24.34	Maximum of Log Data	3.192
Mean	17.71	Mean of log Data	2.843
Median	16.8	SD of log Data	0.271
SD	4.781		
Coefficient of Variation	0.27		
Skewness	0.386		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	21.64	95% H-UCL	23.19
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	26.23
95% Adjusted-CLT UCL	21.25	97.5% Chebyshev (MVUE) UCL	29.92
95% Modified-t UCL	21.69	99% Chebyshev (MVUE) UCL	37.17

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.403	Data appear Normal at 5% Significance Level	
Theta Star	2.107		
MLE of Mean	17.71		
MLE of Standard Deviation	6.108		
nu star	100.8		
Approximate Chi Square Value (.05)	78.67	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	20.92
Adjusted Chi Square Value	71.62	95% Jackknife UCL	21.64
		95% Standard Bootstrap UCL	20.61
Anderson-Darling Test Statistic	0.223	95% Bootstrap-t UCL	22.62
Anderson-Darling 5% Critical Value	0.698	95% Hall's Bootstrap UCL	22.88
Kolmogorov-Smirnov Test Statistic	0.184	95% Percentile Bootstrap UCL	20.51
Kolmogorov-Smirnov 5% Critical Value	0.332	95% BCA Bootstrap UCL	20.82
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.21
		97.5% Chebyshev(Mean, Sd) UCL	29.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	37.13
95% Approximate Gamma UCL	22.7		
95% Adjusted Gamma UCL	24.93		
Potential UCL to Use		Use 95% Student's-t UCL	21.64

Round Pond Sediment Mercury UCL for 1994, 2001, 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inches

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101DC-06	5/23/2006	1	8.61	0-4
OU2R-SED-101DNE-06	5/23/2006	1	8.42	0-4
OU2R-SED-101DNW-06	5/23/2006	1	7.96	0-4
OU2R-SED-101DSE-06	5/23/2006	1	7.77	0-4
OU2R-SED-101DSW-06	5/23/2006	1	8.58	0-4
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR12-FSB-092509	9/25/2009	1	17	2-4
SDCR12-FSC-092509	9/25/2009	1	19	4-8
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6
SE-R2-101101-03	10/4/2001	1	15	0-6
SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/3/10

RP Sed Hg all A

General Statistics			
Number of Valid Observations	33	Number of Distinct Observations	27
Raw Statistics		Log-transformed Statistics	
Minimum	7.77	Minimum of Log Data	2.05
Maximum	32.1	Maximum of Log Data	3.469
Mean	18.57	Mean of log Data	2.853
Median	19	SD of log Data	0.395
SD	6.445		
Coefficient of Variation	0.347		
Skewness	-0.0316		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Test Statistic	0.913
Shapiro Wilk Critical Value	0.931	Shapiro Wilk Critical Value	0.931
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20.47	95% H-UCL	21.34
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.46
95% Adjusted-CLT UCL	20.41	97.5% Chebyshev (MVUE) UCL	26.95
95% Modified-t UCL	20.47	99% Chebyshev (MVUE) UCL	31.85
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.799	Data appear Normal at 5% Significance Level	
Theta Star	2.731		
MLE of Mean	18.57		
MLE of Standard Deviation	7.121		
nu star	448.7		
Approximate Chi Square Value (.05)	400.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0419	95% CLT UCL	20.41
Adjusted Chi Square Value	398.3	95% Jackknife UCL	20.47
		95% Standard Bootstrap UCL	20.34

Anderson-Darling Test Statistic	0.644	95% Bootstrap-t UCL	20.48
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	20.53
Kolmogorov-Smirnov Test Statistic	0.121	95% Percentile Bootstrap UCL	20.48
Kolmogorov-Smirnov 5% Critical Value	0.153	95% BCA Bootstrap UCL	20.34
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	23.46
		97.5% Chebyshev(Mean, Sd) UCL	25.57
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	29.73
95% Approximate Gamma UCL	20.8		
95% Adjusted Gamma UCL	20.92		
Potential UCL to Use		Use 95% Student's-t UCL	20.47

Round Pond Sediment Mercury UCL for 1994, 2001, 2006, 2008 and 2009 for Samples Starting at Zero Inches

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101DC-06	5/23/2006	1	8.61	0-4
OU2R-SED-101DNE-06	5/23/2006	1	8.42	0-4
OU2R-SED-101DNW-06	5/23/2006	1	7.96	0-4
OU2R-SED-101DSE-06	5/23/2006	1	7.77	0-4
OU2R-SED-101DSW-06	5/23/2006	1	8.58	0-4
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-101DNE-08	6/5/2008	1	26.7	0-4
OU2R-SED-101DNW-08	6/5/2008	1	20.3	0-4
OU2R-SED-101DSE-08	6/5/2008	1	15.8	0-4
OU2R-SED-101DSW-08	6/5/2008	1	21.9	0-4
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-101DC-08	6/5/2008	1	26.3	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
OU2R-SED-101DC-09	6/5/2009	1	21.9	0-4
OU2R-SED-101DNE-09	6/5/2009	1	24.8	0-4
OU2R-SED-101DSE-09	6/5/2009	1	22.8	0-4
OU2R-SED-101DNW-09	6/5/2009	1	20.1	0-4
OU2R-SED-101DSW-09	6/5/2009	1	32.1	0-4
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6
SE-R2-101101-03	10/4/2001	1	15	0-6
SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10

CHECKED BY/DATE: HEF 5/3/10

RP Sed Hg all B

General Statistics			
Number of Valid Observations	32	Number of Distinct Observations	26
Raw Statistics		Log-transformed Statistics	
Minimum	7.77	Minimum of Log Data	2.05
Maximum	32.1	Maximum of Log Data	3.469
Mean	18.65	Mean of log Data	2.855
Median	19	SD of log Data	0.402
SD	6.546		
Coefficient of Variation	0.351		
Skewness	-0.0696		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.93	Shapiro Wilk Critical Value	0.93
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20.61	95% H-UCL	21.54
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.77
95% Adjusted-CLT UCL	20.54	97.5% Chebyshev (MVUE) UCL	27.36
95% Modified-t UCL	20.61	99% Chebyshev (MVUE) UCL	32.45
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.582	Data appear Normal at 5% Significance Level	
Theta Star	2.833		
MLE of Mean	18.65		
MLE of Standard Deviation	7.269		
nu star	421.2		
Approximate Chi Square Value (.05)	374.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0416	95% CLT UCL	20.55
Adjusted Chi Square Value	372.3	95% Jackknife UCL	20.61
		95% Standard Bootstrap UCL	20.49

Anderson-Darling Test Statistic	0.681	95% Bootstrap-t UCL	20.64
Anderson-Darling 5% Critical Value	0.747	95% Hall's Bootstrap UCL	20.61
Kolmogorov-Smirnov Test Statistic	0.137	95% Percentile Bootstrap UCL	20.41
Kolmogorov-Smirnov 5% Critical Value	0.156	95% BCA Bootstrap UCL	20.44
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	23.69
		97.5% Chebyshev(Mean, Sd) UCL	25.87
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.16
95% Approximate Gamma UCL	20.97		
95% Adjusted Gamma UCL	21.1		
Potential UCL to Use		Use 95% Student's-t UCL	20.61

Round Pond Sediment Average Mercury UCL for 1994, 2001, 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inches

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-06	5/23/2006	1	8.268	0-4
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
SDCR12-ave0-6-092509	9/25/2009	1	16.75	0-8
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6
SE-R2-101101-03	10/4/2001	1	15	0-6
SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: RMP 5/6/10

RP Sed Hg all average A

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	15
Raw Statistics		Log-transformed Statistics	
Minimum	8.268	Minimum of Log Data	2.112
Maximum	28	Maximum of Log Data	3.332
Mean	18.82	Mean of log Data	2.89
Median	18	SD of log Data	0.318
SD	5.507		
Coefficient of Variation	0.293		
Skewness	0.0424		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	21.01	95% H-UCL	21.75
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.96
95% Adjusted-CLT UCL	20.91	97.5% Chebyshev (MVUE) UCL	27.59
95% Modified-t UCL	21.01	99% Chebyshev (MVUE) UCL	32.76
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	9.58	Data appear Normal at 5% Significance Level	
Theta Star	1.964		
MLE of Mean	18.82		
MLE of Standard Deviation	6.079		
nu star	364.1		
Approximate Chi Square Value (.05)	320.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	20.89
Adjusted Chi Square Value	317.3	95% Jackknife UCL	21.01
		95% Standard Bootstrap UCL	20.81

Anderson-Darling Test Statistic	0.246	95% Bootstrap-t UCL	21.18
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	20.97
Kolmogorov-Smirnov Test Statistic	0.112	95% Percentile Bootstrap UCL	20.83
Kolmogorov-Smirnov 5% Critical Value	0.199	95% BCA Bootstrap UCL	20.89
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.32
		97.5% Chebyshev(Mean, Sd) UCL	26.71
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	31.39
95% Approximate Gamma UCL	21.35		
95% Adjusted Gamma UCL	21.59		
Potential UCL to Use		Use 95% Student's-t UCL	21.01

Round Pond Sediment Average Mercury UCL for 1994, 2001, 2006, 2008 and 2009 for Samples Starting at Zero Inches

Sample ID	Date	Detected	Mercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-06	5/23/2006	1	8.268	0-4
OU2R-SED-101D-average-08	6/5/2008	1	22.2	0-4
OU2R-SED-101D-average-09	6/5/2009	1	24.34	0-4
SDCR12-FSA-092509	9/25/2009	1	12	0-2
SDCR13-CA-092609	9/26/2009	1	18	0-12
OU2R-SED-102DC-08	6/5/2008	1	15.6	0-4
OU2R-SED-102C-09	6/5/2009	1	14.1	0-4
ODG0501-0694	6/30/1994	1	26	0-6
ODG0502-0694	6/30/1994	1	19	0-6
ODG0503-0694	6/30/1994	1	19	0-6
SE-R1-101101-01	10/4/2001	1	18	0-6
SE-R1-101101-02	10/4/2001	1	28	0-6
SE-R1-101101-03	10/4/2001	1	27	0-6
SE-R2-101101-01	10/4/2001	1	12	0-6
SE-R2-101101-02	10/4/2001	1	16	0-6
SE-R2-101101-03	10/4/2001	1	15	0-6
SE-R7-101101-01	10/4/2001	1	18	0-6
SE-R7-101101-02	10/4/2001	1	25	0-6
SE-R7-101101-03	10/4/2001	1	20	0-6

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: RMP 5/6/10

RP Sed Hg all average B

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	16
Raw Statistics		Log-transformed Statistics	
Minimum	8.268	Minimum of Log Data	2.112
Maximum	28	Maximum of Log Data	3.332
Mean	19.07	Mean of log Data	2.908
Median	18	SD of log Data	0.303
SD	5.284		
Coefficient of Variation	0.277		
Skewness	0.0189		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.968	Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	21.17	95% H-UCL	21.87
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.99
95% Adjusted-CLT UCL	21.07	97.5% Chebyshev (MVUE) UCL	27.53
95% Modified-t UCL	21.17	99% Chebyshev (MVUE) UCL	32.52
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	10.59	Data appear Normal at 5% Significance Level	
Theta Star	1.8		
MLE of Mean	19.07		
MLE of Standard Deviation	5.858		
nu star	402.6		
Approximate Chi Square Value (.05)	357.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	21.06
Adjusted Chi Square Value	353.3	95% Jackknife UCL	21.17
		95% Standard Bootstrap UCL	21.02

Anderson-Darling Test Statistic	0.279	95% Bootstrap-t UCL	21.36
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	21.04
Kolmogorov-Smirnov Test Statistic	0.103	95% Percentile Bootstrap UCL	21.02
Kolmogorov-Smirnov 5% Critical Value	0.198	95% BCA Bootstrap UCL	21
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.35
		97.5% Chebyshev(Mean, Sd) UCL	26.64
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	31.13
95% Approximate Gamma UCL	21.5		
95% Adjusted Gamma UCL	21.72		
Potential UCL to Use		Use 95% Student's-t UCL	21.17

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Note: 3 ft and 6 ft elevations correspond to 3 ft or 6 ft NAVD88

Basin Surface Water Total Methylmercury UCL 1995

Sample ID	Date	Detected	Methylmercury (ng/l)
SW-B10-PU-01	9/14/1995	1	2.8
SW-G02-PU-01	9/14/1995	1	4.31
SW-G03-PU-01	9/14/1995	1	2.56
SW-I06-PU-01	9/14/1995	1	3.35
SW-I10-PU-01	9/14/1995	1	2.45
SW-T09-PU-01	9/14/1995	1	2.45
SW-T02-PU-01	9/16/1995	1	3.15

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

1995 TMeHg

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	6
Raw Statistics		Log-transformed Statistics	
Minimum	2.45	Minimum of Log Data	0.896
Maximum	4.31	Maximum of Log Data	1.461
Mean	3.01	Mean of log Data	1.083
Median	2.8	SD of log Data	0.207
SD	0.671		
Coefficient of Variation	0.223		
Skewness	1.382		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.85	Shapiro Wilk Test Statistic	0.885
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	3.503	95% H-UCL	3.571
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4.032
95% Adjusted-CLT UCL	3.568	97.5% Chebyshev (MVUE) UCL	4.475
95% Modified-t UCL	3.525	99% Chebyshev (MVUE) UCL	5.346
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	15.06	Data appear Normal at 5% Significance Level	
Theta Star	0.2		
MLE of Mean	3.01		
MLE of Standard Deviation	0.776		

nu star	210.9		
Approximate Chi Square Value (.05)	178.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	3.427
Adjusted Chi Square Value	169.2	95% Jackknife UCL	3.503
		95% Standard Bootstrap UCL	3.396
Anderson-Darling Test Statistic	0.43	95% Bootstrap-t UCL	3.799
Anderson-Darling 5% Critical Value	0.707	95% Hall's Bootstrap UCL	4.891
Kolmogorov-Smirnov Test Statistic	0.199	95% Percentile Bootstrap UCL	3.404
Kolmogorov-Smirnov 5% Critical Value	0.311	95% BCA Bootstrap UCL	3.546
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4.115
		97.5% Chebyshev(Mean, Sd) UCL	4.593
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5.532
95% Approximate Gamma UCL	3.561		
95% Adjusted Gamma UCL	3.752		
Potential UCL to Use		Use 95% Student's-t UCL	3.503

Basin Surface Water Filtered Methylmercury UCL 1995

Sample ID	Date	Detected	Methylmercury (ng/l)
SW-B10-PU-01	9/14/1995	1	0.457
SW-G02-PU-01	9/14/1995	1	0.359
SW-G03-PU-01	9/14/1995	1	0.46
SW-I06-PU-01	9/14/1995	1	0.576
SW-I10-PU-01	9/14/1995	1	0.463
SW-T09-PU-01	9/14/1995	1	0.436
SW-T02-PU-01	9/16/1995	1	0.477

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

1995 DMeHg

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.359	Minimum of Log Data	-1.024
Maximum	0.576	Maximum of Log Data	-0.552
Mean	0.461	Mean of log Data	-0.782
Median	0.46	SD of log Data	0.139
SD	0.0639		
Coefficient of Variation	0.139		
Skewness	0.391		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.508	95% H-UCL	0.515
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.567
95% Adjusted-CLT UCL	0.505	97.5% Chebyshev (MVUE) UCL	0.613
95% Modified-t UCL	0.509	99% Chebyshev (MVUE) UCL	0.702

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	34.83	Data appear Normal at 5% Significance Level	
Theta Star	0.0132		
MLE of Mean	0.461		
MLE of Standard Deviation	0.0781		
nu star	487.7		

Approximate Chi Square Value (.05)	437.5	Nonparametric Statistics	
Adjusted Level of Significance	0.0158	95% CLT UCL	0.501
Adjusted Chi Square Value	423	95% Jackknife UCL	0.508
		95% Standard Bootstrap UCL	0.498
Anderson-Darling Test Statistic	0.505	95% Bootstrap-t UCL	0.509
Anderson-Darling 5% Critical Value	0.708	95% Hall's Bootstrap UCL	0.533
Kolmogorov-Smirnov Test Statistic	0.236	95% Percentile Bootstrap UCL	0.498
Kolmogorov-Smirnov 5% Critical Value	0.311	95% BCA Bootstrap UCL	0.497
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.566
		97.5% Chebyshev(Mean, Sd) UCL	0.612
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.702
95% Approximate Gamma UCL	0.514		
95% Adjusted Gamma UCL	0.532		
Potential UCL to Use		Use 95% Student's-t UCL	0.508

Basin Surface Water-Shallow Methylmercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	2.28	1
OU2B-SW-205DS-08	6/3/2008	1	2.36	1
OU2B-SW-301DS-08	6/3/2008	1	3.11	0.80
OU2B-SW-303DS-08	6/3/2008	1	1.91	1
OU2B-SW-304DS-08	6/3/2008	1	2.38	1
OU2B-SW-101DS-08	6/4/2008	1	3.08	2
OU2B-SW-103DS-08	6/4/2008	1	2.49	3
OU2B-SW-201DS-08	6/4/2008	1	2.57	1
OU2B-SW-203DS-08	6/4/2008	1	2.71	2
OU2B-SW-301DS-09	6/3/2009	1	0.786	2
OU2B-SW-201DS-09	6/3/2009	1	0.748	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.918	2
OU2B-SW-304DS-09	6/3/2009	1	0.791	2
OU2B-SW-DHDS-09	6/4/2009	1	0.735	9
OU2B-SW-103DS-09	6/4/2009	1	0.734	4
OU2B-SW-101DS-09	6/4/2009	1	0.782	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.767	3
OU2B-SW-105DS-09	6/8/2009	1	1.19	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.87	1

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

08-09 TMeHg Shallow

General Statistics

Number of Valid Observations	19	Number of Distinct Observations	19

Raw Statistics

		Log-transformed Statistics	
Minimum	0.734	Minimum of Log Data	-0.309
Maximum	3.11	Maximum of Log Data	1.135
Mean	1.643	Mean of log Data	0.335
Median	1.19	SD of log Data	0.592
SD	0.919		
Coefficient of Variation	0.56		
Skewness	0.327		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.814	Shapiro Wilk Test Statistic	0.803
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.008	95% H-UCL	2.232
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.67
95% Adjusted-CLT UCL	2.007	97.5% Chebyshev (MVUE) UCL	3.112
95% Modified-t UCL	2.011	99% Chebyshev (MVUE) UCL	3.981
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.777	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.591		
MLE of Mean	1.643		
MLE of Standard Deviation	0.986		
nu star	105.5		
Approximate Chi Square Value (.05)	82.83	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	1.99
Adjusted Chi Square Value	81.07	95% Jackknife UCL	2.008
		95% Standard Bootstrap UCL	1.978
Anderson-Darling Test Statistic	1.628	95% Bootstrap-t UCL	2.056
Anderson-Darling 5% Critical Value	0.747	95% Hall's Bootstrap UCL	1.969
Kolmogorov-Smirnov Test Statistic	0.251	95% Percentile Bootstrap UCL	1.99
Kolmogorov-Smirnov 5% Critical Value	0.2	95% BCA Bootstrap UCL	1.997
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.562
		97.5% Chebyshev(Mean, Sd) UCL	2.96
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.741
95% Approximate Gamma UCL	2.093		
95% Adjusted Gamma UCL	2.138		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	2.562

Basin Surface Water-Shallow Filtered Methylmercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	0.96	1
OU2B-SW-205DS-08	6/3/2008	1	0.673	1
OU2B-SW-301DS-08	6/3/2008	1	0.643	0.80
OU2B-SW-303DS-08	6/3/2008	1	0.893	1
OU2B-SW-304DS-08	6/3/2008	1	0.883	1
OU2B-SW-101DS-08	6/4/2008	1	0.867	2
OU2B-SW-103DS-08	6/4/2008	1	0.807	3
OU2B-SW-201DS-08	6/4/2008	1	0.843	1
OU2B-SW-203DS-08	6/4/2008	1	0.606	2
OU2B-SW-301DS-09	6/3/2009	1	0.42	2
OU2B-SW-201DS-09	6/3/2009	1	0.422	2.2
OU2B-SW-303DS-09	6/3/2009	1	0.413	2
OU2B-SW-304DS-09	6/3/2009	1	0.476	2
OU2B-SW-DHDS-09	6/4/2009	1	0.47	9
OU2B-SW-103DS-09	6/4/2009	1	0.426	4
OU2B-SW-101DS-09	6/4/2009	1	0.461	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.468	3
OU2B-SW-105DS-09	6/8/2009	1	0.419	1.2
OU2B-SW-205DS-09	6/8/2009	1	0.468	1.0

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

08-09 DMeHg Shallow

General Statistics

Number of Valid Observations	19	Number of Distinct Observations	18

Raw Statistics

Minimum	0.413	Log-transformed Statistics	
Maximum	0.96	Minimum of Log Data	-0.884
Mean	0.611	Maximum of Log Data	-0.0408
Median	0.476	Mean of log Data	-0.541
SD	0.2	SD of log Data	0.317
Coefficient of Variation	0.328		
Skewness	0.554		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.827	Shapiro Wilk Test Statistic	0.839
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.691	95% H-UCL	0.704
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.807
95% Adjusted-CLT UCL	0.693	97.5% Chebyshev (MVUE) UCL	0.892
95% Modified-t UCL	0.692	99% Chebyshev (MVUE) UCL	1.06
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.802	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0695		
MLE of Mean	0.611		
MLE of Standard Deviation	0.206		
nu star	334.5		
Approximate Chi Square Value (.05)	293.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	0.687
Adjusted Chi Square Value	289.7	95% Jackknife UCL	0.691
		95% Standard Bootstrap UCL	0.684
Anderson-Darling Test Statistic	1.338	95% Bootstrap-t UCL	0.699
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	0.681
Kolmogorov-Smirnov Test Statistic	0.275	95% Percentile Bootstrap UCL	0.692
Kolmogorov-Smirnov 5% Critical Value	0.199	95% BCA Bootstrap UCL	0.689
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.812
		97.5% Chebyshev(Mean, Sd) UCL	0.898
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.069
95% Approximate Gamma UCL	0.698		
95% Adjusted Gamma UCL	0.706		

Potential UCL to Use	Use 95% Student's-t UCL	0.691

Basin Surface Water-Shallow Methylmercury UCL 2008 and 2009 at 6 ft.
NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	4.84	1
OU2R-SW-101DS-09	6/3/2009	1	0.825	2.2
OU2B-SW-105DS-08	6/3/2008	1	2.28	1
OU2B-SW-205DS-08	6/3/2008	1	2.36	1
OU2B-SW-301DS-08	6/3/2008	1	3.11	0.80
OU2B-SW-303DS-08	6/3/2008	1	1.91	1
OU2B-SW-304DS-08	6/3/2008	1	2.38	1
OU2B-SW-101DS-08	6/4/2008	1	3.08	2
OU2B-SW-103DS-08	6/4/2008	1	2.49	3
OU2B-SW-201DS-08	6/4/2008	1	2.57	1
OU2B-SW-203DS-08	6/4/2008	1	2.71	2
OU2B-SW-301DS-09	6/3/2009	1	0.786	2
OU2B-SW-201DS-09	6/3/2009	1	0.748	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.918	2
OU2B-SW-304DS-09	6/3/2009	1	0.791	2
OU2B-SW-DHDS-09	6/4/2009	1	0.735	9
OU2B-SW-103DS-09	6/4/2009	1	0.734	4
OU2B-SW-101DS-09	6/4/2009	1	0.782	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.767	3
OU2B-SW-105DS-09	6/8/2009	1	1.19	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.87	1

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

08-09 TMeHg Shallow

General Statistics			
Number of Valid Observations	21	Number of Distinct Observations	21
Raw Statistics		Log-transformed Statistics	
Minimum	0.734	Minimum of Log Data	-0.309
Maximum	4.84	Maximum of Log Data	1.577
Mean	1.756	Mean of log Data	0.369
Median	1.19	SD of log Data	0.636
SD	1.137		
Coefficient of Variation	0.647		
Skewness	1.032		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.827	Shapiro Wilk Test Statistic	0.842
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.184	95% H-UCL	2.395
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.872
95% Adjusted-CLT UCL	2.224	97.5% Chebyshev (MVUE) UCL	3.358
95% Modified-t UCL	2.193	99% Chebyshev (MVUE) UCL	4.311
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.374	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.74		
MLE of Mean	1.756		
MLE of Standard Deviation	1.14		
nu star	99.7		
Approximate Chi Square Value (.05)	77.66	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	2.164
Adjusted Chi Square Value	76.17	95% Jackknife UCL	2.184
		95% Standard Bootstrap UCL	2.144
Anderson-Darling Test Statistic	1.471	95% Bootstrap-t UCL	2.239
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	2.274
Kolmogorov-Smirnov Test Statistic	0.251	95% Percentile Bootstrap UCL	2.154
Kolmogorov-Smirnov 5% Critical Value	0.191	95% BCA Bootstrap UCL	2.185
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.837
		97.5% Chebyshev(Mean, Sd) UCL	3.305
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4.224
95% Approximate Gamma UCL	2.254		
95% Adjusted Gamma UCL	2.298		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	2.837

Basin Surface Water-Shallow Filtered Methylmercury UCL 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	2.25	1
OU2R-SW-101DS-09	6/3/2009	1	0.532	2.2
OU2B-SW-105DS-08	6/3/2008	1	0.96	1
OU2B-SW-205DS-08	6/3/2008	1	0.673	1
OU2B-SW-301DS-08	6/3/2008	1	0.643	0.80
OU2B-SW-303DS-08	6/3/2008	1	0.893	1
OU2B-SW-304DS-08	6/3/2008	1	0.883	1
OU2B-SW-101DS-08	6/4/2008	1	0.867	2
OU2B-SW-103DS-08	6/4/2008	1	0.807	3
OU2B-SW-201DS-08	6/4/2008	1	0.843	1
OU2B-SW-203DS-08	6/4/2008	1	0.606	2
OU2B-SW-301DS-09	6/3/2009	1	0.42	2
OU2B-SW-201DS-09	6/3/2009	1	0.422	2.2
OU2B-SW-303DS-09	6/3/2009	1	0.413	2
OU2B-SW-304DS-09	6/3/2009	1	0.476	2
OU2B-SW-DHDS-09	6/4/2009	1	0.47	9
OU2B-SW-103DS-09	6/4/2009	1	0.426	4
OU2B-SW-101DS-09	6/4/2009	1	0.461	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.468	3
OU2B-SW-105DS-09	6/8/2009	1	0.419	1.2
OU2B-SW-205DS-09	6/8/2009	1	0.468	1.0

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

08-09 DMeHg Shallow

General Statistics			
Number of Valid Observations	21	Number of Distinct Observations	20
Raw Statistics		Log-transformed Statistics	
Minimum	0.413	Minimum of Log Data	-0.884
Maximum	2.25	Maximum of Log Data	0.811
Mean	0.686	Mean of log Data	-0.481
Median	0.532	SD of log Data	0.423
SD	0.406		
Coefficient of Variation	0.592		
Skewness	3.077		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.63	Shapiro Wilk Test Statistic	0.83
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.839	95% H-UCL	0.811
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.951
95% Adjusted-CLT UCL	0.895	97.5% Chebyshev (MVUE) UCL	1.071
95% Modified-t UCL	0.848	99% Chebyshev (MVUE) UCL	1.307
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.317	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.159		
MLE of Mean	0.686		
MLE of Standard Deviation	0.33		
nu star	181.3		
Approximate Chi Square Value (.05)	151.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	0.831
Adjusted Chi Square Value	149.1	95% Jackknife UCL	0.839
		95% Standard Bootstrap UCL	0.83
Anderson-Darling Test Statistic	1.345	95% Bootstrap-t UCL	0.986
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	1.423
Kolmogorov-Smirnov Test Statistic	0.207	95% Percentile Bootstrap UCL	0.854
Kolmogorov-Smirnov 5% Critical Value	0.19	95% BCA Bootstrap UCL	0.902
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.072
		97.5% Chebyshev(Mean, Sd) UCL	1.239
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.567
95% Approximate Gamma UCL	0.822		
95% Adjusted Gamma UCL	0.834		

Potential UCL to Use	Use 95% Student's-t UCL	0.839
	or 95% Modified-t UCL	0.848

Basin Surface Water-Deep Methylmercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DD-08	6/3/2008	1	2.45	4
OU2B-SW-205DD-08	6/3/2008	1	3.1	4
OU2B-SW-301DD-08	6/3/2008	1	4.03	3.20
OU2B-SW-303DD-08	6/3/2008	1	3.45	4
OU2B-SW-304DD-08	6/3/2008	1	2.69	4
OU2B-SW-101DD-08	6/4/2008	1	3.01	9
OU2B-SW-103DD-08	6/4/2008	1	2.91	10
OU2B-SW-201DD-08	6/4/2008	1	3.16	4
OU2B-SW-203DD-08	6/4/2008	1	2.38	7
OU2B-SW-301DD-09	6/3/2009	1	0.714	8
OU2B-SW-201DD-09	6/3/2009	1	0.756	8.80
OU2B-SW-303DD-09	6/3/2009	1	0.652	8
OU2B-SW-304DD-09	6/3/2009	1	0.833	8
OU2B-SW-DHDD-09	6/4/2009	1	1.08	36
OU2B-SW-103DD-09	6/4/2009	1	0.613	15
OU2B-SW-101DD-09	6/4/2009	1	0.693	13.0
OU2B-SW-203DD-09	6/4/2009	1	0.702	12
OU2B-SW-105DD-09	6/8/2009	1	1.71	4.80
OU2B-SW-205DD-09	6/8/2009	1	1.06	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

08-09 TMeHg Deep

General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	19
Raw Statistics		Log-transformed Statistics	
Minimum	0.613	Minimum of Log Data	-0.489
Maximum	4.03	Maximum of Log Data	1.394
Mean	1.894	Mean of log Data	0.425
Median	1.71	SD of log Data	0.697
SD	1.173		
Coefficient of Variation	0.619		
Skewness	0.293		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.863	Shapiro Wilk Test Statistic	0.852
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.361	95% H-UCL	2.807
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3.345
95% Adjusted-CLT UCL	2.356	97.5% Chebyshev (MVUE) UCL	3.961
95% Modified-t UCL	2.364	99% Chebyshev (MVUE) UCL	5.172
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.132	Data Follow Appr. Gamma Distribution at 5% Significanc	
Theta Star	0.889		
MLE of Mean	1.894		
MLE of Standard Deviation	1.297		
nu star	81.01		
Approximate Chi Square Value (.05)	61.27	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	2.337
Adjusted Chi Square Value	59.77	95% Jackknife UCL	2.361
		95% Standard Bootstrap UCL	2.328
Anderson-Darling Test Statistic	1.18	95% Bootstrap-t UCL	2.37
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	2.35
Kolmogorov-Smirnov Test Statistic	0.196	95% Percentile Bootstrap UCL	2.312
Kolmogorov-Smirnov 5% Critical Value	0.2	95% BCA Bootstrap UCL	2.37
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3.067
		97.5% Chebyshev(Mean, Sd) UCL	3.574
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4.571
95% Approximate Gamma UCL	2.505		
95% Adjusted Gamma UCL	2.568		

Potential UCL to Use	Use 95% Approximate Gamma UCL	2.505

Basin Surface Water-Deep Filtered Methylmercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DD-08	6/3/2008	1	0.679	4
OU2B-SW-205DD-08	6/3/2008	1	0.609	4
OU2B-SW-301DD-08	6/3/2008	1	0.952	3.20
OU2B-SW-303DD-08	6/3/2008	1	0.731	4
OU2B-SW-304DD-08	6/3/2008	1	0.586	4
OU2B-SW-101DD-08	6/4/2008	1	0.883	9
OU2B-SW-103DD-08	6/4/2008	1	0.838	10
OU2B-SW-201DD-08	6/4/2008	1	0.858	4
OU2B-SW-203DD-08	6/4/2008	1	0.625	7
OU2B-SW-301DD-09	6/3/2009	1	0.46	8
OU2B-SW-201DD-09	6/3/2009	1	0.468	8.80
OU2B-SW-303DD-09	6/3/2009	1	0.476	8
OU2B-SW-304DD-09	6/3/2009	1	0.491	8
OU2B-SW-DHDD-09	6/4/2009	1	0.638	36
OU2B-SW-103DD-09	6/4/2009	1	0.452	15
OU2B-SW-101DD-09	6/4/2009	1	0.48	13
OU2B-SW-203DD-09	6/4/2009	1	0.506	12
OU2B-SW-105DD-09	6/8/2009	1	0.649	4.80
OU2B-SW-205DD-09	6/8/2009	1	0.413	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

08-09 DMeHg Deep

General Statistics

Number of Valid Observations	19	Number of Distinct Observations	19

Raw Statistics

Minimum	0.413	Log-transformed Statistics Minimum of Log Data	-0.884
Maximum	0.952	Maximum of Log Data	-0.0492
Mean	0.621	Mean of log Data	-0.509
Median	0.609	SD of log Data	0.257
SD	0.165		
Coefficient of Variation	0.266		
Skewness	0.668		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.931
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.686	95% H-UCL	0.694
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.782
95% Adjusted-CLT UCL	0.689	97.5% Chebyshev (MVUE) UCL	0.851
95% Modified-t UCL	0.687	99% Chebyshev (MVUE) UCL	0.989
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.31	Data appear Normal at 5% Significance Level	
Theta Star	0.0466		
MLE of Mean	0.621		
MLE of Standard Deviation	0.17		
nu star	505.8		
Approximate Chi Square Value (.05)	454.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	0.683
Adjusted Chi Square Value	450.4	95% Jackknife UCL	0.686
		95% Standard Bootstrap UCL	0.681
Anderson-Darling Test Statistic	0.575	95% Bootstrap-t UCL	0.695
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	0.691
Kolmogorov-Smirnov Test Statistic	0.179	95% Percentile Bootstrap UCL	0.687
Kolmogorov-Smirnov 5% Critical Value	0.198	95% BCA Bootstrap UCL	0.691
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.786
		97.5% Chebyshev(Mean, Sd) UCL	0.857
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.998
95% Approximate Gamma UCL	0.691		
95% Adjusted Gamma UCL	0.697		

Potential UCL to Use	Use 95% Student's-t UCL	0.686
	or 95% Modified-t UCL	0.692

Basin Surface Water-Deep Methylmercury UCL 2008 and 2009 at 6 ft.
NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DD-09	6/3/2009	1	0.788	8.8
OU2R-SW-101DD-08	6/3/2008	1	5.53	4.5
OU2B-SW-105DD-08	6/3/2008	1	2.45	4
OU2B-SW-205DD-08	6/3/2008	1	3.1	4
OU2B-SW-301DD-08	6/3/2008	1	4.03	3.20
OU2B-SW-303DD-08	6/3/2008	1	3.45	4
OU2B-SW-304DD-08	6/3/2008	1	2.69	4
OU2B-SW-101DD-08	6/4/2008	1	3.01	9
OU2B-SW-103DD-08	6/4/2008	1	2.91	10
OU2B-SW-201DD-08	6/4/2008	1	3.16	4
OU2B-SW-203DD-08	6/4/2008	1	2.38	7
OU2B-SW-301DD-09	6/3/2009	1	0.714	8
OU2B-SW-201DD-09	6/3/2009	1	0.756	8.80
OU2B-SW-303DD-09	6/3/2009	1	0.652	8
OU2B-SW-304DD-09	6/3/2009	1	0.833	8
OU2B-SW-DHDD-09	6/4/2009	1	1.08	36
OU2B-SW-103DD-09	6/4/2009	1	0.613	15
OU2B-SW-101DD-09	6/4/2009	1	0.693	13.0
OU2B-SW-203DD-09	6/4/2009	1	0.702	12
OU2B-SW-105DD-09	6/8/2009	1	1.71	4.80
OU2B-SW-205DD-09	6/8/2009	1	1.06	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

08-09 TMeHg Deep

General Statistics			
Number of Valid Observations	21	Number of Distinct Observations	21
Raw Statistics		Log-transformed Statistics	
Minimum	0.613	Minimum of Log Data	-0.489
Maximum	5.53	Maximum of Log Data	1.71
Mean	2.015	Mean of log Data	0.454
Median	1.71	SD of log Data	0.735
SD	1.394		
Coefficient of Variation	0.692		
Skewness	0.82		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.868	Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.54	95% H-UCL	2.98
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3.561
95% Adjusted-CLT UCL	2.573	97.5% Chebyshev (MVUE) UCL	4.222
95% Modified-t UCL	2.549	99% Chebyshev (MVUE) UCL	5.521
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.904	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.058		
MLE of Mean	2.015		
MLE of Standard Deviation	1.46		
nu star	79.96		
Approximate Chi Square Value (.05)	60.36	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	2.515
Adjusted Chi Square Value	59.05	95% Jackknife UCL	2.54
		95% Standard Bootstrap UCL	2.507
Anderson-Darling Test Statistic	1.086	95% Bootstrap-t UCL	2.645
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	2.575
Kolmogorov-Smirnov Test Statistic	0.201	95% Percentile Bootstrap UCL	2.522
Kolmogorov-Smirnov 5% Critical Value	0.192	95% BCA Bootstrap UCL	2.53
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3.341
		97.5% Chebyshev(Mean, Sd) UCL	3.915
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5.042
95% Approximate Gamma UCL	2.669		
95% Adjusted Gamma UCL	2.728		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	3.341

Basin Surface Water-Deep Filtered Methylmercury UCL 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DD-08	6/3/2008	1	3.42	4.5
OU2R-SW-101DD-09	6/3/2009	1	0.556	8.8
OU2B-SW-105DD-08	6/3/2008	1	0.679	4
OU2B-SW-205DD-08	6/3/2008	1	0.609	4
OU2B-SW-301DD-08	6/3/2008	1	0.952	3.20
OU2B-SW-303DD-08	6/3/2008	1	0.731	4
OU2B-SW-304DD-08	6/3/2008	1	0.586	4
OU2B-SW-101DD-08	6/4/2008	1	0.883	9
OU2B-SW-103DD-08	6/4/2008	1	0.838	10
OU2B-SW-201DD-08	6/4/2008	1	0.858	4
OU2B-SW-203DD-08	6/4/2008	1	0.625	7
OU2B-SW-301DD-09	6/3/2009	1	0.46	8
OU2B-SW-201DD-09	6/3/2009	1	0.468	8.80
OU2B-SW-303DD-09	6/3/2009	1	0.476	8
OU2B-SW-304DD-09	6/3/2009	1	0.491	8
OU2B-SW-DHDD-09	6/4/2009	1	0.638	36
OU2B-SW-103DD-09	6/4/2009	1	0.452	15
OU2B-SW-101DD-09	6/4/2009	1	0.48	13
OU2B-SW-203DD-09	6/4/2009	1	0.506	12
OU2B-SW-105DD-09	6/8/2009	1	0.649	4.80
OU2B-SW-205DD-09	6/8/2009	1	0.413	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

08-09 DMeHg Deep

General Statistics			
Number of Valid Observations	21	Number of Distinct Observations	21
Raw Statistics		Log-transformed Statistics	
Minimum	0.413	Minimum of Log Data	-0.884
Maximum	3.42	Maximum of Log Data	1.23
Mean	0.751	Mean of log Data	-0.43
Median	0.609	SD of log Data	0.452
SD	0.631		
Coefficient of Variation	0.841		
Skewness	4.13		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.444	Shapiro Wilk Test Statistic	0.737
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.989	95% H-UCL	0.878
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.035
95% Adjusted-CLT UCL	1.11	97.5% Chebyshev (MVUE) UCL	1.172
95% Modified-t UCL	1.009	99% Chebyshev (MVUE) UCL	1.443
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.156	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.238		
MLE of Mean	0.751		
MLE of Standard Deviation	0.423		
nu star	132.5		
Approximate Chi Square Value (.05)	106.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0383	95% CLT UCL	0.978
Adjusted Chi Square Value	105.2	95% Jackknife UCL	0.989
		95% Standard Bootstrap UCL	0.974
Anderson-Darling Test Statistic	2.264	95% Bootstrap-t UCL	1.516
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	1.82
Kolmogorov-Smirnov Test Statistic	0.219	95% Percentile Bootstrap UCL	1.015
Kolmogorov-Smirnov 5% Critical Value	0.191	95% BCA Bootstrap UCL	1.148
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.352
		97.5% Chebyshev(Mean, Sd) UCL	1.612
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2.122
95% Approximate Gamma UCL	0.931		

95% Adjusted Gamma UCL	0.946		
Potential UCL to Use		Use 95% Student's-t UCL	0.989
		or 95% Modified-t UCL	1.009

Basin Surface Water-Combined Methylmercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	2.28	1
OU2B-SW-205DS-08	6/3/2008	1	2.36	1
OU2B-SW-301DS-08	6/3/2008	1	3.11	0.80
OU2B-SW-303DS-08	6/3/2008	1	1.91	1
OU2B-SW-304DS-08	6/3/2008	1	2.38	1
OU2B-SW-101DS-08	6/4/2008	1	3.08	2
OU2B-SW-103DS-08	6/4/2008	1	2.49	3
OU2B-SW-201DS-08	6/4/2008	1	2.57	1
OU2B-SW-203DS-08	6/4/2008	1	2.71	2
OU2B-SW-301DS-09	6/3/2009	1	0.786	2
OU2B-SW-201DS-09	6/3/2009	1	0.748	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.918	2
OU2B-SW-304DS-09	6/3/2009	1	0.791	2
OU2B-SW-DHDS-09	6/4/2009	1	0.735	9
OU2B-SW-103DS-09	6/4/2009	1	0.734	4
OU2B-SW-101DS-09	6/4/2009	1	0.782	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.767	3
OU2B-SW-105DS-09	6/8/2009	1	1.19	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.87	1
OU2B-SW-105DD-08	6/3/2008	1	2.45	4
OU2B-SW-205DD-08	6/3/2008	1	3.1	4
OU2B-SW-301DD-08	6/3/2008	1	4.03	3.20
OU2B-SW-303DD-08	6/3/2008	1	3.45	4
OU2B-SW-304DD-08	6/3/2008	1	2.69	4
OU2B-SW-101DD-08	6/4/2008	1	3.01	9
OU2B-SW-103DD-08	6/4/2008	1	2.91	10
OU2B-SW-201DD-08	6/4/2008	1	3.16	4
OU2B-SW-203DD-08	6/4/2008	1	2.38	7
OU2B-SW-301DD-09	6/3/2009	1	0.714	8
OU2B-SW-201DD-09	6/3/2009	1	0.756	8.8
OU2B-SW-303DD-09	6/3/2009	1	0.652	8
OU2B-SW-304DD-09	6/3/2009	1	0.833	8
OU2B-SW-DHDD-09	6/4/2009	1	1.08	36
OU2B-SW-103DD-09	6/4/2009	1	0.613	15
OU2B-SW-101DD-09	6/4/2009	1	0.693	13
OU2B-SW-203DD-09	6/4/2009	1	0.702	12
OU2B-SW-105DD-09	6/8/2009	1	1.71	4.8
OU2B-SW-205DD-09	6/8/2009	1	1.06	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

08-09 TMeHg combined

General Statistics			
Number of Valid Observations	38	Number of Distinct Observations	37
Raw Statistics		Log-transformed Statistics	
Minimum	0.613	Minimum of Log Data	-0.489
Maximum	4.03	Maximum of Log Data	1.394
Mean	1.769	Mean of log Data	0.38
Median	1.45	SD of log Data	0.639
SD	1.047		
Coefficient of Variation	0.592		
Skewness	0.38		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.848	Shapiro Wilk Test Statistic	0.84
Shapiro Wilk Critical Value	0.938	Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.055	95% H-UCL	2.22
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.648
95% Adjusted-CLT UCL	2.059	97.5% Chebyshev (MVUE) UCL	3.023
95% Modified-t UCL	2.057	99% Chebyshev (MVUE) UCL	3.759
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.582	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.685		
MLE of Mean	1.769		
MLE of Standard Deviation	1.101		
nu star	196.2		
Approximate Chi Square Value (.05)	164.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0434	95% CLT UCL	2.048
Adjusted Chi Square Value	163.6	95% Jackknife UCL	2.055
		95% Standard Bootstrap UCL	2.036
Anderson-Darling Test Statistic	2.429	95% Bootstrap-t UCL	2.065
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	2.058
Kolmogorov-Smirnov Test Statistic	0.202	95% Percentile Bootstrap UCL	2.047
Kolmogorov-Smirnov 5% Critical Value	0.144	95% BCA Bootstrap UCL	2.042
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.509
		97.5% Chebyshev(Mean, Sd) UCL	2.829
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.459
95% Approximate Gamma UCL	2.106		

95% Adjusted Gamma UCL	2.121		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	2.509

Basin Surface Water-Combined Filtered Methylmercury UCL 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	0.96	1
OU2B-SW-205DS-08	6/3/2008	1	0.673	1
OU2B-SW-301DS-08	6/3/2008	1	0.643	0.80
OU2B-SW-303DS-08	6/3/2008	1	0.893	1
OU2B-SW-304DS-08	6/3/2008	1	0.883	1
OU2B-SW-101DS-08	6/4/2008	1	0.867	2
OU2B-SW-103DS-08	6/4/2008	1	0.807	3
OU2B-SW-201DS-08	6/4/2008	1	0.843	1
OU2B-SW-203DS-08	6/4/2008	1	0.606	2
OU2B-SW-301DS-09	6/3/2009	1	0.42	2
OU2B-SW-201DS-09	6/3/2009	1	0.422	2.2
OU2B-SW-303DS-09	6/3/2009	1	0.413	2
OU2B-SW-304DS-09	6/3/2009	1	0.476	2
OU2B-SW-DHDS-09	6/4/2009	1	0.47	9
OU2B-SW-103DS-09	6/4/2009	1	0.426	4
OU2B-SW-101DS-09	6/4/2009	1	0.461	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.468	3
OU2B-SW-105DS-09	6/8/2009	1	0.419	1.2
OU2B-SW-205DS-09	6/8/2009	1	0.468	1
OU2B-SW-105DD-08	6/3/2008	1	0.679	4
OU2B-SW-205DD-08	6/3/2008	1	0.609	4
OU2B-SW-301DD-08	6/3/2008	1	0.952	3.20
OU2B-SW-303DD-08	6/3/2008	1	0.731	4
OU2B-SW-304DD-08	6/3/2008	1	0.586	4
OU2B-SW-101DD-08	6/4/2008	1	0.883	9
OU2B-SW-103DD-08	6/4/2008	1	0.838	10
OU2B-SW-201DD-08	6/4/2008	1	0.858	4
OU2B-SW-203DD-08	6/4/2008	1	0.625	7
OU2B-SW-301DD-09	6/3/2009	1	0.46	8
OU2B-SW-201DD-09	6/3/2009	1	0.468	8.8
OU2B-SW-303DD-09	6/3/2009	1	0.476	8
OU2B-SW-304DD-09	6/3/2009	1	0.491	8
OU2B-SW-DHDD-09	6/4/2009	1	0.638	36
OU2B-SW-103DD-09	6/4/2009	1	0.452	15
OU2B-SW-101DD-09	6/4/2009	1	0.48	13
OU2B-SW-203DD-09	6/4/2009	1	0.506	12
OU2B-SW-105DD-09	6/8/2009	1	0.649	4.8
OU2B-SW-205DD-09	6/8/2009	1	0.413	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

08-09 DMeHg combined

General Statistics

Number of Valid Observations	38	Number of Distinct Observations	33

Raw Statistics

Minimum	0.413	Log-transformed Statistics Minimum of Log Data	-0.884
Maximum	0.96	Maximum of Log Data	-0.0408
Mean	0.616	Mean of log Data	-0.525
Median	0.596	SD of log Data	0.285
SD	0.181		
Coefficient of Variation	0.294		
Skewness	0.562		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.861	Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.938	Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.666	95% H-UCL	0.67
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.742
95% Adjusted-CLT UCL	0.667	97.5% Chebyshev (MVUE) UCL	0.796
95% Modified-t UCL	0.666	99% Chebyshev (MVUE) UCL	0.904
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.55	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0533		
MLE of Mean	0.616		
MLE of Standard Deviation	0.181		
nu star	878		
Approximate Chi Square Value (.05)	810.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0434	95% CLT UCL	0.664
Adjusted Chi Square Value	807.6	95% Jackknife UCL	0.666
		95% Standard Bootstrap UCL	0.665
Anderson-Darling Test Statistic	1.628	95% Bootstrap-t UCL	0.667
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	0.668
Kolmogorov-Smirnov Test Statistic	0.198	95% Percentile Bootstrap UCL	0.662
Kolmogorov-Smirnov 5% Critical Value	0.143	95% BCA Bootstrap UCL	0.668
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.744
		97.5% Chebyshev(Mean, Sd) UCL	0.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.909
95% Approximate Gamma UCL	0.668		
95% Adjusted Gamma UCL	0.67		

Potential UCL to Use	Use 95% Student's-t UCL	0.666
	or 95% Modified-t UCL	0.666

Basin Surface Water-Deep and Shallow Methylmercury UCL 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	4.84	1
OU2R-SW-101DS-09	6/3/2009	1	0.825	2.2
OU2R-SW-101DD-09	6/3/2009	1	0.788	8.8
OU2R-SW-101DD-08	6/3/2008	1	5.53	4.5
OU2B-SW-105DS-08	6/3/2008	1	2.28	1
OU2B-SW-205DS-08	6/3/2008	1	2.36	1
OU2B-SW-301DS-08	6/3/2008	1	3.11	0.80
OU2B-SW-303DS-08	6/3/2008	1	1.91	1
OU2B-SW-304DS-08	6/3/2008	1	2.38	1
OU2B-SW-101DS-08	6/4/2008	1	3.08	2
OU2B-SW-103DS-08	6/4/2008	1	2.49	3
OU2B-SW-201DS-08	6/4/2008	1	2.57	1
OU2B-SW-203DS-08	6/4/2008	1	2.71	2
OU2B-SW-301DS-09	6/3/2009	1	0.786	2
OU2B-SW-201DS-09	6/3/2009	1	0.748	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.918	2
OU2B-SW-304DS-09	6/3/2009	1	0.791	2
OU2B-SW-DHDS-09	6/4/2009	1	0.735	9
OU2B-SW-103DS-09	6/4/2009	1	0.734	4
OU2B-SW-101DS-09	6/4/2009	1	0.782	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.767	3
OU2B-SW-105DS-09	6/8/2009	1	1.19	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.87	1
OU2B-SW-105DD-08	6/3/2008	1	2.45	4
OU2B-SW-205DD-08	6/3/2008	1	3.1	4
OU2B-SW-301DD-08	6/3/2008	1	4.03	3.20
OU2B-SW-303DD-08	6/3/2008	1	3.45	4
OU2B-SW-304DD-08	6/3/2008	1	2.69	4
OU2B-SW-101DD-08	6/4/2008	1	3.01	9
OU2B-SW-103DD-08	6/4/2008	1	2.91	10
OU2B-SW-201DD-08	6/4/2008	1	3.16	4
OU2B-SW-203DD-08	6/4/2008	1	2.38	7
OU2B-SW-301DD-09	6/3/2009	1	0.714	8
OU2B-SW-201DD-09	6/3/2009	1	0.756	8.8
OU2B-SW-303DD-09	6/3/2009	1	0.652	8
OU2B-SW-304DD-09	6/3/2009	1	0.833	8
OU2B-SW-DHDD-09	6/4/2009	1	1.08	36
OU2B-SW-103DD-09	6/4/2009	1	0.613	15
OU2B-SW-101DD-09	6/4/2009	1	0.693	13
OU2B-SW-203DD-09	6/4/2009	1	0.702	12

OU2B-SW-105DD-09	6/8/2009	1	1.71	4.8
OU2B-SW-205DD-09	6/8/2009	1	1.06	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

08-09 TMeHg combined

General Statistics			
Number of Valid Observations	42	Number of Distinct Observations	41
Raw Statistics		Log-transformed Statistics	
Minimum	0.613	Minimum of Log Data	-0.489
Maximum	5.53	Maximum of Log Data	1.71
Mean	1.885	Mean of log Data	0.412
Median	1.45	SD of log Data	0.681
SD	1.263		
Coefficient of Variation	0.67		
Skewness	0.924		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.794	Shapiro Wilk Test Statistic	0.797
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.213	95% H-UCL	2.364
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.83
95% Adjusted-CLT UCL	2.236	97.5% Chebyshev (MVUE) UCL	3.236
95% Modified-t UCL	2.218	99% Chebyshev (MVUE) UCL	4.035
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.246	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.839		
MLE of Mean	1.885		
MLE of Standard Deviation	1.258		
nu star	188.7		
Approximate Chi Square Value (.05)	157.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0443	95% CLT UCL	2.206
Adjusted Chi Square Value	156.9	95% Jackknife UCL	2.213
		95% Standard Bootstrap UCL	2.196
Anderson-Darling Test Statistic	2.274	95% Bootstrap-t UCL	2.239
Anderson-Darling 5% Critical Value	0.758	95% Hall's Bootstrap UCL	2.241
Kolmogorov-Smirnov Test Statistic	0.208	95% Percentile Bootstrap UCL	2.204
Kolmogorov-Smirnov 5% Critical Value	0.138	95% BCA Bootstrap UCL	2.253
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.735
		97.5% Chebyshev(Mean, Sd) UCL	3.103
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.825
95% Approximate Gamma UCL	2.253		

Basin Surface Water-Deep and Shallow Filtered Methylmercury UCL 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	2.25	1
OU2R-SW-101DS-09	6/3/2009	1	0.532	2.2
OU2R-SW-101DD-08	6/3/2008	1	3.42	4.5
OU2R-SW-101DD-09	6/3/2009	1	0.556	8.8
OU2B-SW-105DS-08	6/3/2008	1	0.96	1
OU2B-SW-205DS-08	6/3/2008	1	0.673	1
OU2B-SW-301DS-08	6/3/2008	1	0.643	0.80
OU2B-SW-303DS-08	6/3/2008	1	0.893	1
OU2B-SW-304DS-08	6/3/2008	1	0.883	1
OU2B-SW-101DS-08	6/4/2008	1	0.867	2
OU2B-SW-103DS-08	6/4/2008	1	0.807	3
OU2B-SW-201DS-08	6/4/2008	1	0.843	1
OU2B-SW-203DS-08	6/4/2008	1	0.606	2
OU2B-SW-301DS-09	6/3/2009	1	0.42	2
OU2B-SW-201DS-09	6/3/2009	1	0.422	2.2
OU2B-SW-303DS-09	6/3/2009	1	0.413	2
OU2B-SW-304DS-09	6/3/2009	1	0.476	2
OU2B-SW-DHDS-09	6/4/2009	1	0.47	9
OU2B-SW-103DS-09	6/4/2009	1	0.426	4
OU2B-SW-101DS-09	6/4/2009	1	0.461	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.468	3
OU2B-SW-105DS-09	6/8/2009	1	0.419	1.2
OU2B-SW-205DS-09	6/8/2009	1	0.468	1
OU2B-SW-105DD-08	6/3/2008	1	0.679	4
OU2B-SW-205DD-08	6/3/2008	1	0.609	4
OU2B-SW-301DD-08	6/3/2008	1	0.952	3.20
OU2B-SW-303DD-08	6/3/2008	1	0.731	4
OU2B-SW-304DD-08	6/3/2008	1	0.586	4
OU2B-SW-101DD-08	6/4/2008	1	0.883	9
OU2B-SW-103DD-08	6/4/2008	1	0.838	10
OU2B-SW-201DD-08	6/4/2008	1	0.858	4
OU2B-SW-203DD-08	6/4/2008	1	0.625	7
OU2B-SW-301DD-09	6/3/2009	1	0.46	8
OU2B-SW-201DD-09	6/3/2009	1	0.468	8.8
OU2B-SW-303DD-09	6/3/2009	1	0.476	8
OU2B-SW-304DD-09	6/3/2009	1	0.491	8
OU2B-SW-DHDD-09	6/4/2009	1	0.638	36
OU2B-SW-103DD-09	6/4/2009	1	0.452	15
OU2B-SW-101DD-09	6/4/2009	1	0.48	13
OU2B-SW-203DD-09	6/4/2009	1	0.506	12

OU2B-SW-105DD-09	6/8/2009	1	0.649	4.8
OU2B-SW-205DD-09	6/8/2009	1	0.413	4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10
CHECKED BY/DATE: RMP 5/6/10

08-09 DMeHg combined

General Statistics			
Number of Valid Observations	42	Number of Distinct Observations	37

Raw Statistics		Log-transformed Statistics	
Minimum	0.413	Minimum of Log Data	-0.884
Maximum	3.42	Maximum of Log Data	1.23
Mean	0.718	Mean of log Data	-0.455
Median	0.596	SD of log Data	0.433
SD	0.525		
Coefficient of Variation	0.731		
Skewness	4.063		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.507	Shapiro Wilk Test Statistic	0.764
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.855	95% H-UCL	0.79
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.905
95% Adjusted-CLT UCL	0.906	97.5% Chebyshev (MVUE) UCL	0.996
95% Modified-t UCL	0.863	99% Chebyshev (MVUE) UCL	1.174
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.896	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.184		
MLE of Mean	0.718		
MLE of Standard Deviation	0.364		
nu star	327.3		
Approximate Chi Square Value (.05)	286.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0443	95% CLT UCL	0.852
Adjusted Chi Square Value	285	95% Jackknife UCL	0.855
		95% Standard Bootstrap UCL	0.851
Anderson-Darling Test Statistic	3.127	95% Bootstrap-t UCL	1.073
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	1.534
Kolmogorov-Smirnov Test Statistic	0.193	95% Percentile Bootstrap UCL	0.863
Kolmogorov-Smirnov 5% Critical Value	0.137	95% BCA Bootstrap UCL	0.933
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.072
		97.5% Chebyshev(Mean, Sd) UCL	1.225
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.525
95% Approximate Gamma UCL	0.821		
95% Adjusted Gamma UCL	0.825		

Potential UCL to Use	Use 95% Student's-t UCL	0.855
	or 95% Modified-t UCL	0.863

Basin Surface Water-Deep and Shallow Methylmercury UCL for 1995, 2008 and 2009 at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	2.28	1
OU2B-SW-205DS-08	6/3/2008	1	2.36	1
OU2B-SW-301DS-08	6/3/2008	1	3.11	0.80
OU2B-SW-303DS-08	6/3/2008	1	1.91	1
OU2B-SW-304DS-08	6/3/2008	1	2.38	1
OU2B-SW-101DS-08	6/4/2008	1	3.08	2
OU2B-SW-103DS-08	6/4/2008	1	2.49	3
OU2B-SW-201DS-08	6/4/2008	1	2.57	1
OU2B-SW-203DS-08	6/4/2008	1	2.71	2
OU2B-SW-301DS-09	6/3/2009	1	0.786	2
OU2B-SW-201DS-09	6/3/2009	1	0.748	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.918	2
OU2B-SW-304DS-09	6/3/2009	1	0.791	2
OU2B-SW-DHDS-09	6/4/2009	1	0.735	9
OU2B-SW-103DS-09	6/4/2009	1	0.734	4
OU2B-SW-101DS-09	6/4/2009	1	0.782	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.767	3
OU2B-SW-105DS-09	6/8/2009	1	1.19	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.87	1
OU2B-SW-105DD-08	6/3/2008	1	2.45	4
OU2B-SW-205DD-08	6/3/2008	1	3.1	4
OU2B-SW-301DD-08	6/3/2008	1	4.03	3.20
OU2B-SW-303DD-08	6/3/2008	1	3.45	4
OU2B-SW-304DD-08	6/3/2008	1	2.69	4
OU2B-SW-101DD-08	6/4/2008	1	3.01	9
OU2B-SW-103DD-08	6/4/2008	1	2.91	10
OU2B-SW-201DD-08	6/4/2008	1	3.16	4
OU2B-SW-203DD-08	6/4/2008	1	2.38	7
OU2B-SW-301DD-09	6/3/2009	1	0.714	8
OU2B-SW-201DD-09	6/3/2009	1	0.756	8.8
OU2B-SW-303DD-09	6/3/2009	1	0.652	8
OU2B-SW-304DD-09	6/3/2009	1	0.833	8
OU2B-SW-DHDD-09	6/4/2009	1	1.08	36
OU2B-SW-103DD-09	6/4/2009	1	0.613	15
OU2B-SW-101DD-09	6/4/2009	1	0.693	13
OU2B-SW-203DD-09	6/4/2009	1	0.702	12
OU2B-SW-105DD-09	6/8/2009	1	1.71	4.8
OU2B-SW-205DD-09	6/8/2009	1	1.06	4
SW-B10-PU-01	9/14/1995	1	2.8	NA
SW-G02-PU-01	9/14/1995	1	4.31	NA
SW-G03-PU-01	9/14/1995	1	2.56	NA

SW-I06-PU-01	9/14/1995	1	3.35	NA
SW-I10-PU-01	9/14/1995	1	2.45	NA
SW-T09-PU-01	9/14/1995	1	2.45	NA
SW-T02-PU-01	9/16/1995	1	3.15	NA

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/13/10

All TMeHg combined

General Statistics

Number of Valid Observations	45	Number of Distinct Observations	42

Raw Statistics		Log-transformed Statistics	
Minimum	0.613	Minimum of Log Data	-0.489
Maximum	4.31	Maximum of Log Data	1.461
Mean	1.962	Mean of log Data	0.489
Median	2.36	SD of log Data	0.645
SD	1.091		
Coefficient of Variation	0.556		
Skewness	0.181		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.873	Shapiro Wilk Test Statistic	0.839
Shapiro Wilk Critical Value	0.945	Shapiro Wilk Critical Value	0.945
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.235	95% H-UCL	2.444
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.9
95% Adjusted-CLT UCL	2.234	97.5% Chebyshev (MVUE) UCL	3.291
95% Modified-t UCL	2.236	99% Chebyshev (MVUE) UCL	4.059

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.689	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.73		
MLE of Mean	1.962		
MLE of Standard Deviation	1.196		
nu star	242		
Approximate Chi Square Value (.05)	207	Nonparametric Statistics	
Adjusted Level of Significance	0.0447	95% CLT UCL	2.229
Adjusted Chi Square Value	205.9	95% Jackknife UCL	2.235
		95% Standard Bootstrap UCL	2.226
Anderson-Darling Test Statistic	2.683	95% Bootstrap-t UCL	2.238
Anderson-Darling 5% Critical Value	0.756	95% Hall's Bootstrap UCL	2.228
Kolmogorov-Smirnov Test Statistic	0.209	95% Percentile Bootstrap UCL	2.222
Kolmogorov-Smirnov 5% Critical Value	0.133	95% BCA Bootstrap UCL	2.231
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.671
		97.5% Chebyshev(Mean, Sd) UCL	2.977
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.58
95% Approximate Gamma UCL	2.293		
95% Adjusted Gamma UCL	2.305		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	2.671

Basin Surface Water-Deep and Shallow Filtered Methylmercury UCL for 1995, 2008 and 2009 at 3ft NAVD 88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2B-SW-105DS-08	6/3/2008	1	0.96	1
OU2B-SW-205DS-08	6/3/2008	1	0.673	1
OU2B-SW-301DS-08	6/3/2008	1	0.643	0.80
OU2B-SW-303DS-08	6/3/2008	1	0.893	1
OU2B-SW-304DS-08	6/3/2008	1	0.883	1
OU2B-SW-101DS-08	6/4/2008	1	0.867	2
OU2B-SW-103DS-08	6/4/2008	1	0.807	3
OU2B-SW-201DS-08	6/4/2008	1	0.843	1
OU2B-SW-203DS-08	6/4/2008	1	0.606	2
OU2B-SW-301DS-09	6/3/2009	1	0.42	2
OU2B-SW-201DS-09	6/3/2009	1	0.422	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.413	2
OU2B-SW-304DS-09	6/3/2009	1	0.476	2
OU2B-SW-DHDS-09	6/4/2009	1	0.47	9
OU2B-SW-103DS-09	6/4/2009	1	0.426	4
OU2B-SW-101DS-09	6/4/2009	1	0.461	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.468	3
OU2B-SW-105DS-09	6/8/2009	1	0.419	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.468	1
OU2B-SW-105DD-08	6/3/2008	1	0.679	4.0
OU2B-SW-205DD-08	6/3/2008	1	0.609	4
OU2B-SW-301DD-08	6/3/2008	1	0.952	3.20
OU2B-SW-303DD-08	6/3/2008	1	0.731	4
OU2B-SW-304DD-08	6/3/2008	1	0.586	4
OU2B-SW-101DD-08	6/4/2008	1	0.883	9
OU2B-SW-103DD-08	6/4/2008	1	0.838	10
OU2B-SW-201DD-08	6/4/2008	1	0.858	4.0
OU2B-SW-203DD-08	6/4/2008	1	0.625	7
OU2B-SW-301DD-09	6/3/2009	1	0.46	8
OU2B-SW-201DD-09	6/3/2009	1	0.468	8.80
OU2B-SW-303DD-09	6/3/2009	1	0.476	8
OU2B-SW-304DD-09	6/3/2009	1	0.491	8
OU2B-SW-DHDD-09	6/4/2009	1	0.638	36
OU2B-SW-103DD-09	6/4/2009	1	0.452	15
OU2B-SW-101DD-09	6/4/2009	1	0.48	13
OU2B-SW-203DD-09	6/4/2009	1	0.506	12
OU2B-SW-105DD-09	6/8/2009	1	0.649	4.80
OU2B-SW-205DD-09	6/8/2009	1	0.413	4
SW-B10-PU-01	9/14/1995	1	0.457	NA
SW-G02-PU-01	9/14/1995	1	0.359	NA
SW-G03-PU-01	9/14/1995	1	0.46	NA

SW-I06-PU-01	9/14/1995	1	0.576	NA
SW-I10-PU-01	9/14/1995	1	0.463	NA
SW-T09-PU-01	9/14/1995	1	0.436	NA
SW-T02-PU-01	9/16/1995	1	0.477	NA

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/13/10

All DMeHg combined

General Statistics			
Number of Valid Observations	45	Number of Distinct Observations	39
Raw Statistics		Log-transformed Statistics	
Minimum	0.359	Minimum of Log Data	-1.024
Maximum	0.96	Maximum of Log Data	-0.0408
Mean	0.592	Mean of log Data	-0.565
Median	0.491	SD of log Data	0.283
SD	0.177		
Coefficient of Variation	0.299		
Skewness	0.772		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.851	Shapiro Wilk Test Statistic	0.885
Shapiro Wilk Critical Value	0.945	Shapiro Wilk Critical Value	0.945
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.636	95% H-UCL	0.638
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.702
95% Adjusted-CLT UCL	0.639	97.5% Chebyshev (MVUE) UCL	0.749
95% Modified-t UCL	0.637	99% Chebyshev (MVUE) UCL	0.843
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.66	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0508		
MLE of Mean	0.592		
MLE of Standard Deviation	0.173		
nu star	1050		
Approximate Chi Square Value (.05)	975.5	Nonparametric Statistics	
Adjusted Level of Significance	0.0447	95% CLT UCL	0.635
Adjusted Chi Square Value	973.1	95% Jackknife UCL	0.636
		95% Standard Bootstrap UCL	0.634
Anderson-Darling Test Statistic	2.152	95% Bootstrap-t UCL	0.641
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	0.638
Kolmogorov-Smirnov Test Statistic	0.221	95% Percentile Bootstrap UCL	0.635
Kolmogorov-Smirnov 5% Critical Value	0.132	95% BCA Bootstrap UCL	0.635
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.707
		97.5% Chebyshev(Mean, Sd) UCL	0.757
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.855
95% Approximate Gamma UCL	0.637		
95% Adjusted Gamma UCL	0.639		

Potential UCL to Use	Use 95% Student's-t UCL	0.636
	or 95% Modified-t UCL	0.637

95% Adjusted Gamma UCL	2.267		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	2.735

Basin Surface Water-Deep and Shallow Total Methylmercury UCL for 1995, 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	4.84	1
OU2R-SW-101DS-09	6/3/2009	1	0.825	2.2
OU2R-SW-101DD-09	6/3/2009	1	0.788	8.8
OU2R-SW-101DD-08	6/3/2008	1	5.53	4.5
OU2B-SW-105DS-08	6/3/2008	1	2.28	1
OU2B-SW-205DS-08	6/3/2008	1	2.36	1
OU2B-SW-301DS-08	6/3/2008	1	3.11	0.80
OU2B-SW-303DS-08	6/3/2008	1	1.91	1
OU2B-SW-304DS-08	6/3/2008	1	2.38	1
OU2B-SW-101DS-08	6/4/2008	1	3.08	2
OU2B-SW-103DS-08	6/4/2008	1	2.49	3
OU2B-SW-201DS-08	6/4/2008	1	2.57	1
OU2B-SW-203DS-08	6/4/2008	1	2.71	2
OU2B-SW-301DS-09	6/3/2009	1	0.786	2
OU2B-SW-201DS-09	6/3/2009	1	0.748	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.918	2
OU2B-SW-304DS-09	6/3/2009	1	0.791	2
OU2B-SW-DHDS-09	6/4/2009	1	0.735	9
OU2B-SW-103DS-09	6/4/2009	1	0.734	4
OU2B-SW-101DS-09	6/4/2009	1	0.782	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.767	3
OU2B-SW-105DS-09	6/8/2009	1	1.19	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.87	1
OU2B-SW-105DD-08	6/3/2008	1	2.45	4
OU2B-SW-205DD-08	6/3/2008	1	3.1	4
OU2B-SW-301DD-08	6/3/2008	1	4.03	3.20
OU2B-SW-303DD-08	6/3/2008	1	3.45	4
OU2B-SW-304DD-08	6/3/2008	1	2.69	4
OU2B-SW-101DD-08	6/4/2008	1	3.01	9
OU2B-SW-103DD-08	6/4/2008	1	2.91	10
OU2B-SW-201DD-08	6/4/2008	1	3.16	4
OU2B-SW-203DD-08	6/4/2008	1	2.38	7
OU2B-SW-301DD-09	6/3/2009	1	0.714	8
OU2B-SW-201DD-09	6/3/2009	1	0.756	8.8
OU2B-SW-303DD-09	6/3/2009	1	0.652	8
OU2B-SW-304DD-09	6/3/2009	1	0.833	8
OU2B-SW-DHDD-09	6/4/2009	1	1.08	36
OU2B-SW-103DD-09	6/4/2009	1	0.613	15
OU2B-SW-101DD-09	6/4/2009	1	0.693	13

OU2B-SW-203DD-09	6/4/2009	1	0.702	12
OU2B-SW-105DD-09	6/8/2009	1	1.71	4.8
OU2B-SW-205DD-09	6/8/2009	1	1.06	4
SW-B10-PU-01	9/14/1995	1	2.8	NA
SW-G02-PU-01	9/14/1995	1	4.31	NA
SW-G03-PU-01	9/14/1995	1	2.56	NA
SW-I06-PU-01	9/14/1995	1	3.35	NA
SW-I10-PU-01	9/14/1995	1	2.45	NA
SW-T09-PU-01	9/14/1995	1	2.45	NA
SW-T02-PU-01	9/16/1995	1	3.15	NA

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10

CHECKED BY/DATE: RMP 5/6/10

all TMeHg combined

General Statistics			
Number of Valid Observations	49	Number of Distinct Observations	46
Raw Statistics		Log-transformed Statistics	
Minimum	0.613	Minimum of Log Data	-0.489
Maximum	5.53	Maximum of Log Data	1.71
Mean	2.046	Mean of log Data	0.508
Median	2.36	SD of log Data	0.676
SD	1.256		
Coefficient of Variation	0.614		
Skewness	0.623		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.879	Shapiro Wilk Test Statistic	0.861
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.347	95% H-UCL	2.543
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3.028
95% Adjusted-CLT UCL	2.358	97.5% Chebyshev (MVUE) UCL	3.439
95% Modified-t UCL	2.35	99% Chebyshev (MVUE) UCL	4.248
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.412	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.848		
MLE of Mean	2.046		
MLE of Standard Deviation	1.318		
nu star	236.3		
Approximate Chi Square Value (.05)	201.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0451	95% CLT UCL	2.341
Adjusted Chi Square Value	200.8	95% Jackknife UCL	2.347
		95% Standard Bootstrap UCL	2.34
Anderson-Darling Test Statistic	2.438	95% Bootstrap-t UCL	2.353
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	2.367
Kolmogorov-Smirnov Test Statistic	0.186	95% Percentile Bootstrap UCL	2.355
Kolmogorov-Smirnov 5% Critical Value	0.128	95% BCA Bootstrap UCL	2.365
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.828
		97.5% Chebyshev(Mean, Sd) UCL	3.167
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.831
95% Approximate Gamma UCL	2.397		

95% Adjusted Gamma UCL	2.408		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	2.828

Basin Surface Water-Deep and Shallow Filtered Methylmercury UCL for 1995, 2008 and 2009 at 6 ft. NAVD 88

Sample ID	Date	Detected	Methylmercury (ng/L)	Sample Depth (ft)
OU2R-SW-101DS-08	6/3/2008	1	2.25	1
OU2R-SW-101DS-09	6/3/2009	1	0.532	2.2
OU2R-SW-101DD-08	6/3/2008	1	3.42	4.5
OU2R-SW-101DD-09	6/3/2009	1	0.556	8.8
OU2B-SW-105DS-08	6/3/2008	1	0.96	1
OU2B-SW-205DS-08	6/3/2008	1	0.673	1
OU2B-SW-301DS-08	6/3/2008	1	0.643	0.80
OU2B-SW-303DS-08	6/3/2008	1	0.893	1
OU2B-SW-304DS-08	6/3/2008	1	0.883	1
OU2B-SW-101DS-08	6/4/2008	1	0.867	2
OU2B-SW-103DS-08	6/4/2008	1	0.807	3
OU2B-SW-201DS-08	6/4/2008	1	0.843	1
OU2B-SW-203DS-08	6/4/2008	1	0.606	2
OU2B-SW-301DS-09	6/3/2009	1	0.42	2
OU2B-SW-201DS-09	6/3/2009	1	0.422	2.20
OU2B-SW-303DS-09	6/3/2009	1	0.413	2
OU2B-SW-304DS-09	6/3/2009	1	0.476	2
OU2B-SW-DHDS-09	6/4/2009	1	0.47	9
OU2B-SW-103DS-09	6/4/2009	1	0.426	4
OU2B-SW-101DS-09	6/4/2009	1	0.461	3.5
OU2B-SW-203DS-09	6/4/2009	1	0.468	3
OU2B-SW-105DS-09	6/8/2009	1	0.419	1.20
OU2B-SW-205DS-09	6/8/2009	1	0.468	1
OU2B-SW-105DD-08	6/3/2008	1	0.679	4.0
OU2B-SW-205DD-08	6/3/2008	1	0.609	4
OU2B-SW-301DD-08	6/3/2008	1	0.952	3.20
OU2B-SW-303DD-08	6/3/2008	1	0.731	4
OU2B-SW-304DD-08	6/3/2008	1	0.586	4
OU2B-SW-101DD-08	6/4/2008	1	0.883	9
OU2B-SW-103DD-08	6/4/2008	1	0.838	10
OU2B-SW-201DD-08	6/4/2008	1	0.858	4.0
OU2B-SW-203DD-08	6/4/2008	1	0.625	7
OU2B-SW-301DD-09	6/3/2009	1	0.46	8
OU2B-SW-201DD-09	6/3/2009	1	0.468	8.80
OU2B-SW-303DD-09	6/3/2009	1	0.476	8
OU2B-SW-304DD-09	6/3/2009	1	0.491	8
OU2B-SW-DHDD-09	6/4/2009	1	0.638	36
OU2B-SW-103DD-09	6/4/2009	1	0.452	15
OU2B-SW-101DD-09	6/4/2009	1	0.48	13

OU2B-SW-203DD-09	6/4/2009	1	0.506	12
OU2B-SW-105DD-09	6/8/2009	1	0.649	4.80
OU2B-SW-205DD-09	6/8/2009	1	0.413	4
SW-B10-PU-01	9/14/1995	1	0.457	NA
SW-G02-PU-01	9/14/1995	1	0.359	NA
SW-G03-PU-01	9/14/1995	1	0.46	NA
SW-I06-PU-01	9/14/1995	1	0.576	NA
SW-I10-PU-01	9/14/1995	1	0.463	NA
SW-T09-PU-01	9/14/1995	1	0.436	NA
SW-T02-PU-01	9/16/1995	1	0.477	NA

NA - Not availble

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/6/10

CHECKED BY/DATE: RMP 5/6/10

all DMeHg combined

General Statistics			
Number of Valid Observations	49	Number of Distinct Observations	43
Raw Statistics		Log-transformed Statistics	
Minimum	0.359	Minimum of Log Data	-1.024
Maximum	3.42	Maximum of Log Data	1.23
Mean	0.682	Mean of log Data	-0.502
Median	0.532	SD of log Data	0.419
SD	0.495		
Coefficient of Variation	0.726		
Skewness	4.34		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.509	Shapiro Wilk Test Statistic	0.798
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.8	95% H-UCL	0.739
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.838
95% Adjusted-CLT UCL	0.845	97.5% Chebyshev (MVUE) UCL	0.915
95% Modified-t UCL	0.807	99% Chebyshev (MVUE) UCL	1.067
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.12	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.165		
MLE of Mean	0.682		
MLE of Standard Deviation	0.336		
nu star	403.8		
Approximate Chi Square Value (.05)	358.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0451	95% CLT UCL	0.798
Adjusted Chi Square Value	356.9	95% Jackknife UCL	0.8
		95% Standard Bootstrap UCL	0.798
Anderson-Darling Test Statistic	3.812	95% Bootstrap-t UCL	0.964
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	1.376
Kolmogorov-Smirnov Test Statistic	0.191	95% Percentile Bootstrap UCL	0.811
Kolmogorov-Smirnov 5% Critical Value	0.127	95% BCA Bootstrap UCL	0.863
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.99
		97.5% Chebyshev(Mean, Sd) UCL	1.123
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.385
95% Approximate Gamma UCL	0.768		

95% Adjusted Gamma UCL	0.771		
Potential UCL to Use		Use 95% Student's-t UCL or 95% Modified-t UCL	0.8 0.807

Basin Sediment Methylmercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4
OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4
OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4

OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
SDCR-1-FB-060309	6/3/2009	1	0.00675	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	0.00254	4.8-9.6
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4

OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR2-FSB-092309	9/23/2009	1	0.00117	2-4
SDCR2-FSC-092309	9/23/2009	1	0.0167	4-8
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR3-FSB-092309	9/23/2009	1	0.00566	2-4
SDCR3-FSC-092309	9/23/2009	1	0.0131	4-8
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR8-FSB-092409	9/24/2009	1	0.00436	2-4
SDCR8-FSC-092409	9/24/2009	1	0.00321	4-8
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR11-FSB-092509	9/25/2009	1	0.0068	2-4
SDCR11-FSC-092509	9/25/2009	1	0.00589	4-8

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

Sed MeHg A

General Statistics

Number of Valid Observations	117	Number of Distinct Observations	109

Raw Statistics		Log-transformed Statistics	
Minimum	0.00117	Minimum of Log Data	-6.751
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00695	Mean of log Data	-5.166
Median	0.00524	SD of log Data	0.608
SD	0.005		
Coefficient of Variation	0.72		
Skewness	1.931		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.204	Lilliefors Test Statistic	0.0791
Lilliefors Critical Value	0.0819	Lilliefors Critical Value	0.0819
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00771	95% H-UCL	0.00765
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00867
95% Adjusted-CLT UCL	0.00779	97.5% Chebyshev (MVUE) UCL	0.00946
95% Modified-t UCL	0.00773	99% Chebyshev (MVUE) UCL	0.011

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.643	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00263		
MLE of Mean	0.00695		
MLE of Standard Deviation	0.00427		
nu star	618.5		
Approximate Chi Square Value (.05)	561.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0479	95% CLT UCL	0.00771
Adjusted Chi Square Value	561.1	95% Jackknife UCL	0.00771
		95% Standard Bootstrap UCL	0.00771
Anderson-Darling Test Statistic	2.898	95% Bootstrap-t UCL	0.0078
Anderson-Darling 5% Critical Value	0.761	95% Hall's Bootstrap UCL	0.00782
Kolmogorov-Smirnov Test Statistic	0.125	95% Percentile Bootstrap UCL	0.00775
Kolmogorov-Smirnov 5% Critical Value	0.0858	95% BCA Bootstrap UCL	0.00785
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00896
		97.5% Chebyshev(Mean, Sd) UCL	0.00983
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0115
95% Approximate Gamma UCL	0.00765		
95% Adjusted Gamma UCL	0.00766		

Potential UCL to Use	Use 95% H-UCL	0.00765

Basin Sediment Methylmercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4

OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4
OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4
OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
SDCR-1-FB-060309	6/3/2009	1	0.00675	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	0.00254	4.8-9.6
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4

OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR2-FSB-092309	9/23/2009	1	0.00117	2-4
SDCR2-FSC-092309	9/23/2009	1	0.0167	4-8
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR3-FSB-092309	9/23/2009	1	0.00566	2-4
SDCR3-FSC-092309	9/23/2009	1	0.0131	4-8
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR8-FSB-092409	9/24/2009	1	0.00436	2-4
SDCR8-FSC-092409	9/24/2009	1	0.00321	4-8
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR11-FSB-092509	9/25/2009	1	0.0068	2-4
SDCR11-FSC-092509	9/25/2009	1	0.00589	4-8
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
SDCR12-FSC-092509	9/25/2009	1	0.00189	4-8

SDCR12-FSB-092509	9/25/2009	1	0.00282	2-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 08-09 6ft A

General Statistics			
Number of Valid Observations	131	Number of Distinct Observations	122
Raw Statistics		Log-transformed Statistics	
Minimum	0.00117	Minimum of Log Data	-6.751
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.0067	Mean of log Data	-5.194
Median	0.00523	SD of log Data	0.593
SD	0.0048		
Coefficient of Variation	0.717		
Skewness	2.069		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.209	Lilliefors Test Statistic	0.0833
Lilliefors Critical Value	0.0774	Lilliefors Critical Value	0.0774
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.0074	95% H-UCL	0.00729
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00821
95% Adjusted-CLT UCL	0.00747	97.5% Chebyshev (MVUE) UCL	0.00891
95% Modified-t UCL	0.00741	99% Chebyshev (MVUE) UCL	0.0103
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.748	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.00244		
MLE of Mean	0.0067		
MLE of Standard Deviation	0.00404		
nu star	720		
Approximate Chi Square Value (.05)	658.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0482	95% CLT UCL	0.00739
Adjusted Chi Square Value	658.1	95% Jackknife UCL	0.0074
		95% Standard Bootstrap UCL	0.00738
Anderson-Darling Test Statistic	3.302	95% Bootstrap-t UCL	0.00747
Anderson-Darling 5% Critical Value	0.76	95% Hall's Bootstrap UCL	0.00745
Kolmogorov-Smirnov Test Statistic	0.129	95% Percentile Bootstrap UCL	0.00743
Kolmogorov-Smirnov 5% Critical Value	0.0821	95% BCA Bootstrap UCL	0.00747
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00853
		97.5% Chebyshev(Mean, Sd) UCL	0.00932
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0109
95% Approximate Gamma UCL	0.00732		
95% Adjusted Gamma UCL	0.00733		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	0.00853

Basin Sediment Methylmercury UCL for 2008 and 2009 for All Sample Depths Starting at Zero Inches at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4
OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4
OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4

OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4

OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

Sed MeHg B

General Statistics			
Number of Valid Observations	107	Number of Distinct Observations	101
Raw Statistics		Log-transformed Statistics	
Minimum	0.00142	Minimum of Log Data	-6.557
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00703	Mean of log Data	-5.142
Median	0.00524	SD of log Data	0.577
SD	0.00501		
Coefficient of Variation	0.713		
Skewness	2.008		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.203	Lilliefors Test Statistic	0.0802
Lilliefors Critical Value	0.0857	Lilliefors Critical Value	0.0857
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00783	95% H-UCL	0.00767
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00869
95% Adjusted-CLT UCL	0.00792	97.5% Chebyshev (MVUE) UCL	0.00947
95% Modified-t UCL	0.00785	99% Chebyshev (MVUE) UCL	0.011
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.806	Data appear Lognormal at 5% Significance Level	
Theta Star	0.0025		
MLE of Mean	0.00703		
MLE of Standard Deviation	0.00419		
nu star	600.5		
Approximate Chi Square Value (.05)	544.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0478	95% CLT UCL	0.00782
Adjusted Chi Square Value	544	95% Jackknife UCL	0.00783
		95% Standard Bootstrap UCL	0.00782
Anderson-Darling Test Statistic	3.235	95% Bootstrap-t UCL	0.00797
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	0.00797
Kolmogorov-Smirnov Test Statistic	0.125	95% Percentile Bootstrap UCL	0.00782
Kolmogorov-Smirnov 5% Critical Value	0.0883	95% BCA Bootstrap UCL	0.00794
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00914
		97.5% Chebyshev(Mean, Sd) UCL	0.0101
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0118
95% Approximate Gamma UCL	0.00775		
95% Adjusted Gamma UCL	0.00776		

Potential UCL to Use	Use 95% H-UCL	0.00767

Basin Sediment Methylmercury UCL for 2008 and 2009 for All Sample Depths Starting at 0 Inches at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4

OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4
OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4
OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4

OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 08-09 6ft B

General Statistics			
Number of Valid Observations	119	Number of Distinct Observations	112
Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00678	Mean of log Data	-5.174
Median	0.00523	SD of log Data	0.572
SD	0.00483		
Coefficient of Variation	0.713		
Skewness	2.135		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.207	Lilliefors Test Statistic	0.0804
Lilliefors Critical Value	0.0812	Lilliefors Critical Value	0.0812
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00751	95% H-UCL	0.00736
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00829
95% Adjusted-CLT UCL	0.0076	97.5% Chebyshev (MVUE) UCL	0.009
95% Modified-t UCL	0.00753	99% Chebyshev (MVUE) UCL	0.0104
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.867	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00237		
MLE of Mean	0.00678		
MLE of Standard Deviation	0.004		
nu star	682.3		
Approximate Chi Square Value (.05)	622.7	Nonparametric Statistics	
Adjusted Level of Significance	0.048	95% CLT UCL	0.00751
Adjusted Chi Square Value	622	95% Jackknife UCL	0.00751
		95% Standard Bootstrap UCL	0.00751
Anderson-Darling Test Statistic	3.543	95% Bootstrap-t UCL	0.0077
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	0.00763
Kolmogorov-Smirnov Test Statistic	0.126	95% Percentile Bootstrap UCL	0.00757
Kolmogorov-Smirnov 5% Critical Value	0.0852	95% BCA Bootstrap UCL	0.0076
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00871
		97.5% Chebyshev(Mean, Sd) UCL	0.00955
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0112
95% Approximate Gamma UCL	0.00743		

95% Adjusted Gamma UCL	0.00744		
Potential UCL to Use		Use 95% H-UCL	0.00736

Basin Sediment Average Methylmercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4

OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
SDCR11-average-092509	9/25/2009	1	0.0060925	0-8
SDCR-1-average-060309	6/3/2009	1	0.00463	0-9.6
SDCR2-average-092309	9/23/2009	1	0.0089825	0-8
SDCR3-average-092309	9/23/2009	1	0.0088975	0-8
SDCR8-average-092409	9/24/2009	1	0.00381	0-8

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

Sed MeHg A ave

General Statistics			
Number of Valid Observations	49	Number of Distinct Observations	48
Raw Statistics		Log-transformed Statistics	
Minimum	0.00142	Minimum of Log Data	-6.557
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00658	Mean of log Data	-5.206
Median	0.00488	SD of log Data	0.578
SD	0.00477		
Coefficient of Variation	0.725		
Skewness	2.3		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.753	Shapiro Wilk Test Statistic	0.968
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00772	95% H-UCL	0.00762
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00893
95% Adjusted-CLT UCL	0.00794	97.5% Chebyshev (MVUE) UCL	0.01
95% Modified-t UCL	0.00776	99% Chebyshev (MVUE) UCL	0.0121
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.743	Data appear Lognormal at 5% Significance Level	
Theta Star	0.0024		
MLE of Mean	0.00658		
MLE of Standard Deviation	0.00397		
nu star	268.8		
Approximate Chi Square Value (.05)	231.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0451	95% CLT UCL	0.0077
Adjusted Chi Square Value	230.8	95% Jackknife UCL	0.00772
		95% Standard Bootstrap UCL	0.00768
Anderson-Darling Test Statistic	1.45	95% Bootstrap-t UCL	0.00818
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.00819
Kolmogorov-Smirnov Test Statistic	0.143	95% Percentile Bootstrap UCL	0.00773
Kolmogorov-Smirnov 5% Critical Value	0.128	95% BCA Bootstrap UCL	0.00794
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00955
		97.5% Chebyshev(Mean, Sd) UCL	0.0108
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0134
95% Approximate Gamma UCL	0.00763		
95% Adjusted Gamma UCL	0.00766		

Potential UCL to Use	Use 95% H-UCL	0.00762

Basin Sediment Average Methylmercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
SDCR-1-average-060310	6/3/2009	1	0.0046375	0-9.6
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4
OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4

OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-average-092309	9/23/2009	1	0.0089825	0-8
SDCR3-average-092309	9/23/2009	1	0.0088975	0-8
SDCR8-average-092409	9/24/2009	1	0.00381	0-8
SDCR11-average-092509	9/25/2009	1	0.0060925	0-8
SDCR12-average-092509	9/25/2009	1	0.00246	0-8

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 08-09 ave 6ft A

General Statistics

Number of Valid Observations	55	Number of Distinct Observations	54

Raw Statistics		Log-transformed Statistics	
Minimum	0.00142	Minimum of Log Data	-6.557
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00639	Mean of log Data	-5.225
Median	0.00488	SD of log Data	0.559
SD	0.00456		
Coefficient of Variation	0.713		
Skewness	2.444		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.216	Lilliefors Test Statistic	0.101
Lilliefors Critical Value	0.119	Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00742	95% H-UCL	0.00728
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00846
95% Adjusted-CLT UCL	0.00762	97.5% Chebyshev (MVUE) UCL	0.00941
95% Modified-t UCL	0.00745	99% Chebyshev (MVUE) UCL	0.0113

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.913	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00219		
MLE of Mean	0.00639		
MLE of Standard Deviation	0.00374		
nu star	320.4		
Approximate Chi Square Value (.05)	279.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0456	95% CLT UCL	0.0074
Adjusted Chi Square Value	278.9	95% Jackknife UCL	0.00742
		95% Standard Bootstrap UCL	0.0074
Anderson-Darling Test Statistic	1.62	95% Bootstrap-t UCL	0.00786
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.0079
Kolmogorov-Smirnov Test Statistic	0.144	95% Percentile Bootstrap UCL	0.00744
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL	0.00761
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00907
		97.5% Chebyshev(Mean, Sd) UCL	0.0102
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0125
95% Approximate Gamma UCL	0.00731		
95% Adjusted Gamma UCL	0.00734		

Potential UCL to Use	Use 95% H-UCL	0.00728

Basin Sediment Average Methylmercury UCL for 2008 and 2009 for All Sample Depths Starting at 0 Inches at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4
OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4

OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

Sed MeHg B ave

General Statistics			
Number of Valid Observations	50	Number of Distinct Observations	50
Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00633	Mean of log Data	-5.256
Median	0.00478	SD of log Data	0.598
SD	0.00476		
Coefficient of Variation	0.753		
Skewness	2.39		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.735	Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00746	95% H-UCL	0.00737
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00866
95% Adjusted-CLT UCL	0.00768	97.5% Chebyshev (MVUE) UCL	0.00972
95% Modified-t UCL	0.00749	99% Chebyshev (MVUE) UCL	0.0118
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.594	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00244		
MLE of Mean	0.00633		
MLE of Standard Deviation	0.00393		
nu star	259.4		
Approximate Chi Square Value (.05)	223.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0452	95% CLT UCL	0.00743
Adjusted Chi Square Value	222.2	95% Jackknife UCL	0.00746
		95% Standard Bootstrap UCL	0.00743
Anderson-Darling Test Statistic	1.64	95% Bootstrap-t UCL	0.00782
Anderson-Darling 5% Critical Value	0.758	95% Hall's Bootstrap UCL	0.00786
Kolmogorov-Smirnov Test Statistic	0.155	95% Percentile Bootstrap UCL	0.00748
Kolmogorov-Smirnov 5% Critical Value	0.126	95% BCA Bootstrap UCL	0.00768
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00926
		97.5% Chebyshev(Mean, Sd) UCL	0.0105
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.013
95% Approximate Gamma UCL	0.00735		
95% Adjusted Gamma UCL	0.00739		

Potential UCL to Use	Use 95% H-UCL	0.00737

Basin Sediment Average Methylmercury UCL for 2008 and 2009 for All Sample Depths Starting at 0 Inches at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4
OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4

OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 08-09 ave 6ft B

General Statistics

Number of Valid Observations	55	Number of Distinct Observations	55

Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00621	Mean of log Data	-5.261
Median	0.00487	SD of log Data	0.575
SD	0.00457		
Coefficient of Variation	0.735		
Skewness	2.515		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.227	Lilliefors Test Statistic	0.114
Lilliefors Critical Value	0.119	Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00725	95% H-UCL	0.00712
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0083
95% Adjusted-CLT UCL	0.00745	97.5% Chebyshev (MVUE) UCL	0.00926
95% Modified-t UCL	0.00728	99% Chebyshev (MVUE) UCL	0.0111

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.778	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00224		
MLE of Mean	0.00621		
MLE of Standard Deviation	0.00373		
nu star	305.6		
Approximate Chi Square Value (.05)	266.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0456	95% CLT UCL	0.00723
Adjusted Chi Square Value	265.1	95% Jackknife UCL	0.00725
		95% Standard Bootstrap UCL	0.00722
Anderson-Darling Test Statistic	1.812	95% Bootstrap-t UCL	0.00767
Anderson-Darling 5% Critical Value	0.758	95% Hall's Bootstrap UCL	0.00768
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	0.00729
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL	0.00742
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.0089
		97.5% Chebyshev(Mean, Sd) UCL	0.0101
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0123
95% Approximate Gamma UCL	0.00714		
95% Adjusted Gamma UCL	0.00716		

Potential UCL to Use	Use 95% H-UCL	0.00712

Basin Sediment Methylmercury UCL for 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-103DC-06	5/23/2006	1	0.00681	0-4
OU2B-SED-103DNE-06	5/23/2006	1	0.00685	0-4
OU2B-SED-103DNW-06	5/23/2006	1	0.00737	0-4
OU2B-SED-103DSE-06	5/23/2006	1	0.00772	0-4
OU2B-SED-103DSW-06	5/23/2006	1	0.0074	0-4
OU2B-SED-104DC-06	5/24/2006	1	0.00921	0-4
OU2B-SED-104DNE-06	5/24/2006	1	0.00969	0-4
OU2B-SED-104DNW-06	5/24/2006	1	0.00789	0-4
OU2B-SED-104DSE-06	5/24/2006	1	0.00892	0-4
OU2B-SED-104DSW-06	5/24/2006	1	0.00942	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-202DC-06	5/20/2006	1	0.00579	0-4
OU2B-SED-202DNE-06	5/20/2006	1	0.00455	0-4
OU2B-SED-202DNW-06	5/20/2006	1	0.00425	0-4
OU2B-SED-202DSE-06	5/20/2006	1	0.00469	0-4
OU2B-SED-202DSW-06	5/20/2006	1	0.00525	0-4
OU2B-SED-203DC-06	5/21/2006	1	0.0086	0-4
OU2B-SED-203DNE-06	5/21/2006	1	0.00802	0-4
OU2B-SED-203DNW-06	5/21/2006	1	0.00887	0-4
OU2B-SED-203DSE-06	5/21/2006	1	0.0101	0-4
OU2B-SED-203DSW-06	5/21/2006	1	0.01	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-303DC-06	5/21/2006	1	0.00503	0-4
OU2B-SED-303DNE-06	5/21/2006	1	0.00464	0-4
OU2B-SED-303DNW-06	5/21/2006	1	0.00431	0-4
OU2B-SED-303DSE-06	5/21/2006	1	0.00463	0-4
OU2B-SED-303DSW-06	5/21/2006	1	0.00521	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4

OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4
OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4
OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4
OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4

SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4

OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR2-FSB-092309	9/23/2009	1	0.00117	2-4
SDCR3-FSB-092309	9/23/2009	1	0.00566	2-4
SDCR8-FSB-092409	9/24/2009	1	0.00436	2-4
SDCR11-FSB-092509	9/25/2009	1	0.0068	2-4
SDCR-1-FB-060309	6/3/2009	1	0.00675	2.4-4.8
SDCR2-FSC-092309	9/23/2009	1	0.0167	4-8
SDCR3-FSC-092309	9/23/2009	1	0.0131	4-8
SDCR8-FSC-092409	9/24/2009	1	0.00321	4-8
SDCR11-FSC-092509	9/25/2009	1	0.00589	4-8
SDCR-1-FC-060309	6/3/2009	1	0.00254	4.8-9.6

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/5/10

sed MeHg 06,08,09 A

General Statistics			
Number of Valid Observations	151	Number of Distinct Observations	140
Raw Statistics		Log-transformed Statistics	
Minimum	0.00117	Minimum of Log Data	-6.751
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00688	Mean of log Data	-5.145
Median	0.00566	SD of log Data	0.564
SD	0.00453		
Coefficient of Variation	0.658		
Skewness	2.034		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.159	Lilliefors Test Statistic	0.0502
Lilliefors Critical Value	0.0721	Lilliefors Critical Value	0.0721
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00749	95% H-UCL	0.00745
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00829
95% Adjusted-CLT UCL	0.00756	97.5% Chebyshev (MVUE) UCL	0.00892
95% Modified-t UCL	0.0075	99% Chebyshev (MVUE) UCL	0.0102
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.101	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00222		
MLE of Mean	0.00688		
MLE of Standard Deviation	0.00391		
nu star	936.6		
Approximate Chi Square Value (.05)	866.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0484	95% CLT UCL	0.00749
Adjusted Chi Square Value	865.9	95% Jackknife UCL	0.00749
		95% Standard Bootstrap UCL	0.00748
Anderson-Darling Test Statistic	2.331	95% Bootstrap-t UCL	0.00762
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	0.00761
Kolmogorov-Smirnov Test Statistic	0.0842	95% Percentile Bootstrap UCL	0.00749
Kolmogorov-Smirnov 5% Critical Value	0.0768	95% BCA Bootstrap UCL	0.00753
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00849
		97.5% Chebyshev(Mean, Sd) UCL	0.00919
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0106
95% Approximate Gamma UCL	0.00744		
95% Adjusted Gamma UCL	0.00745		

Potential UCL to Use	Use 95% H-UCL	0.00745

Basin Sediment Methylmercury UCL for 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-202DC-06	5/20/2006	1	0.00579	0-4
OU2B-SED-202DNE-06	5/20/2006	1	0.00455	0-4
OU2B-SED-202DNW-06	5/20/2006	1	0.00425	0-4
OU2B-SED-202DSE-06	5/20/2006	1	0.00469	0-4
OU2B-SED-202DSW-06	5/20/2006	1	0.00525	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-203DC-06	5/21/2006	1	0.0086	0-4
OU2B-SED-203DNE-06	5/21/2006	1	0.00802	0-4
OU2B-SED-203DNW-06	5/21/2006	1	0.00887	0-4
OU2B-SED-203DSE-06	5/21/2006	1	0.0101	0-4
OU2B-SED-203DSW-06	5/21/2006	1	0.01	0-4
OU2B-SED-303DC-06	5/21/2006	1	0.00503	0-4
OU2B-SED-303DNE-06	5/21/2006	1	0.00464	0-4
OU2B-SED-303DNW-06	5/21/2006	1	0.00431	0-4
OU2B-SED-303DSE-06	5/21/2006	1	0.00463	0-4
OU2B-SED-303DSW-06	5/21/2006	1	0.00521	0-4
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2R-SED-101DC-06	5/23/2006	1	0.00531	0-4
OU2R-SED-101DNE-06	5/23/2006	1	0.00561	0-4
OU2R-SED-101DNW-06	5/23/2006	1	0.0048	0-4
OU2R-SED-101DSE-06	5/23/2006	1	0.0108	0-4
OU2R-SED-101DSW-06	5/23/2006	1	0.011	0-4
OU2B-SED-103DC-06	5/23/2006	1	0.00681	0-4
OU2B-SED-103DNE-06	5/23/2006	1	0.00685	0-4
OU2B-SED-103DNW-06	5/23/2006	1	0.00737	0-4
OU2B-SED-103DSE-06	5/23/2006	1	0.00772	0-4
OU2B-SED-103DSW-06	5/23/2006	1	0.0074	0-4
OU2B-SED-104DC-06	5/24/2006	1	0.00921	0-4
OU2B-SED-104DNE-06	5/24/2006	1	0.00969	0-4
OU2B-SED-104DNW-06	5/24/2006	1	0.00789	0-4
OU2B-SED-104DSE-06	5/24/2006	1	0.00892	0-4
OU2B-SED-104DSW-06	5/24/2006	1	0.00942	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4

OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4
OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4

OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4
OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
SDCR-1-FB-060309	6/3/2009	1	0.00675	2.4-4.8
SDCR-1-FC-060309	6/3/2009	1	0.00254	4.8-9.6
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4

OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR2-FSB-092309	9/23/2009	1	0.00117	2-4
SDCR2-FSC-092309	9/23/2009	1	0.0167	4-8
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR3-FSB-092309	9/23/2009	1	0.00566	2-4
SDCR3-FSC-092309	9/23/2009	1	0.0131	4-8
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR8-FSB-092409	9/24/2009	1	0.00436	2-4
SDCR8-FSC-092409	9/24/2009	1	0.00321	4-8
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR11-FSB-092509	9/25/2009	1	0.0068	2-4
SDCR11-FSC-092509	9/25/2009	1	0.00589	4-8
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
SDCR12-FSC-092509	9/25/2009	1	0.00189	4-8
SDCR12-FSB-092509	9/25/2009	1	0.00282	2-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 06, 08-09 6ft A

General Statistics			
Number of Valid Observations	171	Number of Distinct Observations	158
Raw Statistics		Log-transformed Statistics	
Minimum	0.00117	Minimum of Log Data	-6.751
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.0067	Mean of log Data	-5.165
Median	0.00541	SD of log Data	0.552
SD	0.00435		
Coefficient of Variation	0.649		
Skewness	2.124		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.165	Lilliefors Test Statistic	0.0494
Lilliefors Critical Value	0.0678	Lilliefors Critical Value	0.0678
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00725	95% H-UCL	0.00719
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00795
95% Adjusted-CLT UCL	0.00731	97.5% Chebyshev (MVUE) UCL	0.00852
95% Modified-t UCL	0.00726	99% Chebyshev (MVUE) UCL	0.00963
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.23	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00208		
MLE of Mean	0.0067		
MLE of Standard Deviation	0.00373		
nu star	1105		
Approximate Chi Square Value (.05)	1028	Nonparametric Statistics	
Adjusted Level of Significance	0.0486	95% CLT UCL	0.00725
Adjusted Chi Square Value	1028	95% Jackknife UCL	0.00725
		95% Standard Bootstrap UCL	0.00725
Anderson-Darling Test Statistic	2.588	95% Bootstrap-t UCL	0.00734
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	0.00729
Kolmogorov-Smirnov Test Statistic	0.0898	95% Percentile Bootstrap UCL	0.00724
Kolmogorov-Smirnov 5% Critical Value	0.0716	95% BCA Bootstrap UCL	0.00733
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00816
		97.5% Chebyshev(Mean, Sd) UCL	0.00878
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.01
95% Approximate Gamma UCL	0.0072		
95% Adjusted Gamma UCL	0.0072		

Potential UCL to Use	Use 95% H-UCL	0.00719

Basin Sediment Methylmercury UCL for 2006, 2008 and 2009 for All Sample Depths Starting at Zero Inches at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-202DC-06	5/20/2006	1	0.00579	0-4
OU2B-SED-202DNE-06	5/20/2006	1	0.00455	0-4
OU2B-SED-202DNW-06	5/20/2006	1	0.00425	0-4
OU2B-SED-202DSE-06	5/20/2006	1	0.00469	0-4
OU2B-SED-202DSW-06	5/20/2006	1	0.00525	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-203DC-06	5/21/2006	1	0.0086	0-4
OU2B-SED-203DNE-06	5/21/2006	1	0.00802	0-4
OU2B-SED-203DNW-06	5/21/2006	1	0.00887	0-4
OU2B-SED-203DSE-06	5/21/2006	1	0.0101	0-4
OU2B-SED-203DSW-06	5/21/2006	1	0.01	0-4
OU2B-SED-303DC-06	5/21/2006	1	0.00503	0-4
OU2B-SED-303DNE-06	5/21/2006	1	0.00464	0-4
OU2B-SED-303DNW-06	5/21/2006	1	0.00431	0-4
OU2B-SED-303DSE-06	5/21/2006	1	0.00463	0-4
OU2B-SED-303DSW-06	5/21/2006	1	0.00521	0-4
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2B-SED-103DC-06	5/23/2006	1	0.00681	0-4
OU2B-SED-103DNE-06	5/23/2006	1	0.00685	0-4
OU2B-SED-103DNW-06	5/23/2006	1	0.00737	0-4
OU2B-SED-103DSE-06	5/23/2006	1	0.00772	0-4
OU2B-SED-103DSW-06	5/23/2006	1	0.0074	0-4
OU2B-SED-104DC-06	5/24/2006	1	0.00921	0-4
OU2B-SED-104DNE-06	5/24/2006	1	0.00969	0-4
OU2B-SED-104DNW-06	5/24/2006	1	0.00789	0-4
OU2B-SED-104DSE-06	5/24/2006	1	0.00892	0-4
OU2B-SED-104DSW-06	5/24/2006	1	0.00942	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4
OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4

OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4
OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4
OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4
OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4

SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4
OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4

OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/5/10

sed MeHg 06,08,09 B

General Statistics			
Number of Valid Observations	141	Number of Distinct Observations	132
Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.0069	Mean of log Data	-5.137
Median	0.00544	SD of log Data	0.549
SD	0.00453		
Coefficient of Variation	0.656		
Skewness	2.106		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.152	Lilliefors Test Statistic	0.0636
Lilliefors Critical Value	0.0746	Lilliefors Critical Value	0.0746
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00753	95% H-UCL	0.00745
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0083
95% Adjusted-CLT UCL	0.0076	97.5% Chebyshev (MVUE) UCL	0.00893
95% Modified-t UCL	0.00755	99% Chebyshev (MVUE) UCL	0.0102
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.2	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00216		
MLE of Mean	0.0069		
MLE of Standard Deviation	0.00386		
nu star	902.4		
Approximate Chi Square Value (.05)	833.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0483	95% CLT UCL	0.00753
Adjusted Chi Square Value	833	95% Jackknife UCL	0.00753
		95% Standard Bootstrap UCL	0.00752
Anderson-Darling Test Statistic	2.448	95% Bootstrap-t UCL	0.00763
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	0.00762
Kolmogorov-Smirnov Test Statistic	0.0939	95% Percentile Bootstrap UCL	0.00756
Kolmogorov-Smirnov 5% Critical Value	0.0793	95% BCA Bootstrap UCL	0.00763
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00856
		97.5% Chebyshev(Mean, Sd) UCL	0.00928
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0107
95% Approximate Gamma UCL	0.00747		

95% Adjusted Gamma UCL	0.00748

Potential UCL to Use	Use 95% H-UCL	0.00745

Basin Sediment Methylmercury UCL for 2006, 2008 and 2009 for All Sample Depths Starting at 0 Inches at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-202DC-06	5/20/2006	1	0.00579	0-4
OU2B-SED-202DNE-06	5/20/2006	1	0.00455	0-4
OU2B-SED-202DNW-06	5/20/2006	1	0.00425	0-4
OU2B-SED-202DSE-06	5/20/2006	1	0.00469	0-4
OU2B-SED-202DSW-06	5/20/2006	1	0.00525	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-203DC-06	5/21/2006	1	0.0086	0-4
OU2B-SED-203DNE-06	5/21/2006	1	0.00802	0-4
OU2B-SED-203DNW-06	5/21/2006	1	0.00887	0-4
OU2B-SED-203DSE-06	5/21/2006	1	0.0101	0-4
OU2B-SED-203DSW-06	5/21/2006	1	0.01	0-4
OU2B-SED-303DC-06	5/21/2006	1	0.00503	0-4
OU2B-SED-303DNE-06	5/21/2006	1	0.00464	0-4
OU2B-SED-303DNW-06	5/21/2006	1	0.00431	0-4
OU2B-SED-303DSE-06	5/21/2006	1	0.00463	0-4
OU2B-SED-303DSW-06	5/21/2006	1	0.00521	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2R-SED-101DC-06	5/23/2006	1	0.00531	0-4
OU2R-SED-101DNE-06	5/23/2006	1	0.00561	0-4
OU2R-SED-101DNW-06	5/23/2006	1	0.0048	0-4
OU2R-SED-101DSE-06	5/23/2006	1	0.0108	0-4
OU2R-SED-101DSW-06	5/23/2006	1	0.011	0-4
OU2B-SED-103DC-06	5/23/2006	1	0.00681	0-4
OU2B-SED-103DNE-06	5/23/2006	1	0.00685	0-4
OU2B-SED-103DNW-06	5/23/2006	1	0.00737	0-4
OU2B-SED-103DSE-06	5/23/2006	1	0.00772	0-4
OU2B-SED-103DSW-06	5/23/2006	1	0.0074	0-4
OU2B-SED-104DC-06	5/24/2006	1	0.00921	0-4
OU2B-SED-104DNE-06	5/24/2006	1	0.00969	0-4
OU2B-SED-104DNW-06	5/24/2006	1	0.00789	0-4
OU2B-SED-104DSE-06	5/24/2006	1	0.00892	0-4
OU2B-SED-104DSW-06	5/24/2006	1	0.00942	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4

OU2B-SED-502DC-08	6/5/2008	1	0.0189	0-4
OU2B-SED-502DNE-08	6/5/2008	1	0.0234	0-4
OU2B-SED-502DNW-08	6/5/2008	1	0.0117	0-4
OU2B-SED-502DSE-08	6/5/2008	1	0.00867	0-4
OU2B-SED-502DSW-08	6/5/2008	1	0.0125	0-4
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501DC-08	6/6/2008	1	0.00346	0-4
OU2B-SED-501DNE-08	6/6/2008	1	0.00322	0-4
OU2B-SED-501DNW-08	6/6/2008	1	0.00295	0-4
OU2B-SED-501DSE-08	6/6/2008	1	0.00399	0-4
OU2B-SED-501DSW-08	6/6/2008	1	0.00336	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103DNE-08	6/7/2008	1	0.00319	0-4
OU2B-SED-103DNW-08	6/7/2008	1	0.00294	0-4
OU2B-SED-103DSE-08	6/7/2008	1	0.00367	0-4
OU2B-SED-103DSW-08	6/7/2008	1	0.00435	0-4
OU2B-SED-103DC-08	6/7/2008	1	0.00523	0-4
OU2B-SED-104DC-08	6/8/2008	1	0.00873	0-4
OU2B-SED-104DNE-08	6/8/2008	1	0.00771	0-4
OU2B-SED-104DNW-08	6/8/2008	1	0.00654	0-4
OU2B-SED-104DSE-08	6/8/2008	1	0.00696	0-4
OU2B-SED-104DSW-08	6/8/2008	1	0.00879	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202DC-08	6/9/2008	1	0.0076	0-4
OU2B-SED-202DNE-08	6/9/2008	1	0.0067	0-4
OU2B-SED-202DNW-08	6/9/2008	1	0.00713	0-4
OU2B-SED-202DSE-08	6/9/2008	1	0.00806	0-4
OU2B-SED-202DSW-08	6/9/2008	1	0.00541	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-203DNE-08	6/10/2008	1	0.00754	0-4
OU2B-SED-203DNW-08	6/10/2008	1	0.00903	0-4

OU2B-SED-203DSE-08	6/10/2008	1	0.00661	0-4
OU2B-SED203DSW-08	6/10/2008	1	0.0097	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-303DNE-08	6/10/2008	1	0.00717	0-4
OU2B-SED-303DNW-08	6/10/2008	1	0.00495	0-4
OU2B-SED-303DSE-08	6/10/2008	1	0.00618	0-4
OU2B-SED-303DSW-08	6/10/2008	1	0.00496	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.00818	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.00573	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.0039	0-4
OU2B-SED-103DNE-09	6/6/2009	1	0.00393	0-4
OU2B-SED-103DSE-09	6/6/2009	1	0.00374	0-4
OU2B-SED-103DNW-09	6/6/2009	1	0.00512	0-4
OU2B-SED-103DSW-09	6/6/2009	1	0.00379	0-4
OU2B-SED-104DC-09	6/6/2009	1	0.00592	0-4
OU2B-SED-104DNE-09	6/6/2009	1	0.00667	0-4
OU2B-SED-104DNW-09	6/6/2009	1	0.00599	0-4
OU2B-SED-104DSE-09	6/6/2009	1	0.00613	0-4
OU2B-SED-104DSW-09	6/6/2009	1	0.0068	0-4
OU2B-SED-202DC-09	6/6/2009	1	0.00432	0-4
OU2B-SED-202DNE-09	6/6/2009	1	0.0034	0-4
OU2B-SED-202DNW-09	6/6/2009	1	0.00219	0-4
OU2B-SED-202DSE-09	6/6/2009	1	0.00445	0-4
OU2B-SED-202DSW-09	6/6/2009	1	0.00487	0-4
OU2B-SED-501DC-09	6/7/2009	1	0.0031	0-4
OU2B-SED-501DNE-09	6/7/2009	1	0.00329	0-4
OU2B-SED-501DNW-09	6/7/2009	1	0.00352	0-4
OU2B-SED-501DSE-09	6/7/2009	1	0.00378	0-4
OU2B-SED-501DSW-09	6/7/2009	1	0.0195	0-4
OU2B-SED-502DC-09	6/7/2009	1	0.0186	0-4
OU2B-SED-502DNE-09	6/7/2009	1	0.0238	0-4

OU2B-SED-502DNW-09	6/7/2009	1	0.0147	0-4
OU2B-SED-502DSE-09	6/7/2009	1	0.0214	0-4
OU2B-SED-502DSW-09	6/7/2009	1	0.00378	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.00445	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303DNE-09	6/7/2009	1	0.00756	0-4
OU2B-SED-303DNW-09	6/7/2009	1	0.00634	0-4
OU2B-SED-303DSE-09	6/7/2009	1	0.00669	0-4
OU2B-SED-303DSW-09	6/7/2009	1	0.00377	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.0115	0-4
OU2B-SED-203DNE-09	6/7/2009	1	0.0128	0-4
OU2B-SED-203DNW-09	6/7/2009	1	0.0119	0-4
OU2B-SED-203DSE-09	6/7/2009	1	0.0127	0-4
OU2B-SED-203DSW-09	6/7/2009	1	0.0127	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 06, 08-09 6ft B

General Statistics			
Number of Valid Observations	159	Number of Distinct Observations	148

Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00676	Mean of log Data	-5.147
Median	0.00541	SD of log Data	0.53
SD	0.00434		
Coefficient of Variation	0.641		
Skewness	2.206		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.159	Lilliefors Test Statistic	0.0594
Lilliefors Critical Value	0.0703	Lilliefors Critical Value	0.0703
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00733	95% H-UCL	0.00724
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00799
95% Adjusted-CLT UCL	0.00739	97.5% Chebyshev (MVUE) UCL	0.00856
95% Modified-t UCL	0.00734	99% Chebyshev (MVUE) UCL	0.00966
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.401	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00199		
MLE of Mean	0.00676		
MLE of Standard Deviation	0.00367		
nu star	1081		
Approximate Chi Square Value (.05)	1006	Nonparametric Statistics	
Adjusted Level of Significance	0.0485	95% CLT UCL	0.00733
Adjusted Chi Square Value	1005	95% Jackknife UCL	0.00733
		95% Standard Bootstrap UCL	0.00732
Anderson-Darling Test Statistic	2.814	95% Bootstrap-t UCL	0.0074
Anderson-Darling 5% Critical Value	0.758	95% Hall's Bootstrap UCL	0.00736
Kolmogorov-Smirnov Test Statistic	0.0918	95% Percentile Bootstrap UCL	0.00734
Kolmogorov-Smirnov 5% Critical Value	0.0746	95% BCA Bootstrap UCL	0.00738
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00826
		97.5% Chebyshev(Mean, Sd) UCL	0.00891
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0102
95% Approximate Gamma UCL	0.00727		
95% Adjusted Gamma UCL	0.00728		

Potential UCL to Use	Use 95% H-UCL	0.00724

Basin Sediment Average MethylmercuryUCL for 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-103D-average-06	5/23/2006	1	0.00723	0-4
OU2B-SED-104D-average-06	5/24/2006	1	0.009026	0-4
OU2B-SED-202D-average-06	5/20/2006	1	0.004906	0-4
OU2B-SED-203D-average-06	5/21/2006	1	0.009118	0-4
OU2B-SED-303D-average-06	5/21/2006	1	0.004764	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4

OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4
OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
SDCR11-average-092509	9/25/2009	1	0.0060925	0-8
SDCR-1-average-060309	6/3/2009	1	0.00463	0-9.6
SDCR2-average-092309	9/23/2009	1	0.0089825	0-8
SDCR3-average-092309	9/23/2009	1	0.0088975	0-8
SDCR8-average-092409	9/24/2009	1	0.00381	0-8

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10

CHECKED BY/DATE: HEF 5/5/10

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General Statistics

Number of Valid Observations	65	Number of Distinct Observations	64

Raw Statistics		Log-transformed Statistics	
Minimum	0.00142	Minimum of Log Data	-6.557
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00642	Mean of log Data	-5.207
Median	0.00491	SD of log Data	0.543
SD	0.00431		
Coefficient of Variation	0.671		
Skewness	2.4		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.187	Lilliefors Test Statistic	0.0884
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00732	95% H-UCL	0.00722
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00831
95% Adjusted-CLT UCL	0.00747	97.5% Chebyshev (MVUE) UCL	0.00916
95% Modified-t UCL	0.00734	99% Chebyshev (MVUE) UCL	0.0108

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.159	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00203		
MLE of Mean	0.00642		
MLE of Standard Deviation	0.00361		
nu star	410.7		
Approximate Chi Square Value (.05)	364.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0463	95% CLT UCL	0.0073
Adjusted Chi Square Value	363.7	95% Jackknife UCL	0.00732
		95% Standard Bootstrap UCL	0.0073
Anderson-Darling Test Statistic	1.368	95% Bootstrap-t UCL	0.00756
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.0076
Kolmogorov-Smirnov Test Statistic	0.118	95% Percentile Bootstrap UCL	0.00733
Kolmogorov-Smirnov 5% Critical Value	0.111	95% BCA Bootstrap UCL	0.00757
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00876
		97.5% Chebyshev(Mean, Sd) UCL	0.00976
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0117
95% Approximate Gamma UCL	0.00723		
95% Adjusted Gamma UCL	0.00725		

Potential UCL to Use	Use 95% H-UCL	0.00722

Basin Sediment Average MethylmercuryUCL for 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-06	5/23/2006	1	0.007504	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
SDCR12-average-092509	9/25/2009	1	0.00246	0-8
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-202D-average-06	5/20/2006	1	0.004906	0-4
OU2B-SED-203D-average-06	5/21/2006	1	0.009118	0-4
OU2B-SED-303D-average-06	5/21/2006	1	0.004764	0-4
OU2R-SED-101D-average-06	5/23/2006	1	0.007504	0-4
OU2B-SED-103D-average-06	5/23/2006	1	0.00723	0-4
OU2B-SED-104D-average-06	5/24/2006	1	0.009026	0-4
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4

OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
SDCR-1-average-060310	6/3/2009	1	0.0046375	0-9.6
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4
OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSC-092309	9/23/2009	1	0.0089825	0-8
SDCR3-FSC-092309	9/23/2009	1	0.0088975	0-8
SDCR8-FSC-092409	9/24/2009	1	0.00381	0-8
SDCR11-FSC-092509	9/25/2009	1	0.0060925	0-8
SDCR12-average-092509	9/25/2009	1	0.00246	0-8

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 06, 08-09 ave 6ft A

General Statistics			
Number of Valid Observations	77	Number of Distinct Observations	70
Raw Statistics		Log-transformed Statistics	
Minimum	0.00142	Minimum of Log Data	-6.557
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00626	Mean of log Data	-5.22
Median	0.00524	SD of log Data	0.521
SD	0.00403		
Coefficient of Variation	0.644		
Skewness	2.551		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.171	Lilliefors Test Statistic	0.0705
Lilliefors Critical Value	0.101	Lilliefors Critical Value	0.101
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00703	95% H-UCL	0.00693
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00788
95% Adjusted-CLT UCL	0.00716	97.5% Chebyshev (MVUE) UCL	0.00861
95% Modified-t UCL	0.00705	99% Chebyshev (MVUE) UCL	0.0101
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.449	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00182		
MLE of Mean	0.00626		
MLE of Standard Deviation	0.00337		
nu star	531.1		
Approximate Chi Square Value (.05)	478.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0469	95% CLT UCL	0.00702
Adjusted Chi Square Value	477.7	95% Jackknife UCL	0.00703
		95% Standard Bootstrap UCL	0.00701
Anderson-Darling Test Statistic	1.262	95% Bootstrap-t UCL	0.00721
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.00725
Kolmogorov-Smirnov Test Statistic	0.11	95% Percentile Bootstrap UCL	0.00707
Kolmogorov-Smirnov 5% Critical Value	0.102	95% BCA Bootstrap UCL	0.00728
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00827
		97.5% Chebyshev(Mean, Sd) UCL	0.00913
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0108
95% Approximate Gamma UCL	0.00695		
95% Adjusted Gamma UCL	0.00696		

Potential UCL to Use	Use 95% H-UCL	0.00693

Basin Sediment Average MethylmercuryUCL for 2006, 2008 and 2009 for All Sample Depths Starting at Zero Inches at 3ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-103D-average-06	5/23/2006	1	0.00723	0-4
OU2B-SED-104D-average-06	5/24/2006	1	0.009026	0-4
OU2B-SED-202D-average-06	5/20/2006	1	0.004906	0-4
OU2B-SED-203D-average-06	5/21/2006	1	0.009118	0-4
OU2B-SED-303D-average-06	5/21/2006	1	0.004764	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4
OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4

OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

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General Statistics			
Number of Valid Observations	65	Number of Distinct Observations	65
Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00627	Mean of log Data	-5.242
Median	0.00488	SD of log Data	0.563
SD	0.00434		
Coefficient of Variation	0.692		
Skewness	2.443		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.189	Lilliefors Test Statistic	0.0816
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00716	95% H-UCL	0.00709
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00819
95% Adjusted-CLT UCL	0.00732	97.5% Chebyshev (MVUE) UCL	0.00906
95% Modified-t UCL	0.00719	99% Chebyshev (MVUE) UCL	0.0108
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.982	Data appear Lognormal at 5% Significance Level	
Theta Star	0.0021		
MLE of Mean	0.00627		
MLE of Standard Deviation	0.00363		
nu star	387.7		
Approximate Chi Square Value (.05)	343	Nonparametric Statistics	
Adjusted Level of Significance	0.0463	95% CLT UCL	0.00715
Adjusted Chi Square Value	342.1	95% Jackknife UCL	0.00716
		95% Standard Bootstrap UCL	0.00714
Anderson-Darling Test Statistic	1.354	95% Bootstrap-t UCL	0.00739
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.00746
Kolmogorov-Smirnov Test Statistic	0.124	95% Percentile Bootstrap UCL	0.00719
Kolmogorov-Smirnov 5% Critical Value	0.111	95% BCA Bootstrap UCL	0.00731
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00861
		97.5% Chebyshev(Mean, Sd) UCL	0.00962
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0116
95% Approximate Gamma UCL	0.00708		
95% Adjusted Gamma UCL	0.0071		

Potential UCL to Use	Use 95% H-UCL	0.00709

Basin Sediment Average MethylmercuryUCL for 2006, 2008 and 2009 for All Sample Depths Starting at 0 Inches at 6ft NAVD88

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-06	5/23/2006	1	0.007504	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-101C-06	5/21/2006	1	0.00336	0-4
OU2B-SED-102C-06	5/20/2006	1	0.00419	0-4
OU2B-SED-105C-06	5/23/2006	1	0.00958	0-4
OU2B-SED-201C-06	5/21/2006	1	0.00804	0-4
OU2B-SED-204C-06	5/20/2006	1	0.00623	0-4
OU2B-SED-204C-06-RS	6/29/2006	1	0.00973	0-4
OU2B-SED-205C-06	5/21/2006	1	0.00345	0-4
OU2B-SED-301C-06	5/23/2006	1	0.0026	0-4
OU2B-SED-302C-06	5/20/2006	1	0.00328	0-4
OU2B-SED-304C-06	5/22/2006	1	0.00544	0-4
OU2B-SED-202D-average-06	5/20/2006	1	0.004906	0-4
OU2B-SED-203D-average-06	5/21/2006	1	0.009118	0-4
OU2B-SED-303D-average-06	5/21/2006	1	0.004764	0-4
OU2R-SED-101D-average-06	5/23/2006	1	0.007504	0-4
OU2B-SED-103D-average-06	5/23/2006	1	0.00723	0-4
OU2B-SED-104D-average-06	5/24/2006	1	0.009026	0-4
OU2B-SED-502D-ave-08	6/5/2008	1	0.015034	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2B-SED-401C-08	6/6/2008	1	0.00893	0-4
OU2B-SED-403C-08	6/6/2008	1	0.00631	0-4
OU2B-SED-404C-08	6/6/2008	1	0.00281	0-4
OU2B-SED-501D-ave-08	6/6/2008	1	0.003396	0-4
OU2B-SED-402C-08	6/6/2008	1	0.00436	0-4
OU2B-SED-004C-08	6/7/2008	1	0.00517	0-4
OU2B-SED-101C-08	6/7/2008	1	0.00308	0-4
OU2B-SED-102C-08	6/7/2008	1	0.00488	0-4
OU2B-SED-103D-ave-08	6/7/2008	1	0.003876	0-4
OU2B-SED-104D-ave-08	6/8/2008	1	0.007746	0-4
OU2B-SED-105C-08	6/8/2008	1	0.0134	0-4
OU2B-SED-106C-08	6/8/2008	1	0.00435	0-4
OU2B-SED-201C-08	6/8/2008	1	0.00983	0-4
OU2B-SED-202D-ave-08	6/9/2008	1	0.00698	0-4
OU2B-SED-204C-08	6/9/2008	1	0.00746	0-4

OU2B-SED-205C-08	6/9/2008	1	0.00405	0-4
OU2B-SED-301C-08	6/10/2008	1	0.004	0-4
OU2B-SED-302C-08	6/10/2008	1	0.00206	0-4
OU2B-SED-304C-08	6/10/2008	1	0.00465	0-4
OU2B-SED-203D-ave-08	6/10/2008	1	0.008212	0-4
OU2B-SED-303D-ave-08	6/10/2008	1	0.005798	0-4
SDCR-1-FA-060309	6/3/2009	1	0.00672	0-2.4
OU2B-SED-301C-09	6/3/2009	1	0.00337	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4
OU2B-SED-004C-09	6/5/2009	1	0.00487	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2B-SED-101C-09	6/5/2009	1	0.00265	0-4
OU2B-SED-DHC-09	6/5/2009	1	0.00431	0-4
OU2B-SED-102C-09	6/5/2009	1	0.00462	0-4
OU2B-SED-103D-ave-09	6/6/2009	1	0.004096	0-4
OU2B-SED-104D-ave-09	6/6/2009	1	0.006302	0-4
OU2B-SED-202D-ave-09	6/6/2009	1	0.003846	0-4
OU2B-SED-501D-ave-09	6/7/2009	1	0.006638	0-4
OU2B-SED-502D-ave-09	6/7/2009	1	0.016456	0-4
OU2B-SED-402C-09	6/7/2009	1	0.00381	0-4
OU2B-SED-303D-ave-09	6/7/2009	1	0.005762	0-4
OU2B-SED-203D-ave-09	6/7/2009	1	0.01232	0-4
OU2B-SED-204C-09	6/7/2009	1	0.00469	0-4
OU2B-SED-106C-09	6/8/2009	1	0.00569	0-4
OU2B-SED-105C-09	6/8/2009	1	0.0212	0-4
OU2B-SED-205C-09	6/8/2009	1	0.00302	0-4
OU2B-SED-201C-09	6/8/2009	1	0.00524	0-4
OU2B-SED-302C-09	6/8/2009	1	0.00142	0-4
OU2B-SED-304C-09	6/9/2009	1	0.00359	0-4
OU2B-SED-401C-09	6/9/2009	1	0.00286	0-4
OU2B-SED-403C-09	6/9/2009	1	0.00538	0-4
OU2B-SED-404C-09	6/9/2009	1	0.0257	0-4
SDCR2-FSA-092309	9/23/2009	1	0.00136	0-2
SDCR3-FSA-092309	9/23/2009	1	0.00373	0-2
SDCR8-FSA-092409	9/24/2009	1	0.00446	0-2
SDCR11-FSA-092509	9/25/2009	1	0.00579	0-2
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: RMP 5/6/10

MeHg 06, 08-09 ave 6ft B

General Statistics			
Number of Valid Observations	77	Number of Distinct Observations	71
Raw Statistics		Log-transformed Statistics	
Minimum	0.00136	Minimum of Log Data	-6.6
Maximum	0.0257	Maximum of Log Data	-3.661
Mean	0.00615	Mean of log Data	-5.242
Median	0.00517	SD of log Data	0.53
SD	0.00403		
Coefficient of Variation	0.656		
Skewness	2.618		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.184	Lilliefors Test Statistic	0.0806
Lilliefors Critical Value	0.101	Lilliefors Critical Value	0.101
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00691	95% H-UCL	0.00682
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00777
95% Adjusted-CLT UCL	0.00705	97.5% Chebyshev (MVUE) UCL	0.0085
95% Modified-t UCL	0.00694	99% Chebyshev (MVUE) UCL	0.00994
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.36	Data appear Lognormal at 5% Significance Level	
Theta Star	0.00183		
MLE of Mean	0.00615		
MLE of Standard Deviation	0.00335		
nu star	517.5		
Approximate Chi Square Value (.05)	465.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0469	95% CLT UCL	0.0069
Adjusted Chi Square Value	464.8	95% Jackknife UCL	0.00691
		95% Standard Bootstrap UCL	0.00689
Anderson-Darling Test Statistic	1.45	95% Bootstrap-t UCL	0.00711
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	0.00731
Kolmogorov-Smirnov Test Statistic	0.121	95% Percentile Bootstrap UCL	0.00698
Kolmogorov-Smirnov 5% Critical Value	0.102	95% BCA Bootstrap UCL	0.00704
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00815
		97.5% Chebyshev(Mean, Sd) UCL	0.00902
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0107
95% Approximate Gamma UCL	0.00683		

95% Adjusted Gamma UCL	0.00684		
Potential UCL to Use		Use 95% H-UCL	0.00682

Round Pond Sediment Methylmercury UCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
SDCR12-FSC-092509	9/25/2009	1	0.00189	4-8
SDCR12-FSB-092509	9/25/2009	1	0.00282	2-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

RP MeHg A

General Statistics			
Number of Valid Observations	15	Number of Distinct Observations	15

Raw Statistics		Log-transformed Statistics	
Minimum	0.00189	Minimum of Log Data	-6.271
Maximum	0.00715	Maximum of Log Data	-4.941
Mean	0.00463	Mean of log Data	-5.433
Median	0.00466	SD of log Data	0.37
SD	0.00151		
Coefficient of Variation	0.326		
Skewness	-0.201		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Test Statistic	0.925
Shapiro Wilk Critical Value	0.881	Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00532	95% H-UCL	0.00567
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00663
95% Adjusted-CLT UCL	0.00525	97.5% Chebyshev (MVUE) UCL	0.00748
95% Modified-t UCL	0.00531	99% Chebyshev (MVUE) UCL	0.00916
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.049	Data appear Normal at 5% Significance Level	
Theta Star	6.57E-04		
MLE of Mean	0.00463		
MLE of Standard Deviation	0.00174		
nu star	211.5		
Approximate Chi Square Value (.05)	178.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0324	95% CLT UCL	0.00527
Adjusted Chi Square Value	175.1	95% Jackknife UCL	0.00532
		95% Standard Bootstrap UCL	0.00525
Anderson-Darling Test Statistic	0.42	95% Bootstrap-t UCL	0.0053
Anderson-Darling 5% Critical Value	0.738	95% Hall's Bootstrap UCL	0.00526
Kolmogorov-Smirnov Test Statistic	0.171	95% Percentile Bootstrap UCL	0.00526
Kolmogorov-Smirnov 5% Critical Value	0.222	95% BCA Bootstrap UCL	0.00521
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00633
		97.5% Chebyshev(Mean, Sd) UCL	0.00706
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.00851
95% Approximate Gamma UCL	0.00548		
95% Adjusted Gamma UCL	0.00559		

Potential UCL to Use	Use 95% Student's-t UCL	0.00532

Round Pond Sediment Methylmercury UCL for 2008 and 2009 for All Sample Depths Starting at 0 Inches

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/13/10

RP MeHg B

General Statistics			
Number of Valid Observations	13	Number of Distinct Observations	13

Raw Statistics		Log-transformed Statistics	
Minimum	0.00309	Minimum of Log Data	-5.78
Maximum	0.00715	Maximum of Log Data	-4.941
Mean	0.00498	Mean of log Data	-5.335
Median	0.0052	SD of log Data	0.274
SD	0.00127		
Coefficient of Variation	0.256		
Skewness	-0.138		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	0.916
Shapiro Wilk Critical Value	0.866	Shapiro Wilk Critical Value	0.866
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00561	95% H-UCL	0.00581
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00665
95% Adjusted-CLT UCL	0.00555	97.5% Chebyshev (MVUE) UCL	0.00737
95% Modified-t UCL	0.00561	99% Chebyshev (MVUE) UCL	0.00879
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.85	Data appear Normal at 5% Significance Level	
Theta Star	4.20E-04		
MLE of Mean	0.00498		
MLE of Standard Deviation	0.00145		
nu star	308		
Approximate Chi Square Value (.05)	268.4	Nonparametric Statistics	
Adjusted Level of Significance	0.0301	95% CLT UCL	0.00556
Adjusted Chi Square Value	263.1	95% Jackknife UCL	0.00561
		95% Standard Bootstrap UCL	0.00553
Anderson-Darling Test Statistic	0.421	95% Bootstrap-t UCL	0.00558
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	0.00554
Kolmogorov-Smirnov Test Statistic	0.162	95% Percentile Bootstrap UCL	0.00555
Kolmogorov-Smirnov 5% Critical Value	0.236	95% BCA Bootstrap UCL	0.00555
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00652
		97.5% Chebyshev(Mean, Sd) UCL	0.00719
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0085
95% Approximate Gamma UCL	0.00572		
95% Adjusted Gamma UCL	0.00583		

Potential UCL to Use	Use 95% Student's-t UCL	0.00561

Round Pond Average Sediment MethylmercuryUCL for 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
SDCR12-average-092509	9/25/2009	1	0.00246	0-8
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

Round Pond Average Sediment MethylmercuryUCL for 2008 and 2009 for All Sample Depths Starting at 0 Inches

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10
CHECKED BY/DATE: HEF 4/13/10

Round Pond Sediment Methylmercury UCL for 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101DC-06	5/23/2006	1	0.00531	0-4
OU2R-SED-101DNE-06	5/23/2006	1	0.00561	0-4
OU2R-SED-101DNW-06	5/23/2006	1	0.0048	0-4
OU2R-SED-101DSE-06	5/23/2006	1	0.0108	0-4
OU2R-SED-101DSW-06	5/23/2006	1	0.011	0-4
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
SDCR12-FSC-092509	9/25/2009	1	0.00189	4-8
SDCR12-FSB-092509	9/25/2009	1	0.00282	2-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

RP Sed MeHg 06,08,09 A

General Statistics			
Number of Valid Observations	20	Number of Distinct Observations	20
Raw Statistics		Log-transformed Statistics	
Minimum	0.00189	Minimum of Log Data	-6.271
Maximum	0.011	Maximum of Log Data	-4.51
Mean	0.00535	Mean of log Data	-5.315
Median	0.00526	SD of log Data	0.424
SD	0.00231		
Coefficient of Variation	0.432		
Skewness	1.227		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.877	Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00624	95% H-UCL	0.0065
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00763
95% Adjusted-CLT UCL	0.00635	97.5% Chebyshev (MVUE) UCL	0.00861
95% Modified-t UCL	0.00627	99% Chebyshev (MVUE) UCL	0.0105
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.228	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.00102		
MLE of Mean	0.00535		
MLE of Standard Deviation	0.00234		
nu star	209.1		
Approximate Chi Square Value (.05)	176.7	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	0.0062
Adjusted Chi Square Value	174.3	95% Jackknife UCL	0.00624
		95% Standard Bootstrap UCL	0.00616
Anderson-Darling Test Statistic	0.497	95% Bootstrap-t UCL	0.00656
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	0.00711
Kolmogorov-Smirnov Test Statistic	0.137	95% Percentile Bootstrap UCL	0.00622
Kolmogorov-Smirnov 5% Critical Value	0.194	95% BCA Bootstrap UCL	0.00641
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.0076
		97.5% Chebyshev(Mean, Sd) UCL	0.00858
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0105
95% Approximate Gamma UCL	0.00633		
95% Adjusted Gamma UCL	0.00642		

Potential UCL to Use	Use 95% Approximate Gamma UCL	0.00633

Round Pond Sediment Methylmercury UCL for 2006, 2008 and 2009 for All Sample Depths Starting at 0 Inches

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101DC-06	5/23/2006	1	0.00531	0-4
OU2R-SED-101DNE-06	5/23/2006	1	0.00561	0-4
OU2R-SED-101DNW-06	5/23/2006	1	0.0048	0-4
OU2R-SED-101DSE-06	5/23/2006	1	0.0108	0-4
OU2R-SED-101DSW-06	5/23/2006	1	0.011	0-4
OU2R-SED-101DNE-08	6/5/2008	1	0.0052	0-4
OU2R-SED-101DNW-08	6/5/2008	1	0.00319	0-4
OU2R-SED-101DSE-08	6/5/2008	1	0.00447	0-4
OU2R-SED-101DSW-08	6/5/2008	1	0.00309	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
OU2R-SED-101DC-08	6/5/2008	1	0.00466	0-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-101DC-09	6/5/2009	1	0.00599	0-4
OU2R-SED-101DNE-09	6/5/2009	1	0.00584	0-4
OU2R-SED-101DSE-09	6/5/2009	1	0.0064	0-4
OU2R-SED-101DNW-09	6/5/2009	1	0.00565	0-4
OU2R-SED-101DSW-09	6/5/2009	1	0.00451	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

RP Sed MeHg 06,08,09 B

General Statistics			
Number of Valid Observations	18	Number of Distinct Observations	18

Raw Statistics		Log-transformed Statistics	
Minimum	0.00309	Minimum of Log Data	-5.78
Maximum	0.011	Maximum of Log Data	-4.51
Mean	0.00568	Mean of log Data	-5.231
Median	0.00533	SD of log Data	0.349
SD	0.00219		
Coefficient of Variation	0.385		
Skewness	1.49		

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.827	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.897	Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.00658	95% H-UCL	0.00667
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.00773
95% Adjusted-CLT UCL	0.00672	97.5% Chebyshev (MVUE) UCL	0.00862
95% Modified-t UCL	0.00661	99% Chebyshev (MVUE) UCL	0.0104
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.077	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	8.03E-04		
MLE of Mean	0.00568		
MLE of Standard Deviation	0.00214		
nu star	254.8		
Approximate Chi Square Value (.05)	218.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0357	95% CLT UCL	0.00653
Adjusted Chi Square Value	215.6	95% Jackknife UCL	0.00658
		95% Standard Bootstrap UCL	0.0065
Anderson-Darling Test Statistic	0.684	95% Bootstrap-t UCL	0.00709
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL	0.0116
Kolmogorov-Smirnov Test Statistic	0.171	95% Percentile Bootstrap UCL	0.00656
Kolmogorov-Smirnov 5% Critical Value	0.204	95% BCA Bootstrap UCL	0.00664
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.00793
		97.5% Chebyshev(Mean, Sd) UCL	0.0089
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0108
95% Approximate Gamma UCL	0.00661		
95% Adjusted Gamma UCL	0.00671		

Potential UCL to Use	Use 95% Approximate Gamma UCL	0.00661

Round Pond Sediment Average MethylmercuryUCL for 2006, 2008 and 2009 at 0-2, 2-4, 4-8 and 0-12 Inch Depths

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-06	5/23/2006	1	0.007504	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
SDCR12-average-092509	9/25/2009	1	0.00246	0-8
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

Round Pond Sediment Methylmercury UCL for 2006, 2008 and 2009 for All Sample Depths Starting at 0 Inches

Sample ID	Date	Detected	Methylmercury (mg/kg)	Depth Interval (inches)
OU2R-SED-101D-average-06	5/23/2006	1	0.007504	0-4
OU2R-SED-101D-average-08	6/5/2008	1	0.004122	0-4
OU2R-SED-101D-average-09	6/5/2009	1	0.005678	0-4
OU2R-SED-102DC-08	6/5/2008	1	0.00715	0-4
SDCR12-FSA-092509	9/25/2009	1	0.00324	0-2
OU2R-SED-102C-09	6/5/2009	1	0.00535	0-4

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/3/10
CHECKED BY/DATE: HEF 5/5/10

Appendix O Index
(Titles below are active links to the Appendix O data file)

Surface Water, 1991, 1994, HCB, Elevation Independent

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, HCB, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, HCB, 6 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, HCB, 3 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, HCB, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, HCB, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, HCB, 6 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, HCB, 3 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, HCB, 6 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 6 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 3 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 6 ft

Sediment Basin, Average, Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 3 ft

Sediment Basin, Average, Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, HCB, 6 ft

Sediment Round Pond, 0-2, 0-4, 4-8 and 0-12, 1994, 2001, 2006, 2008, 2009, HCB, Elevation Independent

Sediment Round Pond, Starting at 0, 1994, 2001, 2006, 2008, 2009, HCB, Elevation Independent

Sediment Round Pond, Average, 0-2, 0-4, 4-8 and 0-12, 1994, 2001, 2006, 2008, 2009, HCB, Elevation Independent

Sediment Round Pond, Average, Starting at 0, 1994, 2001, 2006, 2008, 2009, HCB, Elevation Independent

Note: 3 ft and 6 ft elevations correspond to 3 ft of 6 ft NAVD88

Basin Surfacewater HCB UCL 1991 and 1994

Sample ID	Date	Detected	HCB (ng/L)
OWG0101-0694	6/27/1994	1	40.2
OWG0107-0894	8/18/1994	1	24.7
OWG0202-0694	6/27/1994	1	44.2
OWG0208-0894	8/18/1994	1	28.9
OWG0303-0694	6/27/1994	1	41.2
OWG0309-0894	8/18/1994	1	21.5
WGC901-0891	8/29/1991	0	10000
WGC902-0891	8/29/1991	0	10000
WGF201-0891	8/29/1991	0	10000
WGG601-0891	8/30/1991	0	10000
WGG602-0891	8/30/1991	0	10000
WGH501-0891	8/30/1991	0	10000
WGH502-0891	8/30/1991	0	10000
WGH901-0891	8/29/1991	0	10000
WGH902-0891	8/29/1991	0	10000

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/14/10

1991-94 SW HCB

General Statistics

Number of Valid Data	15	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	900.00%
		Percent Non-Detects	60.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	2.15E+01	Minimum Detected	3.068
Maximum Detected	4.42E+01	Maximum Detected	3.789
Mean of Detected	3.35E+01	Mean of Detected	3.473
SD of Detected	9.605	SD of Detected	0.302
Minimum Non-Detect	10000	Minimum Non-Detect	9.21
Maximum Non-Detect	10000	Maximum Non-Detect	9.21

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.886	Shapiro Wilk Test Statistic	0.888
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3013	Mean	6.5
SD	2519	SD	2.564
95% DL/2 (t) UCL	4159	95% H-Stat (DL/2) UCL	876047

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.473
		SD in Log Scale	2.94E-01
		Mean in Original Scale	3.36E+01
		SD in Original Scale	9.67E+00
		95% Percentile Bootstrap UCL	3.75E+01
		95% BCA Bootstrap UCL	37.5

Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only

k star (bias corrected)	6.99E+00	Data appear Normal at 5% Significance Level	
Theta Star	4.783		
nu star	83.92		
A-D Test Statistic	0.441	Nonparametric Statistics	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	3.35E+01
5% K-S Critical Value	0.332	SD	8.77E+00
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	3.92E+00
		95% KM (t) UCL	4.04E+01
Assuming Gamma Distribution		95% KM (z) UCL	3.99E+01
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4.08E+01
Minimum	1.55E+01	95% KM (bootstrap t) UCL	4.18E+01
Maximum	4.49E+01	95% KM (BCA) UCL	3.95E+01
Mean	3.33E+01	95% KM (Percentile Bootstrap) UCL	3.96E+01
Median	3.50E+01	95% KM (Chebyshev) UCL	5.05E+01
SD	9.338	97.5% KM (Chebyshev) UCL	5.79E+01
k star	9.48E+00	99% KM (Chebyshev) UCL	72.46
Theta star	3.51		
Nu star	284.5	Potential UCLs to Use	
AppChi2	2.46E+02	95% KM (t) UCL	4.04E+01
95% Gamma Approximate UCL	3.84E+01	95% KM (Percentile Bootstrap) UCL	39.63
95% Adjusted Gamma UCL	39.12		

Note: DL/2 is not a recommended method.

Basin Sediment HCB UCL for 2008 and 2009 at 3ft. NAVD88

Sample ID	Date	Detected	HCB (mg/kg)	Depth Interval (inches)
OU2B-SED-403C-08	6/6/2008	0	1.3	0-4
OU2B-SED-402C-08	6/6/2008	0	1.48	0-4
OU2B-SED-201C-08	6/8/2008	1	7.29	0-4
OU2B-SED-204C-08	6/9/2008	0	0.979	0-4
OU2B-SED-302C-08	6/10/2008	1	3.35	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.98	0-4
OU2B-SED-303DC-08	6/10/2008	1	34.1	0-4
OU2B-SED-303DC-09	6/7/2009	1	8.9	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0221	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.867	0-4
OU2B-SED-204C-09	6/7/2009	1	0.628	0-4
OU2B-SED-201C-09	6/8/2009	1	5.97	0-4
OU2B-SED-302C-09	6/8/2009	0	0.0069	0-4
OU2B-SED-403C-09	6/9/2009	1	0.0313	0-4
SDCR3-CA-092709	9/27/2009	0	0.034	0-12
SDCR8-CA-092809	9/28/2009	0	0.11	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

SED HCB 08-09 A

General Statistics			
Number of Valid Data	16	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	6
		Percent Non-Detects	37.50%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0221	Minimum Detected	-3.812
Maximum Detected	34.1	Maximum Detected	3.529
Mean of Detected	6.214	Mean of Detected	0.279
SD of Detected	10.32	SD of Detected	2.4
Minimum Non-Detect	0.0069	Minimum Non-Detect	-4.976
Maximum Non-Detect	1.48	Maximum Non-Detect	0.392

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	68.75%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.633	Shapiro Wilk Test Statistic	0.914
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.006	Mean	-0.706
SD	8.519	SD	2.615
95% DL/2 (t) UCL	7.739	95% H-Stat (DL/2) UCL	416.6

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.137
		SD in Log Scale	2.748
		Mean in Original Scale	3.901
		SD in Original Scale	8.566
		95% Percentile Bootstrap UCL	7.983
		95% BCA Bootstrap UCL	9.555

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.362	Data appear Gamma Distributed at 5% Significance Level
Theta Star	17.17	
nu star	7.236	

A-D Test Statistic	0.25	Nonparametric Statistics

5% A-D Critical Value	0.791	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.791	Mean	3.942
5% K-S Critical Value	0.284	SD	8.277
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.182
		95% KM (t) UCL	7.767
Assuming Gamma Distribution		95% KM (z) UCL	7.531
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.688
Minimum	2.21E-02	95% KM (bootstrap t) UCL	14.59
Maximum	34.1	95% KM (BCA) UCL	8.294
Mean	5.917	95% KM (Percentile Bootstrap) UCL	7.79
Median	5.221	95% KM (Chebyshev) UCL	13.45
SD	8.004	97.5% KM (Chebyshev) UCL	17.57
k star	0.555	99% KM (Chebyshev) UCL	25.65
Theta star	10.66		
Nu star	17.77	Potential UCLs to Use	
AppChi2	9.226	95% KM (BCA) UCL	8.294
95% Gamma Approximate UCL	11.4		
95% Adjusted Gamma UCL	12.33		

Note: DL/2 is not a recommended method.

Basin Sediment HCB UCL for 1991, 1994, 2001, 2008 and 2009 at 3ft. NAVD88 Elevation

Sample ID	Date	Detected	HCB (mg/kg)	Depth Interval (inches)
OU2B-SED-403C-08	6/6/2008	0	1.3	0-4
OU2B-SED-402C-08	6/6/2008	0	1.48	0-4
OU2B-SED-201C-08	6/8/2008	1	7.29	0-4
OU2B-SED-204C-08	6/9/2008	0	0.979	0-4
OU2B-SED-302C-08	6/10/2008	1	3.35	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.98	0-4
OU2B-SED-303DC-08	6/10/2008	1	34.1	0-4
OU2B-SED-303DC-09	6/7/2009	1	8.9	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0221	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.867	0-4
OU2B-SED-204C-09	6/7/2009	1	0.628	0-4
OU2B-SED-201C-09	6/8/2009	1	5.97	0-4
OU2B-SED-302C-09	6/8/2009	0	0.0069	0-4
OU2B-SED-403C-09	6/9/2009	1	0.0313	0-4
ODG0101-0694	6/30/1994	1	6.4	0-6
ODG0102-0694	6/30/1994	1	5.7	0-6
ODG0103-0694	6/30/1994	1	5.6	0-6
ODG0301-0694	6/30/1994	1	0.78	0-6
ODG0302-0694	6/30/1994	1	0.25	0-6
ODG0303-0694	6/30/1994	1	0.074	0-6
SE-H2-0901	9/7/2001	1	0.9	0-6
SE-H6-0901	9/7/2001	1	1.2	0-6
SE-J3-0901	9/7/2001	1	0.29	0-6
SE-J6-0901	9/7/2001	1	0.12	0-6
SE-K4-0901	9/7/2001	1	0.14	0-6
SE-K5-0901	9/7/2001	1	0.1	0-6
SE-B4-0901	9/8/2001	1	0.086	0-6
SE-B5-0901	9/8/2001	1	7.9	0-6
SE-C6-0901	9/8/2001	1	0.42	0-6
SE-D10-0901	9/8/2001	1	0.38	0-6
SE-D3-0901	9/8/2001	1	51	0-6
SE-E2-0901	9/8/2001	1	53	0-6
SE-E3-0901	9/8/2001	1	16	0-6
SE-F7-0901	9/8/2001	1	0.23	0-6
SE-FP17-0901	9/8/2001	1	0.032	0-6
SE-FP22-0901	9/8/2001	1	0.16	0-6
SE-G3-0901	9/8/2001	1	32	0-6
SE-H4-0901	9/8/2001	1	0.7	0-6

SE-H8-0901	9/8/2001	1	0.24	0-6
SE-I10-0901	9/8/2001	1	0.12	0-6
SE-B10-101101-01	10/11/2001	1	1	0-6
SE-B10-101101-02	10/11/2001	1	0.79	0-6
SE-B10-101101-03	10/11/2001	1	5.3	0-6
SE-B10-101101-04	10/11/2001	1	0.9	0-6
SE-B10-101101-05	10/11/2001	1	2.2	0-6
SE-B10-101101-06	10/11/2001	1	2	0-6
SE-B1-101101-01	10/11/2001	1	15	0-6
SE-B1-101101-02	10/11/2001	1	1.4	0-6
SE-B1-101101-03	10/11/2001	1	18	0-6
SE-B2-101101-01	10/11/2001	1	1.7	0-6
SE-B2-101101-02	10/11/2001	1	0.48	0-6
SE-B2-101101-03	10/11/2001	1	0.87	0-6
SE-B3-101101-01	10/11/2001	1	2.9	0-6
SE-B3-101101-02	10/11/2001	1	1.3	0-6
SE-B3-101101-03	10/11/2001	1	1.9	0-6
SE-B4-101101-01	10/11/2001	1	0.95	0-6
SE-B4-101101-02	10/11/2001	1	5.1	0-6
SE-B4-101101-03	10/11/2001	1	3.9	0-6
SE-B5-101101-01	10/11/2001	1	0.8	0-6
SE-B5-101101-02	10/11/2001	1	6.5	0-6
SE-B5-101101-03	10/11/2001	1	0.83	0-6
SE-B6-101101-01	10/11/2001	1	0.52	0-6
SE-B6-101101-02	10/11/2001	1	0.91	0-6
SE-B6-101101-03	10/11/2001	1	1.5	0-6
SE-B6-101101-04	10/11/2001	1	0.6	0-6
SE-B6-101101-05	10/11/2001	1	0.63	0-6
SE-B6-101101-06	10/11/2001	1	0.75	0-6
SGA07-081091	10-Aug-91	0	1	0-6
SGB10-080791	07-Aug-91	0	1	0-6
SGB04-081391	13-Aug-91	1	1.2	0-6
SGB05-081391	13-Aug-91	1	4.5	0-6
SGB06-081091	10-Aug-91	0	1	0-6
SGB07-081091	10-Aug-91	0	1	0-6
SGB08-080991	09-Aug-91	0	1	0-6
SGB09-080991	09-Aug-91	0	1	0-6
SGC10-080891	08-Aug-91	0	1.5	0-6
SGC04-081391	13-Aug-91	1	3.8	0-6
SGC05-081391	13-Aug-91	1	20	0-6
SGC06-081191	11-Aug-91	0	1.3	0-6
SGC07-081091	10-Aug-91	0	1	0-6
SGC08-080991	09-Aug-91	0	1	0-6
SGC09-080991	09-Aug-91	0	1	0-6
SGD10-080891	08-Aug-91	0	1.5	0-6
SGD11-080991	09-Aug-91	0	1	0-6
SGD03-081491	14-Aug-91	1	51.9	0-6
SGD04-081391	13-Aug-91	1	11.4	0-6

SGD05-081391	13-Aug-91	1	1	0-6
SGD06-081191	11-Aug-91	0	1.7	0-6
SGD07-081091	10-Aug-91	0	1	0-6
SGD08-080991	09-Aug-91	0	1	0-6
SGD09-080991	09-Aug-91	0	1	0-6
SGE10-080891	08-Aug-91	0	1	0-6
SGE02-081491	14-Aug-91	1	265	0-6
SCE201-1191	14-Nov-91	1	250	0-2.04
SGE03-081391	13-Aug-91	1	110	0-6
SGE04-081391	13-Aug-91	1	44.8	0-6
SGE05-081391	13-Aug-91	1	3.7	0-6
SGE06-081091	10-Aug-91	0	1	0-6
SGE07-081091	10-Aug-91	0	1	0-6
SGE08-080991	09-Aug-91	0	1	0-6
SGE09-080991	09-Aug-91	0	1	0-6
SGF01-081491	14-Aug-91	1	32.5	0-6
SGF10-080791	07-Aug-91	0	1	0-6
SGF02-081391	13-Aug-91	1	122	0-6
SGF03-081391	13-Aug-91	1	35.6	0-6
SGF04-081391	13-Aug-91	1	66.2	0-6
SGF05-081391	13-Aug-91	1	1.4	0-6
SGF06-081091	10-Aug-91	1	1.4	0-6
SGF07-081191	11-Aug-91	0	1.4	0-6
SGF08080891	08-Aug-91	0	1	0-6
SGF09-080891	08-Aug-91	0	1	0-6
SGG01-081491	14-Aug-91	1	3.1	0-6
SGG02-081391	13-Aug-91	1	6	0-6
SGG03-081391	13-Aug-91	1	40	0-6
SGG04-081391	13-Aug-91	1	4.3	0-6
SGG05-081391	13-Aug-91	0	1	0-6
SGG06-081091	10-Aug-91	0	1	0-6
SGG07-081091	10-Aug-91	0	1	0-6
SGG08-081191	11-Aug-91	0	1.3	0-6
SGG09-080991	09-Aug-91	0	1.4	0-6
SGH10-080991	09-Aug-91	0	1	0-6
SGH02-081391	13-Aug-91	1	1.7	0-6
SGH03-081391	13-Aug-91	0	1	0-6
SGH04-081391	13-Aug-91	1	0.5	0-6
SGH05-081391	13-Aug-91	0	1	0-6
SGH06-081091	10-Aug-91	0	1	0-6
SGH07-081091	10-Aug-91	0	1	0-6
SGH08-081191	11-Aug-91	0	1.5	0-6
SGH09-080991	09-Aug-91	0	1	0-6
SGI10-081191	11-Aug-91	1	1.8	0-6
SGI03-081391	13-Aug-91	0	1	0-6
SGI04-081391	13-Aug-91	0	1	0-6
SGI05-081391	13-Aug-91	0	1	0-6
SGI06-081091	10-Aug-91	0	1	0-6
SCI701-1191	13-Nov-91	1	0.39	0-2.04
SGI07-081091	10-Aug-91	0	1	0-6
SGI08-080991	09-Aug-91	0	1	0-6
SGI09-080991	09-Aug-91	0	1	0-6
SGJ03-081391	13-Aug-91	0	1	0-6

SGJ04-081391	13-Aug-91	0	1	0-6
SGJ05-081391	13-Aug-91	0	1	0-6
SGJ06-081191	11-Aug-91	0	1.6	0-6
SGJ07-081191	11-Aug-91	0	0.76	0-6
SGJ09-080991	09-Aug-91	0	1	0-6
SGK04-081391	13-Aug-91	0	0.67	0-6
SGK05-081391	13-Aug-91	0	1	0-6
SGFP11-083192	31-Aug-92	0	0.5	0-6
OSG0901-0694	30-Jun-94	1	0.2	0-6
OSG0902-0694	30-Jun-94	1	0.11	0-6
OSG0903-0694	30-Jun-94	1	0.06	0-6
SDCR3-CA-092709	9/27/2009	0	0.034	0-12
SDCR8-CA-092809	9/28/2009	0	0.11	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

SED HCB all A

General Statistics			
Number of Valid Data	152	Number of Detected Data	92
Number of Distinct Detected Data	85	Number of Non-Detect Data	60
		Percent Non-Detects	39.47%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0221	Minimum Detected	-381.20%
Maximum Detected	265	Maximum Detected	5.58
Mean of Detected	15.32	Mean of Detected	0.671
SD of Detected	42.02	SD of Detected	2.099
Minimum Non-Detect	0.0069	Minimum Non-Detect	-4.976
Maximum Non-Detect	1.7	Maximum Non-Detect	0.531

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	108
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	44
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	71.05%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.358	Lilliefors Test Statistic	0.0742
5% Lilliefors Critical Value	0.0924	5% Lilliefors Critical Value	0.0924
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9.472	Mean	0.0806
SD	33.42	SD	1.864
95% DL/2 (t) UCL	13.96	95% H-Stat (DL/2) UCL	6.46

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.243
		SD in Log Scale	2.174
		Mean in Original Scale	9.426
		SD in Original Scale	33.43
		95% Percentile Bootstrap UCL	14.15
		95% BCA Bootstrap UCL	15.96

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.326	Data appear Lognormal at 5% Significance Level
Theta Star	46.93	
nu star	60.05	

A-D Test Statistic	5.131	Nonparametric Statistics

5% A-D Critical Value	0.86	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.86	Mean	9.427
5% K-S Critical Value	0.101	SD	33.32
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.718
		95% KM (t) UCL	13.92
Assuming Gamma Distribution		95% KM (z) UCL	13.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	13.92
Minimum	1.00E-09	95% KM (bootstrap t) UCL	17.48
Maximum	265	95% KM (BCA) UCL	14.3
Mean	14.18	95% KM (Percentile Bootstrap) UCL	14.44
Median	1.45E+00	95% KM (Chebyshev) UCL	21.27
SD	34.73	97.5% KM (Chebyshev) UCL	26.4
k star	0.142	99% KM (Chebyshev) UCL	36.47
Theta star	99.76		
Nu star	43.21	Potential UCLs to Use	
AppChi2	29.14	97.5% KM (Chebyshev) UCL	26.4
95% Gamma Approximate UCL	21.03		
95% Adjusted Gamma UCL	21.11		

Note: DL/2 is not a recommended method.

Basin Sediment HCB UCL for 1991, 1994, 2001, 2008 and 2009 at 6ft NAVD88 Elevation

Sample ID	Date	Detected	HCB (mg/kg)	Depth Interval (inches)
SGB10-080791	07-Aug-91	0	1	0-6
SGF10-080791	07-Aug-91	0	1	0-6
SGC10-080891	08-Aug-91	0	1.5	0-6
SGD10-080891	08-Aug-91	0	1.5	0-6
SGE10-080891	08-Aug-91	0	1	0-6
SGF08080891	08-Aug-91	0	1	0-6
SGF09-080891	08-Aug-91	0	1	0-6
SGB08-080991	09-Aug-91	0	1	0-6
SGB09-080991	09-Aug-91	0	1	0-6
SGC08-080991	09-Aug-91	0	1	0-6
SGC09-080991	09-Aug-91	0	1	0-6
SGD08-080991	09-Aug-91	0	1	0-6
SGD09-080991	09-Aug-91	0	1	0-6
SGD11-080991	09-Aug-91	0	1	0-6
SGE08-080991	09-Aug-91	0	1	0-6
SGE09-080991	09-Aug-91	0	1	0-6
SGG09-080991	09-Aug-91	0	1.4	0-6
SGH09-080991	09-Aug-91	0	1	0-6
SGH10-080991	09-Aug-91	0	1	0-6
SGI08-080991	09-Aug-91	0	1	0-6
SGI09-080991	09-Aug-91	0	1	0-6
SGJ09-080991	09-Aug-91	0	1	0-6
SGA07-081091	10-Aug-91	0	1	0-6
SGB06-081091	10-Aug-91	0	1	0-6
SGB07-081091	10-Aug-91	0	1	0-6
SGC07-081091	10-Aug-91	0	1	0-6
SGD07-081091	10-Aug-91	0	1	0-6
SGE06-081091	10-Aug-91	0	1	0-6
SGE07-081091	10-Aug-91	0	1	0-6
SGF06-081091	10-Aug-91	1	1.4	0-6
SGG06-081091	10-Aug-91	0	1	0-6
SGG07-081091	10-Aug-91	0	1	0-6
SGH06-081091	10-Aug-91	0	1	0-6
SGH07-081091	10-Aug-91	0	1	0-6
SGI06-081091	10-Aug-91	0	1	0-6
SGI07-081091	10-Aug-91	0	1	0-6
SGC06-081191	11-Aug-91	0	1.3	0-6
SGD06-081191	11-Aug-91	0	1.7	0-6
SGF07-081191	11-Aug-91	0	1.4	0-6
SGG08-081191	11-Aug-91	0	1.3	0-6

SGH08-081191	11-Aug-91	0	1.5	0-6
SGI10-081191	11-Aug-91	1	1.8	0-6
SGJ06-081191	11-Aug-91	0	1.6	0-6
SGJ07-081191	11-Aug-91	0	0.76	0-6
SGB04-081391	13-Aug-91	1	1.2	0-6
SGB05-081391	13-Aug-91	1	4.5	0-6
SGC04-081391	13-Aug-91	1	3.8	0-6
SGC05-081391	13-Aug-91	1	20	0-6
SGD04-081391	13-Aug-91	1	11.4	0-6
SGD05-081391	13-Aug-91	1	1	0-6
SGE03-081391	13-Aug-91	1	110	0-6
SGE04-081391	13-Aug-91	1	44.8	0-6
SGE05-081391	13-Aug-91	1	3.7	0-6
SGF02-081391	13-Aug-91	1	122	0-6
SGF03-081391	13-Aug-91	1	35.6	0-6
SGF04-081391	13-Aug-91	1	66.2	0-6
SGF05-081391	13-Aug-91	1	1.4	0-6
SGG02-081391	13-Aug-91	1	6	0-6
SGG03-081391	13-Aug-91	1	40	0-6
SGG04-081391	13-Aug-91	1	4.3	0-6
SGG05-081391	13-Aug-91	0	1	0-6
SGH02-081391	13-Aug-91	1	1.7	0-6
SGH03-081391	13-Aug-91	0	1	0-6
SGH04-081391	13-Aug-91	1	0.5	0-6
SGH05-081391	13-Aug-91	0	1	0-6
SGI03-081391	13-Aug-91	0	1	0-6
SGI04-081391	13-Aug-91	0	1	0-6
SGI05-081391	13-Aug-91	0	1	0-6
SGJ03-081391	13-Aug-91	0	1	0-6
SGJ04-081391	13-Aug-91	0	1	0-6
SGJ05-081391	13-Aug-91	0	1	0-6
SGK04-081391	13-Aug-91	0	0.67	0-6
SGK05-081391	13-Aug-91	0	1	0-6
SGD03-081491	14-Aug-91	1	51.9	0-6
SGE02-081491	14-Aug-91	1	265	0-6
SGF01-081491	14-Aug-91	1	32.5	0-6
SGG01-081491	14-Aug-91	1	3.1	0-6
SCI701-1191	13-Nov-91	1	0.39	0-2.04
SCE201-1191	14-Nov-91	1	250	0-2.04
SGFP30-082992	8/29/1992	0	0.5	0-6
SGFP11-083192	8/31/1992	0	0.5	0-6
SGFP23-083192	8/31/1992	0	0.5	0-6
ODG0101-0694	6/30/1994	1	6.4	0-6
ODG0102-0694	6/30/1994	1	5.7	0-6
ODG0103-0694	6/30/1994	1	5.6	0-6
ODG0301-0694	6/30/1994	1	0.78	0-6

ODG0302-0694	6/30/1994	1	0.25	0-6
ODG0303-0694	6/30/1994	1	0.074	0-6
ODG0501-0694	6/30/1994	0	0.052	0-6
ODG0502-0694	6/30/1994	0	0.052	0-6
ODG0503-0694	6/30/1994	0	0.054	0-6
OSG0701-0694	6/30/1994	1	0.34	0-6
OSG0702-0694	6/30/1994	1	0.33	0-6
OSG0703-0694	6/30/1994	1	0.5	0-6
OSG0801-0694	6/30/1994	1	0.12	0-6
OSG0802-0694	6/30/1994	1	0.67	0-6
OSG0803-0694	6/30/1994	1	0.094	0-6
OSG0901-0694	6/30/1994	1	0.2	0-6
OSG0902-0694	6/30/1994	1	0.11	0-6
OSG0903-0694	6/30/1994	1	0.06	0-6
OSG1001-0694	6/30/1994	1	0.057	0-6
OSG1002-0694	6/30/1994	1	0.051	0-6
OSG1003-0694	6/30/1994	1	0.073	0-6
SE-H2-0901	9/7/2001	1	0.9	0-6
SE-H6-0901	9/7/2001	1	1.2	0-6
SE-J3-0901	9/7/2001	1	0.29	0-6
SE-J6-0901	9/7/2001	1	0.12	0-6
SE-K4-0901	9/7/2001	1	0.14	0-6
SE-K5-0901	9/7/2001	1	0.1	0-6
SE-B4-0901	9/8/2001	1	0.086	0-6
SE-B5-0901	9/8/2001	1	7.9	0-6
SE-C6-0901	9/8/2001	1	0.42	0-6
SE-D10-0901	9/8/2001	1	0.38	0-6
SE-D3-0901	9/8/2001	1	51	0-6
SE-E2-0901	9/8/2001	1	53	0-6
SE-E3-0901	9/8/2001	1	16	0-6
SE-F7-0901	9/8/2001	1	0.23	0-6
SE-FP17-0901	9/8/2001	1	0.032	0-6
SE-FP22-0901	9/8/2001	1	0.16	0-6
SE-G3-0901	9/8/2001	1	32	0-6
SE-H4-0901	9/8/2001	1	0.7	0-6
SE-H8-0901	9/8/2001	1	0.24	0-6
SE-I10-0901	9/8/2001	1	0.12	0-6
SE-R1-101101-01	10/4/2001	1	0.45	0-6
SE-R1-101101-02	10/4/2001	0	0.01	0-6
SE-R1-101101-03	10/4/2001	0	0.01	0-6
SE-R2-101101-01	10/4/2001	0	0.01	0-6
SE-R2-101101-02	10/4/2001	1	0.28	0-6
SE-R2-101101-03	10/4/2001	1	2	0-6
SE-R7-101101-01	10/4/2001	0	0.01	0-6
SE-R7-101101-02	10/4/2001	0	0.01	0-6
SE-R7-101101-03	10/4/2001	0	0.01	0-6
SE-B10-101101-01	10/11/2001	1	1	0-6
SE-B10-101101-02	10/11/2001	1	0.79	0-6
SE-B10-101101-03	10/11/2001	1	5.3	0-6
SE-B10-101101-04	10/11/2001	1	0.9	0-6
SE-B10-101101-05	10/11/2001	1	2.2	0-6
SE-B10-101101-06	10/11/2001	1	2	0-6
SE-B1-101101-01	10/11/2001	1	15	0-6

SE-B1-101101-02	10/11/2001	1	1.4	0-6
SE-B1-101101-03	10/11/2001	1	18	0-6
SE-B2-101101-01	10/11/2001	1	1.7	0-6
SE-B2-101101-02	10/11/2001	1	0.48	0-6
SE-B2-101101-03	10/11/2001	1	0.87	0-6
SE-B3-101101-01	10/11/2001	1	2.9	0-6
SE-B3-101101-02	10/11/2001	1	1.3	0-6
SE-B3-101101-03	10/11/2001	1	1.9	0-6
SE-B4-101101-01	10/11/2001	1	0.95	0-6
SE-B4-101101-02	10/11/2001	1	5.1	0-6
SE-B4-101101-03	10/11/2001	1	3.9	0-6
SE-B5-101101-01	10/11/2001	1	0.8	0-6
SE-B5-101101-02	10/11/2001	1	6.5	0-6
SE-B5-101101-03	10/11/2001	1	0.83	0-6
SE-B6-101101-01	10/11/2001	1	0.52	0-6
SE-B6-101101-02	10/11/2001	1	0.91	0-6
SE-B6-101101-03	10/11/2001	1	1.5	0-6
SE-B6-101101-04	10/11/2001	1	0.6	0-6
SE-B6-101101-05	10/11/2001	1	0.63	0-6
SE-B6-101101-06	10/11/2001	1	0.75	0-6
OU2B-SED-403C-08	6/6/2008	0	1.3	0-4
OU2B-SED-402C-08	6/6/2008	0	1.48	0-4
OU2B-SED-201C-08	6/8/2008	1	7.29	0-4
OU2B-SED-204C-08	6/9/2008	0	0.979	0-4
OU2B-SED-302C-08	6/10/2008	1	3.35	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.98	0-4
OU2B-SED-303DC-08	6/10/2008	1	34.1	0-4
OU2B-SED-303DC-09	6/7/2009	1	8.9	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0221	0-4
OU2B-SED-203DC-09	6/7/2009	1	0.867	0-4
OU2B-SED-204C-09	6/7/2009	1	0.628	0-4
OU2B-SED-201C-09	6/8/2009	1	5.97	0-4
OU2B-SED-302C-09	6/8/2009	0	0.0069	0-4
OU2B-SED-403C-09	6/9/2009	1	0.0313	0-4
SDCR3-CA-092709	9/27/2009	0	0.034	0-12
SDCR8-CA-092809	9/28/2009	0	0.11	0-12

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10
CHECKED BY/DATE: HEF 5/5/10

Sed HCB all years A 6ft

General Statistics			
Number of Valid Data	175	Number of Detected Data	104
Number of Distinct Detected Data	94	Number of Non-Detect Data	71
		Percent Non-Detects	40.57%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0221	Minimum Detected	-3.812
Maximum Detected	265	Maximum Detected	5.58
Mean of Detected	13.6	Mean of Detected	0.424
SD of Detected	39.79	SD of Detected	2.121
Minimum Non-Detect	0.0069	Minimum Non-Detect	-4.976
Maximum Non-Detect	1.7	Maximum Non-Detect	0.531

Note: Data have multiple DLs - Use of KM Method is recommended		
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Non-Detect	130
Observations < Largest ND are treated as NDs	Number treated as Detected	45
	Single DL Non-Detect Percentage	74.29%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.366	Lilliefors Test Statistic	0.0793
5% Lilliefors Critical Value	0.0869	5% Lilliefors Critical Value	0.0869
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.259	Mean	-0.29
SD	31.29	SD	2.093
95% DL/2 (t) UCL	12.17	95% H-Stat (DL/2) UCL	13.18
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.744
		SD in Log Scale	2.411
		Mean in Original Scale	8.18
		SD in Original Scale	31.31
		95% Percentile Bootstrap UCL	12.35
		95% BCA Bootstrap UCL	13.23
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.311	Data appear Lognormal at 5% Significance Level	
Theta Star	43.77		
nu star	64.61		
A-D Test Statistic	6.502	Nonparametric Statistics	

5% A-D Critical Value	0.864	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.864	Mean	8.192
5% K-S Critical Value	0.0958	SD	31.22
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.371
		95% KM (t) UCL	12.11
Assuming Gamma Distribution		95% KM (z) UCL	12.09
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12.1
Minimum	2.21E-02	95% KM (bootstrap t) UCL	15.77
Maximum	265	95% KM (BCA) UCL	12.34
Mean	13.12	95% KM (Percentile Bootstrap) UCL	12.47
Median	5.849	95% KM (Chebyshev) UCL	18.53
SD	31.16	97.5% KM (Chebyshev) UCL	23
k star	0.461	99% KM (Chebyshev) UCL	31.79
Theta star	28.47		
Nu star	161.2	Potential UCLs to Use	
AppChi2	132.9	97.5% KM (Chebyshev) UCL	23
95% Gamma Approximate UCL	15.92		
95% Adjusted Gamma UCL	15.94		

Note: DL/2 is not a recommended method.

Round Pond Sediment HCB UCL for 1994 and 2001

Sample ID	Date	Detected	HCB (mg/kg)	*Depth* Interval (inches)
ODG0501-0694	6/30/1994	0	0.052	0-6
ODG0502-0694	6/30/1994	0	0.052	0-6
ODG0503-0694	6/30/1994	0	0.054	0-6
SE-R1-101101-01	10/4/2001	1	0.45	0-6
SE-R1-101101-02	10/4/2001	0	0.01	0-6
SE-R1-101101-03	10/4/2001	0	0.01	0-6
SE-R2-101101-01	10/4/2001	0	0.01	0-6
SE-R2-101101-02	10/4/2001	1	0.28	0-6
SE-R2-101101-03	10/4/2001	1	2	0-6
SE-R7-101101-01	10/4/2001	0	0.01	0-6
SE-R7-*101101-02*	*10/4/2001*	*0*	*0.01*	*0-6*
SE-R7-101101-03	10/4/2001	0	0.01	0-6

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

RP Sed HCB 94-01

General Statistics			
Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.28	Minimum Detected	-1.273
Maximum Detected	3	Maximum Detected	1.099
Mean of Detected	1.76	Mean of Detected	0.173
SD of Detected	1.376	SD of Detected	1.268
Minimum Non-Detect	0.01	Minimum Non-Detect	-4.605
Maximum Non-Detect	0.054	Maximum Non-Detect	-2.919

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	75.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.977	Shapiro Wilk Test Statistic	0.874
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.449	Mean	-3.515
SD	0.984	SD	2.396
95% DL/2 (t) UCL	0.959	95% H-Stat (DL/2) UCL	6.707

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.861
		SD in Log Scale	2.893
		Mean in Original Scale	0.451

SD in Original Scale	0.983
95% Percentile Bootstrap UCL	0.944
95% BCA Bootstrap UCL	1.098

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.65
SD	0.852
SE of Mean	0.301
95% KM (t) UCL	1.191
95% KM (z) UCL	1.146
95% KM (jackknife) UCL	1.781
95% KM (bootstrap t) UCL	0.828
95% KM (BCA) UCL	3
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	1.963
97.5% KM (Chebyshev) UCL	2.532
99% KM (Chebyshev) UCL	3.648
Potential UCLs to Use	
95% KM (t) UCL	1.191
95% KM (Percentile Bootstrap) UCL	N/A

Appendix P1 Index

(Titles below are active links to the Appendix P1 data file)

Surface Water, 1991, 1994, DDTR, ND = 0, Elevation Independent

Surface Water, 1991, 1994, DDTR, ND = 1/2 DL, Elevation Independent

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 1/2 DL, 6 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, DDTR, ND = 0, 3ft

Sediment Basin, Depths Starting at 0, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, Depths Starting at 0, 2008, 2009, DDTR, ND = 1/2 DL, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009, DDTR, ND = 1/2 DL , 6 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, Average, Depths Starting at 0, 2008, 2009, DDTR, ND = 1/2 DL, 6 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

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Sediment Basin, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 6 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, 3 ft DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 6 ft

Sediment Basin, Average Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 3 ft

Sediment Basin, Average Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 3 ft

Sediment Basin, Average Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, 6 ft

Sediment Basin, Average Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, 6ft

Sediment Round Pond, 0-2, 0-4, 4-8 and 0-12, 2008, 2009 DDTR, ND = 0, Elevation Independent

Sediment Round Pond, 0-2, 0-4, 4-8 and 0-12, 2008, 2009 DDTR, ND = 1/2 DL, Elevation Independent

Sediment Round Pond, Depths Starting at 0, 2008, 2009, DDTR, ND = 0, Elevation Independent

Sediment Round Pond, Depths Starting at 0, 2008, 2009, ND = 1/2 DL, Elevation Independent

Sediment Round Pond, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009 DDTR, ND = 0, Elevation Independent

Sediment Round Pond, Average, 0-2, 0-4, 4-8 and 0-12, 2008, 2009 DDTR, ND = 1/2 DL, Elevation Independent

Sediment Round Pond, Average, Depths Starting at 0, 2008, 2009, DDTR, ND = 0, Elevation Independent

Sediment Round Pond, Average, Depths Starting at 0, 2008, 2009, DDTR, ND = 1/2 DL, Elevation Independent

Sediment Round Pond, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, Elevation Independent

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Sediment Round Pond, Average, 0-2, 0-4, 4-8 and 0-12, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, Elevation Independent

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Sediment Round Pond, Average, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 0, Elevation Independent

Sediment Round Pond, Average, Depths Starting at 0, 1991, 1994, 2001, 2006, 2008, 2009, DDTR, ND = 1/2 DL, Elevation Independent

Note: 3 ft and 6 ft elevations correspond to 3 ft or 6 ft NAVD88

Surface Water DDTR UCL with ND Constituents Equal to Zero for 1991 and 1994

Sample ID	Date	Detected	DDTR (ng/L)
OWG0101	6/27/1994	1	141.32
OWG0107	8/18/1994	1	95.7
OWG0202	6/27/1994	1	142.2
OWG0208	8/18/1994	1	184.31
OWG0303	6/27/1994	1	213.3
OWG0309	8/18/1994	1	98.2
OWG0404	6/27/1994	1	162.5
OWG0410	8/18/1994	1	402.3
OWG0505	6/27/1994	1	291.87
OWG0511	8/18/1994	1	276.1
WGC901-0891	8/29/1991	0	100
WGC902-0891	8/29/1991	0	100
WGF201-0891	8/29/1991	0	100
WGH901-0891	8/29/1991	0	100
WGH902-0891	8/29/1991	0	100
WGG601-0891	8/30/1991	0	100
WGG602-0891	8/30/1991	0	100
WGH501-0891	8/30/1991	0	100
WGH502-0891	8/30/1991	0	100

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

DDTR (ND=0)

General Statistics			
Number of Valid Data	19	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	9
		Percent Non-Detects	47.37%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	95.7	Minimum Detected	4.561
Maximum Detected	402.3	Maximum Detected	5.997
Mean of Detected	200.8	Mean of Detected	5.202
SD of Detected	97.19	SD of Detected	0.469
Minimum Non-Detect	100	Minimum Non-Detect	4.605
Maximum Non-Detect	100	Maximum Non-Detect	4.605

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.91	Shapiro Wilk Test Statistic	0.961
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	129.4	Mean	4.591
SD	103.5	SD	0.74
95% DL/2 (t) UCL	170.5	95% H-Stat (DL/2) UCL	116.5
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	71.06	Mean in Log Scale	4.854
SD	164.3	SD in Log Scale	0.546
95% MLE (t) UCL	136.4	Mean in Original Scale	148.8
95% MLE (Tiku) UCL	160	SD in Original Scale	90.67
		95% Percentile Bootstrap UCL	183.8
		95% BCA Bootstrap UCL	190.8

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.675	Data appear Normal at 5% Significance Level	
Theta Star	54.64		
nu star	73.49		
A-D Test Statistic	0.245	Nonparametric Statistics	
5% A-D Critical Value	0.729	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.729	Mean	151.6
5% K-S Critical Value	0.267	SD	84.63

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data			
Minimum	86.08	SE of Mean	20.47
Maximum	402.3	95% KM (t) UCL	187.1
Mean	204	95% KM (z) UCL	185.3
Median	195.7	95% KM (jackknife) UCL	186.2
SD	82.5	95% KM (bootstrap t) UCL	202.9
k star	5.328	95% KM (BCA) UCL	199.7
Theta star	38.29	95% KM (Percentile Bootstrap) UCL	195.7
Nu star	202.5	95% KM (Chebyshev) UCL	240.8
AppChi2	170.5	97.5% KM (Chebyshev) UCL	279.4
95% Gamma Approximate UCL	242.2	99% KM (Chebyshev) UCL	355.3
95% Adjusted Gamma UCL	245.9		

Potential UCLs to Use

95% KM (t) UCL	187.1
95% KM (Percentile Bootstrap) UCL	195.7

Note: DL/2 is not a recommended method.

Surface Water DDTR UCL with ND Constituents Equal to 1/2 DL for 1991 and 1994

Sample ID	Date	Detected	DDTR (ng/L)
OWG0101	6/27/1994	1	141.73
OWG0107	8/18/1994	1	96.375
OWG0202	6/27/1994	1	142.85
OWG0208	8/18/1994	1	184.31
OWG0303	6/27/1994	1	213.71
OWG0309	8/18/1994	1	98.86
OWG0404	6/27/1994	1	163.145
OWG0410	8/18/1994	1	403.005
OWG0505	6/27/1994	1	292.285
OWG0511	8/18/1994	1	276.815
WGC901-0891	8/29/1991	0	100
WGC902-0891	8/29/1991	0	100
WGF201-0891	8/29/1991	0	100
WGH901-0891	8/29/1991	0	100
WGH902-0891	8/29/1991	0	100
WGG601-0891	8/30/1991	0	100
WGG602-0891	8/30/1991	0	100
WGH501-0891	8/30/1991	0	100
WGH502-0891	8/30/1991	0	100

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

DDTR (ND=1/2 DL)

General Statistics

Number of Valid Data	19	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	9
		Percent Non-Detects	47.37%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	96.38	Minimum Detected	4.568
Maximum Detected	403	Maximum Detected	5.999
Mean of Detected	201.3	Mean of Detected	5.205
SD of Detected	97.2	SD of Detected	0.468
Minimum Non-Detect	100	Minimum Non-Detect	4.605
Maximum Non-Detect	100	Maximum Non-Detect	4.605

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.909	Shapiro Wilk Test Statistic	0.961
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	129.6	Mean	4.593
SD	103.7	SD	0.741
95% DL/2 (t) UCL	170.9	95% H-Stat (DL/2) UCL	116.7

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	71.05	Mean in Log Scale	4.859
SD	164.7	SD in Log Scale	0.544
95% MLE (t) UCL	136.6	Mean in Original Scale	149.4
95% MLE (Tiku) UCL	160.2	SD in Original Scale	90.68
		95% Percentile Bootstrap UCL	184.7
		95% BCA Bootstrap UCL	190.8

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.698	Data appear Normal at 5% Significance Level	
Theta Star	54.44		
nu star	73.95		

A-D Test Statistic	0.247	Nonparametric Statistics	
5% A-D Critical Value	0.729	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.729	Mean	152.2
5% K-S Critical Value	0.267	SD	84.6

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data			
Minimum	86.52	SE of Mean	20.46
Maximum	403	95% KM (t) UCL	187.7
Mean	204.6	95% KM (z) UCL	185.9
Median	196.3	95% KM (jackknife) UCL	186.8
SD	82.52	95% KM (bootstrap t) UCL	198.5
k star	5.359	95% KM (BCA) UCL	200.9
Theta star	38.17	95% KM (Percentile Bootstrap) UCL	196.5
Nu star	203.7	95% KM (Chebyshev) UCL	241.4
AppChi2	171.6	97.5% KM (Chebyshev) UCL	280
95% Gamma Approximate UCL	242.7	99% KM (Chebyshev) UCL	355.8
95% Adjusted Gamma UCL	246.4		

Note: DL/2 is not a recommended method.

Potential UCLs to Use	
95% KM (t) UCL	187.7
95% KM (Percentile Bootstrap) UCL	196.5

Basin Sediment DDTR UCL with ND Constituents Equal to Zero for 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OU2B-SED-103DC-09	6/6/2009	1	0.3054	0-4
OU2B-SED-203DC-09	6/7/2009	1	2.675	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.06	0-4
OU2B-SED-402C-09	6/7/2009	1	1.1398	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-402C-08	6/6/2008	1	0.07289	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
SDCR13-CA-092609	9/26/2009	0	0.051	0-12
SDCR3-CA-092709	9/27/2009	1	0.86	0-12
SDCR8-CA-092809	9/28/2009	1	0.094	0-12
SDCR9-CA-092609	9/26/2009	1	1.56	0-12

2008 DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

Sed DDTR 08-09 ND=0

General Statistics

Number of Valid Data	12	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	2
		Percent Non-Detects	16.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	2.675	Maximum Detected	0.984
Mean of Detected	0.793	Mean of Detected	-0.868
SD of Detected	0.826	SD of Detected	1.337
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.051	Maximum Non-Detect	-2.976

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	16.67%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.852	Shapiro Wilk Test Statistic	0.925
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.663	Mean	-1.44
SD	0.806	SD	1.822
95% DL/2 (t) UCL	1.081	95% H-Stat (DL/2) UCL	5.649

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.579	Mean in Log Scale	-1.39
SD	0.879	SD in Log Scale	1.717
95% MLE (t) UCL	1.034	Mean in Original Scale	0.663
95% MLE (Tiku) UCL	1.028	SD in Original Scale	0.805
		95% Percentile Bootstrap UCL	1.053
		95% BCA Bootstrap UCL	1.126

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.709	Data appear Normal at 5% Significance Level
Theta Star	1.117	
nu star	14.19	

A-D Test Statistic	0.241	Nonparametric Statistics

5% A-D Critical Value	0.751	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.751	Mean	0.67
5% K-S Critical Value	0.274	SD	0.765
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.233
		95% KM (t) UCL	1.089
Assuming Gamma Distribution		95% KM (z) UCL	1.054
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.084
Minimum	1.00E-09	95% KM (bootstrap t) UCL	1.362
Maximum	2.675	95% KM (BCA) UCL	1.068
Mean	0.66	95% KM (Percentile Bootstrap) UCL	1.072
Median	0.412	95% KM (Chebyshev) UCL	1.686
SD	0.808	97.5% KM (Chebyshev) UCL	2.125
k star	0.203	99% KM (Chebyshev) UCL	2.988
Theta star	3.258		
Nu star	4.865	Potential UCLs to Use	
AppChi2	1.09	95% KM (t) UCL	1.089
95% Gamma Approximate UCL	2.947	95% KM (Percentile Bootstrap) UCL	1.072
95% Adjusted Gamma UCL	3.797		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Half the PQL for 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OU2B-SED-103DC-09	6/6/2009	1	0.318	0-4
OU2B-SED-303DC-09	6/7/2009	1	2.71765	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0784	0-4
OU2B-SED-203DC-09	6/7/2009	1	1.14315	0-4
OU2B-SED-402C-08	6/6/2008	1	0.065798	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
SDCR13-CA-092609	9/26/2009	0	0.051	0-12
SDCR3-CA-092709	9/27/2009	1	0.911	0-12
SDCR8-CA-092809	9/28/2009	1	0.369	0-12
SDCR9-CA-092609	9/26/2009	1	1.82	0-12

2008 DDT_R calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

Sed DDTR 08-09 DL/2

General Statistics			
Number of Valid Data	12	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	2
		Percent Non-Detects	16.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0658	Minimum Detected	-2.721
Maximum Detected	2.718	Maximum Detected	1
Mean of Detected	0.858	Mean of Detected	-0.687
SD of Detected	0.843	SD of Detected	1.224
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.051	Maximum Non-Detect	-2.976

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	16.67%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.858	Shapiro Wilk Test Statistic	0.942
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.718	Mean	-1.29
SD	0.83	SD	1.81
95% DL/2 (t) UCL	1.148	95% H-Stat (DL/2) UCL	6.178

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.632	Mean in Log Scale	-1.163
SD	0.907	SD in Log Scale	1.568
95% MLE (t) UCL	1.102	Mean in Original Scale	0.72
95% MLE (Tiku) UCL	1.097	SD in Original Scale	0.828
		95% Percentile Bootstrap UCL	1.129
		95% BCA Bootstrap UCL	1.217

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.817	Data appear Normal at 5% Significance Level
Theta Star	1.051	
nu star	16.34	

A-D Test Statistic	0.172	Nonparametric Statistics

5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	0.726
5% K-S Critical Value	0.273	SD	0.788
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.24
		95% KM (t) UCL	1.156
Assuming Gamma Distribution		95% KM (z) UCL	1.12
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.151
Minimum	1.00E-09	95% KM (bootstrap t) UCL	1.437
Maximum	2.718	95% KM (BCA) UCL	1.196
Mean	0.715	95% KM (Percentile Bootstrap) UCL	1.143
Median	0.444	95% KM (Chebyshev) UCL	1.771
SD	0.833	97.5% KM (Chebyshev) UCL	2.223
k star	0.205	99% KM (Chebyshev) UCL	3.111
Theta star	3.486		
Nu star	4.923	Potential UCLs to Use	
AppChi2	1.117	95% KM (t) UCL	1.156
95% Gamma Approximate UCL	3.152	95% KM (Percentile Bootstrap) UCL	1.143
95% Adjusted Gamma UCL	4.053		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Zero for 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OU2B-SED-103DC-09	6/6/2009	1	0.3054	0-4
OU2B-SED-203DC-09	6/7/2009	1	2.675	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.06	0-4
OU2B-SED-402C-09	6/7/2009	1	1.1398	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-402C-08	6/6/2008	1	0.07289	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
SDCR13-CA-092609	9/26/2009	0	0.051	0-12
SDCR3-CA-092709	9/27/2009	1	0.86	0-12
SDCR8-CA-092809	9/28/2009	1	0.094	0-12
SDCR9-CA-092609	9/26/2009	1	1.56	0-12
OU2R-SED-101DC-08	6/6/2008	1	0.085498	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.2216	0-4

2008 DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10

CHECKED BY/DATE: HEF 5/4/10

Sed DDTR 08-09 6ft ND=0

General Statistics			
Number of Valid Data	14	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	2
		Percent Non-Detects	14.29%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	2.675	Maximum Detected	0.984
Mean of Detected	0.686	Mean of Detected	-1.054
SD of Detected	0.788	SD of Detected	1.3
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.051	Maximum Non-Detect	-2.976

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	14.29%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.802	Shapiro Wilk Test Statistic	0.935
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.59	Mean	-1.518
SD	0.764	SD	1.698
95% DL/2 (t) UCL	0.952	95% H-Stat (DL/2) UCL	3.352
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.522	Mean in Log Scale	-1.492
SD	0.82	SD in Log Scale	1.634
95% MLE (t) UCL	0.911	Mean in Original Scale	0.59
95% MLE (Tiku) UCL	0.899	SD in Original Scale	0.764
		95% Percentile Bootstrap UCL	0.931
		95% BCA Bootstrap UCL	1.029
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.706	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.971		
nu star	16.95		
A-D Test Statistic	0.324	Nonparametric Statistics	

5% A-D Critical Value	0.761	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.761	Mean	0.597
5% K-S Critical Value	0.254	SD	0.732
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.204
		95% KM (t) UCL	0.958
Assuming Gamma Distribution		95% KM (z) UCL	0.933
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.955
Minimum	1.00E-09	95% KM (bootstrap t) UCL	1.248
Maximum	2.675	95% KM (BCA) UCL	0.969
Mean	0.588	95% KM (Percentile Bootstrap) UCL	0.925
Median	0.264	95% KM (Chebyshev) UCL	1.487
SD	0.766	97.5% KM (Chebyshev) UCL	1.872
k star	0.219	99% KM (Chebyshev) UCL	2.629
Theta star	2.687		
Nu star	6.127	Potential UCLs to Use	
AppChi2	1.705	95% KM (Chebyshev) UCL	1.487
95% Gamma Approximate UCL	2.113		
95% Adjusted Gamma UCL	2.546		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Half the PQL for 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OU2B-SED-103DC-09	6/6/2009	1	0.318	0-4
OU2B-SED-303DC-09	6/7/2009	1	2.71765	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0784	0-4
OU2B-SED-203DC-09	6/7/2009	1	1.14315	0-4
OU2B-SED-402C-08	6/6/2008	1	0.065798	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
SDCR13-CA-092609	9/26/2009	0	0.051	0-12
SDCR3-CA-092709	9/27/2009	1	0.911	0-12
SDCR8-CA-092809	9/28/2009	1	0.369	0-12
SDCR9-CA-092609	9/26/2009	1	1.82	0-12
OU2R-SED-101DC-08	6/5/2008	1	0.117018	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.22585	0-4

2008 DDT_R calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10

CHECKED BY/DATE: HEF 5/4/10

Sed DDTR 08-09 6ft RL/2

General Statistics			
Number of Valid Data	14	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	2
		Percent Non-Detects	14.29%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0658	Minimum Detected	-2.721
Maximum Detected	2.718	Maximum Detected	1
Mean of Detected	0.744	Mean of Detected	-0.876
SD of Detected	0.808	SD of Detected	1.199
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.051	Maximum Non-Detect	-2.976

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	14.29%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.811	Shapiro Wilk Test Statistic	0.968
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.64	Mean	-1.365
SD	0.789	SD	1.681
95% DL/2 (t) UCL	1.013	95% H-Stat (DL/2) UCL	3.585
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.571	Mean in Log Scale	-1.282
SD	0.848	SD in Log Scale	1.511
95% MLE (t) UCL	0.972	Mean in Original Scale	0.641
95% MLE (Tiku) UCL	0.961	SD in Original Scale	0.788
		95% Percentile Bootstrap UCL	0.998
		95% BCA Bootstrap UCL	1.087
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.803	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.926		
nu star	19.27		
A-D Test Statistic	0.196	Nonparametric Statistics	

5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	0.647
5% K-S Critical Value	0.252	SD	0.755
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.211
		95% KM (t) UCL	1.02
Assuming Gamma Distribution		95% KM (z) UCL	0.993
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.016
Minimum	1.00E-09	95% KM (bootstrap t) UCL	1.34
Maximum	2.718	95% KM (BCA) UCL	1.049
Mean	0.637	95% KM (Percentile Bootstrap) UCL	1.032
Median	0.344	95% KM (Chebyshev) UCL	1.565
SD	0.791	97.5% KM (Chebyshev) UCL	1.963
k star	0.222	99% KM (Chebyshev) UCL	2.743
Theta star	2.87		
Nu star	6.218	Potential UCLs to Use	
AppChi2	1.752	95% KM (Chebyshev) UCL	1.565
95% Gamma Approximate UCL	2.262		
95% Adjusted Gamma UCL	2.72		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Zero for 1991, 1994, 2001, 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	3.4081	0-6
SGD10-080891	8/8/1991	1	4.4916	0-6
SGG09-080991	8/9/1991	1	3.3293	0-6
SGC06-081191	8/11/1991	1	2.8762	0-6
SGD06-081191	8/11/1991	1	6.5798	0-6
SGF07-081191	8/11/1991	1	1.4578	0-6
SGG08-081191	8/11/1991	1	2.561	0-6
SGH08-081191	8/11/1991	1	3.7036	0-6
SGI10-081191	8/11/1991	1	4.2552	0-6
SGJ06-081191	8/11/1991	1	8.45918	0-6
SGJ07-081191	8/11/1991	1	11.1108	0-6
SGC05-081391	8/13/1991	1	0.53584	0-6
SGG03-081391	8/13/1991	1	3.2505	0-6
SGH04-081391	8/13/1991	1	3.8809	0-6
SGK04-081391	8/13/1991	1	12.214	0-6
ODG0101-0694	6/30/1994	1	1.431	0-6
ODG0102-0694	6/30/1994	1	1.408	0-6
ODG0103-0694	6/30/1994	1	2.014	0-6
ODG0301-0694	6/30/1994	1	4.748	0-6
ODG0302-0694	6/30/1994	1	5.283	0-6
ODG0303-0694	6/30/1994	1	6.178	0-6
SE-H2-0901	9/7/2001	1	1.821	0-6
SE-H6-0901	9/7/2001	1	0.737	0-6
SE-J3-0901	9/7/2001	1	1.696	0-6
SE-J6-0901	9/7/2001	1	1.078	0-6
SE-K4-0901	9/7/2001	1	3.48	0-6
SE-K5-0901	9/7/2001	1	1.24	0-6
SE-B4-0901	9/8/2001	1	0.411	0-6
SE-B5-0901	9/8/2001	1	1.69	0-6
SE-C6-0901	9/8/2001	1	0.697	0-6
SE-D10-0901	9/8/2001	1	1.185	0-6
SE-D3-0901	9/8/2001	1	0.732	0-6
SE-E2-0901	9/8/2001	1	0.082	0-6
SE-E3-0901	9/8/2001	1	0.159	0-6
SE-F7-0901	9/8/2001	1	0.684	0-6
SE-G3-0901	9/8/2001	1	0.0921	0-6
SE-H4-0901	9/8/2001	1	0.868	0-6
SE-H8-0901	9/8/2001	1	0.63	0-6
SE-I10-0901	9/8/2001	1	0.635	0-6

SE-B10-101101-01	10/11/2001	1	4.45	0-6
SE-B10-101101-02	10/11/2001	1	2.37	0-6
SE-B10-101101-03	10/11/2001	1	2.27	0-6
SE-B10-101101-04	10/11/2001	1	3.71	0-6
SE-B10-101101-05	10/11/2001	1	1.96	0-6
SE-B10-101101-06	10/11/2001	1	1.57	0-6
SE-B1-101101-01	10/11/2001	1	3.21	0-6
SE-B1-101101-02	10/11/2001	1	2.54	0-6
SE-B1-101101-03	10/11/2001	1	3.15	0-6
SE-B2-101101-01	10/11/2001	1	7.5	0-6
SE-B2-101101-02	10/11/2001	1	6.14	0-6
SE-B2-101101-03	10/11/2001	1	5.16	0-6
SE-B3-101101-01	10/11/2001	1	4.04	0-6
SE-B3-101101-02	10/11/2001	1	5.18	0-6
SE-B3-101101-03	10/11/2001	1	5.09	0-6
SE-B4-101101-01	10/11/2001	1	4.55	0-6
SE-B4-101101-02	10/11/2001	1	8.86	0-6
SE-B4-101101-03	10/11/2001	1	5.98	0-6
SE-B5-101101-01	10/11/2001	1	3.28	0-6
SE-B5-101101-02	10/11/2001	1	9.06	0-6
SE-B5-101101-03	10/11/2001	1	4.86	0-6
SE-B6-101101-01	10/11/2001	1	0.77	0-6
SE-B6-101101-02	10/11/2001	1	0.76	0-6
SE-B6-101101-03	10/11/2001	1	0.57	0-6
SE-B6-101101-04	10/11/2001	1	0.7	0-6
SE-B6-101101-05	10/11/2001	1	1.14	0-6
SE-B6-101101-06	10/11/2001	1	0.7	0-6
OU2B-SED-103DC-09	6/6/2009	1	0.3054	0-4
OU2B-SED-203DC-09	6/7/2009	1	2.675	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.06	0-4
OU2B-SED-402C-09	6/7/2009	1	1.1398	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-402C-08	6/6/2008	1	0.07289	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
SE-FP17-0901	9/8/2001	1	3.36	0-6
SDCR3-CA-092709	9/27/2009	1	0.86	0-12
SDCR8-CA-092809	9/28/2009	1	0.094	0-12
SDCR9-CA-092609	9/26/2009	1	1.56	0-12

2008 DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/14/10

Sed DDTR ND=0 all

General Statistics

Number of Valid Data	78	Number of Detected Data	77
Number of Distinct Detected Data	76	Number of Non-Detect Data	1
		Percent Non-Detects	1.28%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	12.21	Maximum Detected	2.503
Mean of Detected	2.882	Mean of Detected	0.519
SD of Detected	2.658	SD of Detected	1.229
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.0144	Maximum Non-Detect	-4.241

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.144	Lilliefors Test Statistic	0.111
5% Lilliefors Critical Value	0.101	5% Lilliefors Critical Value	0.101
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.846	Mean	0.449
SD	2.661	SD	1.368
95% DL/2 (t) UCL	3.347	95% H-Stat (DL/2) UCL	5.593

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	2.828	Mean in Log Scale	0.478
SD	2.67	SD in Log Scale	1.274
95% MLE (t) UCL	3.331	Mean in Original Scale	2.846
95% MLE (Tiku) UCL	3.305	SD in Original Scale	2.66
		95% Percentile Bootstrap UCL	3.366
		95% BCA Bootstrap UCL	3.42

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	1.03	Data appear Gamma Distributed at 5% Significance Level
Theta Star	2.799	
nu star	158.6	
A-D Test Statistic	0.388	Nonparametric Statistics
5% A-D Critical Value	0.78	Kaplan-Meier (KM) Method
K-S Test Statistic	0.78	Mean 2.846
5% K-S Critical Value	0.105	SD 2.643

Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.301
		95% KM (t) UCL	3.348
Assuming Gamma Distribution		95% KM (z) UCL	3.342
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.348
Minimum	1.00E-09	95% KM (bootstrap t) UCL	3.422
Maximum	12.21	95% KM (BCA) UCL	3.356
Mean	2.845	95% KM (Percentile Bootstrap) UCL	3.352
Median	1.987	95% KM (Chebyshev) UCL	4.159
SD	2.661	97.5% KM (Chebyshev) UCL	4.727
k star	0.729	99% KM (Chebyshev) UCL	5.843
Theta star	3.902		
Nu star	113.8	Potential UCLs to Use	
AppChi2	90.13	95% KM (Chebyshev) UCL	4.159
95% Gamma Approximate UCL	3.591		
95% Adjusted Gamma UCL	3.607		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Half the PQL for 1991, 1994, 2001, 2008 and 2009 at 3 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	3.4081	0-6
SGD10-080891	8/8/1991	1	4.4916	0-6
SGG09-080991	8/9/1991	1	3.3293	0-6
SGC06-081191	8/11/1991	1	2.8762	0-6
SGD06-081191	8/11/1991	1	6.5798	0-6
SGF07-081191	8/11/1991	1	1.4578	0-6
SGG08-081191	8/11/1991	1	2.561	0-6
SGH08-081191	8/11/1991	1	3.7036	0-6
SGI10-081191	8/11/1991	1	4.2552	0-6
SGJ06-081191	8/11/1991	1	8.45918	0-6
SGJ07-081191	8/11/1991	1	11.1108	0-6
SGC05-081391	8/13/1991	1	0.53584	0-6
SGG03-081391	8/13/1991	1	3.2505	0-6
SGH04-081391	8/13/1991	1	3.8809	0-6
SGK04-081391	8/13/1991	1	12.214	0-6
ODG0101-0694	6/30/1994	1	1.431	0-6
ODG0102-0694	6/30/1994	1	1.408	0-6
ODG0103-0694	6/30/1994	1	2.014	0-6
ODG0301-0694	6/30/1994	1	4.748	0-6
ODG0302-0694	6/30/1994	1	5.283	0-6
ODG0303-0694	6/30/1994	1	6.178	0-6
SE-H6-0901	9/7/2001	1	0.746	0-6
SE-J6-0901	9/7/2001	1	1.0865	0-6
SE-B4-0901	9/8/2001	1	0.423	0-6
SE-B5-0901	9/8/2001	1	1.6989	0-6
SE-C6-0901	9/8/2001	1	0.717	0-6
SE-D10-0901	9/8/2001	1	1.196	0-6
SE-D3-0901	9/8/2001	1	0.73575	0-6
SE-E2-0901	9/8/2001	1	0.0893	0-6
SE-E3-0901	9/8/2001	1	0.1621	0-6
SE-F7-0901	9/8/2001	1	0.713	0-6
SE-G3-0901	9/8/2001	1	0.09525	0-6
SE-H4-0901	9/8/2001	1	0.8755	0-6
SE-H8-0901	9/8/2001	1	0.65	0-6
SE-I10-0901	9/8/2001	1	0.661	0-6
SE-B10-101101-01	10/11/2001	1	4.515	0-6
SE-B10-101101-02	10/11/2001	1	2.5	0-6
SE-B10-101101-03	10/11/2001	1	2.33	0-6
SE-B10-101101-04	10/11/2001	1	3.78	0-6

SE-B10-101101-06	10/11/2001	1	1.7	0-6
SE-B1-101101-01	10/11/2001	1	3.39	0-6
SE-B1-101101-02	10/11/2001	1	2.73	0-6
SE-B1-101101-03	10/11/2001	1	3.34	0-6
SE-B2-101101-01	10/11/2001	1	7.64	0-6
SE-B2-101101-02	10/11/2001	1	6.47	0-6
SE-B2-101101-03	10/11/2001	1	5.41	0-6
SE-B3-101101-01	10/11/2001	1	4.61	0-6
SE-B3-101101-02	10/11/2001	1	5.49	0-6
SE-B3-101101-03	10/11/2001	1	5.4	0-6
SE-B4-101101-01	10/11/2001	1	4.66	0-6
SE-B4-101101-02	10/11/2001	1	8.99	0-6
SE-B4-101101-03	10/11/2001	1	6.24	0-6
SE-B5-101101-01	10/11/2001	1	3.355	0-6
SE-B5-101101-02	10/11/2001	1	9.14	0-6
SE-B5-101101-03	10/11/2001	1	64.8	0-6
SE-B6-101101-01	10/11/2001	1	1.01	0-6
SE-B6-101101-02	10/11/2001	1	1	0-6
SE-B6-101101-03	10/11/2001	1	0.89	0-6
SE-B6-101101-04	10/11/2001	1	0.91	0-6
SE-B6-101101-05	10/11/2001	1	1.28	0-6
SE-B6-101101-06	10/11/2001	1	0.925	0-6
OU2B-SED-103DC-09	6/6/2009	1	0.318	0-4
OU2B-SED-303DC-09	6/7/2009	1	2.71765	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0784	0-4
OU2B-SED-203DC-09	6/7/2009	1	1.14315	0-4
OU2B-SED-402C-08	6/6/2008	1	0.065798	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
SE-H2-0901	9/7/2001	1	1.821	0-6
SE-J3-0901	9/7/2001	1	1.696	0-6
SE-K4-0901	9/7/2001	1	3.48	0-6
SE-K5-0901	9/7/2001	1	1.24	0-6
SE-B10-101101-05	10/11/2001	1	1.96	0-6
SE-FP17-0901	9/8/2001	1	3.36	0-6
SDCR3-CA-092709	9/27/2009	1	0.911	0-12
SDCR8-CA-092809	9/28/2009	1	0.369	0-12
SDCR9-CA-092609	9/26/2009	1	1.82	0-12

2008 DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/14/10

Sed DDTR RL/2 all

General Statistics			
Number of Valid Data	78	Number of Detected Data	77
Number of Distinct Detected Data	77	Number of Non-Detect Data	1
		Percent Non-Detects	1.28%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0658	Minimum Detected	-2.721
Maximum Detected	64.8	Maximum Detected	4.171
Mean of Detected	3.736	Mean of Detected	0.614
SD of Detected	7.536	SD of Detected	1.24
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.0144	Maximum Non-Detect	-4.241

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.313	Lilliefors Test Statistic	0.0913
5% Lilliefors Critical Value	0.101	5% Lilliefors Critical Value	0.101
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.688	Mean	0.542
SD	7.499	SD	1.383
95% DL/2 (t) UCL	5.102	95% H-Stat (DL/2) UCL	6.334

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	3.626	Mean in Log Scale	0.572
SD	7.514	SD in Log Scale	1.286
95% MLE (t) UCL	5.042	Mean in Original Scale	3.689
95% MLE (Tiku) UCL	4.893	SD in Original Scale	7.498
		95% Percentile Bootstrap UCL	5.324
		95% BCA Bootstrap UCL	6.262

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.813	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	4.593		
nu star	125.3		
A-D Test Statistic	1.063	Nonparametric Statistics	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	3.689

5% K-S Critical Value	0.105	SD	7.45
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.849
		95% KM (t) UCL	5.103
Assuming Gamma Distribution		95% KM (z) UCL	5.086
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.102
Minimum	1.00E-09	95% KM (bootstrap t) UCL	7.232
Maximum	64.8	95% KM (BCA) UCL	5.381
Mean	3.688	95% KM (Percentile Bootstrap) UCL	5.325
Median	1.987	95% KM (Chebyshev) UCL	7.39
SD	7.499	97.5% KM (Chebyshev) UCL	8.991
k star	0.619	99% KM (Chebyshev) UCL	12.14
Theta star	5.958		
Nu star	96.57	Potential UCLs to Use	
AppChi2	74.9	95% KM (Chebyshev) UCL	7.39
95% Gamma Approximate UCL	4.755		
95% Adjusted Gamma UCL	4.778		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Zero for 1991, 1994, 2001, 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	3.4081	0-6
SGD10-080891	8/8/1991	1	4.4916	0-6
SGG09-080991	8/9/1991	1	3.3293	0-6
SGC06-081191	8/11/1991	1	2.8762	0-6
SGD06-081191	8/11/1991	1	6.5798	0-6
SGF07-081191	8/11/1991	1	1.4578	0-6
SGG08-081191	8/11/1991	1	2.561	0-6
SGH08-081191	8/11/1991	1	3.7036	0-6
SGI10-081191	8/11/1991	1	4.2552	0-6
SGJ06-081191	8/11/1991	1	8.45918	0-6
SGJ07-081191	8/11/1991	1	11.1108	0-6
SGC05-081391	8/13/1991	1	0.53584	0-6
SGG03-081391	8/13/1991	1	3.2505	0-6
SGH04-081391	8/13/1991	1	3.8809	0-6
SGK04-081391	8/13/1991	1	12.214	0-6
ODG0101-0694	6/30/1994	1	1.431	0-6
ODG0102-0694	6/30/1994	1	1.408	0-6
ODG0103-0694	6/30/1994	1	2.014	0-6
ODG0301-0694	6/30/1994	1	4.748	0-6
ODG0302-0694	6/30/1994	1	5.283	0-6
ODG0303-0694	6/30/1994	1	6.178	0-6
SE-H2-0901	9/7/2001	1	1.821	0-6
SE-H6-0901	9/7/2001	1	0.737	0-6
SE-J3-0901	9/7/2001	1	1.696	0-6
SE-J6-0901	9/7/2001	1	1.078	0-6
SE-K4-0901	9/7/2001	1	3.48	0-6
SE-K5-0901	9/7/2001	1	1.24	0-6
SE-B4-0901	9/8/2001	1	0.411	0-6
SE-B5-0901	9/8/2001	1	1.69	0-6
SE-C6-0901	9/8/2001	1	0.697	0-6
SE-D10-0901	9/8/2001	1	1.185	0-6
SE-D3-0901	9/8/2001	1	0.732	0-6
SE-E2-0901	9/8/2001	1	0.082	0-6
SE-E3-0901	9/8/2001	1	0.159	0-6
SE-F7-0901	9/8/2001	1	0.684	0-6
SE-G3-0901	9/8/2001	1	0.0921	0-6
SE-H4-0901	9/8/2001	1	0.868	0-6
SE-H8-0901	9/8/2001	1	0.63	0-6
SE-I10-0901	9/8/2001	1	0.635	0-6
SE-B10-101101-01	10/11/2001	1	4.45	0-6

SE-B10-101101-02	10/11/2001	1	2.37	0-6
SE-B10-101101-03	10/11/2001	1	2.27	0-6
SE-B10-101101-04	10/11/2001	1	3.71	0-6
SE-B10-101101-05	10/11/2001	1	1.96	0-6
SE-B10-101101-06	10/11/2001	1	1.57	0-6
SE-B1-101101-01	10/11/2001	1	3.21	0-6
SE-B1-101101-02	10/11/2001	1	2.54	0-6
SE-B1-101101-03	10/11/2001	1	3.15	0-6
SE-B2-101101-01	10/11/2001	1	7.5	0-6
SE-B2-101101-02	10/11/2001	1	6.14	0-6
SE-B2-101101-03	10/11/2001	1	5.16	0-6
SE-B3-101101-01	10/11/2001	1	4.04	0-6
SE-B3-101101-02	10/11/2001	1	5.18	0-6
SE-B3-101101-03	10/11/2001	1	5.09	0-6
SE-B4-101101-01	10/11/2001	1	4.55	0-6
SE-B4-101101-02	10/11/2001	1	8.86	0-6
SE-B4-101101-03	10/11/2001	1	5.98	0-6
SE-B5-101101-01	10/11/2001	1	3.28	0-6
SE-B5-101101-02	10/11/2001	1	9.06	0-6
SE-B5-101101-03	10/11/2001	1	4.86	0-6
SE-B6-101101-01	10/11/2001	1	0.77	0-6
SE-B6-101101-02	10/11/2001	1	0.76	0-6
SE-B6-101101-03	10/11/2001	1	0.57	0-6
SE-B6-101101-04	10/11/2001	1	0.7	0-6
SE-B6-101101-05	10/11/2001	1	1.14	0-6
SE-B6-101101-06	10/11/2001	1	0.7	0-6
OU2B-SED-103DC-09	6/6/2009	1	0.3054	0-4
OU2B-SED-203DC-09	6/7/2009	1	2.675	0-4
OU2B-SED-303DC-09	6/7/2009	1	0.06	0-4
OU2B-SED-402C-09	6/7/2009	1	1.1398	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2B-SED-402C-08	6/6/2008	1	0.07289	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
OSG0901-0694	6/30/1994	1	177	0-6
OSG0902-0694	6/30/1994	1	155	0-6
OSG0903-0694	6/30/1994	1	41.2	0-6
SE-FP17-0901	9/8/2001	1	3.36	0-6
SDCR3-CA-092709	9/27/2009	1	0.86	0-12
SDCR8-CA-092809	9/28/2009	1	0.094	0-12
SDCR9-CA-092609	9/26/2009	1	1.56	0-12
ODG0501-0694	6/30/1994	1	5.86	0-6
ODG0502-0694	6/30/1994	1	5.99	0-6
ODG0503-0694	6/30/1994	1	7.14	0-6
SE-R1-100401-04	10/4/2001	1	26.03	0-6

SE-R1-100401-05	10/4/2001	1	10.277	0-6
SE-R1-100401-06	10/4/2001	1	14.66	0-6
SE-R1-100401-01	10/4/2001	1	10.18	0-6
SE-R1-100401-02	10/4/2001	1	20.54	0-6
SE-R1-100401-03	10/4/2001	1	13.79	0-6
SE-R2-100401-01	10/4/2001	1	2.341	0-6
SE-R2-100401-02	10/4/2001	1	2.97	0-6
SE-R2-100401-03	10/4/2001	1	2.225	0-6
SE-R7-100401-01	10/4/2001	1	2.82	0-6
SE-R7-100401-02	10/4/2001	1	2.73	0-6
SE-R7-100401-03	10/4/2001	1	2.202	0-6
OU2R-SED-101DC-08	6/6/2008	1	0.085498	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.2216	0-4
SDCR13-CA-092609	9/26/2009	0	0.015	0-12

2008 DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 5/4/10

CHECKED BY/DATE: HEF 5/4/10

Sed DDTR all 6ft ND=0

General Statistics			
Number of Valid Data	99	Number of Detected Data	97
Number of Distinct Detected Data	96	Number of Non-Detect Data	2
		Percent Non-Detects	2.02%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	177	Maximum Detected	5.176
Mean of Detected	7.476	Mean of Detected	0.797
SD of Detected	23.87	SD of Detected	1.473
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.015	Maximum Non-Detect	-4.2
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	97
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	2.02%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.378	Lilliefors Test Statistic	0.0753
5% Lilliefors Critical Value	0.09	5% Lilliefors Critical Value	0.09
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.326	Mean	0.681
SD	23.64	SD	1.667
95% DL/2 (t) UCL	11.27	95% H-Stat (DL/2) UCL	11.41
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.989	Mean in Log Scale	0.722
SD	23.82	SD in Log Scale	1.549
95% MLE (t) UCL	10.96	Mean in Original Scale	7.326
95% MLE (Tiku) UCL	10.51	SD in Original Scale	23.64
		95% Percentile Bootstrap UCL	11.49
		95% BCA Bootstrap UCL	13.64
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.51	Data appear Lognormal at 5% Significance Level	
Theta Star	14.65		
nu star	99.04		
A-D Test Statistic	5.119	Nonparametric Statistics	

5% A-D Critical Value	0.817	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.817	Mean	7.327
5% K-S Critical Value	0.096	SD	23.52
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.377
		95% KM (t) UCL	11.27
Assuming Gamma Distribution		95% KM (z) UCL	11.24
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.27
Minimum	1.00E-09	95% KM (bootstrap t) UCL	22.52
Maximum	177	95% KM (BCA) UCL	11.98
Mean	7.325	95% KM (Percentile Bootstrap) UCL	11.56
Median	2.561	95% KM (Chebyshev) UCL	17.69
SD	23.64	97.5% KM (Chebyshev) UCL	22.17
k star	0.398	99% KM (Chebyshev) UCL	30.97
Theta star	18.41		
Nu star	78.77	Potential UCLs to Use	
AppChi2	59.33	95% KM (Chebyshev) UCL	17.69
95% Gamma Approximate UCL	9.727		
95% Adjusted Gamma UCL	9.768		

Note: DL/2 is not a recommended method.

Basin Sediment DDTR UCL with ND Constituents Equal to Half the PQL for 1991, 1994, 2001, 2008 and 2009 at 6 ft. NAVD88

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
SGC10-080891	8/8/1991	1	3.4081	0-6
SGD10-080891	8/8/1991	1	4.4916	0-6
SGG09-080991	8/9/1991	1	3.3293	0-6
SGC06-081191	8/11/1991	1	2.8762	0-6
SGD06-081191	8/11/1991	1	6.5798	0-6
SGF07-081191	8/11/1991	1	1.4578	0-6
SGG08-081191	8/11/1991	1	2.561	0-6
SGH08-081191	8/11/1991	1	3.7036	0-6
SGI10-081191	8/11/1991	1	4.2552	0-6
SGJ06-081191	8/11/1991	1	8.45918	0-6
SGJ07-081191	8/11/1991	1	11.1108	0-6
SGC05-081391	8/13/1991	1	0.53584	0-6
SGG03-081391	8/13/1991	1	3.2505	0-6
SGH04-081391	8/13/1991	1	3.8809	0-6
SGK04-081391	8/13/1991	1	12.214	0-6
ODG0101-0694	6/30/1994	1	1.431	0-6
ODG0102-0694	6/30/1994	1	1.408	0-6
ODG0103-0694	6/30/1994	1	2.014	0-6
ODG0301-0694	6/30/1994	1	4.748	0-6
ODG0302-0694	6/30/1994	1	5.283	0-6
ODG0303-0694	6/30/1994	1	6.178	0-6
ODG0501-0694	6/30/1994	1	5.86	0-6
ODG0502-0694	6/30/1994	1	5.99	0-6
ODG0503-0694	6/30/1994	1	7.14	0-6
OSG0901-0694	6/30/1994	1	177	0-6
OSG0902-0694	6/30/1994	1	155	0-6
OSG0903-0694	6/30/1994	1	41.2	0-6
SE-H2-0901	9/7/2001	1	1.821	0-6
SE-H6-0901	9/7/2001	1	0.746	0-6
SE-J3-0901	9/7/2001	1	1.696	0-6
SE-J6-0901	9/7/2001	1	1.0865	0-6
SE-K4-0901	9/7/2001	1	3.48	0-6
SE-K5-0901	9/7/2001	1	1.24	0-6
SE-B4-0901	9/8/2001	1	0.423	0-6
SE-B5-0901	9/8/2001	1	1.6989	0-6
SE-C6-0901	9/8/2001	1	0.717	0-6
SE-D10-0901	9/8/2001	1	1.196	0-6
SE-D3-0901	9/8/2001	1	0.73575	0-6
SE-E2-0901	9/8/2001	1	0.0893	0-6

SE-E3-0901	9/8/2001	1	0.1621	0-6
SE-F7-0901	9/8/2001	1	0.713	0-6
SE-FP17-0901	9/8/2001	1	3.36	0-6
SE-G3-0901	9/8/2001	1	0.09525	0-6
SE-H4-0901	9/8/2001	1	0.8755	0-6
SE-H8-0901	9/8/2001	1	0.65	0-6
SE-I10-0901	9/8/2001	1	0.661	0-6
SE-R1-100401-01	10/4/2001	1	10.18	0-6
SE-R1-100401-02	10/4/2001	1	20.554	0-6
SE-R1-100401-03	10/4/2001	1	13.79	0-6
SE-R1-100401-04	10/4/2001	1	26.03	0-6
SE-R1-100401-05	10/4/2001	1	10.277	0-6
SE-R1-100401-06	10/4/2001	1	14.66	0-6
SE-R2-100401-01	10/4/2001	1	2.3555	0-6
SE-R2-100401-03	10/4/2001	1	2.239	0-6
SE-R7-100401-01	10/4/2001	1	2.8355	0-6
SE-R7-100401-02	10/4/2001	1	2.73	0-6
SE-R7-100401-03	10/4/2001	1	2.202	0-6
SE-R2-100401-03	10/5/2001	1	2.9845	0-6
SE-B10-101101-01	10/11/2001	1	4.515	0-6
SE-B10-101101-02	10/11/2001	1	2.5	0-6
SE-B10-101101-03	10/11/2001	1	2.33	0-6
SE-B10-101101-04	10/11/2001	1	3.78	0-6
SE-B10-101101-05	10/11/2001	1	1.96	0-6
SE-B10-101101-06	10/11/2001	1	1.7	0-6
SE-B1-101101-01	10/11/2001	1	3.39	0-6
SE-B1-101101-02	10/11/2001	1	2.73	0-6
SE-B1-101101-03	10/11/2001	1	3.34	0-6
SE-B2-101101-01	10/11/2001	1	7.64	0-6
SE-B2-101101-02	10/11/2001	1	6.47	0-6
SE-B2-101101-03	10/11/2001	1	5.41	0-6
SE-B3-101101-01	10/11/2001	1	4.61	0-6
SE-B3-101101-02	10/11/2001	1	5.49	0-6
SE-B3-101101-03	10/11/2001	1	5.4	0-6
SE-B4-101101-01	10/11/2001	1	4.66	0-6
SE-B4-101101-02	10/11/2001	1	8.99	0-6
SE-B4-101101-03	10/11/2001	1	6.24	0-6
SE-B5-101101-01	10/11/2001	1	3.355	0-6
SE-B5-101101-02	10/11/2001	1	9.14	0-6
SE-B5-101101-03	10/11/2001	1	64.8	0-6
SE-B6-101101-01	10/11/2001	1	1.01	0-6
SE-B6-101101-02	10/11/2001	1	1	0-6
SE-B6-101101-03	10/11/2001	1	0.89	0-6
SE-B6-101101-04	10/11/2001	1	0.91	0-6
SE-B6-101101-05	10/11/2001	1	1.28	0-6

SE-B6-101101-06	10/11/2001	1	0.925	0-6
OU2R-SED-101DC-08	6/5/2008	1	0.117018	0-4
OU2B-SED-402C-08	6/6/2008	1	0.065798	0-4
OU2B-SED-103DC-08	6/7/2008	0	0.0144	0-4
OU2B-SED-203DC-08	6/10/2008	1	0.639068	0-4
OU2B-SED-303DC-08	6/10/2008	1	0.518898	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.22585	0-4
OU2B-SED-103DC-09	6/6/2009	1	0.318	0-4
OU2B-SED-303DC-09	6/7/2009	1	2.71765	0-4
OU2B-SED-402C-09	6/7/2009	1	0.0784	0-4
OU2B-SED-203DC-09	6/7/2009	1	1.14315	0-4
SDCR13-CA-092609	9/26/2009	0	0.015	0-12
SDCR9-CA-092609	9/26/2009	1	1.82	0-12
SDCR3-CA-092709	9/27/2009	1	0.911	0-12
SDCR8-CA-092809	9/28/2009	1	0.369	0-12

2008 DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/14/10

Sed DDTR all 6ft RL/2

General Statistics

Number of Valid Data	99	Number of Detected Data	97
Number of Distinct Detected Data	96	Number of Non-Detect Data	2
		Percent Non-Detects	2.02%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0658	Minimum Detected	-2.721
Maximum Detected	177	Maximum Detected	5.176
Mean of Detected	8.155	Mean of Detected	0.875
SD of Detected	24.55	SD of Detected	1.46
Minimum Non-Detect	0.0144	Minimum Non-Detect	-4.241
Maximum Non-Detect	0.015	Maximum Non-Detect	-4.2

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	97
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	2.02%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.371	Lilliefors Test Statistic	0.0695
5% Lilliefors Critical Value	0.09	5% Lilliefors Critical Value	0.09
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.99	Mean	0.758
SD	24.33	SD	1.661
95% DL/2 (t) UCL	12.05	95% H-Stat (DL/2) UCL	12.24

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	7.647	Mean in Log Scale	0.801
SD	24.51	SD in Log Scale	1.536
95% MLE (t) UCL	11.74	Mean in Original Scale	7.992
95% MLE (Tiku) UCL	11.27	SD in Original Scale	24.33
		95% Percentile Bootstrap UCL	12.53
		95% BCA Bootstrap UCL	14.14

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.507	Data appear Lognormal at 5% Significance Level
Theta Star	16.07	
nu star	98.45	

A-D Test Statistic	5.58	Nonparametric Statistics

5% A-D Critical Value	0.817	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.817	Mean	7.992
5% K-S Critical Value	0.096	SD	24.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.445
		95% KM (t) UCL	12.05
Assuming Gamma Distribution		95% KM (z) UCL	12.01
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12.05
Minimum	1.00E-09	95% KM (bootstrap t) UCL	21.22
Maximum	177	95% KM (BCA) UCL	12.51
Mean	7.99	95% KM (Percentile Bootstrap) UCL	12.27
Median	2.718	95% KM (Chebyshev) UCL	18.65
SD	24.33	97.5% KM (Chebyshev) UCL	23.26
k star	0.396	99% KM (Chebyshev) UCL	32.32
Theta star	20.19		
Nu star	78.37	Potential UCLs to Use	
AppChi2	58.97	95% KM (Chebyshev) UCL	18.65
95% Gamma Approximate UCL	10.62		
95% Adjusted Gamma UCL	10.66		

Note: DL/2 is not a recommended method.

Round Pond Sediment DDTR UCL with ND Constituents Equal to Zero at Depths Starting at 0 Inches for 2008 and 2009

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OU2R-SED-101DC-08	6/6/2008	1	0.085498	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.2216	0-4
SDCR13-CA-092609	9/26/2009	0	0.015	0-12

DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

Round Pond Sediment DDTR UCL with ND Constituents Being Equal to Half the PQL Depths Starting at 0 inches for 2008 and 2009

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OU2R-SED-101DC-08	6/5/2008	1	0.117018	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.22585	0-4
SDCR13-CA-092609	9/26/2009	0	0.015	0-12

DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

Round Pond Sediment DDTR UCL with ND Constituents Equal to Zero at Depths Starting at 0 Inches for 1994, 2001, 2008 and 2009

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OSG0901-0694	6/30/1994	1	177	0-6
OSG0902-0694	6/30/1994	1	155	0-6
OSG0903-0694	6/30/1994	1	41.2	0-6
ODG0501-0694	6/30/1994	1	5.86	0-6
ODG0502-0694	6/30/1994	1	5.99	0-6
ODG0503-0694	6/30/1994	1	7.14	0-6
SE-R1-100401-04	10/4/2001	1	26.03	0-6
SE-R1-100401-05	10/4/2001	1	10.277	0-6
SE-R1-100401-06	10/4/2001	1	14.66	0-6
SE-R1-100401-01	10/4/2001	1	10.18	0-6
SE-R1-100401-02	10/4/2001	1	20.54	0-6
SE-R1-100401-03	10/4/2001	1	13.79	0-6
SE-R2-100401-01	10/4/2001	1	2.341	0-6
SE-R2-100401-02	10/4/2001	1	2.97	0-6
SE-R2-100401-03	10/4/2001	1	2.225	0-6
SE-R7-100401-01	10/4/2001	1	2.82	0-6
SE-R7-100401-02	10/4/2001	1	2.73	0-6
SE-R7-100401-03	10/4/2001	1	2.202	0-6
OU2R-SED-101DC-08	6/6/2008	1	0.085498	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.2216	0-4
SDCR13-CA-092609	9/26/2009	0	0.015	0-12

DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

RP Sed DDTR B ND=0

General Statistics

Number of Valid Data	21	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	1
		Percent Non-Detects	4.76%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0855	Minimum Detected	-2.459
Maximum Detected	177	Maximum Detected	5.176
Mean of Detected	25.16	Mean of Detected	1.865
SD of Detected	49.34	SD of Detected	1.848
Minimum Non-Detect	0.015	Minimum Non-Detect	-420.00%
Maximum Non-Detect	0.015	Maximum Non-Detect	-4.2

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.519	Shapiro Wilk Test Statistic	0.949
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	23.97	Mean	1.543
SD	48.41	SD	2.328
95% DL/2 (t) UCL	42.18	95% H-Stat (DL/2) UCL	506.7

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	22.45	Mean in Log Scale	1.654
SD	48.8	SD in Log Scale	2.046
95% MLE (t) UCL	40.82	Mean in Original Scale	23.97
95% MLE (Tiku) UCL	39.15	SD in Original Scale	48.41
		95% Percentile Bootstrap UCL	42.12
		95% BCA Bootstrap UCL	50.48

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.434	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	57.98	
nu star	17.36	

A-D Test Statistic	0.969	Nonparametric Statistics	
5% A-D Critical Value	0.809	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.809	Mean	23.97
5% K-S Critical Value	0.206	SD	47.24
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	10.58
		95% KM (t) UCL	42.21
Assuming Gamma Distribution		95% KM (z) UCL	41.37
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	42.18
Minimum	1.00E-09	95% KM (bootstrap t) UCL	104.1
Maximum	177	95% KM (BCA) UCL	41.81
Mean	23.96	95% KM (Percentile Bootstrap) UCL	41.8
Median	5.99	95% KM (Chebyshev) UCL	70.07
SD	48.41	97.5% KM (Chebyshev) UCL	90.02
k star	0.281	99% KM (Chebyshev) UCL	129.2
Theta star	85.38		
Nu star	1.18E+01	Potential UCLs to Use	
AppChi2	5.088	95% KM (Chebyshev) UCL	70.07
95% Gamma Approximate UCL	55.52		
95% Adjusted Gamma UCL	59.44		

Note: DL/2 is not a recommended method.

Round Pond Sediment DDTR UCL with ND Constituents Being Equal to Half the PQL Depths Starting at 0 inches for 1994, 2001, 2008 and 2009

Sample ID	Date	Detected	DDTR (mg/kg)	Depth Interval (inches)
OSG0901-0694	6/30/1994	1	177	0-6
OSG0902-0694	6/30/1994	1	155	0-6
OSG0903-0694	6/30/1994	1	41.2	0-6
ODG0501-0694	6/30/1994	1	5.86	0-6
ODG0502-0694	6/30/1994	1	5.99	0-6
ODG0503-0694	6/30/1994	1	7.14	0-6
SE-R1-100401-01	10/4/2001	1	10.18	0-6
SE-R1-100401-02	10/4/2001	1	20.554	0-6
SE-R1-100401-03	10/4/2001	1	13.79	0-6
SE-R1-100401-04	10/4/2001	1	26.03	0-6
SE-R1-100401-05	10/4/2001	1	10.277	0-6
SE-R1-100401-06	10/4/2001	1	14.66	0-6
SE-R2-100401-01	10/4/2001	1	2.3555	0-6
SE-R2-100401-03	10/4/2001	1	2.239	0-6
SE-R7-100401-01	10/4/2001	1	2.8355	0-6
SE-R7-100401-02	10/4/2001	1	2.73	0-6
SE-R7-100401-03	10/4/2001	1	2.202	0-6
SE-R2-100401-03	10/5/2001	1	2.9845	0-6
OU2R-SED-101DC-08	6/5/2008	1	0.117018	0-4
OU2R-SED-101DC-09	6/5/2009	1	0.22585	0-4
SDCR13-CA-092609	9/26/2009	0	0.015	0-12

DDTR calculation based on the sum of the 4,4' Isomers of DDT, DDD and DDE multiplied by a factor of 1.97 based on the ratio of the 4,4' isomers to the 2,4' isomers

Detected: 1=detected, 0 = not detected

PREPARED BY/DATE: EJS 3/22/10

CHECKED BY/DATE: HEF 4/1/10

RP Sed DDTR B RL/2

General Statistics

Number of Valid Data	21	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	1
		Percent Non-Detects	4.76%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.117	Minimum Detected	-2.145
Maximum Detected	177	Maximum Detected	5.176
Mean of Detected	25.17	Mean of Detected	1.883
SD of Detected	49.34	SD of Detected	1.808
Minimum Non-Detect	0.015	Minimum Non-Detect	-4.2
Maximum Non-Detect	0.015	Maximum Non-Detect	-4.2

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.519	Shapiro Wilk Test Statistic	0.952
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	23.97	Mean	1.56
SD	48.4	SD	2.3
95% DL/2 (t) UCL	42.19	95% H-Stat (DL/2) UCL	458

Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	22.46	Mean in Log Scale	1.675
SD	48.8	SD in Log Scale	2.004
95% MLE (t) UCL	40.82	Mean in Original Scale	23.97
95% MLE (Tiku) UCL	39.15	SD in Original Scale	48.4
		95% Percentile Bootstrap UCL	41.24
		95% BCA Bootstrap UCL	48.75

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.439	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	57.4		
nu star	17.54		
A-D Test Statistic	0.993	Nonparametric Statistics	
5% A-D Critical Value	0.807	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.807	Mean	23.98

5% K-S Critical Value	0.206	SD	47.24
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	10.58
		95% KM (t) UCL	42.22
Assuming Gamma Distribution		95% KM (z) UCL	41.37
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	42.19
Minimum	1.00E-09	95% KM (bootstrap t) UCL	107.3
Maximum	177	95% KM (BCA) UCL	42.32
Mean	23.97	95% KM (Percentile Bootstrap) UCL	42.69
Median	5.99	95% KM (Chebyshev) UCL	70.07
SD	48.41	97.5% KM (Chebyshev) UCL	90.02
k star	0.282	99% KM (Chebyshev) UCL	129.2
Theta star	84.94		
Nu star	11.85	Potential UCLs to Use	
AppChi2	5.13	95% KM (Chebyshev) UCL	70.07
95% Gamma Approximate UCL	55.38		
95% Adjusted Gamma UCL	59.27		

Note: DL/2 is not a recommended method.

APPENDIX P2
Screening Level Ecological Risk Assessment

Operable Unit 2, McIntosh, Alabama

Prepared for:

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Cleveland, Tennessee

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1.0 INTRODUCTION

The objective of this Screening Level Ecological Risk Assessment (SLERA) for Operable Unit 2 (OU-2) at the McIntosh Plant Site is to estimate potential ecological risk associated with direct exposure to constituents detected in environmental media. A formal SLERA was not performed for the 1995 Ecological Risk Assessment (ERA) (WCC, 1995). USEPA requested that a formal SLERA be conducted as part of the Updated ERA for OU-2 in a comment letter dated September 10, 2010, to Olin on the Updated ERA (USEPA, 2010). Ecological risk is characterized for both the terrestrial and aquatic environments in OU-2. This SLERA incorporates the more recent monitoring data collected at OU-2, including sediment, surface water, and floodplain soil data, along with the historical data included in the 1995 ERA. More recent fish tissue data were also incorporated into the SLERA. The SLERA includes qualitative evaluations of risk to Assessment Endpoint 1 (benthic macroinvertebrates), Assessment Endpoint 2 (fish), and Assessment Endpoint 3 (soil invertebrates) of the Updated ERA as directed by USEPA (USEPA, 2010). These assessment endpoints are directly exposed to abiotic media (i.e., sediment, surface water, and/or floodplain soils) in OU-2. The qualitative risk assessment consists of the comparison of OU-2 surface water, sediment, and tissue residue (i.e., fish and crayfish) concentrations to appropriate screening benchmarks and/or effects concentrations. Evaluations of risk involving food chain modeling of upper-trophic level receptors feeding on these receptors (i.e., aquatic and terrestrial birds and mammals) are addressed in the Updated ERA, as directed by USEPA (USEPA, 2010).

1.1 PURPOSE AND OBJECTIVES

The SLERA is the initial phase in the updated ecological risk assessment at OU-2. SLERAs are simplified risk assessments in which conservative assumptions are used to produce preliminary risk characterizations. The main purpose of the SLERA is to compare facility-related contaminant concentrations with USEPA Region 4 ecological screening values. The term "ecological risk assessment" (ERA) within the Superfund program specifically refers to a qualitative and/or quantitative appraisal of the actual or potential impacts of a constituent of potential concern (COPC) from a hazardous waste site on plants and animals other than humans and domesticated species (USEPA, 1997).

This SLERA has been prepared in accordance with the following documents:

- USEPA Region 4's Ecological Risk Assessment Bulletins-Supplement to RAGS (USEPA, 2001)
- USEPA's ERAGS (USEPA, 1997)

This SLERA focuses on OU-2, which is comprised of the Olin Basin (Basin), Round Pond, the wastewater and former discharge ditches, and surrounding floodplains on the Olin property located in McIntosh, Alabama. This SLERA includes assessments of risk due to direct exposure to COPCs in OU-2 sediments, surface water, and floodplain soils.

2.0 ECOLOGICAL SCREENING VALUE COMPARISON AND SELECTION OF COPCS

Available data were reviewed in the ecological screening value comparison step and selected for inclusion in the SLERA. Appropriate screening data were selected from the available datasets for representation of ecological exposure. These selected data were ultimately used to identify COPCs for the SLERA.

The SLERA datatsets include historical (i.e., data included in the 1995 ERA) and more recent sampling data (i.e., data collected between 2008 and 2010). Soil, sediment, and surface water data collected at OU-2 in 1991, 1992, and 1994 as part of the 1995 ERA were re-evaluated as part of this SLERA. This re-evaluation was performed at the request of USEPA to determine if any additional COPCs should be addressed based on currently available screening criteria. Analytical data for environmental media from 2008, 2009, and 2010 sampling events were also screened against currently available screening criteria to compare current site conditions to ecological benchmarks. The following table summarizes the data used in the SLERA:

Data Used in Soil, Sediment, and Surface Water Screening

Media	Year Data Collected
Soil	
1995 ERA Dataset	1992, 1994
SLERA Dataset	2010
Sediment	
1995 ERA Dataset	1991, 1992, 1994
SLERA Dataset	2008, 2009
Surface Water	
1995 ERA Dataset	1991, 1994
SLERA Dataset	2008, 2009 for Hg and MeHg 1991, 1994 for HCB and DDTR 1991 for Dissolved Inorganics

Surface soil was collected from 0 to 6 inches below the ground surface. The majority of surficial sediment was collected from 0 to 6 inches below the sediment-water interface. Sample depths for several sediment core samples are as deep as 12 inches below the sediment-water interface if data were not available in the 0 to 6 inch depth interval. USEPA typically accepts an ecological surface soil and sediment depth interval of 0 to 6 inches.

2.1 SLERA DATASETS

The SLERA datasets for sediment, surface water, and surface soil included chemicals detected in at least one sample that were not excluded due to appropriate data selection procedures. The following data selection procedures were used to select and discard data from the total database in order to generate the SLERA dataset. The data selection rules are as follows:

- Duplicate samples were considered to be quality control samples and were therefore not included in the SLERA.
- Soil samples collected at an interval depth greater than 6 inches were not included in the SLERA.
- Sediment samples collected at an interval depth greater than 12 inches were not included in the SLERA.

Data not excluded by one or more selection rules represent the SLERA dataset. This SLERA dataset is conservatively assumed to reflect site-related impacts to those portions of the site with ecological habitat present. Appendix L through P1 presents the ecological datasets used in the SLERA.

2.1.1 Sediment

The USEPA Region 4 Ecological Screening Values (ESVs) for sediment were used to identify COPCs for potential receptors that may come in contact with sediments in OU-2 (Table P2-1). An additional screening evaluation was performed using the Probable Effect Concentrations (PECs) provided by MacDonald et al. (2000). A PEC for HCB was not available from MacDonald et al. (2000). The value utilized for HCB is the Lowest Effects Level (LEL) cited in Persaud (1993). Constituents with concentrations above both the ESV and the PEC or LEL were considered COPCs. Table P2-1 summarizes the ESVs, PECs, and HCB LEL along with site concentrations for both the 1995 ERA dataset and this SLERA.

A total of 28 constituents were originally detected as part of remedial activities in 1991 and 1992. These constituents were compared to current ecological screening values to identify any additional COPCs that may need to be considered in the SLERA. All constituents, with the exception of arsenic, chromium, copper, lead, zinc, 1, 2, 4-Trichlorobenzene, and 1,3-Dichlorobenzene, were above both of the screening values or were considered a COPC due to the lack of available screening data. The constituents that were further evaluated and then removed from the preliminary screening list of COPCs include:

- Beryllium, aldrin, endosulfan I, endosulfan II, gamma-BHC, and heptachlor epoxide were eliminated as COPCs because the frequency of detection was equal to or below 5 percent, which is typically the threshold value recommended by USEPA (USEPA, 2001). Infrequently detected chemicals are unlikely to be continuously contacted by a receptor that may range over the entire site.

- The chlorinated benzenes 1,2-dichlorobenzene, 1,4-dichlorobenzene, chlorobenzene, pentachlorobenzene, and pentachloronitrobenzene were eliminated as COPCs because risk from chlorinated benzenes is primarily driven by HCB. Concentrations of HCB were significantly higher in concentration and located in the same location as the other chlorinated benzenes. HCB is also more bioaccumulative. Ecological risk from chlorinated benzenes is addressed with HCB, which has also been considered a COPC in previous documents for OU-2.

- Antimony, alpha-BHC, beta-BHC, delta-BHC, and cyanide were eliminated as COPCs for several reasons. None of these constituents are bioaccumulative or products of historical activities associated with OU-2. Alpha-BHC, beta-BHC, delta-BHC, and cyanide were not frequently detected, and cyanide historically detected in groundwater has not been observed in monitoring well BA-1 in subsequent sampling events (2000 to 2002). These constituents were originally eliminated as COPCs in the 1995 ERA.

In the Olin letter to Ms. Beth Walden, Remedial Project Manager for USEPA Region 4 dated April 2, 2008, cyanide and zinc were not recommended for inclusion as COPCs. Cyanide and zinc were not included in the DQO process and additional data were not collected for these two constituents. Discussions in meetings with USEPA on December 7/8, 2009, and March 29, 2010, focused future risk assessment activities on mercury, HCB, and DDTR. The sediment COPCs that are carried through the risk process are mercury, methylmercury, HCB, and DDTR. Methylmercury in sediment was selected as a COPC because no screening value is available.

2.1.2 Surface Water

The USEPA Region 4 ESVs for surface water were used to identify COPCs for potential receptors that may come in contact with surface water in OU-2 (Table P2-2). An additional screening evaluation was performed using USEPA Freshwater National Ambient Water Quality Criteria (NAWQC) for each constituent where a value is available. Default Freshwater NAWQC values were used for those metals that may be adjusted for site-specific hardness. Surface water ESVs and AWQC assume concentrations are based on dissolved metals rather than total metals. For this SLERA, screening was performed for both total and dissolved metals using these screening values. Constituents with concentrations above ESVs and the AWQC were considered COPCs. Table P2-2 summarizes the ESVs and AWQC along with site concentrations for both the 1995 ERA dataset and this SLERA.

A total of 9 inorganics (including methylmercury) for total metals, 8 metals for dissolved metals, 2 organic compounds (chloroform and HCB), and 2 pesticides (alpha-BHC and DDTR) were originally detected as part of the remedial investigation in 1991 and the ecological studies in 1994. These constituents were compared to updated ecological screening values to identify COPCs that may need to be considered in the SLERA. Chloroform and alpha-BHC were below screening values and were eliminated from consideration as COPCs. Total arsenic, chromium, and nickel were below screening values and were eliminated from consideration as COPCs. Dissolved arsenic was below the screening values and was eliminated from consideration as a COPC. Dissolved cadmium and lead were non-detect, and therefore, eliminated from consideration as COPCs.

Four total inorganic compounds (zinc, cyanide, lead, and cadmium) were above the screening values, but were eliminated as COPCs for the following reasons:

- Lead and cadmium were not detected in the dissolved form. The conclusion made in the 1995 ERA was that concentrations of these two metals in the unfiltered samples (i.e., total metals) was likely due to suspended sediment and do not reflect what is in the water column. No additional data have been collected for these metals.

- Cyanide was eliminated as a COPC in surface water since groundwater samples taken in 2000-2002 did not find detectable levels of cyanide in monitoring well BA-1, which is located in OU -1 along the bluff adjacent to OU-2. The 2000-2002 groundwater results for cyanide were obtained from a database provided by URS Corporation for site monitoring data. Monitoring well BA-1 is in the path of groundwater flow from the Plant and represents a potential pathway for migration of cyanide to the OU-2 Basin. Cyanide is also not bioaccumulative and has a short half-life. Residual concentrations detected in 1991 would not currently be present, based on its short half life

- Zinc data are from 1991 and no recent data have been collected. Zinc was eliminated as a COPC in the 1995 ERA since the sediment geometric mean of all site data (113 mg/kg) was below the sediment screening value. Sediments may serve as a source to surface water for zinc. Zinc is also not a bioaccumulative chemical. USEPA has not historically recognized zinc as a COPC at this site (WCC, 1995), and no additional data have not been collected since 1991.

Four dissolved inorganic compounds (chromium, nickel, copper, and zinc) were above the screening values, but were eliminated as COPCs for the following reasons:

- Dissolved chromium and nickel data are from 1991. These constituents were not considered COPCs in the 1995 ERA and additional data for these constituents have not been collected since 1991. The elevated values for these dissolved metals were attributed to sample contamination (WCC, 1993). The total analyses were also determined to be more representative of surface water concentrations because total

suspended solids were low in these samples (WCC, 1993). The total analyses for chromium and nickel were below the screening values.

- Dissolved copper data are from 1991, and no recent data have been collected for copper. Only one out of 12 samples was detected for copper. This constituent was not considered a COPC in the 1995 ERA due to a low frequency of detection and no additional data have been collected since 1991.

- Dissolved zinc data are from 1991, and no recent data have been collected for zinc. Zinc was not selected as a COPC because the mean of 44 µg/L was below the Freshwater NAWQC although the maximum detected concentration was above the NAWQC. The area-wide average is more representative of ecological exposures as it includes data across an entire foraging range. Zinc is also not a bioaccumulative chemical. Zinc was not considered a COPC in the 1995 ERA and no additional data have been collected since 1991.

Sulfides in surface water were considered in the evaluation of COPCs, based on the results of the 2006 water samples. The AWQC for sulfides is based on the amount of undissociated H_2S present in water, and not on concentrations of total sulfides (in all forms) (40 CFR Part 131, Chapter I, as amended). Surface water samples in OU-2 were analyzed for total sulfides such that a direct comparison between the AWQC for hydrogen sulfide (0.002 mg/L) and total sulfide results from surface water samples in the Basin and Round Pond cannot be directly compared. Additional evaluation of sulfide as hydrogen sulfide is appropriate and is provided below since the total sulfide concentrations were above the hydrogen sulfide AWQC.

Soluble sulfides in water are primarily in two forms: hydrogen sulfide (H_2S) and hydrosulfide (HS^-), with toxicity from sulfides being derived primarily from H_2S. The proportion of the two forms of sulfides is dependent on pH and Eh. Surface water samples in the Basin and Round Pond are typically oxic with a near neutral pH. Hydrogen sulfide would not be present in surface water with a near neutral pH and positive ORP, based on the pH-Eh diagram provided in Figure P2-1. Sulfide as a COPC is not carried forward as a COPC, as a result. The potential for remedial actions to alter the pH or Eh of the surface water should be evaluated during the remedial process.

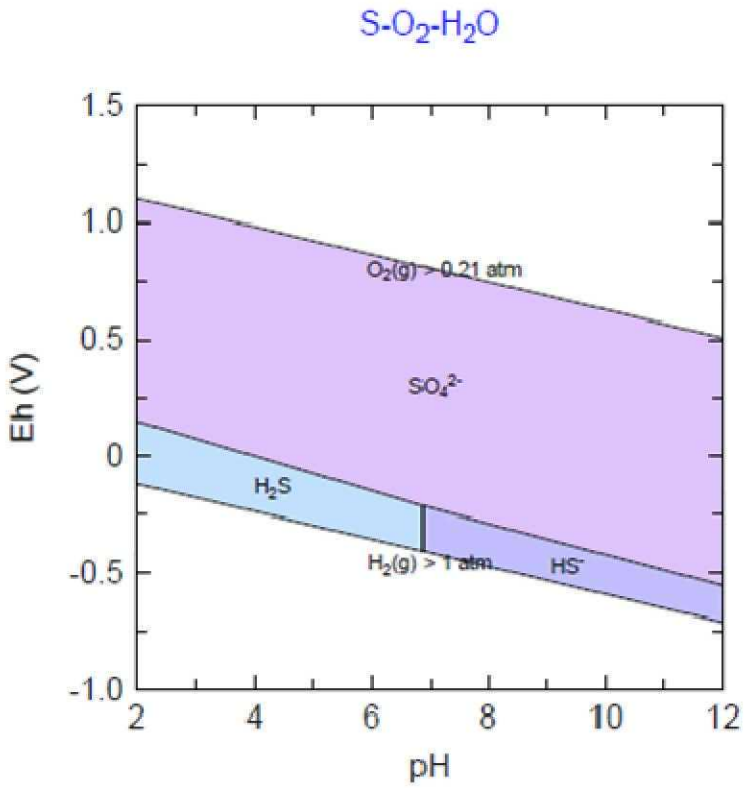


Figure P2-1. Eh versus pH Diagram for Sulfide (from PHREEQC,Version 2)

The surface water COPCs that are carried through the risk process are mercury, methylmercury, HCB, and DDTR. Methylmercury and HCB were selected as COPCs in surface water because screening values were not available. Discussions in meetings with USEPA on December 7/8, 2009 and March 29, 2010 focused future risk assessment activities on mercury, HCB, and DDTR.

2.1.3 Surface Soil

The USEPA Region 4 ESVs for soil were used to identify COPCs for potential receptors that may come in contact with floodplain surface soils in OU-2 (Table P2-3). The only constituents analyzed as part of site investigations in 1991, 1992, and 1994 and included in the 1995 ERA were mercury, HCB, and DDTR. Subsequent sampling efforts for floodplain soils have focused only on mercury, methylmercury, HCB, and DDTR which have been identified as COPCs at OU-2. Mercury, HCB, and DDTR were above the current ESVs in both the 1995 ERA dataset and the 2010 floodplain surface soil samples and

are selected as surface soil COPCs. Methylmercury was not identified as a surface soil COPC based on the floodplain surface soil data.

2.1.4 Selection of Constituents of Potential Concern

Based on the sediment, surface water, and surface soil screening results discussed above and presented in Tables P2-1 through P2-3, the resulting COPCs are as follows:

COPCs
Sediment
Mercury
Methylmercury
HCB
DDTR
Surface Water
Mercury
Methylmercury
HCB
DDTR
Surface Soil
Mercury
HCB
DDTR

The COPCs to be carried through the risk assessment process for OU-2 include mercury, methylmercury, HCB, and DDTR.

3.0 SCREENING LEVEL TOXICITY ASSESSMENT

A conceptual site model (CSM) of sediment transport and deposition is provided in Section 5.0 of the Remedial Investigation Addendum. The contaminants for the site were determined to be mercury, methylmercury, HCB, and DDTR following completion of the 1995 Ecological Risk Assessment and discussions of toxicity in this section are focused on these COCs. Details are discussed here for characterization of exposure and are summarized briefly to support endpoint selection. Mercury and HCB were released from Olin facilities and transported via the wastewater ditch and former discharge ditch to the Basin; mercury likely underwent methylation after deposition in the Basin. DDTR was released from the Ciba-Geigy property north of OU-2 and entered OU-2 via surface water. Atmospheric deposition from a variety of ultimate sources also provided inputs (especially of mercury and DDTR). The four COPCs are largely concentrated in aquatic sediments and floodplain soils within OU-2, but smaller fractions of the COPCs exist in solution and/or suspension in surface water, in the atmosphere (via volatilization), and in biological tissues (via bioaccumulation). Ecological receptors are vulnerable to exposure to the COPCs through direct contact with, inhalation of, and/or ingestion of the physical and biological media. The general types of anticipated effects are discussed here to provide a basis for assessment endpoint selection.

3.1 MERCURY/METHYLMERCURY

The toxicity of mercury varies considerably depending on the chemical form and mode of exposure. Under laboratory conditions, aqueous concentrations of various mercury species (especially organomercury compounds) in the range of surface-water concentrations of total mercury measured in OU-2 are reported to be acutely or chronically toxic to sensitive aquatic organisms (USEPA, 1985; Eisler, 1987; USEPA, 1997a). There is thus a potential for direct effects to aquatic biota involving survival (lethality), development, growth, and reproduction. Mercury exposure may also result in adverse neurological effects or impairment of renal (kidney) function (IRIS, 2010). Depending on its availability for uptake via the roots (i.e., solubility in interstitial moisture), mercury can impair the development and growth of sensitive terrestrial vascular plants (Kabata and Kabata-Pendias, 1992). Since mercury (especially methylated forms) is readily bioaccumulated, there is a potential for indirect exposure to both aquatic and terrestrial consumers via ingestion. Methylmercury is a neurotoxin to vertebrates. Limited information is available to evaluate the dietary toxicity to fishes, but the extensive data for higher vertebrates (especially birds and mammals) suggest a potential for acute effects and a possibility for chronic dietary effects to certain vulnerable receptors (Eisler, 1987). Such indirect effects on higher

vertebrates could include impaired development, growth, and reproduction. Mercury has also been associated with mutagenic and teratogenic effects in various animals.

3.2 HCB

HCB appears not to be directly toxic to aquatic organisms at concentrations below its aqueous solubility (about 6 µg/L) (USEPA, 1988). HCB is not expected to elicit any significant adverse effects among strictly aquatic receptors. HCB also appears very unlikely to be toxic to vascular plants at the levels found in the floodplain soils, as evidenced by its former wide use as a fungicide (Courtney, 1979; Hansen, 1994). HCB is highly lipophilic and bioaccumulative, so there is a potential for adverse effects to higher-level consumers via ingestion. The chronic toxicity to birds and mammals related to liver damage and impaired reproduction is reportedly associated with dietary concentrations that might be encountered by certain receptors (Courtney, 1979; Newell et al. 1987; Hansen, 1994). Data are insufficient to evaluate the potential chronic dietary effects of HCB on reptiles.

3.3 DDTR

The toxicity of DDTR varies considerably depending on the chemical form and mode of exposure. Under laboratory conditions, aqueous concentrations of DDTR or individual metabolites in the range of surface-water concentrations of DDTR measured in the Basin and Round Pond are reported to be within the effects range of sensitive aquatic organisms (USEPA, 1980; Meyers and Hendricks, 1985; Mayer and Ellersieck, 1986). The potential for direct effects to aquatic biota, involving survival (lethality), development, growth, and reproduction must be evaluated. DDTR is unlikely to be toxic to vascular plants at the bulk-soil concentrations measured in the floodplain (Rajonna and de la Cruz, 1977). Acute toxicity to higher vertebrates is relatively low, but chronic responses are associated with very low dietary exposure. DDTR is a relatively potent neurotoxin to vertebrates and invertebrates (Chambers, 1994), and chronic exposures are associated with liver damage in mammals and fish (Meyers and Hendricks, 1985). The chief concern in vertebrates is reproductive effects, associated particularly with the metabolite DDE, and believed to be caused by estrogenic effects and effects on the mixed function oxygenase system (Chambers, 1994). DDE also interferes with calcium metabolism, at least in birds, resulting in eggshell thinning and reduced reproductive potential (Bitman et al., 1969; Lundholm, 1997). Since DDTR is highly lipophilic and readily bioaccumulated, there is a potential for indirect exposure to higher vertebrate consumers via ingestion.

3.4 SELECTION OF QUALITATIVE TOXICITY VALUES FOR ASSESSMENT ENDPOINTS 1, 2, AND 3

A review of available literature, including primary sources and compilation documents, provided numerous toxicity benchmarks and effects concentrations relating to mercury, methylmercury, HCB, and DDTR studies on various environmental media and receptors. Toxicity values obtained from a single study are referred to as effects concentrations. Consensus values are be referred to as toxicity benchmarks. The following section summarizes the toxicity studies reviewed and the selected benchmarks or effects concentrations for each medium and COPC to be compared against OU-2 media concentrations. Tables P2-4, P2-5, and P2-6 present the toxicity benchmarks and effects concentrations reviewed and selected for Assessment Endpoints 1, 2, and 3, respectively.

3.4.1 Assessment Endpoint 1: Protection of the Long-term Health and Reproductive Success of the Benthic Macroinvertebrate Community

3.4.1.1 Measurement Endpoint 1: Sediment Toxicity Values

Mercury

Mercury concentrations were mainly compared to the threshold effects concentration (TEC) of 0.18 mg/kg for mercury and the "probable effects concentration" (PEC) of 1.06 mg/kg for mercury (MacDonald et al., 2000; USEPA, 2002g). A variety of sediment quality guidelines (Persaud et al., 1993; Smith et al., 1996; Long and Morgan, 1991; etc.) have been developed for use in evaluating chemical concentrations in freshwater sediments. Some of these have been generally derived from correlations of bulk sediment toxicity test results with chemical concentrations in the bulk sediments. Mixtures of chemicals are present within each toxicity test sample, and the causative agent(s) for toxicity are frequently not identified. The presence of multiple chemicals in a single toxicity test makes interpretation difficult, especially when dose-response data are not available for some chemicals. In addition, these correlations are statistical associations, not causal relationships. One misconception is the meaning of the term PEC in that it refers to a benchmark value derived from a wide range of data sets and is not an effects concentration (i.e., a value derived from a single chemical, dose-response study). The concentrations used to derive the PECs consist of a wide range of data sets, with values expected to be associated with toxicity at least 50 percent of the time. The PECs are intended to identify chemical concentrations above which harmful effects to sediment organisms are expected to occur frequently. These PECs were numerically derived from the geometric mean of the available sediment quality guidelines.

The various guidelines have been numerically consolidated into "consensus-based" sediment quality guidelines (MacDonald et al., 2000), and are widely applied. Professionals in the field generally agree that these are useful for screening level evaluations, but do not take the place of other tools such as site-specific sediment toxicity tests, and are not for independent use as remediation goals.

PECs are widely misapplied because of a lack of understanding regarding the derivation and meaning of these values. This is particularly true for the mercury values. Unlike many of the other PECs, the mercury evaluation database is very limited. Although many chemical PECs have been evaluated using hundreds of samples, the mercury PEC was evaluated using 79 samples, only 4 of which were considered "toxic" (sample different from control or reference for one endpoint) (Ingersoll and MacDonald, 1999; USEPA, 1996b). The PEC of 1.06 mg/kg correctly identified all four of these samples as toxic, and thus the percentage of samples correctly predicted to be toxic is reported as 100 percent. This has led to an erroneous assumption on the part of many PEC users that the mercury PEC is highly predictive and reliable; however, this is not the case. In fact, in spite of this presentation of the mercury PEC (i.e., 100 percent of samples correctly predicted to be toxic), it is pointed out in the text of the MacDonald paper that there is insufficient data to evaluate the predictive ability of the mercury PEC. Review of the source papers shows that each four toxic samples has more than one chemical concentration that exceeds its respective PEC and a minimum of four chemicals with ratios higher than mercury. Mercury is a very minor contributor, at best, in these highly contaminated sediment samples. Mercury's contribution to the total summed PEC ratios for these four toxic samples ranged from only 3.06 percent to 8.84 percent. Inspection of the other contributions suggests that mercury was not the primary responsible toxic agent in any of these samples, and may not be a contributing toxic agent. PEC quotients (specifically developed to assess predictive ability of the PECs) are developed for chemicals that have a reasonably reliable (e.g., 75 percent) predictive ability given a minimum sample size, and are not developed for chemicals with unreliable PECs. Because of its lack of reliability, mercury is specifically excluded from the calculation of PEC quotients for individual samples.

Comparative values in addition to the PEC of 1.06 mg/kg were assembled. Two freshwater studies demonstrated that concentrations above the PEC produced no effects (Saouter et al., 1993; Odin et al., 1994). These studies used mayflies (*Hexagenia rigida*) as the test species. Mayflies were exposed to sediments for 9 days and 15 days with concentrations of 1.0 mg/kg and 10.0 mg/kg (dry weight), respectively, of mercuric chloride. The study using 1.0 mg/kg as the dose concentration showed no effect on growth, and the study using 10.0 mg/kg as the dose concentration showed no effect on growth or survival. A recent paper by Chibunda (2009) supports the mercury benchmarks. Chibunda (2009) tested

multiple mercury levels in the absence of other contaminants and observed significantly reduced survival and emergence of *Chironomus riparius* larvae at 3.84 mg/kg of mercury. Growth of larvae was significantly reduced at 2.42 mg/kg and emergence was delayed at 0.93 mg/kg.

For comparison to OU-2 sediment concentrations, the TEC and PEC (MacDonald et al., 2000) were used with the interpretive caution noted in the above discussion. The additional effects concentrations discussed are included here as weight of evidence due to the limited utility in using the PEC of 1.06 mg/kg (Table P2-4). Sediment mercury concentrations were also compared against the effects concentration for survival and reproduction of 3.84 mg/kg (Chibunda, 2009).

Methylmercury

Three freshwater toxicity studies that compare methylmercury sediment concentrations to benthos ecotoxicity were identified (Table P2-4). The studies were available in Saouter et al. (1993), Odin et al. (1994), and Odin et al. (1995). Mayflies (*Hexagenia rigida*) were used as the study species. The tolerance for *Hexagenia* mayflies from North Carolina and the Mid-Atlantic Ecoregions is within the range of 4.7 to 6, respectively. Toxicity tests are performed routinely using *Daphnia* and *Hyalella azteca*, both of which have a tolerance value of 8 for the Mid-Atlantic Ecoregion and the Northwest. Therefore, *Hexagenia* toxicity values are protective of more species than toxicity values generated using standard toxicity test species. Mayflies were exposed to sediments with concentrations of 0.5 mg/kg, 2.98 mg/kg, and 5.0 mg/kg of methylmercuric chloride for study durations of 9 days, 15 days, and 15 days, respectively. No effect on growth (i.e., the only study endpoint) was noted at the 0.5 mg/kg dose level. Studies using 2.98 mg/kg and 5.0 mg/kg dose levels showed no effects on growth or survival.

There is some uncertainty with the toxicity values presented in the studies referenced in the above paragraph. Researchers who added methylmercury to sediment to test the bioaccumulation into mayflies indicated that much of the methylmercury they added converted to inorganic mercury during the test (Odin et al., 1994). Only a small fraction of the mercury in sediments is naturally found in the form of methylmercury (approximately 99.97% based on 2008-2009 Basin sediment data), and methylmercury does not directly contribute significantly to overall toxicity in sediments. The use of a toxicity value for total mercury is more appropriate for screening sediments. Total mercury includes both inorganic and organic forms of mercury.

Two consensus-based toxicity values were identified for mercury. The studies were available in MacDonald et al. (2000) and Chibunda (2009). The study by MacDonald (2000) evaluated the effect-level concentrations to various benthic macroinvertebrates from multiple published sources and developed consensus-based lower (TEC) and upper effect values (PEC) for selected contaminants. A mercury TEC of 0.18 mg/kg and PEC of 1.06 mg/kg are provided in MacDonald et al. (2000) (Table P2-4). The TEC and PEC are statistically derived concentrations and are not a result of directly measured toxicity studies. The TECs and PECs presented in MacDonald et al. (2000) were evaluated for reliability in predicting toxicity in sediments and were found to provide an accurate basis for predicting toxicity (MacDonald et al. 2000). The study by Chibunda (2009) used the midge (Chironomus riparius) as the study species. Midges were exposed to mercury in sediments for 28 days to assess survival and reproduction. An effects concentration of 3.84 mg/kg for survival and reproduction was provided in Chibunda (2009) (Table P2-4). The mercury TEC and PEC (MacDonald et al., 2000) were used for comparison to OU-2 sediment methylmercury concentrations, as well as the effects concentration of 3.84 mg/kg for survival and reproduction (Chibunda, 2009) (Table P2-4).

HCB

Several studies were identified for comparison of sediment HCB concentrations to benthos toxicity (Table P2-4). Persaud et al. (1993) reported a Lowest Effect Level (LEL) for HCB of 0.02 mg/kg for sediment toxicity to benthos based on the 5th percentile of screening level concentrations. Persaud et al. (1993) also calculated a HCB Severe Effect Level (SEL) of 24 mg/kg based on the 95^{th} percentile of screening level concentrations. According to Persaud et al. (1993), the SEL should be converted to a bulk sediment value by multiplying the site-specific TOC sediment concentration by the SEL. The average TOC percentage for 2009 for OU-2 (including the Round Pond and excluding the deep hole of the Basin) is 1.8 percent. Multiplying 1.8 percent TOC by the SEL of 24 mg/kg yields a site-specific HCB SEL of 0.43 mg/kg.

Van der Kooij et al. (1991) was also evaluated for use as HCB screening benchmarks for sediment exposure to benthos. Van der Kooij et al. (1991) presented an example sediment benchmark of 8.9 mg/kg using a direct aquatic effect no observed effects concentration (NOEC) estimated using a minimum toxicity equation and extrapolating an LC_{50} to a NOEC and the fractional organic carbon (FOC) in sediments and the K_{ow} of HCB. Van der Kooij et al. (1991) also calculated an example sediment quality criterion for dissolved HCB of 0.12 mg/kg using the log K_{ow} of HCB to calculate a BCF and a product standard used in Sweden for fish consumption. However, site-specific data are available to calculate a sediment benchmark using the equations presented in Van der Kooij et al. (1991). Using the withdrawn

Canadian water quality criterion of 0.0065 µg/L as the surface water NOEC and 0.018 (unitless) as the FOC component in the Van der Kooij et al. (1991) equation yields a site-specific sediment benchmark of 0.11 mg/kg, which is within the range of 0.02 mg/kg (LEL) from Persaud et al. (1993) and 0.43 mg/kg (site-specific SEL) based on Persaud et al. (1993).

Schuytema et al. (1990) reported no effect on survival for adult amphipods, *Hyalella azteca,* exposed to 92 mg/kg of HCB in sediments after 28 days (Table P2-4).

The toxicity benchmarks of 0.02 mg/kg (LEL) from Persaud et al. (1993) and 0.43 mg/kg (site-specific SEL) based on Persaud et al. (1993) were used for comparison to OU-2 sediment HCB concentrations.

DDTR

MacDonald et al. (2000) presents consensus-based benchmarks for DDT, DDD, and DDE in sediment. The TEC is 0.00528 mg/kg and the PEC is 0.572 mg/kg for total DDT, DDD, and DDE (Table P2-4). Bettinetti et al. (2005) conducted 28-day toxicity tests for sediment using the benthic oligochaete *Tubifex tubifex* and a 10-day toxicity test on the larval stage of chironomid *Chironomus riparius*. The survival of adult worms was not affected after four weeks of exposure to sediments with a DDT concentration of 0.860 mg/kg (dw). Reduction in fertility of the worms was observed when exposed to 0.0805 mg/kg (dw). No effect on chironomid survival was observed with sediment ranging in concentration from 0.0805 mg/kg (dw) to 0.860 mg/kg (dw). A lowest observed effect concentration (LOEC) of 0.0805 mg/kg (dw) was reported based on the reproductive capacity of *T. tubifex* after 28 days of exposure and chironomid growth after 10 days of exposure.

The TEC and PEC were selected as the toxicity benchmarks for the protection of benthos for comparison to OU-2 sediment DDTR concentrations (Table P2-4).

3.4.1.2 Measurement Endpoint 2: Surface Water Toxicity Values

Mercury

The NAWQC of 0.77 µg/L for mercury (USEPA, 2009) was used as the surface water toxicity benchmark protective of benthos for comparison of OU-2 surface water concentrations (Table P2-4).

Four relevant surface water toxicity studies for mercury were available in the Ecotoxicology (ECOTOX) database (USEPA, 2002f). These studies were freshwater static studies conducted over 96 hours for the generation of an LC_{50} (i.e., the concentration that induced mortality in 50 percent of the study population). The study species and the LC_{50}s were the caddisfly (Trichoptera) at 1,200 µg/L, the damselfly (Zygoptera) at 1,200 µg/L, the midge (Diptera) at 20 µg/L, and the amphipod (Amphipoda) at 10 µg/L.

Two additional published freshwater toxicity studies were found for comparison of surface water concentrations to benthos ecotoxicity. One study (Rossaro et al., 1986) used the midge (*Chironomus riparius*) and one study (Saouter et al., 1993) used the mayfly (*Hexagenia rigida*) as the test species. Midges and mayflies were exposed to surface water at concentrations of 5.5 µg/L and 23 µg/L of mercuric chloride, respectively. The midge study indicated no effect on survival, and the mayfly study showed no effect on growth (i.e., the only endpoint in the study).

Methylmercury

A NAWQC is not available for methylmercury. An appropriate screening benchmark for methylmercury is reported by Suter and Tsao (1996) with a Tier 2 secondary chronic value of 0.0028 µg/L and a secondary acute value of 0.099 µg/L. These values were used as the surface water screening benchmarks for methylmercury protective of benthos and were compared to OU-2 surface water methylmercury concentrations (Table P2-4).

Two published freshwater toxicity studies were found for comparison of surface water methylmercury concentrations to benthos ecotoxicity (Table P2-4). Both studies used the mayfly (*Hexagenia rigida*) as the test species, and the data are listed in Odin et al. (1995) and Saouter et al., (1993). In the studies, mayflies were exposed to surface water at concentrations of 1.8 µg/L and 30 µg/L to 36 µg/L of methylmercuric chloride for 15 days and 9 days, respectively. The first study at the lower concentration indicated no effect on survival or growth, while the second study at the higher concentration indicated no effect on growth (i.e., the only endpoint in the study).

HCB

There is a lack of scientific data on the toxicity of HCB in surface water to benthic organisms. According to USEPA (1988), "... freshwater organisms and their uses should not be affected unacceptably if the four-day average concentration of hexachlorobenzene does not exceed 3.68 µg/L more than once every three years on the average and if the one-hour average concentration does not exceed 6.0 µg/L more than

once every three years on the average." The value of 3.68 g/L was derived from a tissue residue screening benchmark for HCB of 32 mg/kg whole body (wet weight). Based on USEPA (1988), concentrations of HCB at or below the aqueous solubility of 3.68 µg/L (chronic) and 6.0 µg/L (acute) elicit no toxic response. USEPA (1988) is a draft that has never been finalized. Therefore, the above-mentioned values are not formally promulgated criteria for HCB. The Ontario Water Quality Objectives Criterion (OWQOC) of 0.0065 ug/L (OMEE, 1999) was recently withdrawn, which was derived from a tissue residue screening benchmark for HCB of 0.056 mg/kg whole body (wet weight).

The sediment criterion developed by the Dutch researchers assumed a model based on K_{ow} to predict the minimum toxicity of HCB at 0.19 µg/L. The USEPA (2008) method for predicting the narcotic toxicity of HCB using the target lipid model based on the K_{ow} value predicts toxicity at 4 µg/L. However, HCB is anticipated to result in toxicity greater than that of narcosis.

Several additional studies on HCB were identified in scientific literature (Table P2-4). Nebeker et al. (1989) exposed the amphipod *Hyalella azteca* to HCB at a concentration of 5 µg/L for 30 days. No effects on survival, growth, or reproduction were observed at 5 µg/L. Schuytema et al. (1990) reported no effect on survival for adult amphipods, *Hyalella azteca*, exposed to 15.1 µg/L or 37.8 µg/L HCB after 28 days. The lowest ambient water concentrations at which adverse effects have actually been measured are a 50 percent reduction in fertility (EC_{50}) at 16 µg/L in *Daphnia magna* and a reduced instantaneous growth rate at 23 µg/L after 14 days (Calamari et al., 1983). A 20-day toxicity test on the red swamp crayfish, *Procambarus clarkii,* exposed to HCB reported no mortality at 27.3 µg/L (USEPA, 1988). For comparison to OU-2 surface water HCB concentrations, the NOAEL of 15.1 µg/L and the lowest effects TRV of 16 µg/L were used for protection of benthos exposed to HCB surface water concentrations (Table P2-4).

Due to the lack of available data and as a conservative measure for the protection of benthos, the withdrawn Ontario Water Quality Objectives criterion of 0.0065 µg/L was used as the HCB surface water screening benchmark protective of benthos (Table P2-4).

DDTR

The NAWQC of 1.1 µg/L (acute) and 0.001 µg/L (chronic) (USEPA, 2009) were used as the surface water toxicity benchmark protective of benthos for comparison of OU-2 surface water DDTR concentrations (Table P2-4).

Two studies were identified with freshwater toxicity data for DDTR exposure to benthos (Table P2-4). Sodergren and Svensson (1973) reported no effect on survival for nymph mayflies exposed to 0.761 µg/L DDT after 9 days. Bettinetti et al. (2005) reported 48-hour inhibitory concentrations (IC_{50}) of 1.94 µg/L DDT for *Daphnia magna* and 0.76 µg/L DDT for *Daphnia galeata* based on immobilization. A 48-hour LC_{50} of 1.1 µg/L DDT was reported by Randall et al. (1979) for *Daphnia magna*. Crosby and Tucker (1971) reported a 24-hour LC_{50} of 50 µg/L DDT for *Daphnia magna*. Acute toxicities for *Procambarus clarki* are reported within AQUIRE with a 3- day LC_{50} equal to 600 µg/L and a 4-day LC_{50} equal to 28 µg/L (1995). The Region 4 Freshwater Surface Water Screening Value presents a freshwater chronic aquatic life criterion of 0.001 µg/L for DDTR (USEPA, 2001).

3.4.1.3 Measurement Endpoint 3: Tissue Residue Toxicity Values

Mercury

One benthic macroinvertebrate toxicity study for mercury was available in Odin et al. (1994). This study generated no observed effects doses (NOEDs). The study used the burrowing mayfly (*Hexagenia rigida*) as the test species and generated NOED tissue concentrations for growth and mortality of 2.0 mg/kg and 2.7 mg/kg over a test duration of nine days. An additional test duration of 15 days yielded an NOED tissue concentration for growth and mortality of 2 mg/kg to 2.4 mg/kg.

Two additional freshwater toxicity studies were identified in Saouter et al. (1993) and Rossaro et al. (1986). The studies, which used mayflies, indicated no effects on growth after exposure to mercuric chloride in sediment or surface water. One study produced tissue residue concentrations of 0.04 mg/kg (mayflies exposed to sediment) and 3.76 mg/kg (mayflies exposed to surface water) (Saouter et al., 1993). The other identified study used the midge (*Chironomus riparius*). This study (Rossaro et al., 1986) produced no effects on survival after exposure to mercuric chloride in surface water for 30 days. The tissue residue concentrations produced in this study were 40 mg/kg, 88 mg/kg, and 107.6 mg/kg.

Though the studies were conducted over a relatively short duration, from 9 days to 30 days, the longer studies (30 days) produced significantly higher NOED values. The tissue residue concentration known to have multiple no-effects endpoints (growth and survival), 2.7 mg/kg, was selected as the mercury tissue residue effects concentration (Table P2-4). This endpoint is sufficient for protection of growth and survival.

Methylmercury

Three methylmercury studies were available in Saouter et al. (1993), Odin et al. (1994), and Odin et al. (1995). In these studies, mayflies exposed to methylmercuric chloride in surface water and sediment did not experience effects on growth and survival. The tissue residue concentrations at which no effects were noted were 1.0 mg/kg and 7.5 mg/kg (mayflies exposed to surface water), and 2.1 mg/kg, 2.6 mg/kg to 4.5 mg/kg, and 16.0 mg/kg (mayflies exposed to sediment). As a conservative measure, 1.0 mg/kg was used as the methylmercury TRV for comparison to OU-2 tissue residue concentrations for the protection of the benthic macroinvertebrate community (Table P2-4).

HCB

USEPA (2010) recommended a HCB tissue residue benchmark of 0.056 mg/kg whole body (wet weight) protective of fish based on Portland Harbor. This value was used as the benchmark for comparison of benthic macroinvertebrate HCB concentrations (Table P2-4).

Two HCB studies were identified for comparison of OU-2 benthos tissue concentrations (Table P2-4). Schuytema et al. (1990) reported no effect on survival of adult *Hyalella azteca* after 28 days with a HCB tissue concentration of 118 mg/kg. Nebeker et al. (1989) reported no effect on survival, growth, or reproduction of adult *Hyalella azteca* after 30 days with a HCB tissue concentration of 172 mg/kg. The HCB no-effects concentration of 172 mg/kg was selected as the TRV for comparison to OU-2 tissue residue concentrations for the protection of the benthic macroinvertebrate community (Table P2-4).

DDTR

USEPA (2010) recommended two benthos tissue residue benchmarks for DDTR. According to USEPA (2010), review of the ERED database and an evaluation done for Portland Harbor EPA provides 10 percent tissue residue TRVs of 0.04 mg/kg whole body (wet weight) for DDT and 0.07 mg/kg whole body (wet weight) for DDE for the protection of benthic invertebrates. USEPA (2010) stated the tissue residue benchmarks recommended are protective of sensitive species. Review of the ERED database by Olin provided verification that these values are within the range of values recommended by USEPA. The USEPA-recommended benchmarks were used for comparison of OU-2 benthos DDTR tissue concentrations (Table P2-4).

Two DDTR toxicity studies conducted on water fleas (*Daphnia magna*) and mayflies (*Ephemera danica*) were available for comparison to OU-2 benthos tissue concentrations (Table P2-4). Sodergren and Svensoon (1973) reported no effect on survival with a nymph mayfly DDTR tissue concentration of 3.1 mg/kg after nine days. Crosby and Tucker (1971) reported a 24-hour LC_{50} of 1,150 mg/kg for *Daphnia magna*, which converts to an LOAEL of 115 mg/kg.

3.4.2 Assessment Endpoint 2: Protection of Long-term Health and Reproductive Success of the Fish Community

3.4.2.1 Measurement Endpoint 1: Sediment Toxicity Values

Mercury

Few experimental ecotoxicity studies were identified for fish species exposed to known concentrations of mercury in sediments. One study indicated no effect on survival using the guppy (*Poecilia reticulata*) as the test species and a concentration of 1.023 mg/kg of mercuric chloride in sediment as the test concentration (Kudo, 1979). This study was performed over 20 days. An additional study that developed a no-effects level on survival for guppies was located (Gillespie and Scott, 1971). This study was performed over 55 days using 50 guppies exposed to a sediment mercury concentration of 50 mg/kg. An effects threshold for fish exposed to mercury in sediments is unknown. These sediment effects concentrations address only survival in fish exposed to mercury and are the only effects concentrations for fish exposed to mercury in sediment that could be located in scientific literature. Toxicity tests for fish are more commonly performed using surface water, as opposed to sediments. Therefore, the selected effects concentration for comparison of sediment concentrations is 50 mg/kg (Table P2-5).

Methylmercury

No studies of fish exposed to methylmercury in sediments were identified in scientific literature.

HCB

One study was identified on HCB sediment exposure to fish (Table P2-5). Schuytema et al. (1990) reported no effect on the survival of juvenile fathead minnows exposed to sediment HCB concentrations of 72 mg/kg and 90 mg/kg after 28 days. The no-effects sediment concentration of 90 mg/kg was selected as the effects concentration protective of fish for comparison of sediment HCB concentrations (Table P2-5).

DDTR

No studies of fish exposed to DDTR in sediments were identified in scientific literature.

3.4.2.2 Measurement Endpoint 2: Surface Water Toxicity Values

Mercury

The NAWQC of 0.77 µg/L for mercury (USEPA, 2009) was used as the surface water toxicity benchmark protective of fish for comparison of OU-2 surface water concentrations (Table P2-5).

Ecotoxicity studies on freshwater fish were identified in the ECOTOX database (USEPA, 2002f). LC_{50} values were generated for freshwater fish through 96-hour static tests. One study of the western mosquitofish (*Gambusia affinis*) generated a mortality LC_{50} of 37 µg/L. Three studies of the channel catfish (*Ictalurus punctatus*) generated mortality LC_{50}s of 350 µg/L, 580 µg/L, and 3,300 µg/L, respectively. USEPA guidance suggests the use of a 100-fold uncertainty factor (UF) to generate an NOAEL from an LC_{50}. Thus, NOAELs from the aforementioned studies are 0.37 µg/L for the western mosquitofish and range from 3.5 µg/L to 33 µg/L for the channel catfish. The western mosquitofish has an intermediate tolerance to toxic substances, and the channel catfish is categorized as "tolerant" (USEPA, 1999c). In addition to the LC_{50} studies, a whole body toxicity study was performed (Snarski and Olson, 1982). Snarski and Olson (1982), provides no-effect and lowest effect concentrations of mercuric chloride for surface water. Two of the surface water effects concentrations presented are associated with the fish tissue residue effects concentrations presented in the study. The study presents a mercury LOEC for growth of 0.58 µg/L associated with the 1.31-mg/kg tissue residue lowest effects concentration (whole body) and a mercury no observed effects concentration (NOEC) for reproduction of 0.50 µg/L associated with the 2.84-mg/kg tissue residue NOEC (whole body). The 1.31-mg/kg tissue residue effects concentration represents the LOAEL for more sensitive life stages of fish because the duration of exposure was only 60 days, whereas the 2.84-mg/kg tissue residue effects concentration represents the NOAEL for adult fish over a 41-week exposure duration (ED). Another effects concentration presented in the study noted a reduction in growth of fathead minnows at 0.26 µg/L. Results from this study provide an LOAEL of 0.26 µg/L for the reduction in growth effect on fathead minnows. This LOAEL value is less than reported NOAEL values such that it is likely very close to an accurate effects concentration for fish exposed to mercury in surface water. Concentrations higher than this value are considered to exceed the lowest effects concentration and concentrations less than this value are considered to be in the no effects range for the evaluation of mercury concentrations in surface water.

This is the lowest identified LOAEL effects concentration causing a reduction in growth. Weight of evidence for this LOAEL is demonstrated by the NOAEL of 0.37 µg/L for the mosquitofish, the NOAEL of 3.5 µg/L for the channel catfish, and the effects concentration of 0.32 µg/L for mercury exposure to freshwater fish which represents an effects concentration for 20 percent of the population (EC_{20}) for population level effects (Suter and Tsao, 1996).

Methylmercury

A NAWQC is not available for methylmercury. An appropriate screening benchmark for methylmercury is reported by Suter and Tsao (1996) with a Tier 2 secondary chronic value (SCV) of 0.0028 µg/L and a secondary acute value (SAV) of 0.099 µg/L. These values were used as the surface water screening benchmarks for methylmercury protective of fish and were compared to OU-2 surface water methylmercury concentrations (Table P2-5).

A study with methylmercuric chloride in surface water was identified in the ECOTOX database (USEPA, 2002b). This 96-hour freshwater LC_{50} value, with mortality as the endpoint using a static test on the western mosquitofish (*Gambusia affinis*), produced an LC_{50} of 70 µg/L for methylmercury in surface water. USEPA guidance suggests the use of a 100-fold UF to generate an NOAEL from an LC_{50}. Thus, an appropriate NOAEL from this study would be 0.70 µg/L for methylmercury. In Olson et al. 1975, 0.25 µg/L of methylmercuric chloride caused no effect on survival or growth in fathead minnows over a 336-day exposure period. Weight of evidence is added with studies presented in the USFWS *Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*, which indicated NOAELs for growth and reproduction at concentrations ranging from 0.4 µg/L to 1.0 µg/L for methylmercury (Eisler, 1987).

McKim et al. (1976) reported that following the exposure of three generations of brook trout (*Salvelinus frontalis*) to methylmercury chloride, no toxic symptoms were evident at 0.29 µg/L. Fjeld et al. (1998) analyzed grayling (*Thymallus thymallus*) yolk-fry, which indicated an effect on behavior after exposure of the developing embryos to a surface water methylmercury concentration of 0.80 µg/L. A surface water methylmercury concentration of 0.16 µg/L resulted in no impairment to developing embryos. The test did have interference in the form of an antifungal treatment administered during incubation of the test fish eggs, which brings into question the validity of this value.

HCB

Due to the lack of available data and as a conservative measure for the protection of fish, the withdrawn Ontario Water Quality Objectives criterion of 0.0065 µg/L was used as the HCB surface water screening benchmark protective of fish (Table P2-5).

Several studies were identified on HCB surface water toxicity to fish (Table P2-5). Schuytema et al. (1988) reported no effect on survival of the fathead minnow exposed to surface water concentrations ranging from 1.3 µg/L to 3.1 µg/L and 6.1 µg/L to 13.9 µg/L after 28 days. No effect on survival or growth was observed in embryonic to juvenile fathead minnows exposed to 4.8 µg/L after 32 days (Carlson and Kosian, 1987). Schuytema et al. (1990) reported no effect on survival of juvenile fathead minnows exposed to surface water concentrations ranging from 8.6 µg/L to 11.4 µg/L after 28 days. No effect on survival or growth was observed in juvenile fathead minnows exposed to 5 µg/L after 28 days (Nebeker et al., 1989). In addition, concentrations of HCB at or below the aqueous solubility of 3.68 µg/L (chronic) and 6.0 µg/L (acute) elicited no toxic response to aquatic organisms as noted in USEPA (1988). The AQUIRE and ASTER databases (USEPA, 1995) indicated no effect on survival of largemouth bass after 10- and 15-day exposures to 10 and 26 µg/L HCB, respectively.

DDTR

The NAWQC of 1.1 µg/L (acute) and 0.001 µg/L (chronic) (USEPA, 2009) were used as the surface water toxicity benchmarks protective of fish for comparison of OU-2 surface water DDTR concentrations (Table P2-5).

Several studies were identified on DDTR surface water toxicity to fish (Table P2-5). Jarvinen et al. (1976 and 1977) reported no effect on survival of juvenile to adult fathead minnows exposed to 0.35 µg/L DDT after 266 days and 50 percent reduced survival on juvenile to adult fathead minnows exposed to 1.53 µg/L DDT after 266 days. A LC_{50} of 4 µg/L was observed in mosquitofish after 16 days (Pillai et al., 1977), which converts to a LOAEL of 0.4 µg/L. Mayer and Ellersieck (1986) reported a 96-hour LC_{50} of 13.2 µg/L for the fathead minnow (converts to a LOAEL of 1.32 µg/L) and 6.3 µg/L for the bluegill (converts to a LOAEL of 0.63 µg/L).

3.4.2.3 Measurement Endpoint 3: Tissue Residue Toxicity Values

Mercury– Whole Body

Mercury studies of fish were identified in MacLeod and Pessah (1973), Olson et al. (1975), Wobeser (1975), Snarski and Olson (1982), Friedmann et al. (1996), and Beckvar et al. (2005). Studies performed on suitable surrogate species to the fish collected from OU-2 were selected to evaluate the potential toxicity of mercury. The concentrations used from these studies were tissue residue concentrations in wet weight. In addition, methylmercury studies were also identified for fish because nearly 100 percent of mercury tissue concentrations in fish are methylmercury. Fish tolerance factors were included from USEPA's *An Introduction to Freshwater Fishes as Biological Indicators* (EPA-260-R-08-016; USEPA, 2008). The tolerance of OU-2 fish species is compared to the tolerance limits of the fish used in the toxicity studies.

Whole body studies performed over various time periods and at various dose concentrations of mercuric chloride yielded NOEDs and lowest observed effects doses (LOEDs) for mercury tissue residue concentrations. The concentrations produced in the NOED and LOED studies are the amounts of methylmercury in fish tissue when the fish has reached the corresponding endpoint. A NOED for growth is the amount of methylmercury in the fish tissue at the end of a study in which the fish did not experience a reduction in growth. Because nearly 100 percent of mercury tissue concentrations in fish are methylmercury, methylmercury studies are also discussed in this section for total mercury. No effect on survival of the fathead minnow (*Pimephales promelas*) was noted with a fish tissue mercury concentration of 7.6 mg/kg (Snarski and Olson, 1982). Fish were exposed for 60 days to 3.69 µg/L of mercuric chloride in surface water. Tissue concentrations ranging from 0.32 mg/kg to 9.41 mg/kg had no effects in a 41-week growth study performed on fathead minnows (Snarski and Olson, 1982). LOED values from similar growth studies (30 days and 60 days) on fathead minnows ranged from 1.31 mg/kg to 18.8 mg/kg of mercury in fish tissue (Snarski and Olson, 1982). Another series of 22 tests performed on walleye produced an LOED value for growth of 2.37 mg/kg for mercury (Friedmann et al., 1996). Snarksi and Olson (1982) also reported an NOAEL value of 2.84 mg/kg in the 41-week reproductive study. No effect on juvenile walleye (*Stizostedion vitreum*) survival was observed with a fish tissue methylmercury concentration of 2.37 mg/kg (Friedmann et al., 1996). Another series of 22 tests performed on juvenile walleye produced an LOED value for growth of 2.37 mg/kg for methylmercury (Friedmann et al., 1996).

Toxicity values were generated for various fish species exposed to methylmercuric chloride under various time periods and exposure concentrations. No effect on survival or growth was noted after exposing fathead minnows to 0.25 µg/L of methylmercuric chloride for 336 days (Olson et al., 1975). The residual tissue concentration was 10.9 mg/kg of methylmercury. Studies performed on brook trout for 756 days showed reduced growth after exposing the fish to 0.93 µg/L of methylmercuric chloride. The tissue concentration in the second generation was 9.4 mg/kg. This concentration was also associated with reduced reproduction in brook trout (McKim et al., 1976). No effect on reproduction was noted after exposing brook trout (*Salventinus fontinalis*) to 0.29 µg/L over 756 days. The residual tissue concentration after exposure was 3.4 mg/kg. McKim et al. (1976) also reported no adverse effects on survival and growth in fish with a tissue concentration as high as 2.7 mg/kg. Fish tissue whole body residues of 5 mg/kg to7 mg/kg resulted in toxic symptoms, including death. Thus, this study indicates that fish could exhibit tissue residues between 3 mg/kg and 5 mg/kg without direct toxic effects.

Beckvar et al. (2005) is a compilation document of mercury toxicity studies on fish. Paired no-effect residue (NER) and low-effect residue (LER) whole-body residue concentrations in fish were identified for mercury from published literature. The document reports a whole body LER value of 0.3 mg/kg for the adult life stage of the striped mullet due to exposure of methylmercury in surface water (P2-5). Beckvar et al. (2005) states the LER value was selected as the exposure scenario with the lowest tissue residue.

For comparison purposes, mercury concentrations in whole body fish tissue were evaluated against the LER value of 0.3 mg/kg (P2-5).

HCB – Whole Body

USEPA (2010) recommended a HCB tissue residue benchmark of 0.056 mg/kg whole body (wet weight) protective of fish based on Portland Harbor. This value was selected as the benchmark for comparison of fish tissue HCB concentrations (Table P2-5).

Four studies were identified on HCB fish tissue residue toxicity (Table P2-5). Schuytema et al. (1988) reported no effect on the survival of fathead minnows with HCB tissue residue concentrations ranging from 39 mg/kg to 190 mg/kg after 28 days. Carlson and Kosian (1987) reported no effect on the survival or growth of embryonic to juvenile fathead minnows with an HCB tissue residue concentration of 97 mg/kg after 32 days. Schuytema et al. (1990) reported no effect on the survival of fathead minnows with HCB tissue residue concentrations ranging from 272 mg/kg to 468 mg/kg after 28 days. No effect

on the survival or growth of juvenile fathead minnows was observed with a HCB tissue concentration of 46.5 mg/kg (Nebeker et al., 1989).

DDTR – Whole Body

USEPA (2010) recommended two fish tissue residue effects concentrations for DDTR. According to USEPA (2010), review of the ERED database and an evaluation done for Portland Harbor EPA provides a tissue residue benchmark of 0.46 mg/kg whole body (wet weight) as the no-effect concentration and a tissue reside benchmark of 0.68 mg/kg whole body (wet weight) as the low effect concentration. USEPA (2010) stated the values are the 5 and 10 percentiles of the species sensitivity distribution, and the tissue residue benchmarks are protective of chronic exposures to sensitive fish species. Review of the ERED database by Olin provided verification that these values are within the range of values recommended by USEPA. The USEPA-recommended effects concentrations were selected for comparison of OU-2 DDTR fish tissue residue concentrations (Table P2-5).

Two studies were identified on DDTR fish tissue residue toxicity (Table P2-5). No effect on survival of juvenile to adult fathead minnows was observed at a DDTR tissue residue concentration of 40 mg/kg after 266 days, and 50 percent experienced reduced survival at 160 mg/kg DDTR after 266 days (Jarvinen et al., 1976 and 1977). Fathead minnows containing 70 mg/kg DDT exhibited reduced hatching success (Dillon and Gibson, 1985). Pillai et al. (1977) reported an LC_{50} of 26.5 mg/kg on mosquitofish after 16 days, which converts to a LOAEL of 2.65 mg/kg.

3.4.3 Assessment Endpoint 3: Protection of the Long-term Health and Reproductive Success of the Soil Invertebrate Community

3.4.3.1 Measurement Endpoint 1: Soil Toxicity Values

Mercury

Toxicity studies identified in the USEPA ECOTOX Database and *Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes* (Efroymson et al., 1997), as well as several individual studies, were considered and are discussed below in terms of appropriateness for use as toxicological benchmarks or effects concentrations for soil invertebrates. Toxicity studies considered appropriate include those studies performed in natural soils, because soil invertebrates in OU-2 live in natural soils, not in artificial environments.

In Efroymson et al. (1997), a proposed value of 0.1 ppm was recommended for mercury based on work by Abbasi and Soni (1983) and Efroymson applied a safety factor of 5 to yield a value of 0.5 ppm. Confidence in this value is low because of the limited dataset (i.e., one study) (Efroymson et al., 1997). A review of Abbasi and Soni (1983) determined that the toxicological value suggested is not appropriate for soil. TRV derivation and its dosage concentration have been misrepresented in secondary sources, including Efroymson et al., 1997. The Abbasi and Soni study evaluated effects in an experimental system in which soil was irrigated with a 0.5 ppm (mg/L) concentration of dissolved mercury in wastewater. The paper makes this clear, specifying, "The mortality data clearly brings out the toxicity of chromium and mercury towards *O. pattoni*, even when the metals are present in dissolved form in concentrations of 2.0 ppm and 0.5 ppm, respectively (p. 46)" (Abbasi and Soni, 1983). The soil concentration in this experiment was not 0.5 mg/kg, and, in fact, the soil content after wastewater addition was not analyzed. The level of 0.5 ppm refers to the aqueous, dissolved mercury concentration, not the soil mercury concentration. There are no reasonable means to convert the dissolved effluent concentration, to a soil concentration, so the soil criteria listed by Efroymson based on the Abbasi and Soni results are incorrectly calculated and are excluded as a soil effects concentration.

Efroymson et al. (1997) also presents a soil effects concentration of 30 mg/kg for soil microorganisms (Table P2-6). However, because the 30 mg/kg value published by Efroymson is for soil microorganisms, its applicability to soil invertebrates is unknown. Sheppard et al. (1993) provides a chronic NOEC of 10 mg/kg. Sheppard, primary author of the Sheppard et al. (1993) study, was contacted to discuss the study parameters. According to Sheppard (2005), a LOEC value of 100 mg/kg was generated from the study, and given the length of the study (30 days) to the lifespan of the study organisms (*Lumbricus terrestris* [nightcrawlers]), this value should be considered a chronic LOEC. According to USEPA, a chronic LOEC can be converted to a chronic NOEC by dividing by 10. Thus, a chronic LOEC of 100 mg/kg would convert to a chronic NOEC of 10 mg/kg (Table P2-6).

In addition to these studies, a number of earthworm soil toxicity studies for mercury (mercuric chloride) were identified in the USEPA ECOTOX database. However, the values produced in these studies ranged from 2,400 mg/kg to 4,800 mg/kg which are well above the NOEC and LOEC values identified in Sheppard et al. (1993) (Table P2-6).

Mercury toxicity studies indicate a range of conservative, reliable toxicological values for soil invertebrates from a NOEC of 10 mg/kg to a LOEC of 100 mg/kg for soil invertebrates (Sheppard et al.,

1993). Mercury concentrations in OU-2 surface soils were compared against these selected soil invertebrate effects concentrations.

Methylmercury

One published study (Beyer et al., 1985) was found for comparison of site surface soil methylmercury concentrations for soil invertebrate toxicity (Table P2-6). This study used the earthworm (*Eisenia fetida*) as the test species. Earthworms in this study were exposed to varying concentrations of methylmercury chloride in soil for 84 days. A concentration of 2.5 mg/kg of methylmercury showed no effects on survival or segment regeneration, and a concentration of 12.5 mg/kg of methylmercury showed reduced survival and a reduction in excised segment regeneration. As the only identified effects concentrations, these values were used as the soil invertebrate effects concentrations for comparison to OU-2 surface soil methylmercury concentrations.

HCB

Two studies were identified with soil toxicity data for HCB exposure to soil invertebrates (Table P2-6). The USEPA Ecotox Database reported a LC_{50} value of >1,000 mg/kg for the survival of earthworms (*Eisenia fetida*) exposed to HCB in soil for 28 days (Ballhorn et al., 1984). Walton et al. (1989) used soil microorganisms as the test species exposed to HCB in two soil types for 4 days. HCB at a concentration of 1,000 mg/kg reduced respiration by 37% in the silt loam, but did not lower respiration in the sandy loam soil. The study generated a LOEC of 1,000 mg/kg, which can be converted to a chronic NOEC by dividing by 10. Thus, a chronic LOEC of 1,000 mg/kg would convert to a chronic NOEC of 100 mg/kg. Because the study focused on soil microorganisms, its applicability to soil invertebrates is unknown. Due to limited HCB toxicity data available in scientific literature, these NOEC and LOEC TRVs were selected as the soil invertebrate effects concentrations for comparison to OU-2 surface soil HCB concentrations.

DDTR

One study was identified with soil toxicity data for DDTR exposure to soil invertebrates (Table P2-6). Cathey (1989) used the earthworm (*Lumbricus terrestris*) as the test species. Earthworms in this study were exposed to soils at varying concentrations of 4,4'-DDE. Effects to the study endpoint of survival were observed at concentrations of 14 mg/kg for 1 percent of the test population (LD_1) and 61 mg/kg for 50 percent of the test population (LD_{50}). The LD_1 value is an appropriate LOAEL TRV. The TRV of 14

mg/kg was selected as the soil invertebrate effects concentration for comparison to OU-2 surface soil DDTR concentrations.

4.0 SCREENING LEVEL ECOLOGICAL EFFECTS EVALUATION

The selected toxicity benchmarks and effects concentrations discussed in Section 3.0 were compared against OU-2 media concentrations for Assessment Endpoints 1, 2, and 3. The following table summarizes the data used for comparison of these toxicity benchmarks and effects concentrations for Assessment Endpoints 1, 2, and 3:

Data Used for Assessment Endpoints 1, 2, and 3	
Media	**Year Data Collected**
Soil	2010
Sediment	2008, 2009
Surface Water	2008, 2009 for Hg and MeHg 1991, 1994 for HCB and DDTR
Fish Tissue	
Largemouth Bass	2008 for Hg, MeHg, and HCB
Largemouth Bass	2001 for DDTR
Silversides and Bluegill Sunfish	2008 for Hg, MeHg, and HCB
Mosquitofish	2001 for DDTR
Crayfish Tissue	1994

These data were used for Assessment Endpoints 1, 2, and 3 for consistency with the assessment endpoints presented in the ERA. The above-listed data were also used in the generation of exposure point concentrations (EPCs) for applicable Assessment Endpoints 4 through 13 in the ERA. Sediment data included samples collected up to 12 inches in depth, and soil samples include samples collected up to 6 inches in depth.

4.1 ASSESSMENT ENDPOINT 1: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE BENTHIC MACROINVERTEBRATE COMMUNITY

Assessment Endpoint 1 addressed the potential risk to aquatic invertebrate communities in OU-2. The Basin and Round Pond may serve as a spawning area for fish species and as a foraging habitat for a variety of biota. The benthic macroinvertebrate (benthos) community is an important food source for fish and many predator species.

4.1.1 Measurement Endpoint 1 – Comparison of Sediment Results to TRVs

4.1.1.1 Mercury

Concentrations of mercury in 2008-2009 OU-2 surficial sediments ranged from 0.965 mg/kg (Sample OU2B-SED-404C-08 collected in 2008; 0- to 4-inch depth interval) to 213 mg/kg (Sample OU2B-SED-502DNE-08; 0- to 4-inch depth). Section 3.4.1.1 discussed the selected benchmarks by which to evaluate OU-2 concentrations of sediment in relation to the protection of the benthic macroinvertebrate community, which are the PEC of 1.06 mg/kg, the TEC of 0.18 mg/kg, and the survival and reproduction LOAEL of 3.84 mg/kg. Confidence in the PEC as an actual predictor of toxicity to benthic macroinvertebrate communities based exposure to mercury is low, based on review of MacDonald et al. (2000) and the source studies providing weight of evidence that 1.06 mg/kg is not likely an effects level for mercury. Only one sediment sample was below the PEC of 1.06 mg/kg. Sixty-two of 63 sediment samples (98 percent) exceeded the benthic macroinvertebrate PEC and 100 percent of the samples exceeded the TEC of 0.18 mg/kg. Although confidence in the PEC as a reliable effects concentration is low, there is a potential for risk to benthic macroinvertebrates in OU-2 due to sediment mercury concentrations.

Sediment mercury concentrations were also compared against the survival and reproduction LOAEL of 3.84 mg/kg because of the low confidence in the PEC as a reliable effects concentration. Sixty of 63 sediment samples (95 percent) exceeded the LOAEL TRV of 3.84 mg/kg, providing additional weight of evidence for the potential for risk to benthic macroinvertebrates in OU-2 due to sediment mercury concentrations.

4.1.1.2 Methylmercury

Concentrations of methylmercury in 2008-2009 OU-2 sediments ranged from 0.00142 mg/kg (Sample OU2B-SED-302C-09; 0- to 4-inch depth interval) to 0.0257 mg/kg (Sample OU2B-SED-404C-09; 0- to 4-inch depth interval). Section 3.4.1.1 discussed the selected benchmarks to evaluate methylmercury concentrations in sediments for the protection of benthic macroinvertebrates, which are the TEC of 0.18 mg/kg, the PEC of 1.06 mg/kg, and the LOAEL TRV of 3.84 mg/kg. The maximum methylmercury concentration in OU-2 sediment was 0.0257 mg/kg. Because methylmercury concentrations in OU-2 sediments were several orders of magnitude less than the benchmark ecotoxicity sediment concentrations, potential risk is not anticipated for benthos due to methylmercury exposure in sediment.

4.1.1.3 HCB

Concentrations of HCB in 2008-2009 OU-2 sediments ranged from non-detect (<0.0069 mg/kg; Sample OU2B-SED-302C-09; 0- to 4-inch depth interval) to 34.1 mg/kg (Sample OU2B-SED-303DC-08; 0- to 4-inch depth interval). Section 3.4.1.1 discussed the selected benchmarks to evaluate HCB concentrations in sediments for the protection of benthic macroinvertebrates, which are a LEL of 0.02 mg/kg and a site-specific SEL of 0.43 mg/kg. Fifteen of 16 sediment samples (94 percent) are above the LEL and 11 of the 16 samples (69 percent) were above the site-specific SEL. There is a potential for risk to benthic macroinvertebrates in OU-2 due to HCB exposure in sediment.

4.1.1.4 DDTR

Concentrations of DDTR in 2008-2009 OU-2 sediments ranged from non-detect (<0.0144 mg/kg; Sample OU2B-SED-103DC-08; 0- to 4-inch depth interval) to 2.72 mg/kg (Sample OU2B-SED-303DC-09; 0- to 4-inch depth interval). Section 3.4.1.1 discussed the selected benchmarks to evaluate DDTR concentrations in sediments for the protection of benthic macroinvertebrates, which are a TEC of 0.00528 mg/kg and a PEC of 0.572 mg/kg. Fourteen of 14 sediment samples (100 percent) were above the TEC and 5 of the 14 samples (36 percent) are above the PEC. There is potential risk to benthic macroinvertebrates in OU-2 due to sediment DDTR concentrations.

4.1.2 Measurement Endpoint 2 – Comparison of Surface Water Results to TRVs

4.1.2.1 Mercury

Concentrations of mercury in 2008-2009 OU-2 surface water ranged from 0.00444 µg/L at 8 feet deep (Sample OU2B-SW-301DD-09) to 0.360 µg/L at 2 feet deep (Sample OU2B-SW-203DS-08). The selected surface water benchmark for benthic macroinvertebrates (Section 3.4.1.2) is the NAWQC of 0.77 µg/L. The maximum OU-2 surface water mercury concentration was 0.360 µg/L. Thus, OU-2 surface water concentrations were less than the mercury benchmark associated with benthic macroinvertebrate toxicity. Because mercury concentrations in OU-2 surface water samples were less than the ecotoxicity surface water benchmark concentration, potential risk is not anticipated for benthos due to exposure to mercury concentrations in surface water.

4.1.2.2 Methylmercury

Concentrations of methylmercury in 2008-2009 OU-2 surface water ranged from 0.000613 µg/L at 15 feet deep (Sample OU2B-SW-103DD-09) to 0.00553 µg/L at 4.5 feet deep (Sample OU2R-SW-101DD-08). The selected benchmarks for evaluating the protection of benthic macroinvertebrates from methylmercury concentrations in surface water are the Tier 2 SAV of 0.099 µg/L and the Tier 2 SCV of 0.0028 µg/L (Section 3.4.1.2). OU-2 surface water methylmercury concentrations were less than the Tier 2 SAV. Ten out of 42 surface water samples (24 percent) were above the Tier 2 SCV of 0.0028 µg/L. There is a potential for risk to benthos due to methylmercury concentrations in surface water.

4.1.2.3 HCB

HCB surface water concentrations in 1991 were non-detect with a detection limit of 10.0 µg/L. Concentrations of HCB in OU-2 surface water ranged from 0.0215 µg/L (Sample OWG0309-0894) to 0.0442 µg/L (Sample OWG0202-0694) in 1994. These concentration ranges for HCB are based on the 1991 and 1994 surface water results because current data were not available. As indicated in Section 3.4.1.2, the selected benchmark for evaluating the protection of benthic macroinvertebrates exposed to HCB surface water concentrations is the withdrawn OWQOC of 0.0065 µg/L. Twenty-one of 22 surface water samples (95 percent) were above the withdrawn OWQOC of 0.0065 µg/L. There is a potential for risk to benthos exposed to historic HCB concentrations in surface water.

4.1.2.4 DDTR

DDTR surface water concentrations in 1991 were non-detect with a detection limit of 0.100 µg/L. Concentrations of DDTR in OU-2 surface water ranged from 0.0964 µg/L (Sample OWG0107-0894) to 0.403 µg/L (Sample OWG0410-0894) in 1994. These concentration ranges for DDTR are based on the 1991 and 1994 surface water results because current data were not available. The selected benchmarks for evaluating the protection of benthic macroinvertebrates from DDTR concentrations in surface water are the acute NAWQC of 1.1 µg/L and the chronic NAWQC of 0.001 µg/L (Section 3.4.1.2). OU-2 surface water DDTR concentrations were less than the acute NAWQC of 1.1 µg/L. Twenty-two out of 22 surface water samples (100 percent) were above the chronic NAWQC of 0.001 µg/L. There is a potential for risk to benthos exposed to historic DDTR concentrations in surface water. Current DDTR surface water data are not available. Thus, this risk to benthos has likely been mitigated or reduced by two remedial efforts implemented by the adjacent property owner (Ciba-Giegy), which would reduce

exposure to DDTR concentrations. DDTR concentrations in sediment have been reduced by an order of magnitude since the 1990s.

4.1.3 Measurement Endpoint 3 – Benthic Macroinvertebrate Tissue Analysis and Comparison of Tissue Results to TRVs

4.1.3.1 Mercury

Concentrations of mercury in OU-2 crayfish tissue from 1994 ranged from 0.13 mg/kg (Sample OCS0104) to 0.2 mg/kg (Samples OCS0103 and OCS0108). Section 3.4.1.3 discussed the TRV selected to evaluate benthic macroinvertebrate tissue concentrations, which is a NOED tissue residue concentration of 2.7 mg/kg. This NOED produced no effect on growth or survival. In comparison, the maximum benthos tissue concentration for OU-2 was 0.2 mg/kg. Therefore, mercury concentrations in OU-2 benthos tissue were less than the NOED TRV. Based on tissue concentrations, no effects on growth or survival are anticipated for the benthic community exposed to mercury in OU-2.

4.1.3.2 Methylmercury

Methylmercury was not analyzed in the crayfish tissue samples collected from OU-2 in 1994. As a conservative measure, mercury crayfish tissue concentrations were assumed to be 100 percent methylmercury. Therefore, concentrations of methylmercury in OU-2 crayfish tissue were assumed to range from 0.13 mg/kg (Sample OCS0104) to 0.2 mg/kg (Samples OCS0103 and OCS0108). Section 3.4.1.3 discussed the identified methylmercury TRV for benthos tissue residue comparison, which is a NOAEL of 1.0 mg/kg. This NOAEL produced no effect on growth or survival. The maximum methylmercury concentration in crayfish from OU-2 was assumed to be 0.2 mg/kg. Therefore, methylmercury concentrations in OU-2 benthos tissue were less than the NOAEL TRV. Based on tissue concentrations, no effects on growth or survival are anticipated for the benthic community exposed to methylmercury in OU-2.

4.1.3.3 HCB

Concentrations of HCB in OU-2 crayfish tissue from 1994 ranged from 0.088 mg/kg (Sample OCS0110) to 0.91 mg/kg (Samples OCS0106). Section 3.4.1.3 discussed the identified HCB benchmark for benthos tissue residue comparison, which is 0.056 mg/kg. Ten of 10 crayfish samples (100 percent) were above the HCB benchmark for benthos. There is a potential for risk to benthos exposed to HCB in OU-2.

4.1.3.4 DDTR

Concentrations of DDTR in OU-2 crayfish tissue from 1994 ranged from 0.43 mg/kg (Sample OCS0103) to 1.6 mg/kg (Sample OCS0106). Section 3.4.1.3 discussed the 10 percent tissue residue TRVs of 0.04 mg/kg whole body (wet weight) for DDT and 0.07 mg/kg whole body (wet weight) for DDE, which are used as benchmarks for the protection of benthic invertebrates. Ten of 10 crayfish samples (100 percent) were above the DDTR benchmarks for benthos. There is a potential for risk to benthos exposed to DDTR in OU-2.

4.2 ASSESSMENT ENDPOINT 2: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE FISH COMMUNITY

Assessment Endpoint 2 addresses the potential risk to the fish community within OU-2. Based on the water temperature regime, available substrate, and variability of habitat, OU-2 could serve as a spawning area for some fish species and as a foraging habitat for a variety of biota. Fish are also an important food source for many predator species.

4.2.1 Measurement Endpoint 1 – Comparison of Sediment Results to TRVs

4.2.1.1 Mercury

Concentrations of mercury in 2008-2009 OU-2 sediments ranged from 0.965 mg/kg (Sample OU2B-SED-404C-08; 0- to 4-inch depth interval) to 213 mg/kg (Sample OU2B-SED-502DNE-08; 0- to 4-inch depth interval). Section 3.4.2.1 presents the TRV (50 mg/kg) identified for protection of fish exposed to mercury in sediments. Thirteen of 63 sediment samples (21 percent) exceeded the fish TRV of 50 mg/kg. Based on sediment concentrations compared to the selected TRV, OU-2 sediments pose a potential risk to the survival of the fish community.

4.2.1.2 Methylmercury

Concentrations of methylmercury in 2008-2009 OU-2 sediments ranged from 0.00142 mg/kg (Sample OU2B-SED-302C-09; 0- to 4-inch depth interval) to 0.0257 mg/kg (Sample OU2B-SED-404C-09; 0- to 4-inch depth interval). No studies on fish exposed to methylmercury in sediments were identified in scientific literature (Section 3.4.2.1).

4.2.1.3 HCB

Concentrations of HCB in 2008-2009 OU-2 sediments ranged from non-detect (<0.0069 mg/kg; Sample OU2B-SED-302C-09; 0- to 4-inch depth interval) to 34.1 mg/kg (Sample OU2B-SED-303DC-08; 0- to 4-inch depth interval). Section 3.4.2.1 presents the NOAEL TRV of 90 mg/kg identified for protection of fish exposed to HCB in sediments. The maximum HCB concentration in OU-2 sediment was 34.1 mg/kg. Because HCB concentrations in OU-2 sediments were less than the no-effects ecotoxicity sediment concentration for survival, no effects on survival are anticipated for fish due to HCB exposure in sediment.

4.2.1.4 DDTR

Concentrations of DDTR in 2008-2009 OU-2 sediments ranged from non-detect (<0.0144 mg/kg; Sample OU2B-SED-103DC-08; 0- to 4-inch depth interval) to 2.72 mg/kg (Sample OU2B-SED-303DC-09; 0- to 4-inch depth interval). No studies on fish exposed to DDTR in sediments were identified in scientific literature (Section 3.4.2.1).

4.2.2 Measurement Endpoint 2 – Comparison of Surface Water Results to TRVs

4.2.2.1 Mercury

Concentrations of mercury in 2008-2009 OU-2 surface water ranged from 0.00444 µg/L at 8 feet deep (Sample OU2B-SW-301DD-09) to 0.360 µg/L at 2 feet deep (Sample OU2B-SW-203DS-08). The benchmark identified to be protective of the fish community, as discussed in Section 3.4.2.2, is the NAWQC of 0.77 µg/L. The maximum OU-2 surface water mercury concentration was 0.360 µg/L. Thus, OU-2 surface water concentrations were less than the mercury benchmark for fish toxicity. Because mercury concentrations in OU-2 surface water samples were less than the ecotoxicity surface water benchmark concentration, the potential for risk is not anticipated for fish due to exposure to mercury concentrations in surface water.

4.2.2.2 Methylmercury

Concentrations of methylmercury in 2008-2009 OU-2 surface water ranged from 0.000613 µg/L at 15 feet deep (Sample OU2B-SW-103DD-09) to 0.00553 µg/L at 4.5 feet deep (Sample OU2R-SW-101DD-08). Section 3.4.2.2 presents the selected benchmarks for evaluating the protection of fish from methylmercury concentrations in surface water, which are the Tier 2 SAV of 0.099 µg/L and the Tier 2

SCV of 0.0028 µg/L. OU-2 surface water methylmercury concentrations were less than the Tier 2 SAV. Ten out of 42 surface water samples (24 percent) were above the Tier 2 SCV of 0.0028 µg/L. There is a potential for risk to fish due to methylmercury concentrations in surface water.

4.2.2.3 HCB

HCB surface water concentrations in 1991 were non-detect with a detection limit of 10.0 µg/L. Concentrations of HCB in OU-2 surface water ranged from 0.0215 µg/L (Sample OWG0309-0894) to 0.0442 µg/L (Sample OWG0202-0694) in 1994. These concentration ranges for HCB are based on the 1991 and 1994 surface water results because current data were not available. Section 3.4.2.2 presents the selected benchmark for evaluating the protection of fish exposed to HCB surface water concentrations, which is the withdrawn OWQOC of 0.0065 µg/L. Twenty-one out of 22 surface water samples (100 percent) were above the withdrawn OWQOC of 0.0065 µg/L. There is a potential for risk to fish exposed to historic HCB concentrations in surface water.

4.2.2.4 DDTR

DDTR surface water concentrations in 1991 were non-detect with a detection limit of 0.100 µg/L. Concentrations of DDTR in OU-2 surface water ranged from 0.0964 µg/L (Sample OWG0107-0894) to 0.403 µg/L (Sample OWG0410-0894) in 1994. These concentration ranges for DDTR are based on the 1991 and 1994 surface water results because current data were not available. The selected benchmarks for evaluating the protection of fish from DDTR concentrations in surface water are the acute NAWQC of 1.1 µg/L and the chronic NAWQC of 0.001 µg/L (Section 3.4.2.2). OU-2 surface water DDTR concentrations were less than the acute NAWQC of 1.1 µg/L. Twenty-two out of 22 surface water samples (100 percent) were above the chronic NAWQC of 0.001 µg/L. There is a potential for risk to fish exposed to historic DDTR concentrations in surface water. Current DDTR surface water data are not available. Thus, this risk to fish has likely been mitigated or reduced by two remedial efforts implemented by the adjacent property owner (Ciba-Giegy), which would reduce exposure to DDTR concentrations. DDTR concentrations in sediment have been reduced by an order of magnitude since the 1990s.

4.2.3 Measurement Endpoint 3 – Fish Tissue Analysis and Comparison of Fish Tissue Results to TRVs

4.2.3.1 Mercury

Studies performed on suitable surrogate species to the fish collected from OU-2 were selected to evaluate the potential toxicity of mercury. The concentrations used from these studies were tissue residue concentrations in wet weight. The duration of exposure for the studies was generally 60 days, with a few exceptions. Fish tolerance factors were included from USEPA's *An Introduction to Freshwater Fishes as Biological Indicators* (EPA-260-R-08-016; USEPA, 2008). The tolerance of the fish species collected from OU-2 was compared to the tolerance limits of the fish used in the toxicity studies.

Whole body tissue concentrations were compared to the NOED range of 0.32 mg/kg to 9.41 mg/kg and the LOED range of 1.31 mg/kg to 18.8 mg/kg (Section 3.4.2.3), which is protective for growth. In addition, a NOED TRV for reproduction of 2.84 mg/kg was identified. These TRVs were developed in studies using the fathead minnow.

Largemouth bass are characterized as intermediately tolerant to tolerant of toxic pollutants (USEPA, 2008). Fathead minnows are primarily characterized as a tolerant species (USEPA, 2008). As such, largemouth bass and fathead minnows are similar in tolerance to toxic pollutants. Mercury tissue concentrations for largemouth bass in OU-2 ranged from 1.1 mg/kg to 2 mg/kg based on whole-body samples collected in 2008. These concentrations were within the reported range of NOED values. Thirty-six of 40 largemouth bass samples (90 percent) were approximately equal to or greater than the LOED of 1.31 mg/kg. Thus, mercury tissue concentrations in largemouth bass in OU-2 exceeded the reported lowest known health effects concentration for fish having similar tolerance to toxic pollutants. However, largemouth bass tissue concentrations were less than the NOED of 2.84 mg/kg for reproduction in fathead minnows. Thus, largemouth bass have a possibility of experiencing an adverse health effect on growth but are not likely to experience an adverse health effect related to reproduction.

Bluegill sunfish exhibit a similar tolerance to toxic pollutants as that of fathead minnows. Bluegill sunfish are characterized as intermediately tolerant to tolerant of toxic pollutants (USEPA, 2008). Mercury in bluegill sunfish ranged from 0.54 mg/kg to 1.2 mg/kg in OU-2 based on whole-body samples collected in 2008. This range of concentrations was within the range of NOED values (0.32 mg/kg to 9.41 mg/kg) and less than the low end of the LOED range of 1.31 mg/kg. Bluegill sunfish tissue concentrations were also less than the NOED of 2.84 mg/kg for reproduction in fathead minnows.

Mercury concentrations found in bluegill sunfish in OU-2 were less than or within the no-health-effects range of concentrations for fish having similar tolerance to toxic pollutants. The mercury tissue concentrations in bluegill sunfish were also below the reported lowest observed health effects concentration for fish having similar tolerance to toxic pollutants.

Silverside mercury tissue sample concentrations ranged from 0.6 mg/kg to 1.2 mg/kg based on whole-body samples collected in 2008. This range was within the cited NOED range of values based on growth, less than the reproduction NOED, and less than the LOED values for growth. Therefore, mercury tissue concentrations in silversides were below the reported no-health-effects range and lowest observed health effects concentration for fish having similar tolerance to toxic pollutants.

4.2.3.2 HCB

HCB tissue concentrations for predatory fish (i.e., largemouth bass) and forage fish (i.e., bluegills and silversides) were based on whole-body samples collected in 2008. HCB tissue concentrations for largemouth bass in OU-2 ranged from 0.034 mg/kg to 2.5 mg/kg . HCB in bluegill sunfish ranged from 0.0543 mg/kg to 0.637 mg/kg in OU-2. Silverside HCB tissue sample concentrations ranged from 0.0868 mg/kg to 1.99 mg/kg. The selected benchmark for comparison of fish tissue HCB concentrations is 0.056 mg/kg (Section 3.4.2.3). Largemouth bass, bluegill sunfish, and silverside HCB tissue concentrations are above the benchmark of 0.056 mg/kg for fish tissue. There is a potential for risk to fish in OU-2 due to HCB based on fish tissue concentrations.

4.2.3.3 DDTR

DDTR tissue concentrations for predatory fish (i.e., largemouth bass) and forage fish (i.e., mosquitofish) were based on samples collected in 2001. DDTR largemouth bass tissue data were estimated using the available 2001 filet data and a site-specific, species-specific filet to whole body conversion factor of 1.35. Largemouth bass DDTR tissue concentrations from 2001 in OU-2 ranged from 0.068 mg/kg to 0.81 mg/kg. Whole body mosquitofish DDTR tissue concentrations from 2001 in OU-2 ranged from 0.583 mg/kg to 10.82 mg/kg. Tissue residue benchmarks of 0.46 mg/kg whole body (wet weight) as the no-effect concentration and 0.68 mg/kg whole body (wet weight) as the low-effect concentration were selected for effects concentrations as discussed in Section 3.4.2.3. Two out of seven largemouth bass samples (29 percent) are above the no-effect concentration and one out of seven largemouth bass samples (14 percent) is above the low-effect concentration. Twenty-one of 21 mosquitofish samples (100 percent) are above the no-effect concentration and 20 out of 21 mosquitofish samples (95 percent) are above the

low-effect concentration. Largemouth bass and mosquitofish DDTR tissue concentrations in OU-2 are above the no-effect and effect concentrations for DDTR. There is a potential for risk to fish in OU-2 due to DDTR exposure based on tissue concentrations.

4.3 ASSESSMENT ENDPOINT 3: PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF SOIL INVERTEBRATES IN FLOODPLAIN SOILS

Assessment Endpoint 3 addressed the potential risk to soil invertebrate communities in OU-2. The Basin and Round Pond may serve as foraging habitat for a variety of organisms. The soil invertebrate community is an important food source for insectivorous and omnivorous mammals and birds.

4.3.1 Measurement Endpoint 1 – Comparison of Floodplain Soil Results to TRVs

4.3.1.1 Mercury

Concentrations of mercury in 2010 OU-2 surface soil ranged from 0.061 mg/kg (Sample OU2B-FPSB4-10-0-1; 0- to 1-inch depth interval) to 8.9 mg/kg (Sample OU2B-FPSS2-10; 0- to 1-inch depth interval). Section 3.4.3.1 presents the TRVs of 10 mg/kg (NOEC) and 100 mg/kg (LOEC) identified for the protection of soil invertebrates exposed to mercury in soil. None of the thirty-three surface soil samples (0 percent) collected in 2010 for mercury exceeded the soil invertebrate TRVs. Mercury concentrations in OU-2 surface soils were less than the no-effects ecotoxicity soil concentration for survival. Based on surface soil concentrations compared to the selected TRVs, OU-2 surface soils do not pose a potential risk to the survival of the soil invertebrate community.

4.3.1.2 Methylmercury

Concentrations of methylmercury in 2010 OU-2 surface soils ranged from 0.000367 mg/kg (Sample OU2B-FPSB4-10-0-1; 0- to 1-inch depth interval) to 0.00822 mg/kg (Sample OU2B-FPSB5-10-1-2; 1- to 2-inch depth interval). The NOEC and LOEC TRVs (2.5 mg/kg and 12.5 mg/kg, respectively) identified for the protection of soil invertebrates exposed to methylmercury in soil was provided in section 3.4.3.1. None of the 12 surface soil samples (0 percent) collected in 2010 for methylmercury exceeded the soil invertebrate TRVs. Methylmercury concentrations in OU-2 surface soils were less than the no-effects ecotoxicity soil concentration for survival and growth. The potential for risk is not anticipated for soil invertebrates due to methylmercury exposure in surface soil.

4.3.1.3 HCB

Concentrations of HCB in 2010 OU-2 surface soils ranged from non-detect (<0.00078 mg/kg; Sample OU2B-FPSS12-10; 0- to 1-inch depth interval) to 0.275 mg/kg (Sample OU2B-FPSS14-10; 0- to 1-inch depth interval). The NOEC TRV of 100 mg/kg and the LOEC TRV of 1,000 mg/kg identified for the protection of soil microorganisms exposed to HCB in soil were provided in section 3.4.3.1. None of the nine surface soils (0 percent) collected in 2010 for HCB exceeded the soil microorganism TRVs. HCB concentrations in OU-2 surface soils were less than the no-effects ecotoxicity soil concentration for soil microorganisms. There is some uncertainty in the applicability of soil microorganism TRVs to soil invertebrates. The potential for risk is not anticipated for soil invertebrates due to HCB exposure in surface soil.

4.3.1.4 DDTR

Concentrations of DDTR in 2010 OU-2 surface soils ranged from non-detect (<0.002 mg/kg; Sample OU2B-FPSB6-10-0-1; 0- to 1-inch depth interval) to 2.23 mg/kg (Sample OU2B-FPSS1-10; 0- to 1-inch depth interval). The LOAEL TRV of 14 mg/kg identified for the protection of soil invertebrates exposed to DDTR in soil was provided in section 3.4.3.1. None of the fifteen surface soil samples (0 percent) collected in 2010 for DDTR exceeded the soil invertebrate TRV. DDTR concentrations in OU-2 surface soils were less than the effects ecotoxicity sediment concentration for survival. The potential for risk is not anticipated for soil invertebrates due to DDTR exposure in surface soil.

5.0 UNCERTAINTIES

Uncertainties, which may lead to either overstatement or understatement of risk, are associated with any SLERA. The uncertainties can generally be categorized into four main categories: problem formulation, exposure assessment, effects assessment, and risk characterization. The uncertainties from each of these areas are part of the total uncertainty of the SLERA. The identification of these uncertainties and a description of how the uncertainties may influence the SLERA are provided in the following sections.

Uncertainties associated with exposure assessment include the following:

- Exposure of benthic macroinvertebrates to sediments is assumed comparable to that in the laboratory toxicity tests upon which the effects levels (i.e., TRVs) are based. Use of laboratory derived TRVs may overestimate or underestimate potential risk to benthic macroinvertebrate receptors.

- The sediment mercury PEC (1.06 mg/kg) is derived by calculating a geometric mean of the available sediment quality guidelines based on a wide range of data sets, not from single chemical, dose-response studies. The mercury PEC was evaluated using 79 samples, only four of which were considered "toxic" (sample different from control or reference for one endpoint). Thus, the confidence in this sediment mercury PEC as a reliable effects concentration is extremely low. Use of this value as a TRV may overestimate or underestimate potential risk to benthic macroinvertebrates and necessitates the use of additional sediment mercury TRVs.

- Exposure of fish to sediments was assumed comparable to that in the laboratory toxicity tests upon which the effects levels (i.e., TRVs) are based. Use of laboratory derived TRVs may overestimate or underestimate potential risk to fish.

- DDTR surface water samples were collected in 1991 and 1994. Since 1994, DDTR migration to OU-2 has been mitigated by the adjacent landowner and DDTR in sediment has been reduced approximately one order in magnitude since the 1990s. The potential risk to fish and benthos from exposure to DDTR is likely overestimated for current and future conditions.

- HCB surface water samples were collected in 1991 and 1994. The potential risk to fish and benthos from exposure to HCB may be overestimated for current and future conditions.

- Fish exposure to methylmercury in sediments cannot be evaluated due to the lack of available toxicity studies. Comparison of fish tissue sampling results to fish tissue mercury TRVs may overestimate or underestimate potential risk to fish exposed to methylmercury in sediment.

- Various pathways of potential toxicity to fish are evaluated as a weight of evidence approach for the SLERA. Sediment concentrations are included in the exposure assessment of fish to COCs along with surface water and fish tissue residues. There is uncertainty in extrapolation between concentrations in sediment and effects in fish

because fish are exposed to the surface water and not directly to sediments. The partitioning between the sediments and the overlying water and the degree of mixing and dilution in the surface water is site-specific. Therefore, sediments are included as a potential exposure pathway for fish as a line of evidence for the SLERA.

- Concentrations in sediment up to 1 foot in depth were utilized to estimate sediment EPCs to aquatic receptors in OU-2. Surface sediment EPCs were developed for 3-foot NAVD88 (more disturbance by wind driven wave action) and 6-foot NAVD88 (less sediment disturbance due to higher water levels) water elevations using data from multiple years. Surface sediment EPCs also were developed from core samples taken at different depths up to 1 foot deep. This may overestimate or underestimate risk.

- Floodplain soil samples collected in 2010 up to 6 inches in depth were utilized to estimate floodplain soil EPCs to terrestrial receptors in OU-2. The 0 to 6 inch depth interval was used for consistency in sampling intervals from core and grab samples and is considered to be representative of the 0 to 6 inch depth interval as the variations in concentration between depth intervals is negligible for floodplain soils. This may overestimate or underestimate risk.

- For Assessment Endpoints 1, 2, and 3, the ecotoxicity values in scientific literature were compared to the results for each sampling point. The ecotoxicity values used for comparison were not the most conservative values available in scientific literature, and therefore, risk may be underestimated. This comparison assumes that the detected concentration at each sampling point is the concentration ecological receptors would be exposed to 100 percent of the time. This may overestimate or underestimate the risk.

- The use of ecotoxicity values developed from studies using mercury compounds other than methylmercury assumes that each form of mercury is absorbed, is metabolized, and has the same toxicological effects as mercury or methylmercury. This may overestimate or underestimate risk.

- NOAEL and LOAEL ecotoxicity values are the result of experimental design and depend on laboratory test conditions. Actual threshold concentrations are difficult to determine, and although there is potential for effects that occur at concentrations less than published LOAEL TRVs, these are the only known values that cause an effect. Assuming that there is no effect at a concentration below the LOAEL TRVs may underestimate risk.

6.0 INTERPRETATION OF ECOLOGICAL SIGNIFICANCE

The ecological significance of the potential risks posed by mercury, methylmercury, DDTR, and HCB in OU-2 is discussed below in the context of the assessment endpoints. The following sections briefly summarize how the results relate to the hypotheses associated with the assessment endpoints.

6.1.1 Assessment Endpoint 1 - Benthic Macroinvertebrate Community

Endpoint: Protection of the long-term health and reproductive success of the benthic macroinvertebrate community.

Hypothesis: Mercury, methylmercury, HCB, and DDTR concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of the benthic macroinvertebrate community.

The measurement endpoints selected to address this hypothesis indicate that:

Sediment

- OU-2 sediment mercury concentrations ranged from 0.965 mg/kg to 213 mg/kg. Total mercury concentrations in sediments exceeded the benthic PEC (1.06 mg/kg) in 62 of 63 sediment samples (98 percent). Sixty of 63 sediment samples (95 percent) exceeded the LOAEL TRV of 3.84 mg/kg, providing additional weight of evidence for the potential for risk to benthic macroinvertebrates in OU-2 due to sediment mercury concentrations.

- Methylmercury concentrations in OU-2 sediments were several orders of magnitude less than the benchmark ecotoxicity sediment concentrations of 0.18 mg/kg (TEC), 1.06 mg/kg (PEC), and the LOAEL TRV of 3.84 mg/kg. The maximum methylmercury concentration in OU-2 sediment was 0.0257 mg/kg.

- Concentrations of HCB in OU-2 sediments ranged from non-detect (<0.0069 mg/kg) to 34.1 mg/kg. Fifteen of 16 sediment samples (94 percent) are above the LEL of 0.02 mg/kg and 11 of the 16 samples (69 percent) were above the site-specific SEL of 0.43 mg/kg. There is a potential for risk to benthic macroinvertebrates in OU-2 due to HCB exposure in sediment.

- OU-2 sediment DDTR concentrations ranged from non-detect (<0.0144 mg/kg) to 2.72 mg/kg. Fourteen of 14 sediment samples (100 percent) were above the TEC of 0.00528 mg/kg and 5 of the 14 samples (36 percent) are above the PEC of 0.572 mg/kg. There is potential risk to benthic macroinvertebrates in OU-2 due to sediment DDTR concentrations.

Surface Water

- Concentrations of mercury in OU-2 surface water ranged from 0.00444 µg/L to 0.360 µg/L. OU-2 surface water concentrations were less than the mercury NAWQC of 0.77 µg/L. Because mercury concentrations in OU-2 surface water samples were less than the ecotoxicity surface water benchmark concentration, potential risk is not anticipated for benthos due to exposure to mercury concentrations in surface water.

- Concentrations of methylmercury in OU-2 surface water ranged from 0.000613 µg/L to 0.00553 µg/L. OU-2 surface water methylmercury concentrations were less than the Tier 2 SAV of 0.099 µg/L. Ten out of 42 surface water samples (24 percent) were above the Tier 2 SCV of 0.0028 µg/L. There is a potential for risk to benthos due to methylmercury concentrations in surface water.

- HCB surface water concentrations in 1991 were non-detect with a detection limit of 10.0 µg/L. Concentrations of HCB in OU-2 surface water ranged from 0.0215 µg/L to 0.0442 µg/L in 1994. Twenty-one out of 22 surface water samples (95 percent) were above the withdrawn OWQOC of 0.0065 µg/L. There is a potential for risk to benthos exposed to historic HCB concentrations in surface water.

- DDTR surface water concentrations in 1991 were non-detect with a detection limit of 0.100 µg/L. Concentrations of DDTR in OU-2 surface water ranged from 0.0964 µg/L to 0.403 µg/L in 1994. OU-2 surface water DDTR concentrations were less than the acute NAWQC of 1.1 µg/L. Twenty-two out of 22 surface water samples (100 percent) were above the chronic NAWQC of 0.001 µg/L. There is a potential for risk to benthos exposed to historic DDTR concentrations in surface water. Current DDTR surface water data are not available. Thus, this risk to benthos has likely been mitigated or reduced by two remedial efforts implemented by the adjacent property owner (Ciba-Giegy), which would reduce exposure to DDTR concentrations. DDTR concentrations in sediment have been reduced by an order of magnitude since the 1990s.

Benthic Macroinvertebrate Tissue

- The maximum mercury benthos tissue concentration for OU-2 was 0.2 mg/kg, which is below the benthic NOED tissue residue concentration of 2.7 mg/kg based on growth and survival.

- The maximum methylmercury concentration in crayfish from OU-2 was estimated to be 0.2 mg/kg, which is below the benthic NOAEL tissue residue concentration of 1.0 mg/kg based on growth and survival.

- Concentrations of HCB in OU-2 crayfish tissue from 1994 ranged from 0.088 mg/kg to 0.91 mg/kg. Ten of 10 crayfish samples (100 percent) were above the HCB benchmark for benthos of 0.056 mg/kg. There is a potential for risk to benthos exposed to HCB in OU-2.

- The maximum HCB concentration in crayfish from OU-2 was 0.91 mg/kg, which is below the benthic NOAEL tissue residue concentration of 172 mg/kg based on survival, growth, and reproduction.

- Concentrations of DDTR in OU-2 crayfish tissue from 1994 ranged from 0.43 mg/kg to 1.6 mg/kg. Ten of 10 crayfish samples (100 percent) were above the DDTR 10 percent tissue residue TRVs of 0.04 mg/kg whole body (wet weight) for DDT and 0.07 mg/kg whole body (wet weight) for DDE used for the protection of benthic invertebrates. There is a potential for risk to benthos exposed to DDTR in OU-2.

Based on the measurement endpoints, the hypothesis is rejected. Mercury, methylmercury, HCB, and DDTR in environmental media in OU-2 are anticipated to cause adverse effects to the benthic macroinvertebrate community in OU-2. Confidence in the sediment mercury PEC as a reliable effects concentration is extremely low; therefore, exceedances of the PEC have less weight of evidence. However, exceedances of the sediment LOAEL TRV of 3.84 mg/kg for mercury provides additional weight of evidence for the potential for risk to benthic macroinvertebrates in OU-2 due to sediment mercury concentrations. Potential risk from DDTR is likely overestimated because the DDTR data were collected prior to the implementation of two remedial efforts to mitigate DDTR migration. DDTR concentrations in sediment since the early 1990's have reduced by an order of magnitude. Thus, it is anticipated that surface water DDTR concentrations have reduced over this time period as well. Potential risk to benthic macroinvertebrates due to HCB and DDTR surface water exposures may be overestimated because the evaluations are based on historical data.

6.1.2 Assessment Endpoint 2 - Fish Community

Protection of the long-term health and reproductive success of the fish community.

Hypothesis: Mercury, methylmercury, HCB, and DDTR concentrations detected in environmental media in OU-2 are not sufficient to impair the function, health, and reproductive success of the fish community.

The following measurement endpoints were selected to address this hypothesis and indicate that:

Sediment

- OU-2 sediment mercury concentrations ranged from 0.965 mg/kg to 120 mg/kg. Thirteen of 63 sediment samples (21 percent) exceeded the sediment NOAEL TRV of 50 mg/kg protective of fish, indicating that mercury concentrations in OU-2 sediments pose a limited potential for risk to the survival of the fish community.
- Concentrations of methylmercury in OU-2 sediments ranged from 0.00142 mg/kg to 0.0257 mg/kg. No studies on fish exposed to methylmercury in sediments were identified in the scientific literature.

- The maximum HCB concentration in OU-2 sediment was 34.1 mg/kg, which is below the sediment NOAEL TRV of 90 mg/kg protective of fish survival.

- Concentrations of DDTR in OU-2 sediments ranged from non-detect to 2.72 mg/kg. No studies on fish exposed to DDTR in sediments were identified in the scientific literature.

Surface Water

- Concentrations of mercury in OU-2 surface water ranged from 0.00444 µg/L to 0.360 µg/L. OU-2 surface water concentrations were less than the mercury NAWQC of 0.77 µg/L. Because mercury concentrations in OU-2 surface water samples were less than the ecotoxicity surface water benchmark concentration, the potential for risk is not anticipated for fish due to exposure to mercury concentrations in surface water.

- Concentrations of methylmercury in OU-2 surface water ranged from 0.000613 µg/L to 0.00553 µg/L. OU-2 surface water methylmercury concentrations were less than the Tier 2 SAV of 0.099 µg/L. Ten out of 42 surface water samples (24 percent) were above the Tier 2 SCV of 0.0028 µg/L. There is a potential for risk to fish due to methylmercury concentrations in surface water.

- HCB surface water concentrations in 1991 were non-detect with a detection limit of 10.0 µg/L. Concentrations of HCB in OU-2 surface water ranged from 0.0215 µg/L to 0.0442 µg/L in 1994. Twenty-one out of 22 surface water samples (100 percent) were above the withdrawn OWQOC of 0.0065 µg/L. There is a potential for risk to fish exposed to historic HCB concentrations in surface water.

- DDTR surface water concentrations in 1991 were non-detect with a detection limit of 0.100 µg/L. Concentrations of DDTR in OU-2 surface water ranged from 0.0964 µg/L to 0.403 µg/L in 1994. OU-2 surface water DDTR concentrations were less than the acute NAWQC of 1.1 µg/L. Twenty-two out of 22 surface water samples (100 percent) were above the chronic NAWQC of 0.001 µg/L. There is a potential for risk to fish exposed to historic DDTR concentrations in surface water. Current DDTR surface water data are not available. Thus, this risk to benthos has likely been mitigated or reduced by two remedial efforts implemented by the adjacent property owner (Ciba-Giegy), which would reduce exposure to DDTR concentrations. DDTR concentrations in sediment have been reduced by an order of magnitude since the 1990s.

Fish Tissue

- Maximum whole body mercury concentrations for the largemouth bass, the bluegill sunfish, and the silverside in OU-2 were 2 mg/kg, 1.2 mg/kg, and 1.2 mg/kg, respectively. Whole body mercury tissue concentrations were compared against the NOED range of 0.32 mg/kg to 9.41 mg/kg and the LOED range of 1.31 mg/kg to 18.8 mg/kg protective of fish growth, as well as a mercury NOED TRV for reproduction of 2.84 mg/kg. Thirty-six of 40 largemouth bass samples (90 percent) are approximately equal to or greater than the LOED of 1.31 mg/kg. Mercury concentrations in bluegill sunfish and silversides were within the cited no effects range of values based on growth and reproduction.

- HCB tissue concentrations for largemouth bass in OU-2 ranged from 0.034 mg/kg to 2.5 mg/kg. HCB in bluegill sunfish ranged from 0.0543 mg/kg to 0.637 mg/kg in OU-2. Silverside HCB tissue sample concentrations ranged from 0.0868 mg/kg to 1.99 mg/kg. Largemouth bass, bluegill sunfish, and silverside HCB tissue concentrations are above the benchmark of 0.056 mg/kg for fish tissue. There is a potential for risk to fish in OU-2 due to HCB fish tissue concentrations.

- DDTR largemouth bass tissue data were estimated using the available filet data and a site-specific, species-specific filet to whole body conversion factor of 1.35. Largemouth bass DDTR tissue concentrations from 2001 in OU-2 ranged from 0.068 mg/kg to 0.81 mg/kg. Mosquitofish DDTR tissue concentrations from 2001 in OU-2 ranged from 0.583 mg/kg to 10.82 mg/kg. Two out of seven largemouth bass samples (29 percent) are above the no-effect concentration of 0.46 mg/kg and one out of seven largemouth bass samples (14 percent) is above the low-effect concentration of 0.68 mg/kg. Twenty-one of 21 mosquitofish samples (100 percent) are above the no-effect concentration of 0.46 mg/kg and 20 out of 21 mosquitofish samples (95 percent) are above the low-effect concentration of 0.68 mg/kg. Largemouth bass and mosquitofish DDTR tissue concentrations in OU-2 are above the no-effect and effect concentrations for DDTR. There is a potential for risk to fish in OU-2 due to DDTR exposure based on tissue concentrations.

Based on the measurement endpoints, the hypothesis is rejected. Exceedances of mercury effects levels indicate a potential for risk to the fish community from exposure to mercury in OU-2 sediments. Surface water methylmercury, HCB, and DDTR concentrations indicate a potential for risk to the fish community from exposure to OU-2 surface water. Fish tissue residue concentrations also exceed effects levels for mercury, HCB, and DDTR. HCB and DDTR surface water data were collected in 1991 and 1994. Potential risk from DDTR is likely overestimated because the DDTR data were collected prior to the implementation of two remedial efforts to mitigate DDTR migration. DDTR concentrations in sediment since the early 1990's have reduced by an order of magnitude. Thus, it is anticipated that surface water DDTR concentrations have reduced over this time period as well. Potential risk to fish due to HCB and DDTR surface water exposures may be overestimated because the evaluations are based on historical data.

6.1.3 Assessment Endpoint 3 - Soil Invertebrates in Floodplain Soils

Endpoint: Protection of the long-term health and reproductive success of the soil invertebrate community.

Hypothesis: Mercury, methylmercury, HCB, and DDTR concentrations in OU-2 are not sufficient to impair the function, health, and reproductive success of the soil invertebrate community.

The measurement endpoints selected to address this hypothesis indicate that:

- The maximum mercury concentration in OU-2 surface soils was 8.9 mg/kg, which is less than the NOEC TRV of 10 mg/kg protective of soil invertebrate survival.
- The maximum methylmercury concentration in OU-2 surface soils was 0.00822 mg/kg, which is less than the NOEC TRV of 2.5 mg/kg protective of soil invertebrate growth and survival.
- The maximum HCB concentration in OU-2 surface soils was 0.275 mg/kg, which is less than the soil NOEC of 100 mg/kg protective of soil microorganisms.
- The maximum DDTR concentration in OU-2 surface soils was 2.23 mg/kg, which is less than the soil LOAEL TRV of 14 mg/kg protective of soil invertebrate survival.

Based on the measurement endpoints, the hypothesis is accepted. COPC concentrations in OU-2 floodplain surface soils are not anticipated to cause adverse effects to the soil invertebrate community in OU-2.

7.0 SUMMARY AND CONCLUSIONS

The objective of this SLERA was to estimate potential ecological risk associated with direct exposure to constituents detected in environmental media. This SLERA incorporated the more recent monitoring data collected at OU-2, including sediment, surface water, fish tissue, and floodplain soil data, along with the historical data included in the 1995 ERA. The SLERA included qualitative evaluations of risk to Assessment Endpoint 1 (benthic macroinvertebrates), Assessment Endpoint 2 (fish), and Assessment Endpoint 3 (soil invertebrates) of the Updated ERA as directed by UESPA (USEPA, 2010). These assessment endpoints are directly exposed to abiotic media (i.e., sediment, surface water, and/or floodplain soils) in OU-2. The qualitative risk assessment consisted of the comparison of OU-2 surface water, sediment, and tissue residue (i.e., fish and crayfish) concentrations to appropriate screening benchmarks and/or effects concentrations. Evaluations of risk involving food chain modeling of upper-trophic level receptors feeding on these receptors (i.e., aquatic and terrestrial birds and mammals) are addressed in the Updated ERA, as directed by USEPA (USEPA, 2010). COPCs for OU-2 identified in this SLERA and to be carried through the ERA process include mercury, methylmercury, HCB, and DDTR.

A qualitative analysis of risk was performed in this SLERA for the benthic macroinvertebrate, fish communities, and soil invertebrate communities by comparing site sediment, surface water, surface soil, and tissue concentrations to available literature-based toxicity benchmarks or effects concentrations. Based on the qualitative assessment of benthic macroinvertebrate and fish, potential risk is posed to these communities in OU-2. Mercury, methylmercury, HCB, and DDTR in environmental media in OU-2 are anticipated to cause adverse effects to the benthic macroinvertebrate community in OU-2. Exceedances of mercury effects levels indicate a potential for risk to the fish community from exposure to mercury in OU-2 sediments. Surface water methylmercury, HCB, and DDTR concentrations indicate a potential for risk to the fish community from exposure to OU-2 surface water. Fish tissue residue concentrations also exceed effects levels for mercury, HCB, and DDTR. HCB and DDTR surface water data used in this qualitative assessment were collected in 1991 and 1994. DDTR concentrations are likely lower today based on two remedial efforts conducted by the adjacent landowner and reductions in DDTR sediment concentrations since the 1990s. Therefore, potential risk from exposure to DDTR and HCB in surface water may be overestimated. Potential risk to the benthic macroinvertebrate and fish communities must be concluded for DDTR and HCB, but potential risk may be overestimated for exposure to these two COPCs. Based on the qualitative risk assessment for soil invertebrates, mercury, methylmercury, DDTR, and HCB do not pose a potential for risk to the soil invertebrate community in OU-2.

TABLES

TABLE P2-1

SCREENING COMPARISON OF SEDIMENT CONCENTRATIONS TO ECOLOGICAL SCREENING VALUES
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

	1995 SLERA Dataset [a]			2011 Updated SLERA Dataset [b]			Screening Values		Selection of COPC		
Chemical	**Frequency of Detection**	**Mimimum Detected Concentration (mg/kg)**	**Maximum Detected Concentration (mg/kg)**	**Frequency of Detection**	**Mimimum Detected Concentration (mg/kg)**	**Maximum Detected Concentration (mg/kg)**	**USEPA Region 4 Ecological Screening Value (ESV) (mg/kg)[c]**	**Consensus-Based PEC (mg/kg)[f]**	**Max. Detected Concentration > ESV and PEC? (Yes/No)**	**COPC? (Yes/No)**	**Rationale for Including/Excluding COPC**
Inorganics											
Antimony	4 / 8 50%	10.1	24.6	NA	NA	NA	12	NA	Yes	No	(1)
Arsenic	21 / 21 100%	1.3	16.1	NA	NA	NA	7.24	33	No	No	BSL
Beryllium	1 / 21 4.8%	3.7	3.7	NA	NA	NA	NA	NA	Yes	No	FOD
Chromium	21 / 21 100%	6.1	52.1	NA	NA	NA	52.3	111	No	No	BSL
Copper	20 / 21 95%	4	57.5	NA	NA	NA	18.7	149	No	No	BSL
Cyanide	5 / 21 24%	0.34	1.5	NA	NA	NA	1.0 (d)	NA	Yes	No	(1)
Lead	21 / 21 100%	5.3	44.2	NA	NA	NA	30.2	128	No	No	BSL
Mercury	141 / 146 97%	0.074	329	63 / 63 100%	0.965	213	0.13	1.06	Yes	**Yes**	ASL
Methylmercury	NA	NA	NA	55 / 55 100%	0.00142	0.0257	NA	NA	NA	**Yes**	(2)
Zinc	21 / 21 100%	8	227	NA	NA	NA	124	459	No	No	BSL
Organics											
1,2,4-Trichlorobenzene	2 / 27 7.4%	0.14	1.1	NA	NA	NA	9.2 (d)	NA	No	No	BSL
1,2-Dichlorobenzene	2 / 27 7.4%	0.24	0.7	NA	NA	NA	0.34 (d)	NA	Yes	No	(3)
1,3-Dichlorobenzene	5 / 27 19%	0.18	0.95	NA	NA	NA	1.7 (d)	NA	No	No	BSL
1,4-Dichlorobenzene	10 / 27 37%	0.18	3.7	NA	NA	NA	0.35 (d)	NA	Yes	No	(3)
Chlorobenzene	20 / 21 95%	0.004	1	NA	NA	NA	0.82 (d)	NA	Yes	No	(3)
Hexachlorobenzene	69 / 146 47%	0.052	1,002	10 / 16 63%	0.0221	34.1	0.0025 (d)	0.020	Yes	**Yes**	ASL
Pentachlorobenzene	39 / 105 37%	0.47	541	NA	NA	NA	0.0025 (d)	NA	Yes	No	(3)
Pentachloronitrobenzene	25 / 102 25%	1.1	618	NA	NA	NA	NA	NA	Yes	No	(3)
Pesticides											
Aldrin	1 / 21 4.8%	0.028	0.028	NA	NA	NA	0.0025 (d)	NA	Yes	No	FOD
alpha-BHC	2 / 21 10%	0.0089	0.014	NA	NA	NA	0.0025 (d)	NA	Yes	No	(1)
beta-BHC	4 / 21 19%	0.0072	0.018	NA	NA	NA	0.001 (d)	NA	Yes	No	(1)
delta-BHC	2 / 21 10%	0.054	0.17	NA	NA	NA	NA	NA	Yes	No	(1)
Endosulfan I	1 / 21 4.8%	0.11	0.11	NA	NA	NA	0.0029 (d)	NA	Yes	No	FOD
Endosulfan II	1 / 21 4.8%	0.052	0.052	NA	NA	NA	0.014 (d)	NA	Yes	No	FOD
gamma-BHC	1 / 21 4.8%	0.029	0.029	NA	NA	NA	0.0033 (d)	0.00499	Yes	No	FOD
Heptachlor Epoxide	1 / 21 4.8%	0.017	0.017	NA	NA	NA	0.0006 (d)	0.016	Yes	No	FOD
Sum of 4,4' Isomers of DDT, DDD and DDE (DDTr)	41 / 42 98%	0.0094	83	NA	NA	NA	0.0025 (d,e)	NA	Yes	**Yes**	ASL
Sum of 2,4' & 4,4' Isomers of DDT, DDD and DDE (DDTR)	21 / 21 100%	0.74	177	12 / 14 86%	0.066	2.72	0.0025 (d,e)	NA	Yes	**Yes**	ASL

Notes:
mg/kg = milligram per kilogram
NA = Not analyzed
COPC = Constituent of Potential Concern
ESV = Ecological Screening Value
PEC = Probable Effects Concentration
(a) Includes 1991/1992 data collected as part of the 1993 RI for OU-2 and 1994 data collected as part of the ecological studies of OU-2.
(b) Includes 2008 and 2009 sediment data (0-12 inches) only.
(c) USEPA Region 4 Ecological Screening Values for Sediment (USEPA, 2001).
(d) WSRC, 1998. *Ecological Screening Values for Surface Water, Sediment, and Soil* , Draft, June 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina.
(e) Value is for DDD/DDE/DDT.
(f) PECs listed are from MacDonald (2000) except HCB. Value for HCB is the Lowest Effects Level (LEL) cited in Persaud (1993).

Rational for Inclusion/Exclusion of COPC:
ASL = Above One or More Screening Levels
BSL = Below One or More Screening Levels
FOD = Excluded due to low frequency of detection (<5%)
(1) COPC is not bioaccumulative, not used in historical activities, and is not expected to serve as an ongoing source of contamination to the basin. See Section 2.1.1 in the text for further discussion.
(2) Included as COPC because there is no screening value available.
(3) Detections of chlorinated benzenes were typically within the same sample. Because concentrations of HCB were significantly higher compared to other chlorinated benzenes within a sample, and HCB is more bioaccumulative, risk from chlorinated benzenes is adequately addressed by HCB.

PREPARED BY/DATE: MKB 4/1/11
CHECKED BY/DATE: NSR 4/3/11

TABLE P2-2

SCREENING COMPARISON OF SURFACE WATER CONCENTRATIONS TO ECOLOGICAL SCREENING VALUES
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

	1995 ERA Dataset [a]			2011 SLERA Dataset [b]			Screening Values		Selection of COPC		
Chemical	**Frequency of Detection**	**Mimimum Detected Concentration (µg/L)**	**Maximum Detected Concentration (µg/L)**	**Frequency of Detection**	**Mimimum Detected Concentration (µg/L)**	**Maximum Detected Concentration (µg/L)**	**USEPA Region 4 Ecological Screening Value (ESV) (µg/L)[c]**	**USEPA Freshwater NAWQC (µg/L)[e]**	**Max. Detected Concentration > ESV and NAWQC? (Yes/No)**	**COPC? (Yes/No)**	**Rationale for Including/Excluding COPC**
Inorganics, total											
Arsenic	2 / 12 17%	6.7	12.2	NA	NA	NA	190	150	No	No	BSL
Cadmium	2 / 12 17%	2.1	2.2	NA	NA	NA	0.66	0.25	Yes	No	(1)
Chromium	7 / 12 58%	4.3	11.1	NA	NA	NA	117	74	No	No	BSL
Cyanide	7 / 12 58%	12.3	36.9	NA	NA	NA	5.2	5.2	Yes	No	(2)
Lead	3 / 12 25%	3.5	3.8	NA	NA	NA	1.32	2.5	Yes	No	(1)
Mercury	22 / 22 100%	0.23	3.6	42 / 42 100%	0.0044	0.360	0.012	0.77	Yes	**Yes**	ASL
Methylmercury	NA	NA	NA	42 / 42 100%	0.000613	0.00553	NA	NA	NA	**Yes**	(3)
Nickel	7 / 12 58%	10.2	45.9	NA	NA	NA	88	52	No	No	BSL
Zinc	10 / 12 83%	59.9	444	NA	NA	NA	59	120	Yes	No	(4)
Inorganics, dissolved											
Arsenic	2 / 12 17%	3.4	8.8	NA	NA	NA	190	150	No	No	BSL
Cadmium	0 / 12 0%	NA	NA	NA	NA	NA	0.66	0.25	NA	NA	NA
Chromium	11 / 12 92%	4.1	882	NA	NA	NA	117	74	Yes	No	(5)
Copper	1 / 12 8%	33.6	33.6	NA	NA	NA	6.54	NA	Yes	No	(6)
Lead	0 / 12 0%	NA	NA	NA	NA	NA	1.32	2.5	NA	NA	NA
Mercury	1 / 12 8%	0.65	0.65	NA	NA	NA	0.012	0.77	Yes	**Yes**	ASL
Nickel	10 / 10 100%	11.2	616	NA	NA	NA	88	52	Yes	No	(5)
Zinc	3 / 12 25%	80.1	253	NA	NA	NA	59	120	Yes	No	(7)
Organics											
Chloroform	1 / 12 8%	3	3	NA	NA	NA	289	NA	No	No	BSL
Hexachlorobenzene	10 / 22 45%	0.0031	0.044	10 / 22 45%	0.0031	0.044	NA	NA	NA	**Yes**	(3)
Pesticides											
alpha-BHC	2 / 12 17%	0.18	0.22	NA	NA	NA	500	NA	No	No	BSL
DDTR	10 / 22 45%	0.096	0.403	10 / 22 45%	0.096	0.403	0.001 (d)	0.001 (d)	Yes	**Yes**	ASL

Notes:
µg/L = micrograms per liter
NA = Not analyzed
ND = Not detected
COPC = Constituent of Potential Concern
ESV = Ecological Screening Value
NAWQC = National Ambient Water Quality Criterion
(a) Includes 1991 data collected as part of the 1993 RI for OU-2 and 1994 data collected as part of the ecological studies of OU-2.
(b) Dataset includes surface water samples collected at a 6-ft elevation in 2008 and 2009 for mercury and methylmercury. Data from 1991 & 1994 used for HCB and DDTR.
(c) USEPA Region 4 Ecological Screening Values for Surface Water (USEPA, 2001).
(d) Value for 4,4-DDT.
(e) USEPA National Ambient Water Quality Criteria for Freshwater (USEPA, 2009).

PREPARED BY/DATE: MKB 4/1/11
CHECKED BY/DATE: NSR 4/3/11

Rational for Inclusion/Exclusion of COPC:
ASL = Above One or More Screening Levels
BSL = Below One or More Screening Levels
(1) Constituent not found in the dissolved form indicating detected concentrations were likely attributed to suspended sediments in the water sample.
(2) Cyanide not selected as a COPCs because concentrations in monitoring well BA-1 for OU-2 was non-detect for 2000, 2001, and 2002 which are the last years this constituent was sampled.
(3) Selected as a COPC because there is no available screening value.
(4) Zinc not selected as a COPC because the sediment geometric mean of 113 mg/kg cited in the 1995 ERA is below the sediment screening value. See Section 2.1.2 for further discussion of the COPC selection process.
(5) Constituent not selected as a COPC because elevated values for dissolved metals attributed to sample contamination (WCC, 1993). Total analysis more representative of surface water concentrations because total suspended solids were low; total analysis below screening value.
(6) Copper not selected as a COPC due to low frequency of detection. Only 1 out of 12 samples detected.
(7) Zinc not selected as a COPC because the mean of 44 µg/L is below the AWQC and zinc is not a bioaccumulative compound.

TABLE P2-3

SCREENING COMPARISON OF SURFACE SOIL CONCENTRATIONS TO ECOLOGICAL SCREENING VALUES
Updated Ecological Risk Assessment
Olin – McIntosh
Operable Unit 2
McIntosh, Alabama

	1995 ERA Dataset [a]			2011 SLERA Dataset [b]			Screening Values		Selection of COPC		
Chemical	Frequency of Detection	Mimimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Frequency of Detection	Mimimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	USEPA Region 4 Ecological Soil Screening Value (ESV) (mg/kg)[c]	Selected Toxicity Value [d] (mg/kg)	Max. Detected Concentration > ESV? (Yes/No)	COPC? (Yes/No)	Rationale for Including/Excluding COPC
Inorganics, total											
Mercury	28 / 31 90%	0.16	25	33 / 33 100%	0.061	8.9	0.1	10	Yes	**Yes**	ASL
Methylmercury	NA	NA		12 / 12 100%	0.000176	0.0082	0.67	2.5	--	No	BSL
Organics											
Hexachlorobenzene	11 / 31 35%	0.060	8.2	7 / 9 78%	0.001100	0.275	0.0025	100	Yes	**Yes**	ASL
Pesticides											
DDTR	9 / 9 100%	0.74	177	13 / 15 87%	0.066	2.23	0.0025	14	Yes	**Yes**	ASL

Notes:
mg/kg = milligrams per kilogram
NA = Not analyzed
COPC = Constituent of Potential Concern
ESV = Ecological Screening Value
(a) Includes 1992 data collected as part of the 1993 RI for OU-2 and 1994 data collected as part of the ecological studies of OU-2.
(b) Dataset includes floodplain surface soil samples (0-6 inches) collected at a 6-ft elevation from 2010.
(c) USEPA Region 4 Ecological Screening Values for Soil (USEPA, 2001).
(d) Refer to Table P2-6.

Rational for Inclusion/Exclusion of COPC:
ASL = Above Screening Level
BSL = Below Screening Level

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TABLE P2-4

SUMMARY OF SELECTED TOXICITY VALUES FOR ASSESSMENT ENDPOINT 1:
PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE BENTHIC MACROINVERTEBRATE COMMUNITY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	AUTHOR(S), YEAR	STUDY SPECIES	ROUTE OF EXPOSURE	CHEMICAL	TEST DURATION	TOXIC MECHANISM	ENDPOINT	RESULTANT ENDPOINT CONCENTRATION	TYPE OF ENDPOINT CONCENTRATION (TEST CONCENTRATION OR TISSUE RESIDUE CONCENTRATION)
MERCURY STUDIES									
	Sediment								
*	MacDonald et al., 2000	Various	Sediment	Mercury (various)	Various	Various	PEC	1.06 mg/kg	Test Concentration
*	MacDonald et al., 2000	Various	Sediment	Mercury (various)	Various	Various	TEC	0.18 mg/kg	Test Concentration
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Sediment	Mercuric Chloride	9-days	Growth	NOAEL	1.0 mg/kg	Test Concentration
	Odin et al., 1994	*Hexagenia rigida* (mayfly)	Sediment	Mercuric Chloride	15-days	Growth and Survival	NOAEL	10.0 mg/kg	Test Concentration
*	Chibunda, 2009	*Chironomus riparius* (midge)	Sediment	Mercury	28-days	Survival and Reproduction	LOAEL	3.84 mg/kg	Test Concentration
	Chibunda, 2009	*Chironomus riparius* (midge)	Sediment	Mercury	28-days	Growth	LOAEL	2.42 mg/kg	Test Concentration
	Beckvar et al., 2005	*Mugil cephalus* (striped mullet)	Water			Development	LER	0.3 mg/kg	
	Chibunda, 2009	*Chironomus riparius* (midge)	Sediment	Mercury	28-days	Reproduction	LOAEL	0.93 mg/kg	Test Concentration
	Surface Water								
*	USEPA, 2009		Water	Mercury			NAWQC	0.77 µg/L	
	USEPA, 2002b	*Trichoptera* (caddisfly)	Water	Mercury	96-hour	Survival	LC50	1,200 µg/L	Test Concentration
	USEPA, 2002b	*Zygoptera* (damselfly)	Water	Mercury	96-hour	Survival	LC50	1,200 µg/L	Test Concentration
	USEPA, 2002b	*Diptera* (midge)	Water	Mercury	96-hour	Survival	LC50	20 µg/L	Test Concentration
	Rossaro et al., 1986	*Chironomus riparius* (midge)	Surface Water	Mercuric Chloride	30-days	Survival	NOAEL	5.5 µg/L	Test Concentration
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Surface Water	Mercuric Chloride	9-days	Growth	NOAEL	23 µg/L	Test Concentration
	Tissue Residue								
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Sediment	Mercuric Chloride	9-days	Growth	NOAEL	0.04 mg/kg	Tissue Residue Concentration
	Odin et al., 1994	*Hexagenia rigida* (mayfly)	Sediment	Mercuric Chloride	15-days	Growth and Survival	NOAEL	2 - 2.4 mg/kg	Tissue Residue Concentration
	Odin et al., 1994	*Hexagenia rigida* (mayfly)	Surface Water	Mercuric Chloride	9-days	Growth and Survival	NOED	2.0 mg/kg	Tissue Residue Concentration
*	Odin et al., 1994	*Hexagenia rigida* (mayfly)	Surface Water	Mercuric Chloride	unknown	Growth and Survival	NOED	2.7 mg/kg	Tissue Residue Concentration
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Surface Water	Mercuric Chloride	9-days	Growth	NOAEL	3.76 mg/kg	Tissue Residue Concentration
	Rossaro et al., 1986	*Chironomus riparius* (midge)	Surface Water	Mercuric Chloride	30-days	Survival	NOED	40 mg/kg	Tissue Residue Concentration
	Rossaro et al., 1986	*Chironomus riparius* (midge)	Surface Water	Mercuric Chloride	30-days	Survival	NOED	88 mg/kg	Tissue Residue Concentration
	Rossaro et al., 1986	*Chironomus riparius* (midge)	Surface Water	Mercuric Chloride	30-days	Survival	NOED	107.6 mg/kg	Tissue Residue Concentration
METHYLMERCURY STUDIES									
	Sediment								
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Sediment	Methylmercuric Chloride	9-days	Growth	NOAEL	0.5 mg/kg	Test Concentration
	Odin et al., 1995	*Hexagenia rigida* (mayfly)	Sediment	Methylmercuric Chloride	15-days	Growth and Survival	NOAEL	2.98 mg/kg	Test Concentration
	Odin et al., 1994	*Hexagenia rigida* (mayfly)	Sediment	Methylmercuric Chloride	15-days	Growth and Survival	NOAEL	5.0 mg/kg	Test Concentration
*	MacDonald et al., 2000	Various	Sediment	Mercury (various)	various	Various	PEC	1.06 mg/kg	Test Concentration
*	MacDonald et al., 2000	Various	Sediment	Mercury (various)	various	Various	TEC	0.18 mg/kg	Test Concentration
*	Chibunda, 2009	*Chironomus riparius* (midge)	Sediment	Mercury	28-days	Survival and Reproduction	LOAEL	3.84 mg/kg	Test Concentration
	Chibunda, 2009	*Chironomus riparius* (midge)	Sediment	Mercury	28-days	Growth	LOAEL	2.42 mg/kg	Test Concentration
	Chibunda, 2009	*Chironomus riparius* (midge)	Sediment	Mercury	28-days	Reproduction	LOAEL	0.93 mg/kg	Test Concentration
	Surface Water								
*	Suter and Tsao, 1996		Water	Methylmercury			Tier 2 SAV	0.099 µg/L	
*	Suter and Tsao, 1996		Water	Methylmercury			Tier 2 SCV	0.0028 µg/L	
	Odin et al., 1995	*Hexagenia rigida* (mayfly)	Surface Water	Methylmercuric Chloride	15-days	Growth and Survival	NOAEL	1.8 µg/L	Test Concentration
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Surface Water	Methylmercuric Chloride	9-days	Growth	NOAEL	30 - 36 µg/L	Test Concentration
	Tissue Residue								
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Sediment	Methylmercuric Chloride	9-days	Growth	NOAEL	2.1 mg/kg	Tissue Residue Concentration
	Odin et al., 1994	*Hexagenia rigida* (mayfly)	Sediment	Methylmercuric Chloride	15-days	Growth and Survival	NOAEL	2.6 - 4.5 mg/kg	Tissue Residue Concentration
	Odin et al., 1995	*Hexagenia rigida* (mayfly)	Sediment	Methylmercuric Chloride	15-days	Growth and Survival	NOAEL	16.0 mg/kg	Tissue Residue Concentration
	Saouter et al., 1993	*Hexagenia rigida* (mayfly)	Surface Water	Methylmercuric Chloride	9-days	Growth	NOAEL	7.5 mg/kg	Tissue Residue Concentration
*	Odin et al., 1995	*Hexagenia rigida* (mayfly)	Surface Water	Methylmercuric Chloride	15-days	Growth and Survival	NOAEL	1.0 mg/kg	Tissue Residue Concentration

TABLE P2-4

SUMMARY OF SELECTED TOXICITY VALUES FOR ASSESSMENT ENDPOINT 1:
PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE BENTHIC MACROINVERTEBRATE COMMUNITY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	AUTHOR(S), YEAR	STUDY SPECIES	ROUTE OF EXPOSURE	CHEMICAL	TEST DURATION	TOXIC MECHANISM	ENDPOINT	RESULTANT ENDPOINT CONCENTRATION	TYPE OF ENDPOINT CONCENTRATION (TEST CONCENTRATION OR TISSUE RESIDUE CONCENTRATION)
HCB STUDIES									
	Sediment								
	Schuytema et al., 1990	*Hyalella azteca* (amphipod)	Sediment	Hexachlorobenzene	28-days	Survival	NOAEL	92 mg/kg	Test Concentration
*	Persaud, 1993	Various	Sediment	Hexachlorobenzene (various)	Various	Various	LEL	0.02 mg/kg	Test Concentration
*	Persaud, 1993	Various	Sediment	Hexachlorobenzene (various)	Various	Various	SEL (a)	0.43 mg/kg	Derived Concentration
	Surface Water								
*	OMEE, 1999		Surface Water	Hexachlorobenzene			Withdrawn OWQOC	0.0065 µg/L	
	Calamari et al., 1983	Daphnia magna	Surface Water	Hexachlorobenzene	14-days	Reduced Fertility	EC50	16 µg/L	Test Concentration
	Schuytema et al., 1990	*Hyalella azteca* (amphipod)	Surface Water	Hexachlorobenzene	28-days	Survival	NOAEL	37.8 µg/L	Test Concentration
	Schuytema et al., 1990	*Hyalella azteca* (amphipod)	Surface Water	Hexachlorobenzene	28-days	Survival	NOAEL	15.1 µg/L	Test Concentration
	Nebeker et al., 1989	*Hyalella azteca* (amphipod)	Surface Water	Hexachlorobenzene	30-days	Growth, Survival, and Reproduction	NOAEL	5 µg/L	Test Concentration
	USEPA, 1988	*Procambarus clarkii* (red swamp crayfish)	Surface Water	Hexachlorobenzene	20-days	Survival	NOAEL	27.3 µg/L	Test Concentration
	Tissue Residue								
*	USEPA, 2010			Hexachlorobenzene				0.056 mg/kg	
	Schuytema et al., 1990	*Hyalella azteca* (amphipod)	Surface Water	Hexachlorobenzene	28-days	Survival	NOAEL	118 mg/kg	Tissue Residue Concentration
	Schuytema et al., 1990	*Hyalella azteca* (amphipod)	Surface Water	Hexachlorobenzene	28-days	Survival	NOAEL	118 mg/kg	Tissue Residue Concentration
	Nebeker et al., 1989	*Hyalella azteca* (amphipod)	Surface Water	Hexachlorobenzene	30-days	Growth, Survival, and Reproduction	NOAEL	172 mg/kg	Tissue Residue Concentration
DDTR STUDIES									
	Sediment								
*	MacDonald et al., 2000	Various	Sediment	Total DDT, DDE, DDD	Various	Various	PEC	0.572 mg/kg	Test Concentration
*	MacDonald et al., 2000	Various	Sediment	Total DDT, DDE, DDD	Various	Various	TEC	0.00528 mg/kg	Test Concentration
	Bettinetti et al., 2005	*Tubifex tubifex* (worm)	Sediment	DDT	28-days	Survival	NOAEL	0.860 mg/kg	Test Concentration
	Bettinetti et al., 2005	*Tubifex tubifex* (worm)	Sediment	DDT	28-days	Reduced Fertility	LOEC	0.0805 mg/kg	Test Concentration
	Bettinetti et al., 2005	*Chironomus riparius* (chironomid)	Sediment	DDT	10-days	Survival	NOAEL	0.860 mg/kg	Test Concentration
	Bettinetti et al., 2005	*Chironomus riparius* (chironomid)	Sediment	DDT	10-days	Survival	NOAEL	0.0805 mg/kg	Test Concentration
	Bettinetti et al., 2005	*Chironomus riparius* (chironomid)	Sediment	DDT	10-days	Growth	LOEC	0.0805 mg/kg	Test Concentration
	Surface Water								
*	USEPA, 2009		Surface Water	DDT			NAWQC (acute)	1.1 µg/L	
*	USEPA, 2009		Surface Water	DDT			NAWQC (chronic)	0.001 µg/L	
	Crosby and Tucker, 1971	*Daphnia magna* (cladoceran)	Surface Water	DDT	24-hour	Survival	LC50	50 µg/L	Test Concentration
	Sodergren and Svensson, 1973	*Ephemera danica* (mayfly)	Surface Water	DDT	9-days	Survival	NOAEL	0.761 µg/L	Test Concentration
	Randall et al., 1979	*Daphnia magna* (cladoceran)	Surface Water	DDT	48-hour	Survival	LC50	1.1 µg/L	Test Concentration
	Bettinetti et al., 2005	*Daphnia galeata* (cladoceran)	Surface Water	DDT	48-hour	Immobilisation	IC50	0.76 µg/L	Test Concentration
	Bettinetti et al., 2005	*Daphnia magna* (cladoceran)	Surface Water	DDT	48-hour	Immobilisation	IC50	1.94 µg/L	Test Concentration
	Tissue Residue								
	Crosby and Tucker, 1971	*Daphnia magna* (cladoceran)	Surface Water	DDT	1-day	Survival	LC50	1,150 mg/kg (b)	Tissue Residue Concentration
*	USEPA, 2010			DDT			10% Tissue Residue TRV	0.04 mg/kg	Tissue Residue Concentration
*	USEPA, 2010			DDE			10% Tissue Residue TRV	0.07 mg/kg	Tissue Residue Concentration
	Sodergren and Svensson, 1973	*Ephemera danica* (mayfly)	Surface Water	DDTR	9-days	Survival	NOAEL	3.1 mg/kg	Tissue Residue Concentration

Notes:
* Indicates selected toxicity benchmark for comparison to site-specific concentrations
(a) Site-specific SEL derived from Persaud (1993) study by multiplying site-specific percent TOC (1.8%) by the SEL of 24 mg/kg from Persaud (1993) study.
(b) converts to a LOAEL of 115 mg/kg
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
LC_{50} = concentration at which 50% mortality occurs
IC_{50} = concentration at which 50% of population is inhibited
NOAEL = No Observed Adverse Effects Level
LOEC = Lowest Observed Effects Concentration
NOED = No Observed Effects Dose
PEC = Probable Effects Concentration
TEC = Threshold Effects Concentration
SEL = Severe Effects Level
LEL = Lowest Effects Level
NAWQC LER = Low-Effect Residue
Tier 2 SAC = Tier 2 Secondary Acute Value
Tier 2 SCC = Tier 2 Secondary Chronic Value
OWQOC = Ontario Water Quality Objectives Criterion

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TABLE P2-5

SUMMARY OF SELECTED TOXICITY VALUES FOR ASSESSMENT ENDPOINT 2:
LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE FISH COMMUNITY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	AUTHOR(S), YEAR	STUDY SPECIES	ROUTE OF EXPOSURE	CHEMICAL	TEST DURATION	TOXIC MECHANISM	ENDPOINT	RESULTANT ENDPOINT CONCENTRATION	TYPE OF ENDPOINT CONCENTRATION (TEST CONCENTRATION OR TISSUE RESIDUE CONCENTRATION)
MERCURY STUDIES									
	Sediment								
	Kudo, 1979	*Poecilia reticulata* (guppy)	Sediment	Mercuric Chloride	20 days	Survival	NOAEL	1,023 mg/kg	Test Concentration
*	Gillespie and Scott, 1971	*Poecilia reticulata* (guppy)	Sediment	Mercuric Chloride	55 days	Survival	NOAEL	50 mg/kg	Test Concentration
	Surface Water								
*	USEPA, 2009		Water	Mercury			NAWQC	0.77 µg/L	
	USEPA, 2002b	*Gambusia affinis* (western mosquitofish)	Water	(Acetat-o)phenylmercury	96-hour	Mortality	LC_{50}	37 µg/L (a)	Test Concentration
	USEPA, 2002b	*Ictalarus punctatus* (channel catfish)	Water	(Acetat-o)phenylmercury	96-hour	Mortality	LC_{50}	350 µg/L (b)	Test Concentration
	USEPA, 2002b	*Ictalarus punctatus* (channel catfish)	Water	(Acetat-o)phenylmercury	96-hour	Mortality	LC_{50}	580 µg/L (c)	Test Concentration
	USEPA, 2002b	*Ictalarus punctatus* (channel catfish)	Water	(Acetat-o)phenylmercury	96-hour	Mortality	LC_{50}	3,300 µg/L (d)	Test Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	287 days	Reproduction	NOAEL	0.50 µg/L	Test Concentration
*	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	287 days	Growth	LOAEL	0.26 µg/L	Test Concentration
	Snarski and Olson, 1983	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	288 days	Growth	LOEC	0.58 µg/L	
	Suter and Tsao, 1996	Freshwater Fish (rainbow trout)	Water	Mercury	various	recruit abundance (?)	EC_{20}	0.32 µg/L	Test Concentration
	Birge et al., 1979	Surface Water	Water	Mercury	4-days post hatch	Survival	LC_{50}	0.78 µg/L	Test Concentration
	Tissue Residue								
*	Beckvar et al., 2005	*Mugil cephalus* (striped mullet)	Water	Methylmercury		Development	LER	0.3 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	60 days	Growth	NOAEL	0.62 mg/kg and 2.64 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	60 days	Survival	NOED	7.6 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	287 days	Reproduction	NOAEL	2.84 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercury	287 days	Growth	NOED	0.32 - 9.41 mg/kg	Whole Body Tissue Concentration
	Olson et al., 1975	*Pimephales promelas* (fathead minnow)	Water	Mercury	336 days	Survival and Growth	NOAEL	10.69 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas (fathead minnow)*	Water	Mercuric Chloride	60 days	Growth	LOAEL	1.31 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercuric Chloride	60 days	Growth	LOAEL	4.76 mg/kg	Whole Body Tissue Concentration
	Snarski and Olson, 1982	*Pimephales promelas* (fathead minnow)	Water	Mercury	30-60 days	Growth	LOED	1.31 - 18.8 mg/kg	Whole Body Tissue Concentration
METHYLMERCURY STUDIES									
	Surface Water								
*	Suter and Tsao, 1996		Water	Methylmercury			Tier 2 SAV	0.099 µg/L	
*	Suter and Tsao, 1996		Water	Methylmercury			Tier 2 SCV	0.0028 µg/L	
	USEPA, 2002b	*Gambusia affinis* (western mosquitofish)	Water	Chloromethylmercury	96-hour	Mortality	LC_{50}	70 µg/L	Test Concentration
	Olson et al., 1975	*Pimephales promelas* (fathead minnow)	Water	Methylmercuric Chloride	336 days	Survival and Growth	NOAEL	0.25 µg/L	Test Concentration
	Eisler, 1987	Various	Water	Inorganic Mercury	various	Growth and Reproduction	NOAEL	0.40 - 1.0 µg/L	Test Concentration
	Fjeld et al., 1998	*Thymallus thymallus* (grayling)	Water	Methylmercuric Chloride	3 years	Behavior	NOEC	0.16 µg/L	Test Concentration
	McKim et al., 1976	*Salvelinus fontinalis (brook trout)*	Water	Methylmercuric Chloride	16-28 weeks	Survival and Growth	NOEC	0.29 µg/L	Test Concentration
	Suter and Tsao, 1996	Freshwater Fish (rainbow trout)	Water	Methylmercury	various	recruit abundance (?)	EC_{20}	0.28 µg/L	Test Concentration
	Tissue Residue								
*	Beckvar et al., 2005	*Mugil cephalus* (striped mullet)	Water	Methylmercury		Development	LER	0.3 mg/kg	Whole Body Tissue Concentration
	Friedmann et al., 1996	*Stizostedion vitreum* (walleye)	Ingestion	Methylmercury	183 days	Survival	NOED	2.37 mg/kg	Whole Body Tissue Concentration
	Friedmann et al., 1996	*Stizostedion vetreum* (walleye)	Ingestion	Methylmercury	183 days	Growth	LOED	2.37 mg/kg	Whole Body Tissue Concentration
	McKim et al., 1976	*Salvelinus fontinalis (brook trout)*	Water	Methylmercuric Chloride	16-28 weeks	Survival and Growth	NOEC	2.7 mg/kg	Whole Body Tissue Concentration
	McKim et al., 1976	*Salvelinus fontinalis* (brook trout)	Water	Methylmercuric Chloride	756 days	Survival	NOED	9.4 mg/kg	Whole Body Tissue Concentration
	McKim et al., 1976	*Salvelinus fontinalis* (brook trout)	Water	Methylmercuric Chloride	756 days	Reproduction	NOED	9.4 mg/kg	Whole Body Tissue Concentration
	McKim et al., 1976	*Salvelinus fontinalis* (brook trout)	Water	Methylmercuric Chloride	756 days	Reproduction	NOAEL	3.4 mg/kg	Whole Body Tissue Concentration
	Olson et al., 1975	*Pimephales promelas* (fathead minnow)	Water	Methylmercuric Chloride	336 days	Survival and Growth	NOAEL	10.9 mg/kg	Whole Body Tissue Concentration
HCB STUDIES									
	Sediment								
*	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Sediment	Hexachlorobenzene	28-days	Survival	NOAEL	90 mg/kg	Test Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Sediment	Hexachlorobenzene	28-days	Survival	NOAEL	72 mg/kg	Test Concentration
	Surface Water								
*	OMEE, 1999		Surface Water	Hexachlorobenzene			Withdrawn OWQOC	0.0065 µg/L	
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	11 µg/L	Test Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	11.4 µg/L	Test Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	8.6 µg/L	Test Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	8.9 µg/L	Test Concentration
	Nebeker et al., 1989	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival and Growth	NOAEL	5 µg/L	Test Concentration
	Carlson and Kosian, 1987	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	32-days	Survival and Growth	NOAEL	4.8 µg/L	Test Concentration
	Schuytema et al., 1988	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	1.3-3.1 µg/L	Test Concentration
	Schuytema et al., 1988	*Pimephales promelas* (fathead minnow)	Water with sediment added	Hexachlorobenzene	28-days	Survival	NOAEL	6.1-13.9 µg/L	Test Concentration

TABLE P2-5

SUMMARY OF SELECTED TOXICITY VALUES FOR ASSESSMENT ENDPOINT 2:
LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE FISH COMMUNITY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	AUTHOR(S), YEAR	STUDY SPECIES	ROUTE OF EXPOSURE	CHEMICAL	TEST DURATION	TOXIC MECHANISM	ENDPOINT	RESULTANT ENDPOINT CONCENTRATION	TYPE OF ENDPOINT CONCENTRATION (TEST CONCENTRATION OR TISSUE RESIDUE CONCENTRATION)
	Tissue Residue								
*	USEPA, 2010							0.056 mg/kg	
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	337 mg/kg	Whole Body Tissue Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	272 mg/kg	Whole Body Tissue Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	468 mg/kg	Whole Body Tissue Concentration
	Schuytema et al., 1990	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	282 mg/kg	Whole Body Tissue Concentration
	Nebeker et al., 1989	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival and Growth	NOAEL	46.5 mg/kg	Whole Body Tissue Concentration
	Carlson and Kosian, 1987	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	32-days	Survival and Growth	NOAEL	97 mg/kg	Whole Body Tissue Concentration
	Schuytema et al., 1988	*Pimephales promelas* (fathead minnow)	Water	Hexachlorobenzene	28-days	Survival	NOAEL	39-101 mg/kg	Whole Body Tissue Concentration
	Schuytema et al., 1988	*Pimephales promelas* (fathead minnow)	Water with sediment added	Hexachlorobenzene	28-days	Survival	NOAEL	138-190 mg/kg	Whole Body Tissue Concentration
DDTR STUDIES									
	Sediment								
	Surface Water								
*	USEPA, 2009		Surface Water	DDT			NAWQC (acute)	1.1 µg/L	
*	USEPA, 2009		Surface Water	DDT			NAWQC (chronic)	0.001 µg/L	
	Jarvinen et al., 1976 and 1977	*Pimephales promelas* (fathead minnow)	Water	DDT	266-days	Survival	LC50	1.53 µg/L (j)	Test Concentration
	Jarvinen et al., 1976 and 1977	*Pimephales promelas* (fathead minnow)	Water	DDT	266-days	Survival	NOAEL	0.35 µg/L	Test Concentration
	Pillai et al., 1977	*Gambusia affinis* (mosquitofish)	Water	DDT	16-days	Survival	LC50	4 µg/L (e)	Test Concentration
	Mayer and Ellersieck, 1986	*Pimephales promelas* (fathead minnow)	Water	DDT	96-hour	Survival	LC50	13.2 µg/L (f)	Test Concentration
	Mayer and Ellersieck, 1986	*Lepomis macrochirus* (bluegill)	Water	DDT	96-hour	Survival	LC50	6.3 µg/L (g)	Test Concentration
	Tissue Residue								
*	USEPA, 2010			DDTR			NOAEL	0.46 mg/kg	Whole Body Tissue Concentration
*	USEPA, 2010			DDTR			LOAEL	0.68 mg/kg	Whole Body Tissue Concentration
	Jarvinen et al., 1976 and 1977	*Pimephales promelas* (fathead minnow)	Ingestion	DDTR	266-days	Survival	LC25	57 mg/kg	Whole Body Tissue Concentration
	Jarvinen et al., 1976 and 1977	*Pimephales promelas* (fathead minnow)	Water	DDTR	266-days	Survival	LC50	160 mg/kg (h)	Whole Body Tissue Concentration
	Jarvinen et al., 1976 and 1977	*Pimephales promelas* (fathead minnow)	Water	DDTR	266-days	Survival	NOAEL	40 mg/kg	Whole Body Tissue Concentration
	Pillai et al., 1977	*Gambusia affinis* (mosquitofish)	Water	DDT	16-days	Survival	LC50	26.5 mg/kg (i)	Whole Body Tissue Concentration

Notes:
* Indicates study is selected as value to compare against site concentrations
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
LC_{50} = concentration at which 50% mortality occurs
NOAEL = No Observed Adverse Effects Level
NOED = No Observed Effects Dose
LOAEL = Lowest Observed Adverse Effects Level
LOED = Lowest Observed Effects Dose
EC_{20} = concentration at which 20% experience effects
NAWQC = National Ambinet Water Quality Criterion
Tier 2 SAC = Tier 2 Secondary Acute Value
Tier 2 SCC = Tier 2 Secondary Chronic Value
OWQOC = Ontario Water Quality Objectives Criterion
LER = Low-Effect Residue
(a) converts to a NOAEL of 0.37 µg/L
(b) converts to a NOAEL of 3.5 µg/L
(c) converts to a NOAEL of 5.0 µg/L
(d) converts to a NOAEL of 33 µg/L
(e) converts to a LOAEL of 0.4 µg/L
(f) converts to a LOAEL of 1.32 µg/L
(g) converts to a LOAEL of 0.63 µg/L
(h) converts to a LOAEL of 16 mg/kg
(i) converts to a LOAEL of 2.65 mg/kg
(j) not converted to LOAEL due to length of exposure - 266 days (chronic exposure)

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TABLE P2-6

SUMMARY OF SELECTED TOXICITY VALUES FOR ASSESSMENT ENDPOINT 3:
PROTECTION OF THE LONG-TERM HEALTH AND REPRODUCTIVE SUCCESS OF THE SOIL INVERTEBRATE COMMUNITY
Updated Ecological Risk Assessment
Olin - McIntosh
Operable Unit 2
McIntosh, Alabama

	AUTHOR(S), YEAR	STUDY SPECIES	ROUTE OF EXPOSURE	CHEMICAL	TEST DURATION	TOXIC MECHANISM	ENDPOINT	RESULTANT ENDPOINT CONCENTRATION	TYPE OF ENDPOINT CONCENTRATION (TEST CONCENTRATION OR TISSUE RESIDUE CONCENTRATION)
MERCURY STUDIES									
Soil									
	Efroymson et al., 1997	Soil microorganisms	Soil	Mercury	0.1-28 days	Various	LOEC	30 mg/kg	Test Concentration
	Hartenstein et al., 1981 (b)	*Eisenia fetida* (earthworm)	Natural Soil	Mercury	8 weeks	Mortality	NOEC	480 mg/kg - 4,800 mg/kg	Test Concentration
	Hartenstein et al., 1981 (b)	*Eisenia fetida* (earthworm)	Natural Soil	Mercury	8 weeks	Mortality	NOEC	2,400 mg/kg - 24,000 mg/kg	Test Concentration
	Sheppard, 1993	*Lumbricus terreris* (nightcrawlers)	Soil	Mercury	30 days	Mortality	LD_{50}	220 mg/kg - 460 mg/kg	Test Concentration
*	Sheppard, 1993	*Lumbricus terreris* (nightcrawlers)	Soil	Mercury	30 days	Mortality	LOEC (a)	100 mg/kg	Test Concentration
*	Sheppard, 1993	*Lumbricus terreris* (nightcrawlers)	Soil	Mercury	30 days	Mortality	NOEC	10 mg/kg	Test Concentration
METHYLMERCURY STUDIES									
Soil									
*	Beyer et. al., 1985	*Eisenia fetida* (earthworm)	Potting Soil	Methylmercuric Chloride	84	Growth and Survival	NOEC	2.5	Test Concentration
*	Beyer et. al., 1985	*Eisenia fetida* (earthworm)	Potting Soil	Methylmercuric Chloride	84	Growth and Survival	LOEC	12.5	Test Concentration
HCB STUDIES									
Soil									
	Ballhorn et al., 1984 (b)	*Eisenia fetida* (earthworm)	Soil	Hexachlorobenzene	28 days	Survival	LC_{50}	>1,000 mg/kg	Test Concentration
*	Walton et al., 1989	Soil Microorganisms	Soil	Hexachlorobenzene	4 days	Respiration	LOEC (c,d)	1,000 mg/kg	Test Concentration
*	Walton et al., 1989	Soil Microorganisms	Soil	Hexachlorobenzene	4 days	Respiration	NOEC	100 mg/kg	Test Concentration
DDTR STUDIES									
Soil									
*	Cathey, B., 1982	*Lumbricus terrestris* (earthworm)	Soil	4,4'-DDE	42 days	Survival	LD_1	14 mg/kg	Test Concentration
	Cathey, B., 1982	*Lumbricus terrestris* (earthworm)	Soil	4,4'-DDE	42 days	Survival	LD_{50}	61 mg/kg	Test Concentration

Notes:
* Indicates selected toxicity benchmark for comparison to site-specific concentrations
(a) Converts to a NOEC of 10 mg/kg
(b) Study obtained from USEPA Ecotox Database.
(c) Hexachlorobenzene reduced respiration by 37% in the silt loam but did not lower respiration in the sandy loam soil.
(d) Converts to a NOEC of 100 mg/kg
mg/kg = milligrams per kilogram
LC_{50}/LD_{50} = concentration at which 50% mortality occurs
LD_1 = concentration at which 1% mortality occurs
NOEC = No Observed Effects Concentration
LOEC = Lowest Observed Effects Concentration

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