UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

DW-8J

March 9, 2004

CERTIFIED MAIL: 7000 1670 0003 3493 5176
RETURN RECEIPT REQUESTED

Mr. Brian McGuire
Sr. Remediation Engineer
PPG Industries, Inc.
Post Office Box 2009
4325 Rosanna Drive, Bldg. C
Allison Park, Pa., 15101-2009.

Re: PPG Industries , Oak Creek, Wisc.
I D # : WID 059 972 935
Risk Evaluation Tank Farm Area Report,
Dated March 28, 2003.

Dear Mr. McGuire:

The United States Environmental Protection Agency (U. S. EPA) has completed the review of the subject report dated March 28, 2003 and the accompanying letter from the Shaw Group Inc. written on behalf of PPG Industries (PPG). The letter was in response to U. S. EPA's February 28, 2003 comment letter based on a review of the PPG 's previous submission of the report and a letter of explanation.

Based on the review of the March 28, 2003 revised report and the accompanying letter response from PPG, U. S. EPA hereby approves the subject report.

U S EPA, in response to a query in the March 28, 2003 letter accompanying the report would like to offer a clarification to the issue of future facility use restrictions at the site. A deed notice for a land use provision rather than a deed restriction will likely be the appropriate mechanism for implementing the future land use scenarios. In addition to imposition of any institutional and /or engineering controls, regular monitoring of the soil/groundwater will most likely be a condition of the final permit modification or other appropriate enforceable mechanism. This is based on the potential for off-site contamination as stated in the Conclusions section of the subject report.

If you have any questions, please feel free to contact me at (312) 886-3224.

Sincerely,

N. Nemani

Nate Nemani, P.E.
Corrective Action Project Manager
Waste, Pesticides, Toxics Division
Corrective Action Section

cc: Mark Gordon, WDNR
Walt Ebersohl,WDNR
Paul Lambert, Shaw Environmental & Infrastructure

PPG OAK CREEK FACILITY
OAK CREEK, WISCONSIN
RISK EVALUATION OF TANK FARM AREA
FINAL REPORT

Prepared For:
PPG Industries, Inc.
4325 Rosanna Drive
Allison Park, Pennsylvania

Prepared By:
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March 28, 2003

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Shaw™ Shaw Environmental, Inc.

March 28, 2003

Mr. Nate Nemani, P.E.
Corrective Action Project Manager
USEPA Region 5
Waste, Pesticides and Toxics Division
Corrective Action Section
77 West Jackson Boulevard (DW-8J)
Chicago, Illinois 60604-3590

Subject: PPG Industries, Inc.
Oak Creek, Wisconsin
Tank Farm Interim Measures
EPA ID# WID059972935
Wisconsin FID# 241014620
Revised Risk Evaluation

Dear Mr. Nemani:

On behalf of PPG Industries, Inc. (PPG), Shaw Environmental & Infrastructure (Shaw) is transmitting with this letter three copies of the Revised Risk Evaluation for the above referenced facility. We believe that this response incorporates all comments and responses detailed in correspondence between USEPA and PPG dated January 23, 2003 and February 28, 2003.

The Risk Evaluation considered potential exposure pathways and determined that unacceptable risks are not present to any potential receptor, without the imposition of any institutional or engineering controls other than the restriction on groundwater consumption. Therefore, we do not understand the statement made in USEPA's February 28, 2003 response that a deed restriction prohibiting groundwater usage for drinking water purposes is not an "adequate enforceable mechanism" and that additional measures may be required. We would appreciate an opportunity to discuss USEPA's concerns on this issue at such time as is convenient for the agency.

We look forward to continuing to work with you to obtain certification of the completion of the Presumptive Remedy implementation.

Very Truly Yours,

Paul W. Lambert, CPG
Senior Project Manager

Enclosure

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1.0 Introduction

PPG holds a Resource Conservation and Recovery Act (RCRA) operating permit at the Company's Oak Creek, Wisconsin facility. The RCRA permit was issued to PPG on March 31, 1992 with an effective date of May 4, 1992 (USEPA ID WID 059972935). Corrective action provisions of the Federal permit require PPG to implement corrective measures at identified solid waste management units (SWMUs) where necessary. In August 1997, PPG submitted a comprehensive RCRA Facility Investigation (RFI) Report that presented the results of the investigation and assessment of human health and ecological risks that identified three of ten SWMUs that required further action. One SWMU (SWMU 17, secondary containment for the above-ground tanks in the Tank Farm Area) was removed in 1996 in order to install new aboveground storage tanks. Two remaining SWMUs (SWMUs 8, - three 15,000-gallon above-ground DCS accumulation tanks and 18, a 3,770-gallon concrete underdrain sump), within the Tank Farm Area, were addressed in the RFI Risk Assessment, but required further action that included UST closure.

In July 1998, the USEPA granted conditional approval of the RFI Report. The condition of the approval was that PPG initiate corrective measures by proceeding with the closure of the Tank Farm Area in accordance with applicable Wisconsin underground storage tank (UST) closure guidance and implement a presumptive SVE remedy. In February/March 1999, PPG removed 23 of the 40 USTs and closed the remaining 17 USTs in place with Wisconsin Department of Commerce approval.

PPG implemented a presumptive remedy of soil vapor extraction (SVE) combined with air sparging (AS) of groundwater to reduce the levels of soil and groundwater contamination thereby stabilizing the Tank Farm Area. PPG prepared and submitted a CMS Presumptive Remedy Implementation Report in November 1999 where a process for integrating the SVE Interim Measure to a Site Corrective Measure was specified. The process consisted of setting PRGs and developing a contingency plan should the PRGs not be achieved by the Interim Measure. The contingency plan outlined in the CMS Presumptive Remedy Implementation Report involves a risk assessment of residual concentrations.

At the end of the 18-month interim measure, a target compliance/confirmatory sample event was conducted (in January 2001) to confirm results of the presumptive SVE remedy. Only three of the constituents, measured during the January 2001 confirmatory sampling event, had maximum concentrations that exceeded clean-up criteria (identified as the Federal Maximum Contaminant

Levels [MCLs] in the CSM). A subsequent letter, dated April 4, 2001, was sent to USEPA outlining the achievement of PRGs and broaching the need to initiate contingency activities, including performing a risk assessment, at the site.

Accordingly, PPG is presenting this conservative risk evaluation based on the residual and historic concentrations in soil and residual concentrations in groundwater present in the former tank farm area. The evaluation closely adheres to methodology, assumptions, and approach outlined in the previously USEPA-approved RFI risk assessment. This document parallels the previously approved RFI risk assessment by incorporating:

1) an evaluation of soil media in the tank farm area,
2) the same exposure parameters for the industrial worker receptor,
3) the same statistical methodology for developing exposure point concentrations (EPCs), and
4) the same regulatory framework identified by the USEPA for preparation of a risk assessment.

This document differs from the previously approved RFI risk assessment by incorporating:

1) Region IX Industrial PRGs as screening criteria for soil constituents of interest (COIs) instead of Region V Residential Data Quality Levels to accurately define COIs for the industrial site,
2) an evaluation of groundwater in the tank farm area,
3) a quantitative evaluation of the potential future utility/construction worker receptor,
4) a qualitative evaluation of the future off-site residential receptor via fate and transport modeling,
5) a quantitative evaluation of the potential, future indoor worker via volatilization of subsurface soil and groundwater contaminants into indoor air (for slab-on-grade building construction).

2.0 *Identification of Constituents of Interest*

This risk evaluation assesses soil and groundwater data collected at SWMUs within the Tank Farm Area. A preliminary risk screening was completed to identify constituents of interest (COIs) for these areas as the initial step toward completing a risk evaluation for the Site. Appendix A, Identification of COIs, presents the COIs for the soil, soil-to-groundwater, and groundwater pathways. A sample list used in the evaluation of soil and groundwater is also presented in Appendix A. The following were used as screening criteria to identify COIs.

2.1 Soil Screening Criteria

USEPA Region IX Preliminary Remediation Goals. USEPA Region IX developed Preliminary Remediation Goals (PRGs) for soil that are conservative risk-based values for industrial exposure scenarios that provide an adequate level of protection to industrial receptors (USEPA Region IX, November 2000). These values incorporate incidental ingestion, dermal contact, and inhalation exposure pathways. The site use is expected to remain industrial, therefore, constituent concentrations were compared to industrial PRGs. Constituents that were not detected or were detected with maximum concentrations that were below PRGs were eliminated as COIs. Only those constituents detected above their respective PRGs were considered further in the quantitative risk assessment.

USEPA Soil Screening Levels (SSLs) for soil-to-groundwater pathway. The potential for constituents in soil to migrate to groundwater was also evaluated. USEPA developed conservative Soil Screening Levels (SSLs) for this potential migration pathway. The USEPA derived the SSLs using a simple linear partitioning equation to which a dilution attenuation factor (DAF; USEPA, 1996) was applied. USEPA (1996) provides soil-to-groundwater SSLs based on dilution attenuation factors of 20 and 1. The DAF of 20 may be applied for small source areas (<1/2 acre), whereas the DAF of 1 is recommended for large Sites (>30 acres). The DAF of 1 was applied to evaluation of soil data from the Tank Farm Area because its size exceeds 1/2 acre. However, because the Tank Farm Area is much smaller than 30 acres this is a very conservative approach. Constituents with maximum detections that were below SSLs were eliminated as COIs and were not further considered in the quantitative risk assessment. These constituents are present at the Site at acceptable concentrations and will not leach from soil to groundwater at unacceptable concentrations. They do not pose unacceptable risks to human health. Therefore, only those

constituents above their respective SSLs were considered further in the quantitative screening process.

Site-specific Soil Screening Levels (SSLs) for soil-to-groundwater pathway. Constituent concentrations that exceeded published SSLs were further screened against Site-specific SSLs. Site-specific SSLs accurately define soil concentrations that may potentially cause risk (as a result of leaching to groundwater) by considering both site-specific physical and chemical properties. Site-specific SSLs were calculated for 1,1,2,2-tetrachloroethane, benzene, ethylbenzene, styrene, tetrachloroethene, toluene, and xylene. A Site-specific dilution attenuation factor (DAF) was calculated and incorporated into the SSL calculation. Further explanation, including equations and input values for both the DAF and SSL calculations are provided in Appendix B.

Degradation Products. Both tetrachloroethene (PCE) and trichloroethene (TCE) have been detected in soil samples collected from the site; PCE in 11 of 91 samples, and TCE in 1 of 63 samples (see Appendix A, Table 1). Both PCE and TCE will naturally degrade to 1,2-dichloroethene and vinyl chloride. PCE and TCE are not raw materials used at the site, and they are not typically used by the paint and resin manufacturing industry. Further, there are no records indicating that PCE or TCE were stored in the tank farm area. Data provided in the Soil and Groundwater Assessment Report (Warzyn, 1992) shows that vinyl chloride has been analyzed for in soil, but has not been detected at the site, nor has 1,2-DCE (total), another daughter product of the anaerobic decomposition of PCE and TCE. Figure 1 is a map showing the soil boring locations in the Tank Farm Area. Figure 2 shows sample locations and the corresponding detected concentrations of PCE, TCE, 1,2-DCE, and vinyl chloride in soil.

In the most recent groundwater sampling event, both TCE and cis-1,2-dichloroethene were detected at a low concentrations (0.34 ug/L and 0.87 ug/L, respectively) in monitoring well TF-3. Neither PCE nor vinyl chloride was detected in groundwater. A summary of the results of groundwater samples collected in May 2002 are provided in Appendix C.

Based on this information, the concentrations of these constituents in site media appear to be below levels of concern discussed above for potential receptors at the site. Vinyl chloride and 1,2-dichloroethene will not be assessed as a COI in this evaluation since these constituents were tested for in soil but neither was detected. Recent groundwater sampling has shown that these constituents are not present in groundwater at the site. TCE will not be assessed in this evaluation as a COI because it was detected in only one out of 63 soil samples at a concentration below the Region 9 industrial PRG. TCE has been detected in groundwater at concentrations

below the Region 9 tapwater PRG. PCE was not selected as a COI in soil because detected concentrations did not exceed the Region 9 industrial soil PRG. The maximum concentration of PCE in soil exceeds the Region 9 Soil Screening Level; however, recent groundwater data demonstrates that PCE concentrations in are below the Region 9 tapwater PRG.

2.2 Groundwater Screening Criteria

Groundwater screening criteria were utilized to determine whether a constituent should be considered for further evaluation in the RE. The lower of either the USEPA Region IX tap water PRGs or the Wisconsin DNR Enforcement Standards (ES) are the screening criteria for this assessment.

USEPA Region IX Preliminary Remediation Goals. USEPA Region IX has developed Preliminary Remediation Goals (PRGs) for tap water that are conservative risk-based values for residential exposure scenarios; these values incorporate incidental ingestion, dermal contact, and inhalation exposure pathways. Since site use is expected to remain industrial, the tap water PRGs provide an adequate level of protection for the receptor population at the site.

Wisconsin DNR Enforcement Standard and Preventative Action Limit

Groundwater analytical results were also screened against Wisconsin Department of Natural Resources Public Health Groundwater Quality Standards. For purposes of screening, the Enforcement Standard (ES) was selected. Constituents with maximum detected concentrations below the ES were eliminated as COIs and were not further considered in the risk evaluation. Those constituents below their respective criteria are present at the site at acceptable concentrations that are considered protective of groundwater. Therefore, only those constituents above their respective screening criteria were considered further in the quantitative risk assessment.

2.3 Data Evaluation

The analytical data used in the risk assessment as well as a table that provides a list of the samples utilized in the RE is provided in Appendix D. Data evaluation of soil and groundwater are provided below.

Soil

For the evaluation of soil, generally post-remedial soil sample data was supplemented with pre-remedial data in an effort to compile a database with sufficient samples to yield a valid statistical evaluation for the site EPCs. We believe this represents a conservative worst-case scenario since the site has undergone remediation that has lowered the concentrations of constituents in both soil and groundwater at the site. Laboratory analytical data from surface soil and boring samples as summarized in the following reports were utilized in this risk evaluation:

- RFI Report, (ICF Kaiser, 1997): this report includes data provided in (Warzyn, 1992), and analytical data from one soil sample (PPG-HA10-01) collected during the RFI Investigation in 1996. As stated in the RFI (ICF Kaiser, 1997), soil from samples GS-43 through GS-54, B-12 and B-13 were excavated and removed from site in 1996; therefore, these samples were not included in the risk evaluation.

- Corrective Measures Study, June 2000: includes laboratory data from 10 soil samples (5 locations – 2 depths at each location)

- Corrective Measures Study, January 2001: includes laboratory data from 18 soil samples (9 locations - 2 depths at each location). All available soil data were used in the preliminary risk screening to determine COIs and in risk calculations to determine subsequent risks.

The soil data was further segregated by depth zone as follows:

- **Surface soil (0 to 2) feet.** Surface soil is utilized to assess exposure to constituents in soil for the industrial/maintenance worker. A total of 46 soil samples were classified as surface soil, based on the depth being from 0 to 2 feet.

- **Soil (0 to 6) feet.** Soil 0 to 6 feet in depth is utilized to assess exposure to constituents in soil for the construction/utility worker. A total of 61 soil samples were identified in this zone.

- **Soil (0 to 12) feet.** Soil 0 to 12 feet in depth is utilized to assess the potential for leaching and subsequent migration to groundwater of constituents in soil. A total of 80 soil samples were identified in this zone.

Appendix D Table 3 provides a list of the soil samples and their respective depths. Soil sample locations are provided on Figure 1.

Groundwater

Laboratory analytical data were utilized from ten geoprobe groundwater samples (SB-6 through SB-14) collected in January 2001. Additionally, groundwater samples were collected in May 2002 from 7 monitoring wells (LW-2, LW-5, LW-6, TF-1, TF-3, MW-11, and MW-12). It should be noted that not all existing monitoring wells were sampled, since the intent of the May 2002 groundwater sampling event was to assess groundwater quality at the facility boundary as well as below the tank farm.

Analytical data from these monitoring wells, along with the January 2001 groundwater data form a representative groundwater data set. Groundwater analytical results from prior to January 2001 were excluded, as they were collected prior to remediation efforts (UST closure and SVE) and are not representative of current site conditions. These groundwater data were used in the preliminary risk screening to determine COIs and in risk calculations to determine subsequent risks.

2.4 Risk Screening Results

Ethylbenzene, toluene, and xylenes were detected in soil at concentrations above the risk-based PRGs and are therefore identified as COIs for evaluation in the quantitative risk evaluation.

For the evaluation of the soil-to-groundwater pathway, 1,1,2,2-tetrachloroethane, acetone, benzene, ethylbenzene, methylene chloride, styrene, tetrachloroethene (PCE), toluene, and xylene were detected at concentrations above the USEPA Region IX SSLs. These constituents were further screened against the site-specific SSL criteria (Appendix A Table 1). All constituents also exceeded the site-specific SSLs and were therefore identified as COIs for the soil-to-groundwater pathway in the risk evaluation. These COIs are discussed qualitatively in Section 4.2.

For the evaluation of VOCs in groundwater to indoor air, benzene, ethylbenzene, xylenes, 1,2,4-trimethylbenzene, 2-butanone (MEK), 4-methyl-2-pentanone (MIBK), acetone, and naphthalene were detected at concentrations above the screening criteria (the lower of the Region IX tap water PRG or the WDNR ES) and were identified as COIs in groundwater for the quantitative risk evaluation (Appendix A Table 2).

3.0 Exposure Assessment

Exposure assessment characterizes potential exposure scenarios and identifies potential exposure pathways. For potential exposure pathways, constituent concentrations in all relevant media are estimated, and the extent of receptors' constituent intake and absorption are quantitatively evaluated.

General Assumptions. PPG is planning to institute a restrictive covenant on the deed for the potentially impacted portion of the property within the fence line that will 1) prohibit the use of the groundwater in the underlying aquifer as a potable water source and 2) restrict future land use to an industrial/commercial use scenario. With the deed restrictions in place, utilizing industrial PRGs for screening will provide the necessary level of protection for the potential receptors at the site. Figure 3 demonstrates the industrial nature of the site and the surrounding properties and also shows the footprint of the area of the site included by the deed restrictions.

There is little potential for off-site groundwater use in the vicinity of the site given the availability of municipal water, the local hydrogeology and the current land use and zoning restrictions. Nonetheless, exposure of off-site receptors to COIs in groundwater will be addressed qualitatively.

Utilizing industrial PRG's for this evaluation provides a sufficient level of protection for the trespassing youth due to the limited exposure. The exposure duration and frequency for a trespassing youth are expected to be significantly less than that of a construction worker. This is especially true for an active facility such as the Oak Creek site where access is controlled and restricted. Accordingly, the trespassing youth exposure scenario is not considered a critical pathway and evaluation in the RE is unwarranted. Direct contact with constituents in soil is evaluated through the on-site utility worker/construction worker.

3.1 Potential Pathways and Receptors

An exposure pathway describes the course that a constituent takes from its original source to a human receptor. Each exposure pathway includes the following elements: (1) a source or constituent release from a source (e.g., spill, leaking tank), (2) an exposure medium (e.g., soil, air), (3) a point of potential contact for the receptor population with the exposure medium (e.g., an on-site worker exposed to surface soil), and (4) an exposure route at the contact point (e.g.,

incidental ingestion, dermal contact). An exposure pathway is considered complete when all of these elements are present. Only complete exposure pathways were evaluated quantitatively in this risk evaluation.

The former tank farm area is considered a potential source at the site. Soil is considered a potential exposure medium. Both current and future potential receptor populations have been identified for exposure to soil. Currently and in the future, an industrial/research worker may be exposed to surface soil (0 to 2 feet) via incidental ingestion, inhalation, and dermal contact. The utility/construction worker may be exposed to surface and subsurface soil (0 to 6 feet) in the future via incidental ingestion, inhalation, and dermal contact. Lastly, in the future, an indoor worker may potentially be exposed to contaminants in soil (0 to 12 feet) via inhalation of volatiles migrating from the subsurface into indoor air. The aforementioned future receptors are identified in the exposure assessment, however their consideration in this risk evaluation is highly conservative. PPG currently has no intentions for development of the tank farm area and future receptors in the area of the tank farm are improbable.

Groundwater is considered a potential exposure medium because a future on-site indoor worker or utility/construction worker could potentially be exposed to constituents in groundwater. Currently, there is no groundwater usage at the site. Since the site is industrial, there is little potential for future groundwater usage. However, an on-site indoor worker could potentially be exposed to volatile organic constituents in groundwater through volatilization and subsequent migration through soil and into breathing air enclosed in a structure. The construction worker is assumed to be exposed through dermal exposure to constituents in groundwater during utility excavation work. This is a very conservative assumption given the depth to groundwater at the site (5.5 feet). Lastly, a future residential receptor may potentially be exposed to groundwater migrating off-site to residential homes via inhalation and dermal contact; however, surrounding parcels at the site east of the property line are owned by the Milwaukee Metropolitan Sewage District as shown in Figure 3. Therefore, the only plausible off-site receptors at the site are industrial/commercial in nature.

A conceptual site exposure model (CSEM) provides an analysis of the potentially complete exposure pathways at the site including sources of COIs, routes of migration of COIs, and the receptors at the site. The CSEM clarifies which pathways are quantitatively and qualitatively assessed, and a brief explanation why a pathway has been eliminated from further consideration in the RE. The CSEM is provided in Figure 4.

3.2 Quantification of Exposure Point Concentrations (EPCs)

EPCs were calculated for each of the potential receptors identified for each exposure media.

In soil, EPCs were calculated for 1) the current and future industrial/maintenance worker, 2) the future construction/utility, and 3) the future indoor worker. Soil data from 0 to 2 feet in depth were used for the current and future industrial/maintenance worker evaluation. Soil data from 0 to 6 feet in depth were used for the potential future construction/utility worker. Soil data from 0 to 12 feet were utilized for potential future indoor air worker evaluation. The USEPA recommends that the 95% UCL of the mean concentration be used as the EPC for COIs. This statistic was calculated for the COIs, ethylbenzene, toluene, and xylenes in soil. None of the COIs fit a normal or lognormal parametric distribution; the nonparametric EPCs for ethylbenzene, toluene, and xylene in surface soil (0 to 2 feet) were 0.026 mg/kg, 0.01 mg/kg, and 0.21 mg/kg, respectively. The non parametric EPCs for ethylbenzene, toluene, and xylene in soil from 0 to 6 feet were 0.02 mg/kg, 0.006 mg/kg, and 0.26 mg/kg, respectively. The non parametric EPCs for ethylbenzene, toluene, and xylene in soil from 0 to 12 feet were 0.0269 mg/kg, 0.0096 mg/kg, and 0.503 mg/kg respectively. Methodology and results of this approach are outlined in Appendix E. Summaries of the statistics and EPC selection for soil are provided below.

Summary of Surface Soil (0 to 2) Statistics and EPC Selection

COI	Distribution Type	95% UCL (ug/kg)	EPC (ug/kg)	EPC Basis
Ethylbenzene	Undefined	26	26	95% UCL
Toluene	Undefined	10	10	95% UCL
Xylenes (total)	Undefined	210	210	95% UCL

Summary of Soil (0 to 6) Statistics and EPC Selection

COI	Distribution Type	95% UCL (ug/kg)	EPC (ug/kg)	EPC Basis
Ethylbenzene	Undefined	20	20	95% UCL
Toluene	Undefined	6	6	95% UCL
Xylenes (total)	Undefined	260	260	95% UCL

Summary of Soil (0 to 12) Statistics and EPC Selection

COI	Distribution Type	95% UCL (ug/kg)	EPC (ug/kg)	EPC Basis
Ethylbenzene	Undefined	26.9	26.9	95% UCL
Toluene	Undefined	9.6	9.6	95% UCL
Xylenes (total)	Undefined	503	503	95% UCL

In groundwater, EPCs were calculated for the future construction/utility worker and the future on-site indoor worker utilizing groundwater analytical results from January 2001 and May 2002. The EPCs resulting from this for the COI in groundwater are as follows:

Summary of Groundwater Statistics and EPC Selection

COI	Distribution Type	95% UCL (ug/L)	EPC (ug/L)	EPC Basis
Benzene	Lognormal	22	22	95% UCL
Ethylbenzene	Lognormal	490,000	6,400	Maximum
Xylenes (total)	Lognormal	202,000	4,630	Maximum
1,2,4-Trimethylbenzene	Undefined	19	19	Maximum
2-Butanone (MEK)	Undefined	9,800	9,800	Maximum
4-Methyl-2-pentanone (MIBK)	Undefined	22,000	22,000	Maximum
Acetone	Undefined	1,100	1,100	Maximum
Naphthalene	Undefined	47	47	Maximum

3.3 Fate and Transport Modeling

Future building construction has not been forecasted for the tank farm, however, vapor intrusion from both soil and groundwater are conservatively assessed in the Risk Evaluation in the event that construction was to occur. The Johnson and Ettinger Model, endorsed by the USEPA (www.epa.gov/superfund/programs/risk/airmodel /johnson_ettinger.htm), was used to determine potential risks due to vapor intrusion into buildings from both soil and groundwater. If building construction were to occur at the Site in the future, construction would limited to be slab-on-grade due to subsurface conditions. However, to avoid potential institutional controls and land use restrictions, both slab-on-grade and basement scenarios were addressed to ensure acceptable risks to human health regardless of construction type. For more information pertaining to this model, refer to the aforementioned website.

Vaporization of contaminants into indoor air from direct uses of groundwater was not assessed in this Risk Evaluation. As stated in the RFI Report (ICF Kaiser, 1997), "groundwater directly below the Site (Tank Farm area) is generally contained in a zone above clay till that would not yield sufficient water to support any type of direct use. Additionally, process water, cleaning water and drinking water currently being used on-Site is supplied by municipal sources and it is unlikely that this will change in the future." Off-site water use is also currently supplied by municipal sources.

Evaluation of the groundwater fate and transport model requires an understanding of the underdrain system, which was installed as part of the original underground storage tank farm. The underdrain system, which collects groundwater from all areas of the tank farm, consists of a network of 6-inch diameter perforated and non-perforated tile pipes, located on the north and south ends of each former UST foundation pad at the depth of the former pads. The underdrain piping discharges at a depth of about 16 feet below ground surface into a 4 foot by 6 foot by 21 foot deep concrete sump. The contents of the sump are pumped to the plant's wastewater treatment area. The pump operates on automatic level control and maintains a constant water level at a depth sufficient to cause a groundwater gradient inward towards the Tank Farm Area. Based on groundwater data collected from the Tank Farm and the surrounding area, the underdrain system has effectively controlled migration of groundwater from the Tank Farm Area to the native soils.

A groundwater fate and transport evaluation was completed utilizing the Domenico Model (ASTM, 1995) based on conclusions provided in the RFI report. The RFI report conducted a qualitative assessment of the groundwater flow direction in the event that the tank farm underdrain system was inoperable (see Section 8.3.2 of the RFI). The RFI concluded that if the underdrain system was inoperable, the direction of groundwater flow in the tank farm area would be eastward toward the ditch near the eastern boundary of the Site. Using this assumption, the Domenico Model was run to estimate groundwater concentrations of benzene and ethylbenzene at the property boundary. Inputs for the model are provided in Appendix F. Figure 5 outlines the locations of wells used in the modeling effort and groundwater flow direction.

Benzene and ethylbenzene concentrations in groundwater were modeled from the point of their maximum concentration locations, based on the groundwater samples collected in January 2001. The maximum benzene location was at Geoprobe location SB-13 (approximately 300 feet west of the eastern property boundary) and, the maximum ethylbenzene location was at Geoprobe point SB-14 (approximately 340 feet west of the eastern property boundary). The Domenico

model estimated that concentrations of benzene and ethylbenzene would be 0.0095 mg/l and 0.033 mg/l, respectively at the eastern property boundary. Groundwater data collected during the RFI determined that neither benzene nor ethylbenzene were detected at monitoring well MW-11, which is near the centerline of the model. This suggests that the model may overestimate the actual concentrations of benzene and ethylbenzene at the Site.

3.4 Exposure Assumptions

The sections below discuss the exposure assumptions utilized in this risk evaluation. When possible, receptor specific exposure assumptions were kept consistent with those presented in the risk assessment conducted in the RFI Report (ICF Kaiser, 1997). Specifically for exposed skin area, industrial/maintenance workers and construction/utility workers are assumed to wear appropriate clothing during outdoor activities that may involve soil contact. For these types of workers, skin surface area available for dermal contact with soil is assumed to be the typical case clothing scenario for outdoor activities as described by USEPA dermal guidance (1992c). Exposed skin areas are the head and hands, for a total of 2,000 cm^2. Appendices G and H provide the exposure parameters used for each receptor, as well as the spreadsheet calculations of the risks and hazards for each receptor.

Current and Future Industrial/Maintenance Worker and Future Construction/Utility Worker

To evaluate the exposure to soil COIs for the current and future industrial/maintenance worker (soil 0 to 2 feet) and the future construction/utility worker (soil 0 to 6 feet), 95% UCL COI concentrations were utilized to determine human health risks and hazards. For the on-Site industrial/maintenance worker, the ingestion rate is assumed to be 50 milligrams per day. The skin surface area is assumed to be 2000 cm^2. Other exposure assumptions are body weight, 70 kilograms; exposure frequency, 250 days per year; exposure duration, 25 years; averaging time for carcinogenic effects, 25550 days; and averaging time for non-carcinogenic effects, 9125 days. For the on-Site construction/utility worker, the ingestion rate is assumed to be 480 milligrams per day. The skin surface area is assumed to be 2000 cm^2. Other exposure assumptions are body weight, 70 kilograms; exposure frequency, 250 days per year; exposure duration, 1 year; averaging time for carcinogenic effects, 25,550 days; and averaging time for non-carcinogenic effects, 365 days.

The future construction/utility worker is also assumed to be exposed to constituents in groundwater through dermal contact with groundwater during excavation. For this evaluation, the skin surface area is assumed to be 2000 cm^2. Other exposure assumptions are body weight, 70 kilograms; exposure time, 4 hours per day; exposure frequency, 250 days per year; exposure duration, 1 year; averaging time for carcinogenic effects, 25,550 days; and averaging time for non-carcinogenic effects, 365 days.

Inhalation of VOCs is addressed qualitatively for both the industrial/maintenance worker and the construction/utility worker. Inhalation of VOCs migrating from soil beneath a potential building into indoor air were estimated for a hypothetical indoor worker (refer to results in Section 4.1). Since estimated risks and hazards are acceptable for the indoor worker, it is assumed that the risks and hazards associated with the inhalation of ambient air will be much lower than those for the indoor air scenario. Therefore, resulting risks and hazards for both the industrial/maintenance worker and the construction/utility worker will also be acceptable, since vapors will not accumulate in ambient air.

Future On-Site Indoor Worker

The only potential exposure to constituents in soil for a hypothetical future indoor worker is through inhalation of vapor-phase constituents that may migrate from soil (0 to 12 feet) beneath a building into the enclosed breathing air. For the future on-site indoor worker, body weight was assumed to be 70 kilograms; exposure frequency, 250 days per year; exposure duration, 25 years; averaging time for carcinogenic effects, 25,550 days; and averaging time for non-carcinogenic effects, 9,125 days.

Appendix G identifies the exposure parameters used for each receptor. The following table provides a summary of the exposure assumptions utilized in the evaluation.

Summary of Receptor Exposure Assumptions

Exposure Parameter	Industrial Worker	Construction Worker	Indoor Worker
Receptor Specific Parameters			
Body weight (BW)	70 kg	70 kg	70 kg
Exposure Frequency (EF)	250 days/year	250 days/year	250 days/year
Exposure Duration (ED)	25 years	1 year	25 years
Averaging Time (AT) (carcinogenic effects)	25,550 days	25,550 days	25,550 days
Averaging Time (AT) (noncarcinogenic effects)	9,125 days	365 days	9,125 days
Ingestion Rate – soil (IR)	50 mg/day	480 mg/day	NA
Inhalation Rate – Indoor Air	NA	NA	20 cubic meters/day
Exposure Time (ET)– (dermal contact with groundwater)	NA	4 hours/day	NA
Skin Surface Area (soil and groundwater)	NA	2,000 cm^2	NA

4.0 Risk Characterization

As stated by USEPA, risk characterization is the final step of the risk evaluation process. Toxicity and exposure assessment are summarized and integrated into quantitative and qualitative expressions of risk. A summary of the exposure assumptions and the receptor risk and hazard calculations are provided in Appendix G.

4.1 Risk and Hazard Results

The 95% UCL EPCs were utilized to estimate potential risks and hazards for each complete exposure pathway for soil and groundwater. The incremental cancer risks (CR) and hazard quotients (HQ) are calculated for each COI and then summed for the current and future industrial worker receptor, the future construction worker receptor, and the future indoor worker receptor at the Tank Farm Area. Summation of the hazard quotients yields a hazard index (HI).

Current and Future Industrial/Maintenance Worker

Cancer risks and noncancer hazards were calculated for both incidental ingestion of surface soil (0 to 2 feet) and dermal contact with surface soil. The estimated non-carcinogenic HI for both the current and future industrial/maintenance worker is 0.0000002. Cancer risks for the industrial/maintenance worker are acceptable as all detected carcinogenic constituent concentrations were below the screening criteria as shown in Appendix A. Risks and hazards from the vapor-phase organic constituents in both soil and groundwater that migrate through the soil and into outdoor ambient air are not expected to pose a significant risk to the industrial/maintenance worker, since risks and hazards are within acceptable ranges for the indoor worker for these pathways. Risks and hazards are summarized below.

Summary of Cancer Risks and Noncarcinogenic Hazards for the Industrial Worker

COI / Pathway	Cancer Risk	Noncarcinogenic Hazard Quotient
Ingestion of Soil		
Ethylbenzene	NA	0.00000013
Toluene	NA	0.000000025
Xylenes	NA	0.000000051
Dermal Contact with Soil		
Ethylbenzene	NA	0.000000011
Toluene	NA	0.0000000021
Xylenes	NA	0.0000000043
Total Risks and Hazards:	**NA**	**0.0000002**

Future Construction/Utility Worker

Cancer risks and noncancer hazards were calculated for incidental ingestion of soil (0 to 6 feet) and dermal contact with soil and groundwater. The estimated non-carcinogenic HI for the future construction/utility worker is 0.000001. Cancer risks for the construction/utility worker are acceptable as all detected carcinogenic constituent concentrations were below the screening criteria as shown in Appendix A. Similar to the industrial/maintenance worker, risks and hazards from the vapor-phase organic constituents in both subsurface soil and groundwater that migrate through the soil and into outdoor ambient air are not expected to pose a significant risk to the industrial/maintenance worker, since risks and hazards are within acceptable ranges for the indoor worker for these pathways. Risks and hazards are summarized below.

Summary of Cancer Risks and Noncarcinogenic Hazards for the Construction/Utility Worker

COI / Pathway	Cancer Risk	Noncarcinogenic Hazard Quotient
Ingestion of Soil		
Ethylbenzene	NA	0.00000094
Toluene	NA	0.00000014
Xylenes	NA	0.00000061
Dermal Contact with Soil		
Ethylbenzene	NA	0.0000000082
Toluene	NA	0.0000000012
Xylenes	NA	0.0000000053
Dermal Conatact with Groundwater		
Benzene	**2.0 E-08**	**0.0086**
Ethylbenzene	**NA**	**0.24**
Xylenes	**NA**	**0.0096**
1,2,4-Trimethylbenzene	**NA**	**0.0018**
2-Butanone (MEK)	**NA**	**0.0012**
4-Methyl-2-pentanone (MIBK)	**NA**	**0.058**
Acetone	**NA**	**0.00045**
Naphthalene	**NA**	**0.0087**
Total Risks and Hazards:	**2 E-08**	**0.3**

Future Indoor Worker

Cancer risks and noncancer hazards were evaluated for the future on-site indoor worker by estimating the risks and hazards associated with vapor-phase migration of constituents in soil (0 to 12 feet) and groundwater through the soil column and into indoor air. This scenario is potentially possible if a hypothetical building was constructed above the footprint of the tank farm and utilized as either office space or for a laboratory. As discussed in Section 3.3, the Johnson and Ettinger Model was utilized for this assessment. The estimated non-carcinogenic HI associated with vapor intrusion into indoor air from constituents in soil for the future indoor worker is 0.00045. Cancer

risks for the indoor worker are acceptable as all detected carcinogenic constituent concentrations were below the soil screening criteria as shown in Appendix A. The estimated cancer risk from vapor intrusion of constituents in groundwater for the indoor worker is 7.0×10^{-8}. The estimated non-carcinogenic HI associated with vapor intrusion into indoor air from constituents in groundwater is 0.10. Total receptor risks and hazards are obtained by summing the risks and hazards from soil and groundwater. The total cancer risk for the indoor worker is 6.5×10^{-8}, significantly below USEPA's acceptable ranges of 10^{-6} to 10^{-4}; the total hazard index is 0.10, which is below USEPA's target hazard of 1.0 (USEPA, 1989). Risks and hazards are summarized below.

Summary of Cancer Risks and Noncarcinogenic Hazards for the Indoor Worker

COI / Pathway	Cancer Risk	Noncarcinogenic Hazard Quotient
Migration of VOCs in Soil to Indoor Air followed by Inhalation		
Ethylbenzene	NA	0.00011
Toluene	NA	0.00015
Xylenes	NA	0.00019
Migration of VOCs in Groundwater to Indoor Air followed by Inhalation		
Ethylbenzene	NA	0.076
Toluene	NA	NA
Xylenes	NA	0.00054
Acetone	NA	0.000032
Benzene	6.5 E-08	NA
2-Butanone (MEK)	NA	0.00027
Naphthalene	NA	0.00094
1,2,4-Trimetylbenzene	NA	0.002
4-Methyl-2-pentanone (MIBK)	NA	0.018
Total Risks and Hazards:	**7 E-08**	**0.1**

4.2 Soil to Groundwater Pathway

The constituents 1,1,2,2-tetrachloroethane, acetone, benzene, ethylbenzene, methylene chloride, styrene, tetrachloroethene (PCE), toluene, and xylene were detected at concentrations above both the Region IX SSL concentrations and the site-specific SSLs, and were, therefore, identified as COIs for the soil-to-groundwater pathway. Although these constituents were identified as potential COIs in the leaching to groundwater pathway, acetone, benzene, ethylbenzene, and xylenes (total)

were further evaluated quantitatively as COIs in groundwater. Toluene was detected in recent groundwater samples below the screening criteria. The remaining constituents, 1,1,2,2-tetrachloroethane, methylene chloride, styrene, and PCE were not detected in the recent groundwater sampling. Since the site has been active for approximately 30 years, and both soil and groundwater have undergone remediation, it is expected that the recent groundwater data reflect the current constituent concentrations in groundwater; and therefore, no additional groundwater risks should occur as a result of soil constituents leaching to groundwater.

Groundwater Migration

The off-Site residential receptor is evaluated qualitatively via the Domineco fate and transport model. The Domenico model estimated that concentrations of benzene and ethylbenzene would be 9.5 ug/l and 33 ug/l, respectively at the eastern property boundary (the direction of groundwater flow). For benzene this concentration is above the USEPA Region IX tap water PRG; however, the concentration for ethylbenzene is well below its PRG of 1,300 ug/l. It should be noted that the surrounding land use is also industrial and the tap water RBCs are protective of potable groundwater use which does not occur at the site. Current and historical groundwater data have consistently demonstrated that groundwater from monitoring wells at the property boundary (most notably MW-11) have not been impacted from site activities. Based on this information, the Domenico model overestimates the concentration of groundwater at the property boundary, and there is no evidence in the groundwater data that indicates constituents in on-site groundwater are migrating off-site.

4.3 Uncertainty Analysis

Uncertainties are inherent in every aspect of a quantitative risk assessment. These affect the level of confidence that can be placed in the final results. Because of this uncertainty, the assumptions tend to be health-protective and conservative in nature. The following sections enumerate some of the uncertainties with the greatest potential impact on the results of the risk calculations.

Conservatism of Exposure Scenario Assumptions. Although the industrial worker is assumed to be present at the Site for eight hours per day, 250 days per year, their actual work activities may vary throughout the day, and the actual contact with soil may be considerably less. The receptor would not be performing work outdoors during the winter months and dermal contact would be less since more clothing is worn during the cooler months. Therefore, potential exposures and, essentially, calculated risks for all scenarios are conservative because actual

exposure time is likely to be less than the eight hours in an eight-hour work day and/or for fewer days than estimated in the exposure scenario.

Assumptions of Fate and Transport Model. As stated in section 3.3, groundwater flow direction in the no-underdrain scenario was qualitatively evaluated for use in the Domenico model. Since this evaluation is qualitative only and since the underdrain system is currently operable, the groundwater flow direction cannot be measured. This may increase uncertainty of the model because it is based on a qualitative analysis of the no-underdrain scenario. However, site data indicates that groundwater constituent migration off-site is not occurring based on current and historical analytical data for monitoring well MW-11 and other eastern perimeter monitoring wells.

Dermal Exposure Pathways. Each of the exposure scenarios incorporates the exposed hands into the total exposed skin-surface area. It is unlikely that this will be the case during every exposure situation. The worker may wear long sleeves or gloves when the weather is cooler or wet, thus decreasing the percentage of dermal absorption.

Dose-Response Assessment – Potential Carcinogenic Effects. Uncertainties are introduced in animal-to-human extrapolation and high-to-low dose extrapolation. Mathematical models are used to estimate the possible responses associated with exposure to chemicals at levels far below those tested in animals. Humans are typically exposed to environmental chemicals at levels orders of magnitude lower than the lowest dose tested in animals. Such doses may be readily degraded by physiological mechanisms in humans.

Data Quality. Utilizing historical soil analytical data from previous investigations in addition to current data at the site introduces a level of uncertainty in the risk assessment because data from these older investigations were collected over a period of several years for varying reasons. As extensive remediation at the site has produced lower levels of COIs in site media, utilizing the historical analytical data is expected to provide an overestimation of current and future health risks and hazards at the site.

Elevated Detection Limits. Elevated detection limits above the respective PRGs are noted in both the soil and groundwater data sets for some COIs. For soil, TCE, benzo(a)pyrene, and benzo(b)fluoranthene had data sets that were associated with elevated detection limits. TCE had a frequency of detection of 1 out of 63 samples, and both benzo(a)pyrene, and benzo(b)fluoranthene were analyzed in one sample and not detected (Appendix A, Table 1).

These constituents are either detected at a very low frequency or are not detected at all in site media. TCE has been detected in recent groundwater data at very low concentrations (0.28 – 0.34 ug/l) which are below the Region IX PRG for direct contact. Since the site has been operational for approximately 30 years, current data indicates that TCE is not leaching to groundwater at concentrations that pose unacceptable risks to the receptors at the site. By not including these constituents in the quantitative risk evaluation, there is a potential to slightly underestimate risks to receptors. However, this underestimation of risks and hazards is not expected to significantly alter conclusions recommended by this assessment.

In groundwater, detection limits are greater than the PRGs for five volatiles, 1,1,2,2-tetrachloroethane; chloroform; methylene chloride; trans-1,4-dichloro-2-butene; and vinyl chloride, as noted in Appendix A, Table 2. The occurrence of PRGs greater than detection limits in the data set creates some uncertainty because of the potential for these constituents to be present at a concentration above the screening criteria (i.e., PRGs). The screening criteria employed for groundwater utilize the tap water PRGs which assume direct contact with and ingestion of groundwater. Receptors at the site are not exposed via direct contact with or ingestion of groundwater. Not including these constituents in the risk assessment potentially underestimates risks and hazards to receptors at the site; however, this underestimation of risks and hazards is not expected to significantly alter conclusions recommended by this assessment, as estimated risks and hazards were considerably below risk and hazard thresholds.

5.0 Conclusions

Both soil and groundwater were evaluated for the former Tank Farm Area of the PPG Oak Creek facility.

For exposure to constituents in soil, the current and future industrial/maintenance worker, the future construction/utility worker, and the future on-site worker were defined and associated risks were calculated. Both the industrial/maintenance worker and the construction/utility worker receptors scenarios were evaluated for incidental ingestion and dermal contact with soil, while the on-site indoor worker was evaluated for inhalation of volatile constituents in indoor air resulting from both COIs in soil and groundwater. Additionally, the construction/utility worker was evaluated for dermal exposure to COIs in groundwater. Recognizing that the on-site indoor worker had the maximum exposure for volatile inhalation exposure, the evaluation of inhalation exposure for the industrial/maintenance worker and the construction/utility worker was limited to a qualitative assessment. The 95% UCL COI concentrations were utilized to estimate risks and hazards. Adverse carcinogenic and non-carcinogenic health effects from soil for the current and future industrial/maintenance worker and the construction/utility worker do not currently occur and are estimated to not occur in the future. Risks and hazards for the future indoor worker were acceptable for this receptor. The following table summarizes the results of the risk and hazard calculations for all receptors.

Summary of Total Calculated Risks and Hazards by Receptor

Receptor	Total Cancer Risks	Total Hazard Index
Industrial Worker *(exposed to surface soil at 50 mg/day)*	NA – Risks Acceptable as carcinogenic COIs screened out	0.0000002
Construction Worker *(exposed to soil 0-6 feet in depth at 480 mg/day and dermal contact with groundwater)*	2 E-08	0.3
Indoor Worker *(exposed via inhalation to COIs in soil and groundwater)*	7 E-08	0.1

For the evaluation of the soil-to-groundwater pathway, 1,1,2,2-tetrachloroethane, acetone, benzene, ethylbenzene, methylene chloride, styrene, tetrachloroethene (PCE), toluene, and xylene were detected at concentrations above the USEPA Region IX SSLs and the site-specific SSL criteria. Although these COIs were identified as potentially leaching to groundwater at

unacceptable levels, they were either not detected in recent groundwater samples or they were selected as COIs in groundwater and further evaluated in the RE.

For groundwater, COI concentrations were modeled from the point of their maximum concentration locations to the property boundary (point-of-compliance). For benzene, it was estimated that modeled concentrations would reach the property boundary at levels above the USEPA Region IX tap water PRG. However, current and historical groundwater data for the monitoring wells along the eastern property boundary show that constituents in groundwater are not migrating off-site. Additionally, risks to a potential future on-site indoor worker as a result of volatile COIs in soil and groundwater volatilizing into indoor air were evaluated and are within acceptable ranges.

In summary, there are no adverse risks or hazards to any current on-site or future on- or off-site receptors at the site.

6.0 References

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OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Pittsburgh, PA	D. Evans 2/9/03	B. Stanhope 3/27/03		826003-B3

LEGEND:

△ POST-REMEDIATION GEOPROBE SOIL SAMPLING LOCATIONS

• PRE-REMEDIATION SOIL SAMPLING LOCATIONS

N

B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B1

SB-7 SB-6 SB-1 SB-14 SB-13 SB-3 SB-2 SB-8 SB-4 SB-11 SB-12 SB-5 SB-9 SB-10

GS-38 GS-39 GS-40 GS-37 GS-36 GS-35 GS-34 GS-7 GS-4 GS-3 GS-2 GS-1 GS-41 GS-17 GS-16 GS-15 GS-14 GS-13 GS-12 GS-11 GS-10 GS-9 GS-8 GS-30 GS-31 GS-32 GS-33 GS-29 GS-28 GS-27 GS-26 GS-25 GS-24 GS-23 GS-22 GS-21 GS-20 GS-19 GS-18

SCALE

0 50 100 FEET

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PPG INDUSTRIES, INC.
OAK CREEK, WISCONSIN

FIGURE 1
SOIL BORING LOCATIONS
UTILIZED IN THE RISK EVALUATION
TANK FARM AREA REMEDIATION
OAK CREEK, WISCONSIN

File: O:\Project\82_ \826003B3.dwg
XREF Files: IMAGE_ ;ies;
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Plotted By: SMITH_A

SB-1	(0.0'–4.0')	(4.0'–8.0')
PCE	3.5	ND (90)
TCE	NA	NA
1,2 DCE	NA	NA
Vinyl Chloride	NA	NA

SB-6	(0.0'–4.0')	(4.0'–8.0')
PCE	8.2	ND (450)
TCE	NA	NA
1,2 DCE	NA	NA
Vinyl Chloride	NA	NA

SB-7	(0.0'–4.0')	(4.0'–8.0')
PCE	64	200
TCE	NA	NA
1,2 DCE	NA	NA
Vinyl Chloride	NA	NA

GS-15	
PCE	2 J
TCE	2 J
1,2 DCE	ND (6)
Vinyl Chloride	ND (11)

B2	(1.0'–3.0')	(13.5'–15.5')	(21.0'–23.0')	(33.0'–35.0')
PCE	2 J	ND (790)	ND (6)	ND (6)
TCE	ND (5)	ND (790)	ND (6)	ND (6)
1,2 DCE	ND (5)	ND (790)	ND (6)	ND (6)
Vinyl Chloride	ND (10)	ND (1500)	ND (11)	ND (11)

B3 (ND)
SB-7 △
SB-6 △ SB-1
GS-38 (ND) GS-39 (ND) GS-40 (ND)
GS-37 (ND) GS-36 (ND) GS-35 (ND) GS-34 (ND)
B10 (ND)
SB-8 △ (ND)
△ SB-2 (ND)
GS-41 (ND)
B5 (ND)
GS-31 (ND) GS-32 (ND) GS-33 (ND)
GS-30 (ND)
GS-29 (ND) GS-28 (ND) GS-27 (ND) GS-26 (ND)
SB-9 △ (ND)
B4 (ND)

B2
SB-14 △(ND)
SB-13 △ (ND)
SB-3 △ (ND)
GS-4 (ND) GS-2 (ND) B8 (ND)
GS-7 (ND)
GS-3 (ND) GS-1 (ND)
GS-13 (ND) GS-12 (ND) GS-10 (ND)
GS-17 (ND) GS-16 (ND) GS-15 (ND) GS-14 (ND) GS-11 (ND) GS-9 (ND) GS-8 (ND)
B6 (ND)
SB-4 △ (ND)
SB-11 (ND)
SB-12 (ND)
B7 (ND)
B9 (ND)
B11 (ND)
GS-21 (ND)
GS-25 (ND) GS-24 (ND) GS-23 GS-22 (ND) GS-20 (ND) GS-19 (ND) GS-18 (ND)
△ SB-5
SB-10 △
B1 (ND)

GS-12	
PCE	20 J
TCE	ND (27)
1,2 DCE	ND (27)
Vinyl Chloride	ND (54)

GS-23	
PCE	15 J
TCE	ND (27)
1,2 DCE	ND (27)
Vinyl Chloride	ND (53)

SB-5	(0.0'–4.0')	(8.0'–12.0')
PCE	ND (0.9)	0.9
TCE	NA	NA
1,2 DCE	NA	NA
Vinyl Chloride	NA	NA

LEGEND:

- △ POST–REMEDIATION GEOPROBE SOIL SAMPLING LOCATIONS
- • PRE–REMEDIATION SOIL SAMPLING LOCATIONS
- PCE TETRACHLOROETHENE
- TCE TRICHLOROETHENE
- 1,2 DCE 1,2 DICHLOROETHENE
- NA NOT ANALYZED
- ND NOT DETECTED

NOTES:

1. ALL CONCENTRATIONS IN ug/kg.
2. (ND) INDICATES THAT ALL CONSTITUENTS WERE NOT DETECTED AT THE SOIL BORING LOCATION. FOR THE "SB" LOCATIONS, ONLY PCE WAS ANALYZED FOR; ALL OTHER CONSTITUENTS WERE NOT ANALYZED.

N

SCALE
0 50 100 FEET

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OAK CREEK, WISCONSIN

FIGURE 2
DISTRIBUTION OF PCE, TCE, 1,2–DCE, AND VINYL CHLORIDE IN SOIL
TANK FARM AREA REMEDIATION
OAK CREEK, WISCONSIN

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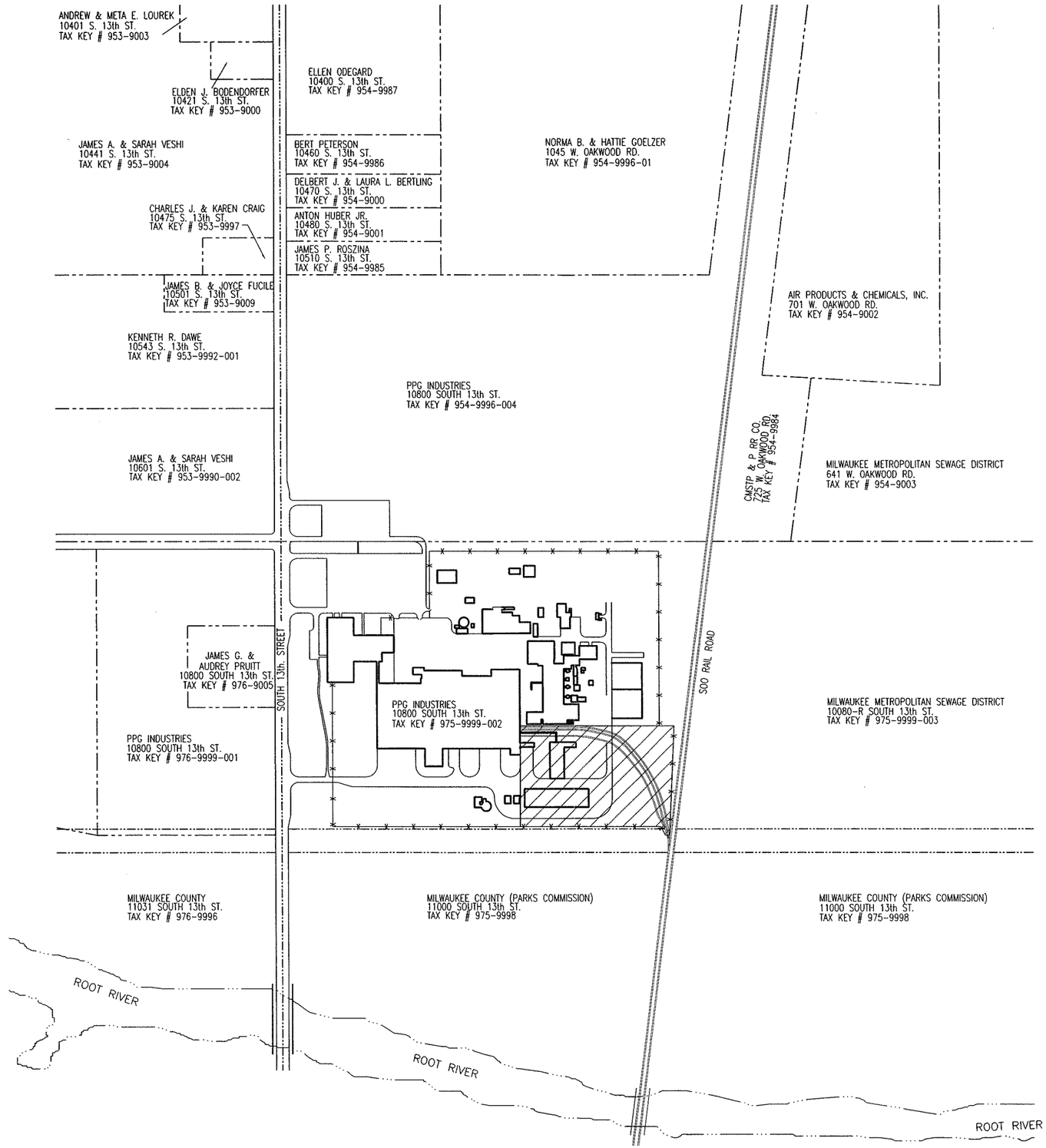
Plotted By: SMITH_A



LEGEND:

- FENCE
- PROPERTY BOUNDARY
- AREA OF DEED RESTRICTION

NOTES:

1. BASE MAP DEVELOPED FROM 1992 CITY OF OAK CREEK OFFICIAL PLAT MAPS.
2. PROPERTY OWNERSHIP RECORDS OBTAINED FROM THE 1992 CITY OF OAK CREEK PROPERTY OWNERSHIP LISTING.

REFERENCE:

DRAWING FROM PPG INDUSTRIES DRAWING NO. 22001M002
DATED: 4/19/02

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Pittsburgh, PA	D. Evans 2/15/03	B. Stanhope 3/27/03		826003-B4

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Plotted By: SMITH_A

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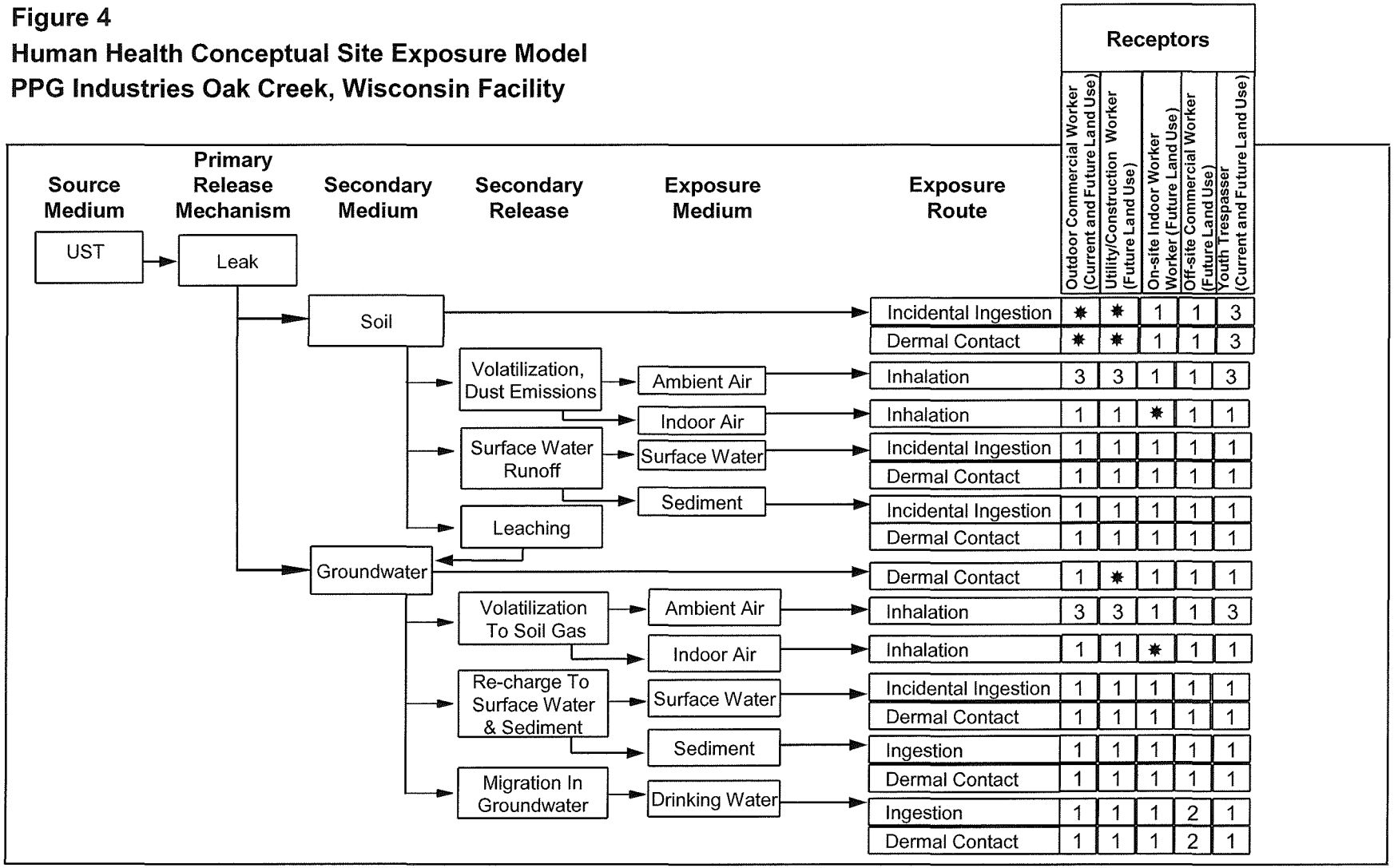
PPG INDUSTRIES, INC.
OAK CREEK, WISCONSIN

FIGURE 3
SURROUNDING PROPERTY OWNERS

TANK FARM AREA REMEDIATION
OAK CREEK, WISCONSIN

Figure 4
Human Health Conceptual Site Exposure Model
PPG Industries Oak Creek, Wisconsin Facility



* = Complete exposure pathway quantitatively evaluated.
1 = Incomplete exposure pathway.
2 = Potentially complete exposure pathway eliminated from further evaluation because scenario is highly improbable.
3 = Potentially complete exposure pathway addressed qualitatively.

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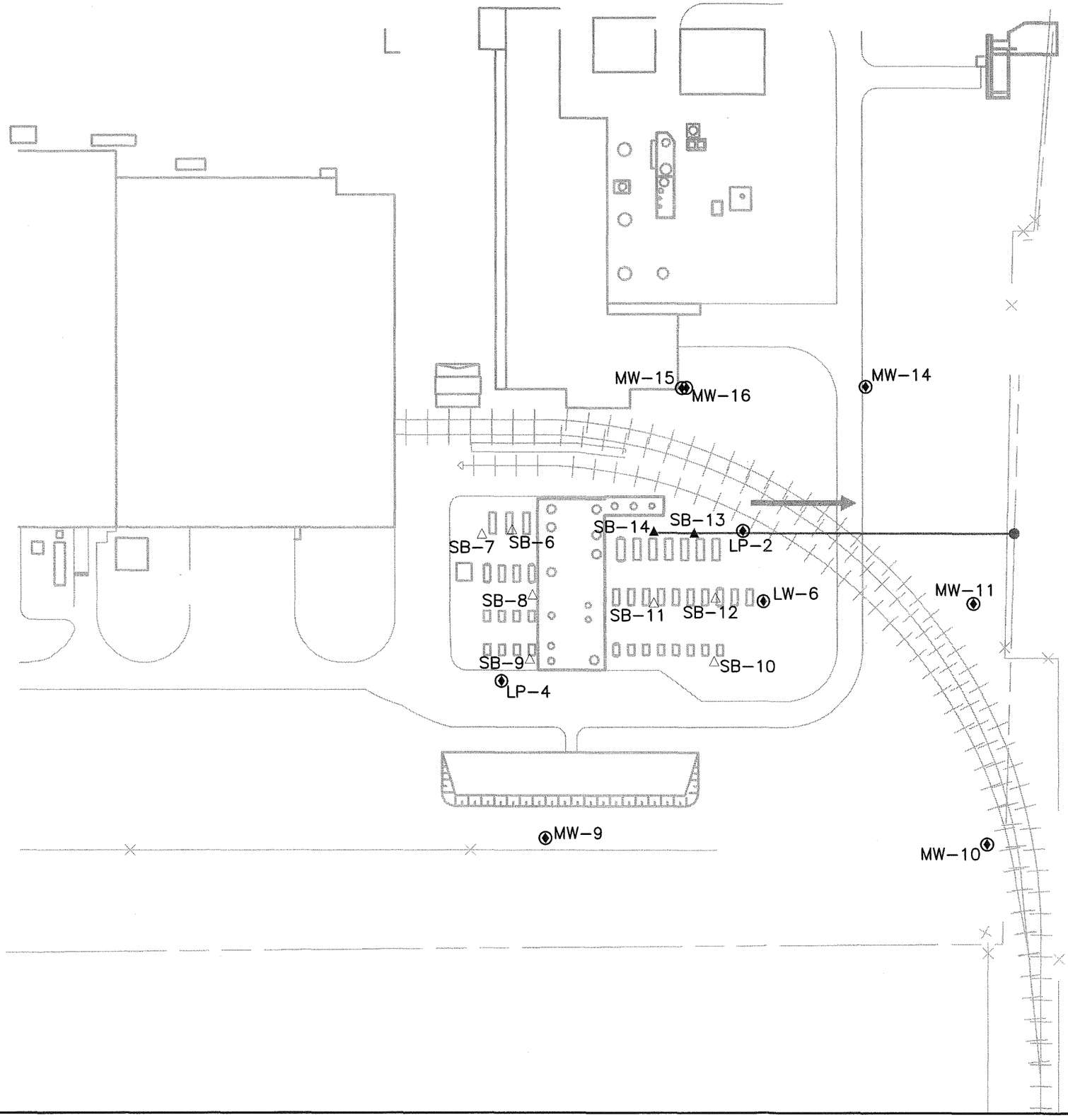
Pittsburgh, PA	D. Evans 2/10/03	B. Stanhope 3/27/03		826003-B1



LEGEND:

- △ GEOPROBE GROUNDWATER SAMPLING LOCATIONS JANUARY 2001
- ⧫ RFI GROUNDWATER SAMPLING LOCATIONS
- INFERRED DIRECTION OF GROUNDWATER FLOW BASED ON RFI REPORT
- CENTERLINE FOR DOMENICO MODEL

SCALE
0 100 200 FEET

Shaw™
Shaw E & I

PPG INDUSTRIES, INC.
OAK CREEK, WISCONSIN

FIGURE 5
GROUNDWATER MAP

TANK FARM AREA REMEDIATION
OAK CREEK, WISCONSIN

File: O:\Project\82(\826003B1.dwg
XREF Files: IMAGE ...es:
Plot Date/Time: Mar 27, 2003 - 11:26am
Plotted By: SMITH_A

APPENDIX A
IDENTIFICATION OF CONSTITUENTS OF INTEREST

Appen Table 1
Identification of Soil and Soil-to-Groundwater COIs
PPG Oak Creek

PARAMETER	Frequency of Detection	Range of Detects	Range of Detection Limits	Region IX PRG	Max Detect Exceed PRG? Yes or No	Federal SSLs 1 DAF	Max Detect Exceed Fed SSL? Yes/No	Site-specific SSLs (Target [GW] =PRG/ES)	Max Detect Exceeds Site-specific SSL? Yes/No
VOLATILES (mg/kg)									
1,1,2,2-Tetrachloroethane	6/91	0.0009 - 0.011	0.0007 - 91	0.9	No	0.0002	**Yes**	0.0013	**Yes**
2-Butanone (MEK)	14/91	0.004 - 9.8	0.0052 - 100	28,000	No	---	NA	---	NA
2-Hexanone	2/63	0.13 - 0.18	0.0052 - 140	---	No	---	NA	---	NA
4-Methyl-2-pentanone (MIBK)	16/91	0.001 J - 390	0.0052 - 52	2,900	No	---	NA	---	NA
Acetone	2/12	18 J - 100	0.1 - 33	6,200	No	0.8	**Yes**	---	NA
Benzene	9/91	0.0006 - 0.01	0.004 - 47	1.5	No	0.002	**Yes**	0.0036	**Yes**
Chlorobenzene	4/63	0.001 J - 0.014	0.005 - 47	540	No	0.07	No	---	NA
Chloroform	1/63	0.001 J - 0.001 J	0.005 - 47	0.5	No	0.03	No	---	NA
Crotonaldehyde	0/62	NA	0.1 - 910	---	NA	---	NA	---	NA
Ethylbenzene	41/91	0.0004 - 810	0.004 - 13	230	**Yes**	0.7	**Yes**	14	**Yes**
Ethylmethacrylate	1/62	0.008 J - 0.008 J	0.01 - 91	140	No	---	NA	---	NA
Methylene chloride	9/32	0.0007 - 0.038	0.004 - 5.2	21	No	0.001	**Yes**	---	NA
Styrene	7/91	0.001 J - 52	0.004 - 47	1,700	No	0.2	**Yes**	6.4	**Yes**
Tetrachloroethene	11/91	0.0009 - 0.2	0.0007 - 47	19	No	0.003	**Yes**	0.09	**Yes**
Toluene	36/91	0.0009 - 630	0.004 - 13	520	**Yes**	0.6	**Yes**	15	**Yes**
Trans-1,4-Dichloro-2-Butene	1/62	0.009 J - 0.009 J	0.016 - 140	0.02	No	---	NA	---	NA
Trichloroethene	1/63	0.002 J - 0.002 J	0.005 - 47	6.1	No	0.003	No	---	NA
Trichlorofluoromethane	1/63	0.001 J - 0.001 J	0.005 - 47	2,000	No	---	NA	---	NA
Xylenes (total)	51/89	0.002 - 2100	0.004 - 4.4	210	**Yes**	9	**Yes**	36	**Yes**
SEMIVOLATILES (mg/kg)									
2-Methylnaphthalene	0/1	NA	0.34 - 0.34	---	---	---	---	---	---
Benzo(a)pyrene	0/1	NA	0.34 - 0.34	0.29	---	0.4	---	---	---
Benzo(b)fluoranthene	0/1	NA	0.34 - 0.34	29	---	0.2	---	---	---
Benzo(k)fluoranthene	0/1	NA	0.34 - 0.34	29	---	2	---	---	---
Butyl benzyl phthalate	0/1	NA	0.34 - 0.34	100,000	---	810	---	---	---
Chrysene	0/1	NA	0.34 - 0.34	290	---	8	---	---	---
Di-n-butyl phthalate	0/1	NA	0.34 - 0.34	88,000	---	270	---	---	---
Fluoranthene	0/1	NA	0.34 - 0.34	30,000	---	210	---	---	---
Indeno(1,2,3-cd)pyrene	0/1	NA	0.34 - 0.34	29	---	0.7	---	---	---
Naphthalene	0/1	NA	0.34 - 0.34	190	---	4	---	---	---
Pyrene	0/1	NA	0.34 - 0.34	54,000	---	210	---	---	---
bis(2-Ethylhexyl) phthalate	1/1	0.14 J - 0.14 J	NA	180	No	180	No	---	---
METALS (mg/kg)									
Aluminum	1/1	2430 - 2430	NA	100,000	No	---	NA	---	---
Arsenic	1/1	2.1 - 2.1	NA	2.7	No	1,000	No	---	---
Barium	1/1	12.6 - 12.6	NA	100,000	No	82,000	No	---	---
Cadmium	1/1	0.12 J - 0.12 J	NA	810	No	400	No	---	---
Calcium	1/1	113000 - 113000	NA	---	NA	---	NA	---	---
Chromium	1/1	4.9 - 4.9	NA	450	No	2,000	No	---	---
Iron	1/1	8230 - 8230	NA	---	NA	---	NA	---	---
Lead	1/1	5.2 J - 5.2 J	NA	750	No	400	No	---	---
Magnesium	1/1	66800 - 66800	NA	---	NA	---	NA	---	---
Mercury	1/1	0.012 J - 0.012 J	NA	610	No	---	NA	---	---
Nickel	1/1	7.1 J - 7.1 J	NA	41,000	No	7,000	No	---	---

U - Not detected.
J - Estimated.
B - Blank contamination.
NA - Not Applicable
--- -No published or calculated value available
DAF = Dilution Attenuation Factor
(Target [GW] =ES) - WDNR Enforcement Std used as Target leachate value in SSL calculation.
Note: Bold print indicates that the constituent exceeds either the PRG or the SSL vlaues or both.
Sources: Region IX Industrial PRGs (EPA RIX, 2000)
EPA SSLs (EPA, Soil Screening Guidance 1996)

Appendix . .. Table 2
Identification of Groundwater COIs
PPG Oak Creek

PARAMETER (ug/l)	Screening Criteria		January 2001		May 2002		Selected as COI Yes or No	Rationale
	U.S. EPA Region IX Tapwater PRG	WDNR Enforcement Standard	Range of Detects	Range of Detection Limits	Range of Detects	Range of Detection Limits		
1,1,2,2-Tetrachloroethane	0.055	0.2	ND	0.5 - 0.5	ND	0.5 - 0.5	No	Max DL > both screening criteria
1,2,4-Trimethylbenzene	12	70	NA	NA	2.4 J - 19	5 - 5	Yes	MDC > PRG
1,3,5-Trimethylbenzene	12	--	NA	NA	1.9 J - 2.4 J	5 - 5	No	--
2-Butanone (MEK)	1,900	460	ND	100 - 100	8,500 J - 11,000	100 - 100	Yes	MDC > both screening criteria
2-Hexanone	1,500[a]	--	NA	NA	5.7 J - 5.7 J	10 - 10	No	--
4-Methyl-2-pentanone (MIBK)	160	500	ND	10 - 10	4.2 J - 24,000	10 - 10	Yes	MDC > both screening criteria
Acetone	610	1,000	NA	NA	32 J - 1,300 J	100 - 100	Yes	MDC > PRG
Benzene	0.35	5	13 - 47	5 - 5	0.47 - 2	0.4 - 0.4	Yes	MDC > both screening criteria
Chlorobenzene	110	100	NA	NA	ND	5 - 5	No	--
Chloroform	0.16	6	NA	NA	ND	0.3 - 0.3	No	Max DL > PRG
cis-1,2-Dichloroethene	61	70	NA	NA	0.85 J - 0.87 J	5 - 5	No	--
Ethylbenzene	1,300	700	11 J - 6,400	5 - 5	0.44 J - 190 J	5 - 5	Yes	MDC > both screening criteria
Ethylmethacrylate	550	--	NA	NA	ND	5 - 5	No	--
Methylene chloride	4.3	5	ND	5 - 5	ND	1 - 1	No	Max DL > PRG
Naphthalene	6.2	40	NA	NA	2.7 - 49	1 - 1	Yes	MDC > both screening criteria
Styrene	1,600	100	ND	5 - 5	ND	5 - 5	No	--
Tetrachloroethene	1.1	5	ND	0.5 - 0.5	ND	1 - 1	No	--
trans-1,4-Dichloro-2-butene	0.0012	--	NA	NA	ND	5 - 5	No	Max DL > PRG
trans-1,2-Dichloroethene	120	100	NA	NA	ND	5 - 5	No	--
Trichloroethene	1.6	5	NA	NA	0.28 J - 0.34 J	1 - 1	No	--
Trichlorofluoromethane	1,300	--	NA	NA	ND	10 - 10	No	--
Toluene	720	1,000	6 - 79	5 - 5	280 J - 280 J	5 - 5	No	--
Vinyl chloride	0.041	0.2	NA	NA	ND	0.5 - 0.5	No	Max DL > both screening criteria
Xylenes (total)	1,400	10,000	34 - 4,630	5 - 5	0.74 J - 1,300	5 - 5	Yes	MDC > PRG

[a] Not listed on Region IX PRG Table. Value is from Region III RBC Table

ND - Analyzed for but not detected.
J - Estimated concentration.
NA - Not analyzed.
MDC = Maximum Detected Concentration
Max DL = Maximum Detection Limit

Sources: (1) USEPA Region IX PRG Table. (2) WDNR Enforcement Standard NR 140.

APPENDIX B
DAF AND SSL CALCULATIONS

Appen . Table 1
Calculation of Dilution Attenuation Factor (DAF)
PPG Oak Creek

Dilution Attenuation Factor Calculation (As per Equation 37, pg 44 of SSL Guidance)

$$DAF = 1 + \left(\frac{Kid}{IL} \right)$$

where:

K	= aquifer hydraulic conductivity (m/yr)	=	3.2	m/day	= 1168 m/yr	= site-specific estimate (information presented in section 8.3.2 of RFI report)
i	= hydraulic gradient (m/m)	=	0.05	m/m		= site-specific (based on historic groundwater elevation data)
d	=mixing zone depth (m)	=	9.93	m		= calculated based on equation 45, pg 45 SSL Guidance 1996
I	= infiltration rate (m/yr)	=	0.18	m/yr		= default SSL Guidance 1996
L	= source length parallel to groundwater flow	=	91.4	m		= site-specific (SB-13 eastward to property boundary)
DAF	= dilution attenuation factor	=	36.3			= calculated based on equation 37, pg 44 SSL Guidance 1996

and

$$d = \left(0.0112L^2\right)^{0.5} + d_a \left\{1 - \exp\left[\frac{(-LI)}{Kid_a}\right]\right\}$$

where d	=mixing zone depth (m)	=	9.93			= calculated based on equation 45, pg 45 SSL Guidance 1996
L	= source length parallel to groundwater flow	=	91.4	m		= site-specific (SB-13 eastward to property boundary)
d_a	= aquifer depth (m)	=	1.7	m		= site-specific estimate (5.5 feet, minimum average depth to gw/thickness of vadose zone)
I	= infiltration rate (m/yr)	=	0.18	m/yr		= default SSL Guidance 1996
K	= aquifer hydraulic conductivity (m/yr)	=	3.2	m/day	= 1168 m/yr	= site-specific estimate (information presented in section 8.3.2 of RFI report)
i	= hydraulic gradient (m/m)	=	0.05	m/m		= site-specific (based on historic groundwater elevation data)

Apper. , Table 2
Calculation of Soil Screening Levels (SSLs)
PPG Oak Creek

SSL Partitioning Equation for Migration to Groundwater (Organics) using WDNR ES as Target Leachate

$$C_t = C_w \left[\left(k_{oc} \times f_{oc} \right) + \frac{\theta_w + \theta_a H^1}{\rho_b} \right]$$

Dilution Attenuation Factor (DAF) = 36.3 (see DAF spdsht)

The DAF-Adjusted C_w, not the C_w, is used in the SSL Partitioning Equation.

Parameters			Default	Benzene	Ethylbenzene	Toluene	Xylene	1,1,2,2-TCA	Styrene	PCE
C_t	=	target clean-up level in soil (mg/kg)	--	calculated	calculated	calculated	calculated	calculated	calculated	calculated
C_w	=	soil leachate concentration (mg/L)= EPA Region 9 PRG or WDNR ES	--	0.00035	0.7	0.72	1.4	0.000055	0.1	0.0011
DAF-Adjusted C_w	=	concentration adjusted for dilution (mg/L)	--	0.012705	25.41	26.136	50.82	0.0019965	3.63	0.03993
k_{oc}	=	soil organic carbon/water partition coefficient (L/kg)	chem-specific	31	165	182	240	221	776	991
f_{oc}	=	fraction organic carbon in soil	0.002	default	default	default	default	default	default	default
$Theta_w$	=	water-filled soil porosity	0.3	default	default	default	default	default	default	default
$Theta_a$	=	air-filled soil porosity	0.134	default	default	default	default	default	default	default
H^1	=	dimensionless Henry's Law Constant	chem-specific	2.28E-01	3.23E-01	2.72E-01	2.17E-01	1.41E-02	1.13E-01	7.54E-01
p_b	=	dry soil bulk density (kg/L)	1.5	default	default	default	default	default	default	default

$C_{t\,(benzene)}$	=	3.6E-03 mg/kg or	3.59E+00 ug/kg
$C_{t\,(ethylbenzene)}$	=	1.4E+01 mg/kg or	1.42E+04 ug/kg
$C_{t\,(toluene)}$	=	1.5E+01 mg/kg or	1.54E+04 ug/kg
$C_{t\,(xylene)}$	=	3.6E+01 mg/kg or	3.55E+04 ug/kg
$C_{t\,(1,1,2,2\text{-}TCA)}$	=	1.3E-03 mg/kg or	1.28E+00 ug/kg
$C_{t\,(Styrene)}$	=	6.4E+00 mg/kg or	6.40E+03 ug/kg
$C_{t\,(PCE)}$	=	9.0E-02 mg/kg or	8.98E+01 ug/kg

References:

H^1, K_{oc} = Region 3 SSL Background input Document

f_{oc}, $Theta_w$, $Theta_a$, p_b = Soil Screening Guidance, Equation 10 (EPA, 1996)

C_w = Wisconsin DNR Chapter 140 Groundwater Quality, Table 1

SSL Partitioning Equation for Migration to Groundwater (Organics) using WDNR PAL as Target Leachate

PAL =Wisconsin Preventative Action Limit

Parameters			Default	Benzene	Ethylbenzene	Toluene	Xylene	1,1,2,2-TCA	Styrene	PCE
C_t	=	target clean-up level in soil (mg/kg)	--	calculated	calculated	calculated	calculated	calculated	calculated	calculated
C_w	=	soil leachate concentration (mg/L)= EPA Region 9 PRG or WDNR PAL	--	0.00035	0.14	0.2	1	0.00002	0.01	0.0005
DAF-Adjusted C_w	=	concentration adjusted for dilution (mg/L)	--	0.012705	5.082	7.26	36.3	0.000726	0.363	0.01815
k_{oc}	=	soil organic carbon/water partition coefficient (L/kg)	chem-specific	31	165	182	240	221	776	991
f_{oc}	=	fraction organic carbon in soil	0.002	default	default	default	default	default	default	default
$Theta_w$	=	water-filled soil porosity	0.3	default	default	default	default	default	default	default
$Theta_a$	=	air-filled soil porosity	0.134	default	default	default	default	default	default	default
H^1	=	dimensionless Henry's Law Constant	chem-specific	2.28E-01	3.23E-01	2.72E-01	2.17E-01	1.41E-02	1.13E-01	7.54E-01
p_b	=	dry soil bulk density (kg/L)	1.5	default	default	default	default	default	default	default

$C_{t\,(benzene)}$	=	3.6E-03 mg/kg or	3.59E+00 ug/kg
$C_{t\,(ethylbenzene)}$	=	2.8E+00 mg/kg or	2.84E+03 ug/kg
$C_{t\,(toluene)}$	=	4.3E+00 mg/kg or	4.27E+03 ug/kg
$C_{t\,(xylene)}$	=	2.5E+01 mg/kg or	2.54E+04 ug/kg
$C_{t\,(1,1,2,2\text{-}TCA)}$	=	4.7E-04 mg/kg or	4.67E-01 ug/kg
$C_{t\,(Styrene)}$	=	6.4E-01 mg/kg or	6.40E+02 ug/kg
$C_{t\,(PCE)}$	=	4.1E-02 mg/kg or	4.08E+01 ug/kg

References:

H^1, K_{oc} = Region 3 SSL Background input Document

f_{oc}, $Theta_w$, $Theta_a$, p_b = Soil Screening Guidance, Equation 10 (EPA, 1996)

C_w = Wisconsin DNR Chapter 140 Groundwater Quality, Table 1

APPENDIX C
MARCH 2002 GROUNDWATER SAMPLING EVENT RESULTS

TABLES

Appendix . Table 1
Analytical Results for Groundwater
PPG Oak Creek, Wisconsin
May 2002

Constituent (ug/L)	LW-2	LW-6	LW-5	TF-1	TF-1 DUP	TF-3	TF-3 DUP	MW-11	MW-12
Acetone	ND 100	ND 100	32 J	58 J	54 J	950 J	1300 J	ND 100	ND 100
Benzene	ND 0.4	ND 0.4	0.48	0.5	0.47	2	1.9	ND 0.4	ND 0.4
2-Butanone	ND 100	ND 100	ND 100	ND 100	ND 100	8500 J	11000	ND 100	ND 100
Chlorobenzene	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5
Chloroform	ND 0.3	ND 0.3	ND 0.3	ND 0.3	ND 0.3	ND 0.3	ND 0.3	ND 0.3	ND 0.3
cis-1,2-Dichloroethene	ND 5	ND 5	ND 5	ND 5	ND 5	0.85 J	0.87 J	ND 5	ND 5
trans-1,2-Dichloroethene	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5
Ethylbenzene	ND 5	0.44 J	160	0.82 J	0.9 J	190 J	150 J	ND 5	ND 5
Ethyl Methacrylate	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5
2-Hexanone	ND 10	ND 10	ND 10	ND 10	ND 10	5.7 J	ND 10	ND 10	ND 10
4-Methyl-2-pentanone	ND 10	ND 10	ND 10	4.7 J	4.2 J	19000	24000	ND 10	ND 10
Methylene chloride	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1
Naphthalene	ND 1	ND 1	3	2.7	2.7	49	45	ND 1	ND 1
Styrene	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5
1,1,2,2-Tetrachloroethane	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5
Tetrachloroethene	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1	ND 1
Toluene	ND 5	ND 5	ND 5	ND 5	ND 5	280 J	280 J	ND 5	ND 5
Trans-1,4-Dichloro-2-Butene	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5	ND 5
Trichloroethene	ND 1	ND 1	ND 1	ND 1	ND 1	0.28 J	0.34 J	ND 1	ND 1
Trichlorofluoromethane	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10	ND 10
1,2,4-Trimethylbenzene	ND 5	ND 5	7.9	2.5 J	2.4 J	19	18	ND 5	ND 5
1,3,5-Trimethylbenzene	ND 5	ND 5	ND 5	ND 5	ND 5	2.4 J	1.9 J	ND 5	ND 5
Vinyl chloride	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 0.5
Xylenes (total)	ND 5	0.74 J	180	1.2 J	1.1 J	1300	1300	ND 5	ND 5

Bold - Indicates detected constituents.

Appendix C: Table 2
Calculated Groundwater Elevations
PPG Oak Creek, Wisconsin
May 23, 2002

WELL_ID	SAMPLE DATE	GROUND ELEVATION	DEPTH TO WATER	GROUNDWATER ELEVATION	WELL DEPTH1	WELL DEPTH2	BOTTOM ELEV1	BOTTOM ELEV2	Comments
LP-1	5/23/02	**696.83**	NM	NC	NR	NM	NC	NC	DESTROYED
LP-2	5/23/02	**99.26**	14.60	84.66	**34.78**	33.67	64.48	65.59	
LP-3	5/23/02	**695.84**	12.83	683.01	NR	34.43	NC	661.41	
LP-4	5/23/02	NR	NM	NC	NM	NM	NC	NC	DESTROYED
LW-1	5/23/02	**696.79**	NM	NC	NM	NM	NC	NC	DESTROYED
LW-2	5/23/02	**697.34**	12.55	684.79	**18.40**	18.48	678.94	678.86	
LW-3	5/23/02	**695.76**	12.96	682.80	NR	14.74	NC	681.02	
LW-4	5/23/02	**696.00**	NM	NC	NR	NM	NC	NC	DESTROYED
LW-5	5/23/02	**99.93**	15.27	NC	**18.10**	17.97	NC	NC	
LW-6	5/23/02	NR	14.23	NC	NR	25.16	NC	NC	
MW-10	5/23/02	693.20	9.63	683.57	25.20	27.68	668.00	665.52	
MW-11	5/23/02	689.20	6.89	682.31	15.30	17.49	673.90	671.71	
MW-12	5/23/02	685.60	6.37	679.23	15.50	17.36	670.10	668.24	
MW-13	5/23/02	683.80	NM	NC	15.30	NM	668.50	NC	
MW-14	5/23/02	694.30	7.00	687.30	15.40	14.53	678.90	679.77	
MW-15	5/23/02	696.30	12.96	683.34	35.10	37.12	661.20	659.18	
MW-16	5/23/02	696.30	7.62	688.68	15.20	17.64	681.10	678.66	
MW-9	5/23/02	695.40	NM	NM	15.10	NM	680.30	NC	DESTROYED
TF-1	5/23/02	**100.83**	15.76	85.07	**18.76**	20.25	82.07	80.58	
TF-3	5/23/02	**101.20**	18.13	83.07	**21.20**	21.08	80.00	80.12	
TW-1	5/23/02	695.80	NR	NC	18.50	NR	677.30	NC	
TW-2	5/23/02	695.10	NR	NC	23.00	NR	672.10	NC	ABANDONED
TW-3	5/23/02	696.00	NR	NC	18.00	NR	678.00	NC	ABANDONED
TW-4	5/23/02	695.50	NR	NC	18.00	NR	677.50	NC	ABANDONED
TW-5	5/23/02	704.60	NR	NC	20.00	NR	684.60	NC	
TW-6	5/23/02	709.70	NR	NC	23.00	NR	686.70	NC	
TW-7	5/23/02	699.60	NR	NC	18.00	NR	681.60	NC	
TW-8	5/23/02	694.40	NR	NC	12.50	NR	681.90	NC	ABANDONED

Key
Bold values are calcualted from TW-3 relative elevation from 1992 Warzyn report and elevation from quarterly groundwater reports (3Q88 through 2Q92).
NM = Not measured.
NR = Not recorded/data not found.
NC = Not calculated.
Bold and underlined values are taken from field notes and use an arbitrary benchmark of 100 feet.

FIGURES

OFFICE	Pittsburgh, PA	
DRAWN BY	--	
CHECKED BY		
APPROVED BY		
DRAWING NUMBER	826003-B8	

LW-2	
ACETONE	ND(100)
BENZENE	ND(0.4)
2-BUTANONE (MEK)	ND(100)
CIS-1,1-DICHLOROETHENE	ND(5)
ETHYLBENZENE	ND(5)
2-HEXANONE	ND(10)
4-METHYL-2-PENTANONE (MIBK)	ND(10)
NAPHTHALENE	ND(1)
TOLUENE	ND(5)
TRICHLOROETHENE (TCE)	ND(1)
1,2,4-TRIMETHYLBENZENE	ND(5)
1,3,5-TRIMETHYLBENZENE	ND(5)
XYLENES	ND(5)

MW-12	
ACETONE	ND(100)
BENZENE	ND(0.4)
2-BUTANONE (MEK)	ND(100)
CIS-1,1-DICHLOROETHENE	ND(5)
ETHYLBENZENE	ND(5)
2-HEXANONE	ND(10)
4-METHYL-2-PENTANONE (MIBK)	ND(10)
NAPHTHALENE	ND(1)
TOLUENE	ND(5)
TRICHLOROETHENE (TCE)	ND(1)
1,2,4-TRIMETHYLBENZENE	ND(5)
1,3,5-TRIMETHYLBENZENE	ND(5)
XYLENES	ND(5)

LEGEND:

◈	MONITORING WELL LOCATIONS
ND(100)	NOT DETECTED AT THE DETECTION LIMIT PROVIDED IN PARENTHESES
J	ESTIMATED CONCENTRATION

NOTE:

ALL RESULTS REPORTED IN µg/L.

MW-15 (NOT SAMPLED)

MW-16 (NOT SAMPLED)

MW-12

MW-14 (NOT SAMPLED/ WELL OBSTRUCTED)

LP-3 (NOT SAMPLED)

LW-3 (NOT SAMPLED)

LW-2

TF-3

TF-2 (NOT SAMPLED)

LP-2 (NOT SAMPLED)

LW-5

LW-6

MW-11

TF-4 (NOT SAMPLED)

TF-1

LW-1 (DESTROYED)

LP-1 (DESTROYED)

LW-4 (DESTROYED)

LP-4 (DESTROYED)

MW-9 (DESTROYED)

MW-10 (NOT SAMPLED/ WELL OBSTRUCTED)

LW-5	
ACETONE	32J
BENZENE	0.48
2-BUTANONE (MEK)	ND(100)
CIS-1,1-DICHLOROETHENE	ND(5)
ETHYLBENZENE	160
2-HEXANONE	ND(10)
4-METHYL-2-PENTANONE (MIBK)	ND(10)
NAPHTHALENE	3
TOLUENE	ND(5)
TRICHLOROETHENE (TCE)	ND(1)
1,2,4-TRIMETHYLBENZENE	7.9
1,3,5-TRIMETHYLBENZENE	ND(5)
XYLENES	180

MW-11	
ACETONE	ND(100)
BENZENE	ND(0.4)
2-BUTANONE (MEK)	ND(100)
CIS-1,1-DICHLOROETHENE	ND(5)
ETHYLBENZENE	ND(5)
2-HEXANONE	ND(10)
4-METHYL-2-PENTANONE (MIBK)	ND(10)
NAPHTHALENE	ND(1)
TOLUENE	ND(5)
TRICHLOROETHENE (TCE)	ND(1)
1,2,4-TRIMETHYLBENZENE	ND(5)
1,3,5-TRIMETHYLBENZENE	ND(5)
XYLENES	ND(5)

LW-6	
ACETONE	ND(100)
BENZENE	ND(0.4)
2-BUTANONE (MEK)	ND(100)
CIS-1,1-DICHLOROETHENE	ND(5)
ETHYLBENZENE	0.44J
2-HEXANONE	ND(10)
4-METHYL-2-PENTANONE (MIBK)	ND(10)
NAPHTHALENE	ND(1)
TOLUENE	ND(5)
TRICHLOROETHENE (TCE)	ND(1)
1,2,4-TRIMETHYLBENZENE	ND(5)
1,3,5-TRIMETHYLBENZENE	ND(5)
XYLENES	0.74J

TF-3/TF-3 DUPLICATE	
ACETONE	950J/1,300J
BENZENE	2/1.9
2-BUTANONE (MEK)	8,500J/11,000
CIS-1,1-DICHLOROETHENE	0.85J/0.87J
ETHYLBENZENE	190J/150J
2-HEXANONE	5.7J/ND(10)
4-METHYL-2-PENTANONE (MIBK)	19,000/24,000
NAPHTHALENE	49/45
TOLUENE	280J/280J
TRICHLOROETHENE (TCE)	0.28J/0.34J
1,2,4-TRIMETHYLBENZENE	19/18
1,3,5-TRIMETHYLBENZENE	2.4J/1.9J
XYLENES	1,300/1,300

TF-1/TF-1 DUPLICATE	
ACETONE	58J/54J
BENZENE	0.5/0.47
2-BUTANONE (MEK)	ND(100)/ND(100)
CIS-1,1-DICHLOROETHENE	ND(5)/ND(5)
ETHYLBENZENE	0.82J/0.9J
2-HEXANONE	ND(10)/ND(10)
4-METHYL-2-PENTANONE (MIBK)	4.7J/4.2J
NAPHTHALENE	2.7/2.7
TOLUENE	ND(5)/ND(5)
TRICHLOROETHENE (TCE)	ND(1)/ND(1)
1,2,4-TRIMETHYLBENZENE	2.5J/2.4J
1,3,5-TRIMETHYLBENZENE	ND(5)/ND(5)
XYLENES	1.2J/1.1J

SCALE

0 100 200 FEET

Shaw E & I, Inc.

PPG INDUSTRIES, INC
OAK CREEK, WISCONSI

FIGURE C-1
CONSTITUENTS IN GROUNDWATE
MAY 2002
TANK FARM AREA REMEDIATION
OAK CREEK, WISCONSIN

O:\Project\826003\82600388.dwg
Plot Date/Time: 07/11/02 02:08pm
Plotted by: SMITH_A
Image: .
Xref: .

CHECKED BY	
APPROVED BY	
DRAWING NUMBER	826003-B7
DRAWN BY	--
OFFICE	Pittsburgh, PA

MW-15
(683.34)

MW-16
(688.68)

MW-14
(687.30)

MW-12
(679.23)

LP-3
(683.01)

LW-3
(682.80)

LW-2
(684.79)

TF-3
(NM)

TF-2
(NM)

LP-2
(NM)

LW-5
(NM)

LW-6
(NM)

MW-11
(682.31)

TF-4
(NM)

TF-1
(NM)

LW-1
(DESTROYED)

LW-4
(DESTROYED)

LP-4
(DESTROYED)

LP-1
(DESTROYED)

MW-9
(DESTROYED)

MW-10
(683.57)

LEGEND:

◆	MONITORING WELL LOCATIONS
(687.30)	GROUNDWATER ELEVATION (MSL)
(NM)	NOT MEASURED

SCALE
0 100 200 FEET

Shaw™
Shaw E & I, Inc.

PPG INDUSTRIES, INC.
OAK CREEK, WISCONSIN

FIGURE C-2
GROUNDWATER ELEVATION MAP
MAY 23, 2002
TANK FARM AREA REMEDIATION
OAK CREEK, WISCONSIN

Image: .
Xref: .
O:\Project\826003\826003B7.dwg
Plot Date/Time: 07/11/02 11:22am
Plotted by: SMITH_A

ANALYTICAL DATA REPORT

1.0 Summary Report

1.1 Laboratory Report

Cover Page
Laboratory Narrative
Laboratory Results

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-03
Client Sample ID: LW-5
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 05:57

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8478

Method: 8260B\5030B
Run ID: R280588
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L		ND	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L	7.9		5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L	180		5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	98.9	(86 - 118%)
1,2-Dichloroethane-d4	106	(80 - 120%)
Toluene-d8	97.9	(88 - 110%)
4-Bromofluorobenzene	106	(86 - 115%)

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-04
Client Sample ID: TF-1
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 04:24

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8475

Method: 8260B\5030B
Run ID: R280585
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks					

RL = Reporting Limit

Login #L0205542
June 12, 2002 11:28 am

KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-04
Client Sample ID: TF-1
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 04:24

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8475

Method: 8260B\5030B
Run ID: R280585
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone	ug/L	58	J	100	1
71-43-2	Benzene	ug/L	0.50		0.40	1
78-93-3	2-Butanone	ug/L		ND	100	1
108-90-7	Chlorobenzene	ug/L		ND	5.0	1
67-66-3	Chloroform	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene	ug/L		ND	5.0	1
156-60-5	trans-1,2-Dichloroethene	ug/L		ND	5.0	1
100-41-4	Ethylbenzene	ug/L	0.82	J	5.0	1
97-63-2	Ethyl Methacrylate	ug/L		ND	5.0	1
591-78-6	2-Hexanone	ug/L		ND	10	1
108-10-1	4-Methyl-2-pentanone	ug/L	4.7	J	10	1
75-09-2	Methylene chloride	ug/L		ND	1.0	1
91-20-3	Naphthalene	ug/L	2.7		1.0	1
100-42-5	Styrene	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene	ug/L		ND	1.0	1
108-88-3	Toluene	ug/L		ND	5.0	1
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L		ND	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L	2.5	J	5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L	1.2	J	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	99.4	(86 - 118%)
1,2-Dichloroethane-d4	107	(80 - 120%)
Toluene-d8	98.0	(88 - 110%)
4-Bromofluorobenzene	101	(86 - 115%)

RL = Reporting Limit

Login #L0205542
June 12, 2002 11:28 am

KEMRON ENVIRONMENTAL SERVICES

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-05
Client Sample ID: TF-1 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 04:55

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8476

Method: 8260B\5030B
Run ID: R280586
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks.....					

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-05
Client Sample ID: TF-1 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 04:55

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8476

Method: 8260B\5030B
Run ID: R280586
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone.....	ug/L	54	J	100	1
71-43-2	Benzene.....	ug/L	0.47		0.40	1
78-93-3	2-Butanone.....	ug/L		ND	100	1
108-90-7	Chlorobenzene.....	ug/L		ND	5.0	1
67-66-3	Chloroform.....	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene.....	ug/L		ND	5.0	1
156-60-5	trans-1,2-Dichloroethene.....	ug/L		ND	5.0	1
100-41-4	Ethylbenzene.....	ug/L	0.90	J	5.0	1
97-63-2	Ethyl Methacrylate.....	ug/L		ND	5.0	1
591-78-6	2-Hexanone.....	ug/L		ND	10	1
108-10-1	4-Methyl-2-pentanone.....	ug/L	4.2	J	10	1
75-09-2	Methylene chloride.....	ug/L		ND	1.0	1
91-20-3	Naphthalene.....	ug/L	2.7		1.0	1
100-42-5	Styrene.....	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane.....	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene.....	ug/L		ND	1.0	1
108-88-3	Toluene.....	ug/L		ND	5.0	1

RL = Reporting Limit

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-05
Client Sample ID: TF-1 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 04:55

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8476

Method: 8260B\5030B
Run ID: R280586
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L		ND	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L	2.4	J	5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L	1.1	J	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	96.8	(86 - 118%)
1,2-Dichloroethane-d4	104	(80 - 120%)
Toluene-d8	99.2	(88 - 110%)
4-Bromofluorobenzene	103	(86 - 115%)

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-06
Client Sample ID: TF-3
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 06:29

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8479

Method: 8260B\5030B
Run ID: R280589
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks	ug/L				

RL = Reporting Limit

Login #L0205542
June 12, 2002 11:28 am

KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-06
Client Sample ID: TF-3
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: D1
COC Info: 31722/

Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A

% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 17:16

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16630

Method: 8260B\5030B
Run ID: R283942
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone	ug/L	950	J	10000	100
71-43-2	Benzene	ug/L		ND	40	100
78-93-3	2-Butanone	ug/L	8500	J	10000	100
108-90-7	Chlorobenzene	ug/L		ND	500	100
67-66-3	Chloroform	ug/L		ND	30	100
156-59-2	cis-1,2-Dichloroethene	ug/L		ND	500	100
156-60-5	trans-1,2-Dichloroethene	ug/L		ND	500	100
100-41-4	Ethylbenzene	ug/L	190	J	500	100
97-63-2	Ethyl Methacrylate	ug/L		ND	500	100
591-78-6	2-Hexanone	ug/L		ND	1000	100
108-10-1	4-Methyl-2-pentanone	ug/L	19000		1000	100
75-09-2	Methylene chloride	ug/L		ND	100	100
91-20-3	Naphthalene	ug/L		ND	100	100
100-42-5	Styrene	ug/L		ND	500	100
79-34-5	1,1,2,2-Tetrachloroethane	ug/L		ND	50	100
127-18-4	Tetrachloroethene	ug/L		ND	100	100
108-88-3	Toluene	ug/L	280	J	500	100
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	500	100
79-01-6	Trichloroethene	ug/L		ND	100	100
75-69-4	Trichlorofluoromethane	ug/L		ND	1000	100
95-63-6	1,2,4-Trimethylbenzene	ug/L		ND	500	100
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	500	100
75-01-4	Vinyl chloride	ug/L		ND	50	100
1330-20-7	Xylenes (total)	ug/L	1300		500	100

SURROGATES- In Percent Recovery:

Dibromofluoromethane	101	(86 - 118%)
1,2-Dichloroethane-d4	108	(80 - 120%)
Toluene-d8	94.5	(88 - 110%)
4-Bromofluorobenzene	94.5	(86 - 115%)

RL = Reporting Limit

Login #L0205542
June 12, 2002 11:28 am

KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-06
Client Sample ID: TF-3
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 06:29

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8479

Method: 8260B\5030B
Run ID: R280589
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone	ug/L	660	I	100	1
71-43-2	Benzene	ug/L	2.0		0.40	1
78-93-3	2-Butanone	ug/L	7200	I	100	1
108-90-7	Chlorobenzene	ug/L		ND	5.0	1
67-66-3	Chloroform	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene	ug/L	0.85	J	5.0	1
156-60-5	trans-1,2-Dichloroethene	ug/L		ND	5.0	1
100-41-4	Ethylbenzene	ug/L	190	I	5.0	1
97-63-2	Ethyl Methacrylate	ug/L		ND	5.0	1
591-78-6	2-Hexanone	ug/L	5.7	J	10	1
108-10-1	4-Methyl-2-pentanone	ug/L	11000	I	10	1
75-09-2	Methylene chloride	ug/L		ND	1.0	1
91-20-3	Naphthalene	ug/L	49		1.0	1
100-42-5	Styrene	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene	ug/L		ND	1.0	1
108-88-3	Toluene	ug/L	250	I	5.0	1
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L	0.28	J	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L	19		5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L	2.4	J	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L	1100	I	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	97.8	(86 - 118%)
1,2-Dichloroethane-d4	104	(80 - 120%)
Toluene-d8	102	(88 - 110%)
4-Bromofluorobenzene	104	(86 - 115%)

RL = Reporting Limit

KEMRON ENVIRONMENTAL SERVICES

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-07
Client Sample ID: TF-3 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 07:01

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8480

Method: 8260B\5030B
Run ID: R280590
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks.....	ug/L				

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-07
Client Sample ID: TF-3 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: D1
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 17:46

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16631

Method: 8260B\5030B
Run ID: R283943
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone.....	ug/L	1300	J	10000	100
71-43-2	Benzene.....	ug/L		ND	40	100
78-93-3	2-Butanone.....	ug/L	11000		10000	100
108-90-7	Chlorobenzene.....	ug/L		ND	500	100
67-66-3	Chloroform.....	ug/L		ND	30	100
156-59-2	cis-1,2-Dichloroethene.....	ug/L		ND	500	100
156-60-5	trans-1,2-Dichloroethene.....	ug/L		ND	500	100
100-41-4	Ethylbenzene.....	ug/L	150	J	500	100
97-63-2	Ethyl Methacrylate.....	ug/L		ND	500	100
591-78-6	2-Hexanone.....	ug/L		ND	1000	100
108-10-1	4-Methyl-2-pentanone.....	ug/L	25000	I	1000	100
75-09-2	Methylene chloride.....	ug/L		ND	100	100
91-20-3	Naphthalene.....	ug/L		ND	100	100
100-42-5	Styrene.....	ug/L		ND	500	100
79-34-5	1,1,2,2-Tetrachloroethane.....	ug/L		ND	50	100
127-18-4	Tetrachloroethene.....	ug/L		ND	100	100
108-88-3	Toluene.....	ug/L	280	J	500	100

RL = Reporting Limit

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-07
Client Sample ID: TF-3 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 17:46

Dil. Type: D1
COC Info: 31722/

Date Collected: 05/23/02

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16631

Sample Weight: N/A
Extract Volume: N/A

% Solid: N/A

Method: 8260B\5030B
Run ID: R283943
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	500	100
79-01-6	Trichloroethene	ug/L		ND	100	100
75-69-4	Trichlorofluoromethane	ug/L		ND	1000	100
95-63-6	1,2,4-Trimethylbenzene	ug/L		ND	500	100
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	500	100
75-01-4	Vinyl chloride	ug/L		ND	50	100
1330-20-7	Xylenes (total)	ug/L	1300		500	100

SURROGATES- In Percent Recovery:

Dibromofluoromethane	103	(86 - 118%)
1,2-Dichloroethane-d4	107	(80 - 120%)
Toluene-d8	95.8	(88 - 110%)
4-Bromofluorobenzene	95.3	(86 - 115%)

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-07
Client Sample ID: TF-3 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 19:52

Dil. Type: D2
COC Info: 31722/

Date Collected: 05/23/02

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16635

Sample Weight: N/A
Extract Volume: N/A

% Solid: N/A

Method: 8260B\5030B
Run ID: R282959
Batch : WG119262

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone	ug/L		ND	50000	500
71-43-2	Benzene	ug/L		ND	200	500
78-93-3	2-Butanone	ug/L	10000	J	50000	500
108-90-7	Chlorobenzene	ug/L		ND	2500	500
67-66-3	Chloroform	ug/L		ND	150	500

RL = Reporting Limit

Login #L0205542
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KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-07
Client Sample ID: TF-3 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: D2
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 19:52

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16635

Method: 8260B\5030B
Run ID: R282959
Batch : WG119262

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
156-59-2	cis-1,2-Dichloroethene	ug/L		ND	2500	500
156-60-5	trans-1,2-Dichloroethene	ug/L		ND	2500	500
100-41-4	Ethylbenzene	ug/L	160	J	2500	500
97-63-2	Ethyl Methacrylate	ug/L		ND	2500	500
591-78-6	2-Hexanone	ug/L		ND	5000	500
108-10-1	4-Methyl-2-pentanone	ug/L	24000		5000	500
75-09-2	Methylene chloride	ug/L		ND	500	500
91-20-3	Naphthalene	ug/L		ND	500	500
100-42-5	Styrene	ug/L		ND	2500	500
79-34-5	1,1,2,2-Tetrachloroethane	ug/L		ND	250	500
127-18-4	Tetrachloroethene	ug/L		ND	500	500
108-88-3	Toluene	ug/L	330	J	2500	500
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	2500	500
79-01-6	Trichloroethene	ug/L		ND	500	500
75-69-4	Trichlorofluoromethane	ug/L		ND	5000	500
95-63-6	1,2,4-Trimethylbenzene	ug/L		ND	2500	500
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	2500	500
75-01-4	Vinyl chloride	ug/L		ND	250	500
1330-20-7	Xylenes (total)	ug/L	1300	J	2500	500

SURROGATES- In Percent Recovery:

Dibromofluoromethane	106	(86 - 118%)
1,2-Dichloroethane-d4	116	(80 - 120%)
Toluene-d8	94.8	(88 - 110%)
4-Bromofluorobenzene	100	(86 - 115%)

RL = Reporting Limit

KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-07
Client Sample ID: TF-3 DUP
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 07:01

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8480

Method: 8260B\5030B
Run ID: R280590
Batch : WG119159

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone	ug/L	740	I	100	1
71-43-2	Benzene	ug/L	1.9		0.40	1
78-93-3	2-Butanone	ug/L	7700	I	100	1
108-90-7	Chlorobenzene	ug/L		ND	5.0	1
67-66-3	Chloroform	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene	ug/L	0.87	J	5.0	1
156-60-5	trans-1,2-Dichloroethene	ug/L		ND	5.0	1
100-41-4	Ethylbenzene	ug/L	180		5.0	1
97-63-2	Ethyl Methacrylate	ug/L		ND	5.0	1
591-78-6	2-Hexanone	ug/L		ND	10	1
108-10-1	4-Methyl-2-pentanone	ug/L	11000	I	10	1
75-09-2	Methylene chloride	ug/L		ND	1.0	1
91-20-3	Naphthalene	ug/L	45		1.0	1
100-42-5	Styrene	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene	ug/L		ND	1.0	1
108-88-3	Toluene	ug/L	250	I	5.0	1
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L	0.34	J	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L	18		5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L	1.9	J	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L	1000	I	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	96.1	(86 - 118%)
1,2-Dichloroethane-d4	99.9	(80 - 120%)
Toluene-d8	102	(88 - 110%)
4-Bromofluorobenzene	103	(86 - 115%)

RL = Reporting Limit

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-08
Client Sample ID: MW-11
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 11:42

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16620

Method: 8260B\5030B
Run ID: R284206
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks.....					

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-08
Client Sample ID: MW-11
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 11:42

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16620

Method: 8260B\5030B
Run ID: R284206
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone.....	ug/L		ND	100	1
71-43-2	Benzene.....	ug/L		ND	0.40	1
78-93-3	2-Butanone.....	ug/L		ND	100	1
108-90-7	Chlorobenzene.....	ug/L		ND	5.0	1
67-66-3	Chloroform.....	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene.....	ug/L		ND	5.0	1
156-60-5	trans-1,2-Dichloroethene.....	ug/L		ND	5.0	1
100-41-4	Ethylbenzene.....	ug/L		ND	5.0	1
97-63-2	Ethyl Methacrylate.....	ug/L		ND	5.0	1
591-78-6	2-Hexanone.....	ug/L		ND	10	1
108-10-1	4-Methyl-2-pentanone.....	ug/L		ND	10	1
75-09-2	Methylene chloride.....	ug/L		ND	1.0	1
91-20-3	Naphthalene.....	ug/L		ND	1.0	1
100-42-5	Styrene.....	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane.....	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene.....	ug/L		ND	1.0	1
108-88-3	Toluene.....	ug/L		ND	5.0	1

RL = Reporting Limit

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-08
Client Sample ID: MW-11
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 11:42

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16620

Method: 8260B\5030B
Run ID: R284206
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L		ND	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L		ND	5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L		ND	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	102	(86 - 118%)
1,2-Dichloroethane-d4	112	(80 - 120%)
Toluene-d8	94.3	(88 - 110%)
4-Bromofluorobenzene	95.8	(86 - 115%)

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-09
Client Sample ID: MW-12
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 12:13

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16621

Method: 8260B\5030B
Run ID: R284207
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks					

RL = Reporting Limit

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KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-09
Client Sample ID: MW-12
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/06/02 Time: 12:13

Instrument: HPMS10
Analyst: MES
Lab File ID: 10M16621

Method: 8260B\5030B
Run ID: R284207
Batch : WG119635

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone	ug/L		ND	100	1
71-43-2	Benzene	ug/L		ND	0.40	1
78-93-3	2-Butanone	ug/L		ND	100	1
108-90-7	Chlorobenzene	ug/L		ND	5.0	1
67-66-3	Chloroform	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene	ug/L		ND	5.0	1
156-60-5	trans-1,2-Dichloroethene	ug/L		ND	5.0	1
100-41-4	Ethylbenzene	ug/L		ND	5.0	1
97-63-2	Ethyl Methacrylate	ug/L		ND	5.0	1
591-78-6	2-Hexanone	ug/L		ND	10	1
108-10-1	4-Methyl-2-pentanone	ug/L		ND	10	1
75-09-2	Methylene chloride	ug/L		ND	1.0	1
91-20-3	Naphthalene	ug/L		ND	1.0	1
100-42-5	Styrene	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene	ug/L		ND	1.0	1
108-88-3	Toluene	ug/L		ND	5.0	1
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L		ND	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L		ND	5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L		ND	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	108		(86 - 118%)
1,2-Dichloroethane-d4	121	*	(80 - 120%)
Toluene-d8	94.7		(88 - 110%)
4-Bromofluorobenzene	98.1		(86 - 115%)

RL = Reporting Limit

Login #L0205542
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KEMRON ENVIRONMENTAL SERVICES

Product: 826-LS - Library Search - VOA

Lab Sample ID: L0205542-10
Client Sample ID: TRIP BLANK
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 23:54

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8501

Method: 8260B\5030B
Run ID: R281248
Batch : WG119168

CAS #	Compound	Units	Result	Qualifiers	RL	Ret Time
	No Searchable Peaks.....					

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-10
Client Sample ID: TRIP BLANK
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 23:54

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8501

Method: 8260B\5030B
Run ID: R281248
Batch : WG119168

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
67-64-1	Acetone.....	ug/L		ND	100	1
71-43-2	Benzene.....	ug/L		ND	0.40	1
78-93-3	2-Butanone.....	ug/L		ND	100	1
108-90-7	Chlorobenzene.....	ug/L		ND	5.0	1
67-66-3	Chloroform.....	ug/L		ND	0.30	1
156-59-2	cis-1,2-Dichloroethene.....	ug/L		ND	5.0	1
156-60-5	trans-1,2-Dichloroethene.....	ug/L		ND	5.0	1
100-41-4	Ethylbenzene.....	ug/L		ND	5.0	1
97-63-2	Ethyl Methacrylate.....	ug/L		ND	5.0	1
591-78-6	2-Hexanone.....	ug/L		ND	10	1
108-10-1	4-Methyl-2-pentanone.....	ug/L		ND	10	1
75-09-2	Methylene chloride.....	ug/L		ND	1.0	1
91-20-3	Naphthalene.....	ug/L		ND	1.0	1
100-42-5	Styrene.....	ug/L		ND	5.0	1
79-34-5	1,1,2,2-Tetrachloroethane.....	ug/L		ND	0.50	1
127-18-4	Tetrachloroethene.....	ug/L		ND	1.0	1
108-88-3	Toluene.....	ug/L		ND	5.0	1

RL = Reporting Limit

Login #L0205542
June 12, 2002 11:28 am

KEMRON ENVIRONMENTAL SERVICES

Product: 826-SPE - Special List - 8260

Lab Sample ID: L0205542-10
Client Sample ID: TRIP BLANK
Site/Work ID: PPG-OAK CREEK
Matrix: Water

Dil. Type: N/A
COC Info: 31722/
Date Collected: 05/23/02

Sample Weight: N/A
Extract Volume: N/A
% Solid: N/A

TCLP Extract Date: N/A
Extract Date: N/A
Analysis Date: 06/05/02 Time: 23:54

Instrument: HPMS11
Analyst: CMS
Lab File ID: 11M8501

Method: 8260B\5030B
Run ID: R281248
Batch : WG119168

CAS #	Compound	Units	Result	Qualifiers	RL	Dilution
110-57-6	Trans-1,4-Dichloro-2-Butene	ug/L		ND	5.0	1
79-01-6	Trichloroethene	ug/L		ND	1.0	1
75-69-4	Trichlorofluoromethane	ug/L		ND	10	1
95-63-6	1,2,4-Trimethylbenzene	ug/L		ND	5.0	1
108-67-8	1,3,5-Trimethylbenzene	ug/L		ND	5.0	1
75-01-4	Vinyl chloride	ug/L		ND	0.50	1
1330-20-7	Xylenes (total)	ug/L		ND	5.0	1

SURROGATES- In Percent Recovery:

Dibromofluoromethane	94.6	(86 - 118%)
1,2-Dichloroethane-d4	94.4	(80 - 120%)
Toluene-d8	101	(88 - 110%)
4-Bromofluorobenzene	98.2	(86 - 115%)

RL = Reporting Limit

Order #: 02-05-542
June 12, 2002 11:28 am

KEMRON ENVIRONMENTAL SERVICES
WORK GROUPS

Work Group	Run ID	Sample	Dil Type	Matrix	Product	Method	Date Collected	Department
WG119159	R280584	L0205542-01		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280584	L0205542-01		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280587	L0205542-02		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280587	L0205542-02		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280588	L0205542-03		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280588	L0205542-03		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280585	L0205542-04		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280585	L0205542-04		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280586	L0205542-05		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280586	L0205542-05		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280589	L0205542-06		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280589	L0205542-06		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280590	L0205542-07		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119159	R280590	L0205542-07		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119168	R281248	L0205542-10		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119168	R281248	L0205542-10		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119262	R282959	L0205542-07	D2	Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119635	R283942	L0205542-06	D1	Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119635	R283943	L0205542-07	D1	Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119635	R284206	L0205542-08		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119635	R284206	L0205542-08		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS
WG119635	R284207	L0205542-09		Water	Library Search - VOA	8260B	23-MAY-2002	Volatile - GC/MS
WG119635	R284207	L0205542-09		Water	Special List - 8260	8260B	23-MAY-2002	Volatile - GC/MS

1.2 Attachments

KEMRON ANALYST LIST

Ohio Valley Laboratory

06/04/2002

AJF - AMANDA J. FICKIESEN
ALT - ANN L. THAYER
ARS - ANGELINA R. SCOTT
BRG - BRENDA R. GREGORY
CAF - CHERYL A. FLOWERS
CAK - CHERYL A. KOELSCH
CBN - CHARLES B. NOLL
CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD
CLK - CARL L. KING
CLW - CHARISSA L. WINTERS
CMS - CRYSTAL M. STEVENS
CSH - CHRIS S. HILL
DAD - DAVE A. DAULEY
DAH - DON A. HUNTER
DAM - DAN A. MUSGRAVE
DAS - DALLAS A. SULLIVAN
DAT - DEBBIE A. TORNES
DEL - DON E. LIGHTFRITZ
DEV - DAVID E. VANDENBERG
DGB - DOUGLAS G. BUTCHER
DIH - DEANNA I. HESSON
DLA - DENISE L. ADAMS
DLB - DAVID L. BUMGARNER
DLN - DEANNA L. NORTON
DLP - DOROTHY L. PAYNE
DLR - DIANNA L. RAUCH
DP - DEANNA L. PIERSON
DRB - DOUG R. BARNETT
DSM - DAVID S. MOSSOR
DST - DENNIS S. TEPE
ECL - ERIC C. LAWSON
GSG - GALEN S. GEORGE
HV - HEMA VILASAGAR
JAL - JOHN A. LENT
JJG - JAKE J. GREUEY
JKW - JANE K. WARDEN
JLS - JANICE L. SCHIMMEL
JMM - JARROD M. MARTIN
JMT - JOY M. THOMAS
JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES
JYH - JI Y. HU
KHR - KIM H. RHODES
KRA - KATHY R. ALBERTSON
LKN - LINDA K. NEDEFF
LRR - LUCYNDA R. ROBERTS
LSA - LUCINDA S. ARNOLD
LSB - LESLIE S. BUCINA
MDA - MICHAEL D. ALBERTSON
MDC - MICHAEL D. COCHRAN
MEF - MIKE E. FLANAGAN
MES - MARY E. SCHILLING
MKZ - MARILYN K. ZUMBRO
MLR - MARY L. ROCHOTTE
MLS - MICHAEL L. SCHIMMEL
MMB - MAREN M. BEERY
MSW - MATT S. WILSON
NJB - NATALIE J. BOOTH
OGT - OKEY G. TUCKER
RDC - REBECCA D. CUTLIP
REF - RON E. FERTILE
REK - ROBERT E. KYER
RJW - RHONDA J. WITTEKIND
RLW - RON L. WATSON
RSS - REGINA S. SIMMONS
RWC - ROD W. CAMPBELL
SJK - SINDY J. KINNEY
SLP - SHERI L. PFALZGRAF
SLT - STEPHANIE L. TEPE
SMW - SHAUNA M. WELCH
SMW - SHARON M. WASHBURN
SPL - STEVE P. LEARN
TJH - TIM J. HOEFLICH
TMM - TAMMY M. MORRIS
VC - VICKI COLLIER
VKL - VICKY K. LAUER

KEMRON Environmental Services, Inc
List of Valid Qualifiers
December 15, 2000

Standard Qualifiers

These are KEMRON's Standard Report Qualifiers

A	See the report narrative
B	Present in the method blank
C	Confirmed by GC/MS
CG	Confluent growth
D	The analyte was quantified at a secondary dilution factor
DL	Surrogate or spike was diluted out
E	Estimated concentration due to sample matrix interference
FL	Free liquid
I	Semiquantitative result, out of instrument calibration range
J	Present below nominal reporting limit
L	Sample reporting limits elevated due to matrix interference
M	Duplicate injection precision not met
N	Tentatively Identified Compound (TIC)
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
NF	Not found
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentration >40% difference between The two GC columns
QNS	Quantity not sufficient to perform analysis
R	Analyte exceeds regulatory limit
RA	Re analysis confirms reported results
RE	Re analysis confirms sample matrix Interference
S	Analyzed by method of standard addition
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
TNTC	Too numerous to count
U	Analyzed for but not detected
W	Post-digestion spike for furnace AA out Of control limits
Z	Can not be resolved from isomer.***
+	Correlation coefficient for the MSA is less Than 0.995
<	Less than
>	Greater than
*	Surrogate or spike compound out of range

***** Special Notes for Organic Analytes**

1. Acrolein and acrylonitrile by method 624 are semiquantative screens only
2. 1,2-Diphenylhydrazine is unstable and is reported as azobenzene
3. N-nitrosodiphenylamine cannot be separated from diphenylamine
4. 3-Methyphenol and 4-Methyphenol are unresolvable compounds
5. m-Xylene and p-Xylene are unresolvable compounds
6. The reporting limits for Appendix II/IX compounds by method 8270 are based on EPA estimated PQLs referenced in 40 CFR Part 264, Appendix IX. They are not always achievable for every compound and are matrix dependent

AFCEE Qualifiers

These are KEMRON's AFCEE Report Qualifiers

J	The analyte was positively identified, the quantitation is an estimation
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL
F	The analyte was positively identified but the associated numerical value is below the RL
R	The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria
B	The analyte was found in an associated blank, as well as in the sample
M	The matrix effect was present
S	To be applied to all field screening data
T	Tentatively identified compound (using GC/MS)

COC No. A 31722

109 Starlite Park
Marietta, OH 45750

KEMRON ENVIRONMENTAL SERVICES

CHAIN-OF-CUSTODY RECORD

Phone: 740-373-4071
Fax: 740-373-4835

Company Name: Shaw Environmental & Infrastructure

Project Contact: Paul Lambert | Contact Phone #: 312-499-3536

Turn Around Requirements: Standard | Location:

Project #: 826003.02 | Project Name: PPG - Oak Creek

Sampler (print): Elizabeth Askew | Signature: Elizabeth A

Program: ☐ NPDES ☐ AFCEE ☐ RCRA ☐ USAGE ☐ Other

ADDITIONAL REQUIREMENTS

Sample I.D. No.	Comp*	Grab	Date	Time	Protocol CWA	Protocol SW846	NUMBER OF CONTAINERS	Hold	VOCs (8260)
LW-2		✓	5/23/07	13:33			2		✓
LW-6		✓		13:39			2		✓
LW-5		✓		13:44			2		✓
TF-1		✓		14:04			2		✓
TF-1 DUP		✓		14:04			2		✓
TF-3		✓		14:38			2		✓
TF-3 DUP		✓		14:38			2		✓
MW-11		✓		15:30			2		✓
MW-12		✓		16:10			2		✓

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Elizabeth A	5/23/07	17:00					

Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time	Cooler Temp in °C	Remarks:
			Shawna Welch	5/24/07	0915	5	SIA intact; c/c sealed

KEMRON Environmental Services	SAMPLES RECEIPT FORM	Marietta Laboratory

CLIENT: SHAW BRG Other SHAW	DATE: 5-24-03 915	SHIPPED BY: ( ) FED-EX ( ) AIRBORNE (✓) UPS ( ) EMERY ( ) RPS ( ) US MAIL ( ) KEMRON ( ) CLIENT

COOLER ID: 1M55 1Z 63V 846 22 1000 038 2	COOLER ID: [illegible]	COOLER ID:
	[illegible] #:	INDEX # :
SEALED (✓) YES ( ) NO	SEALED ( ) YES ( ) NO	SEALED ( ) YES ( ) NO
CUSTODY (✓) YES ( ) NO	CUSTODY ( ) YES ( ) NO	CUSTODY ( ) YES ( ) NO
TEMP : 5 °C (C) (D) (E)	TEMP : °C (C) (D) (E)	TEMP : °C (C) (D) (E)
TEMP IN RANGE (✓) YES ( ) NO (4°C ± 2°)	TEMP IN RANGE ( ) YES ( ) NO (4°C ± 2°)	TEMP IN RANGE ( ) YES ( ) NO (4°C ± 2°)
WET ICE (✓) BLUE ICE ( )	WET ICE ( ) BLUE ICE ( )	WET ICE ( ) BLUE ICE ( )
ICE FROZEN (✓) MELTED ( )	ICE FROZEN ( ) MELTED ( )	ICE FROZEN ( ) MELTED ( )
RADIATION CHECKED (✓) YES ( ) NO	RADIATION CHECKED ( ) YES ( ) NO	RADIATION CHECKED ( ) YES ( ) NO
SAMPLE INTACT (✓) YES ( ) NO SALVAGEBLE ( ) YES ( ) NO	SAMPLE INTACT ( ) YES ( ) NO SALVAGEBLE ( ) YES ( ) NO	SAMPLE INTACT ( ) YES ( ) NO SALVAGEBLE ( ) YES ( ) NO
SAMPLE TYPE: WATER (✓) SOIL ( ) OTHER ( )	SAMPLE TYPE: WATER ( ) SOIL ( ) OTHER ( )	SAMPLE TYPE: WATER ( ) SOIL ( ) OTHER ( )
LABELS: INTACT (✓) YES ( ) NO LEGIBLE (✓) YES ( ) NO MATCH COC ( ) YES (✓) NO	LABELS: INTACT ( ) YES ( ) NO LEGIBLE ( ) YES ( ) NO MATCH COC ( ) YES ( ) NO	LABELS: INTACT ( ) YES ( ) NO LEGIBLE ( ) YES ( ) NO MATCH COC ( ) YES ( ) NO
pH IN RANGE (2 - >9 - >12) ( ) YES ( ) NO AS APPROPRIATE	pH IN RANGE (2 - >9 - >12) ( ) YES ( ) NO AS APPROPRIATE	pH IN RANGE (2 - >9 - >12) ( ) YES ( ) NO AS APPROPRIATE
SAMPLES FROZEN? ( ) YES (✓) NO	SAMPLES FROZEN? ( ) YES ( ) NO	SAMPLES FROZEN? ( ) YES ( ) NO
LOG-IN COMMENTS Date WA empty	LOG-IN COMMENTS	LOG-IN COMMENTS

TSR COMMENTS

CONTACT:	DATE:	TIME:

COMMENTS: ( ) VOICE ( ) FAX ( ) E-MAIL

CRF#4

Sample Receipt Form #2

Client:_____ Project:_____
Date Received: 05-24-08

_____Cooler temperature > than 6 degrees Celcius
Reason_____

__✓__Samples received not on chain of custody log tripblanks
TRIP BLKS (4)

_____Samples on chain of custody not received

_____Information on sample containers different from chain of custody

_____Sample containers received broken, leaking or not sealed (List sample ID)

_____pH out (List sample ID, which container, pH prior to adjusting, amount of acid, preservative)

_____Insufficient sample volume

_____Air bubbles present in Voa vials (List sample ID)

_____Hold time expired (List sample ID)

TSR:
Was client notified regarding information: YES NO
Name of person contacted:_____ Company:_____
TSR:_____ Date:_____

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APPENDIX D
ANALYTICAL DATA AND SAMPLES USED IN THE RISK EVALUATION

Appendix D: Table 1
Soil Sampling Results
Summary of Detected Constituents
PPG Oak Creek

SAMPLE ID		PPG-HA10-01.5	B1	B2	B2	B2	B2	B3	B4	B5	B6	B6	B7	B7	B8	B8	B9	B9
SAMPLE LOCATION		SWMU # 8 RFA 14	13.50-15.5	1.00-3.0	13.50-15.5	21.00-23.0	33.00-35.0	13.50-15.5	13.50-15.5	8.50-10.5	6.00-8.0	18.50-20.5	8.50-10.5	18.50-20.5	1.00-3.0	18.50-20.5	1.00-3.0	13.50-15.5
DEPTH (ft - bgs)		1.5 - 3.5	8/8/91	8/8/91	8/13/91	8/10/91	8/9/91	8/9/91	8/9/91	8/14/91	8/12/91	8/14/91	8/13/91	8/23/91	8/15/91	8/14/91	8/15/91	8/16/91
SAMPLE DATE		10/1/96																
PARAMETER	Region IX PRGs																	
VOLATILES (ug/kg)																		
1,1,2,2-Tetrachloroethane	900	5.2 U	12 U	10 U	1500 U	11 U	11 U	11 U	13 U	12 U	26000 U	11 U	1300 U	12 U	11 U	12 U	9 J	1800 U
2-Butanone (MEK)	28,000,000	5.2 U	12 U	10 U	1500 U	11 U	11 U	11 U	13 U	12 U	26000 U	11 U	1300 U	12 U	11 U	12 U	12 U	1800 U
2-Hexanone	---	5.2 U	19 U	16 U	2400 U	17 U	17 U	16 U	19 U	17 U	41000 U	17 U	2100 U	17 U	16 U	17 U	18 U	2900 U
4-Methyl-2-pentanone (MIBK)	2,900,000	5.2 U	19 U	72000 D	2400 U	17 U	17 U	16 U	19 U	17 U	41000 U	17 U	2100 U	17 U	16 U	17 U	18 U	2900 U
Acetone	6,200,000	100 U	66 B	22 B	1500 BJ	16 B	70 B	38 B	52 B	35 B	45000 B	50 B	1400 B	25 B	40 B	10 BJ	22 B	1800 U
Benzene	1,500	5.2 U	6 U	5 U	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Crotonaldehyde	---	NA	120 U	100 U	15000 U	110 U	110 U	110 U	130 U	120 U	260000 U	110 U	13000 U	120 U	110 U	120 U	120 U	18000 U
Chlorobenzene	540,000	5.2 U	6 U	14	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Chloroform	520	5.2 U	6 U	5 U	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Ethylmethacrylate	140,000	NA	12 U	10 U	1500 U	11 U	11 U	11 U	13 U	12 U	26000 U	11 U	1300 U	12 U	11 U	12 U	12 U	1800 U
Ethylbenzene	230,000	5.2 U	6 U	1100 DJ	6500	6 U	6 U	5 U	6 U	6 U	15000	6 U	640 J	10	3900 D	6 U	6 U	8700
Methylene chloride	21,000	5.2 U	38	36	710 BJ	33 B	46 B	35 B	47 B	33 B	8300 BJ	45 B	470 BJ	41 B	31 B	29 B	23	630 BJ
Styrene	1,700,000	5.2 U	6 U	5 U	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Trans-1,4-Dichloro-2-Butene	18	NA	19 U	16 U	2400 U	17 U	17 U	16 U	19 U	17 U	41000 U	17 U	2100 U	17 U	16 U	17 U	18 U	2900 U
Tetrachloroethene	19,000	5.2 U	6 U	2 J	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Toluene	520,000	5.2 U	6 U	36	790 U	6 U	6 U	5 U	6 U	6 U	4500 J	6 U	330 J	6 U	5 U	6 U	6 U	820 J
Trichloroethene	6,100	5.2 U	6 U	5 U	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Trichlorofluoromethane	2,000,000	10 U	6 U	5 U	790 U	6 U	6 U	5 U	6 U	6 U	13000 U	6 U	670 U	6 U	5 U	6 U	6 U	950 U
Xylenes (total)	210,000	5.2 U	6 U	6600 D	15000	6 U	6 U	5 U	6 U	6 U	110000	6 U	530 J	7	51000 D	6 U	6 U	27000
SEMIVOLATILES (ug/kg)																		
2-Methylnaphthalene	---	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	290	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	29,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	29,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	100,000,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	290,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	88,000,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	30,000,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	29,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	190,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	54,000,000	340 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	180,000	140 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)																		
Aluminum	100,000,000	2430	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	2,700	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	100,000,000	12.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	810,000	0.12 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	---	113000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	450,000	4.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	---	8230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	750,000	5.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	---	66800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	610,000	0.012 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	41,000,000	7.1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ND - Not detected.
U - Not detected.
J - Estimated.
B - Blank contamination.
NA - Not analyzed.
D - Secondary dilution factor
DUP - Duplicate.

Appendix D: Table 1
Soil Sampling Results
Summary of Detected Constituents
PPG Oak Creek

SAMPLE ID SAMPLE LOCATION DEPTH (ft - bgs) SAMPLE DATE PARAMETER	Region IX PRGs	B10 6.00-8.0 8/6/91	B10 13.50-15.5 8/14/91	B11 3.50-5.5 8/16/91	B11 11.00-13.0 8/14/91	GS-1 0.00-2.0 8/2/91	GS-2 0.00-2.0 8/2/91	GS-3 0.00-2.0 8/2/91	GS-4 0.00-2.0 8/5/91	GS-5 0.00-2.0 8/2/91	GS-6 0.00-2.0 8/7/91	GS-7 0.00-2.0 8/2/91	GS-8 0.00-2.0 8/2/91	GS-9 0.00-2.0 8/2/91	GS-10 0.00-2.0 8/2/91	GS-11 0.00-2.0 8/2/91	GS-12 0.00-2.0 8/6/91	GS-13 0.00-2.0 8/2/91	GS-14 0.00-2.0 8/5/91	GS-14 dup 0.00-2.0 8/5/91
VOLATILES (ug/kg)																				
1,1,2,2-Tetrachloroethane	900	1300 U	10000 U	12 U	1400 U	11 U	10 U	11 U	56 U	12 U	3900 U	11 U	11 U	11 U	11 U	11 U	11 J	11 U	1300 U	1300 U
2-Butanone (MEK)	28,000,000	9400	10000 U	45	1400 U	11 U	10 U	11 U	56 U	12 U	9800	11 U	11 U	11 U	11 U	11 U	360	11 U	1300 U	1300 U
2-Hexanone	---	2100 U	17000 U	18 U	2200 U	16 U	16 U	17 U	83 U	17 U	6200 U	16 U	16 U	16 U	16 U	17 U	81 U	16 U	2000 U	2000 U
4-Methyl-2-pentanone (MIBK)	2,900,000	2100 U	17000 U	120	2200 U	16 U	16 U	17 U	83 U	17 U	6200 U	16 U	16 U	16 U	16 U	17 U	9500 DJ	16 U	2000 U	15000
Acetone	6,200,000	1300 U	7100 BJ	36 B	1600 B	24 B	23 B	21 B	93 B	26 B	4100 B	24 B	33 B	24 B	33 B	23 B	280 B	11 B	1300 U	1300 U
Benzene	1,500	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	2 J	2000 U	5 U	5 U	5 U	5 U	6 U	27 U	5 U	650 U	650 U
Crotonaldehyde	---	13000 U	100000 U	120 U	14000 U	110 U	100 U	110 U	560 U	120 U	39000 U	110 U	110 U	110 U	110 U	110 U	540 U	110 U	13000 U	13000 U
Chlorobenzene	540,000	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	2 J	2000 U	5 U	5 U	5 U	5 U	6 U	27 U	5 U	650 U	650 U
Chloroform	520	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	6 U	2000 U	5 U	5 U	5 U	5 U	6 U	27 U	5 U	650 U	650 U
Ethylmethacrylate	140,000	1300 U	10000 U	12 U	1400 U	11 U	10 U	11 U	56 U	12 U	3900 U	11 U	11 U	11 U	11 U	11 U	54 U	11 U	1300 U	1300 U
Ethylbenzene	230,000	11000	170000	190	4000	5 U	5 U	6 U	28 U	6 U	2000 U	37	1 J	5 U	5 U	6 U	4300 DJ	5 U	11000	12000 U
Methylene chloride	21,000	630 BJ	2100 BJ	22 B	680 BJ	32 B	63 B	31 B	160 B	37 B	1200 BJ	19 B	36 B	48 B	35 B	24 B	210 B	19 B	480 BJ	660 BJ
Styrene	1,700,000	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	6 U	52000	17	1 J	5 U	5 U	6 U	400	5 U	650 U	650 U
Trans-1,4-Dichloro-2-Butene	18	2100 U	17000 U	18 U	2200 U	16 U	16 U	17 U	83 U	17 U	6200 U	16 U	16 U	16 U	16 U	17 U	81 U	16 U	2000 U	2000 U
Tetrachloroethene	19,000	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	6 U	2000 U	5 U	5 U	5 U	5 U	6 U	20 J	5 U	650 U	650 U
Toluene	520,000	1200	7400	12	730 U	5 U	5 U	6 U	28 U	2 J	2000 U	5 J	5 U	5 U	5 U	6 U	3300 DJ	5 U	14000	15000
Trichloroethene	6,100	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	6 U	2000 U	5 U	5 U	5 U	5 U	6 U	27 U	5 U	650 U	650 U
Trichlorofluoromethane	2,000,000	690 U	5400 U	6 U	730 U	5 U	5 U	6 U	28 U	6 U	2000 U	5 U	5 U	5 U	5 U	6 U	27 U	5 U	650 U	650 U
Xylenes (total)	210,000	14000	18000	1100	7000	340	76	31	2100	200 B	2000 U	8	5 U	5 U	5 U	6 U	140000 DJ	5 U	28000	29000
SEMIVOLATILES (ug/kg)																				
2-Methylnaphthalene	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzo(a)pyrene	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzo(b)fluoranthene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzo(k)fluoranthene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Butyl benzyl phthalate	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chrysene	290,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Di-n-butyl phthalate	88,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Fluoranthene	30,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Indeno(1,2,3-cd)pyrene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Naphthalene	190,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Pyrene	54,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
bis(2-Ethylhexyl) phthalate	180,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
METALS (mg/kg)																				
Aluminum	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Arsenic	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Barium	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cadmium	810,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Calcium	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chromium	450,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Iron	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Lead	750,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Magnesium	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Mercury	610,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nickel	41,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

ND - Not detected.
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D - Secondary dilution factor
DUP - Duplicate.

Appendix D: Table 1
Soil Sampling Results
Summary of Detected Constituents
PPG Oak Creek

SAMPLE ID SAMPLE LOCATION DEPTH (ft - bgs) SAMPLE DATE PARAMETER	Region IX PRGs	GS-15 0.00-2.0 8/2/91	GS-15 dup 0.00-2.0 8/2/91	GS-16 0.00-2.0 8/7/91	GS-17 0.00-2.0 8/2/91	GS-18 0.00-2.0 8/6/91	GS-19 0.00-2.0 8/2/91	GS-20 0.00-2.0 8/2/91	GS-21 0.00-2.0 8/2/91	GS-22 0.00-2.0 8/2/91	GS-23 0.00-2.0 8/5/91	GS-24 0.00-2.0 8/5/91	GS-25 0.00-2.0 8/2/91	GS-26 0.00-2.0 8/2/91	GS-27 0.00-2.0 8/7/91	GS-28 0.00-2.0 8/6/91	GS-29 0.00-2.0 8/8/91	GS-30 0.00-2.0 8/3/91	GS-31 0.00-2.0 8/5/91
VOLATILES (ug/kg)																			
1,1,2,2-Tetrachloroethane	900	7 J	26000 U	91000 U	10 U	11 U	11 U	11 U	11	11	53 U	2200 U	11 U	11 U	8600 U	11 U	8500 U	11 U	55 U
2-Butanone (MEK)	28,000,000	80	26000 U	91000 U	10 U	11 U	11 U	11 U	11 U	11 U	53 U	2200 U	34	11 U	8600 U	11 U	8500 U	11 U	8700 D
2-Hexanone	---	130	41000 U	140000 U	16 U	16 U	16 U	17 U	17 U	17 U	80 U	3500 U	180	16 U	14000 U	16 U	13000 U	17 U	82 U
4-Methyl-2-pentanone (MIBK)	2,900,000	120000 D	90000	390000	16 U	16 U	16 U	17 U	17 U	17 U	80 U	3500 U	16 U	16 U	14000 U	16 U	13000 U	17 U	82 U
Acetone	6,200,000	27 B	18000 J	100000	28 B	32 B	26 B	15 B	13 B	11 BJ	96 B	2200 U	71 B	16 B	8600 U	12 B	130000 B	19 B	320 B
Benzene	1,500	10	13000 U	47000 U	5 U	5 U	5 U	6 U	6 U	6 U	7 J	1100 U	5 U	5 U	4400 U	5 U	4400 U	6 U	27 U
Crotonaldehyde	---	11 U	260000 U	910000 U	100 U	110 U	110 U	110 U	110 U	110 U	530 U	22000 U	110 U	110 U	86000 U	110 U	85000 U	110 U	550 U
Chlorobenzene	540,000	7	13000 U	47000 U	5 U	5 U	5 U	6 U	6 U	6 U	27 U	1100 U	5 U	5 U	4400 U	5 U	4400 U	6 U	27 U
Chloroform	520	6 U	13000 U	47000 U	5 U	5 U	5 U	6 U	6 U	6 U	27 U	1100 U	5 U	5 U	4400 U	5 U	4400 U	1 J	27 U
Ethylmethacrylate	140,000	8 J	26000 U	91000 U	10 U	11 U	11 U	11 U	11 U	11 U	53 U	2200 U	11 U	11 U	8600 U	11 U	8500 U	11 U	55 U
Ethylbenzene	230,000	200000 D	140000	810000	5 U	5 U	5 U	6 U	6 U	6 U	17000 D	5500	26	5 U	4400 U	27	4400 U	6 U	27 U
Methylene chloride	21,000	26 B	16000 BJ	130000 B	21 B	30 B	12 B	14 B	5 BJ	14 B	280 B	800 BJ	19 B	28 B	1700 BJ	27 B	5100 BJ	12 B	130 B
Styrene	1,700,000	89	13000 U	47000 U	5 U	5 U	5 U	6 U	6 U	6 U	27 U	1100 U	5 U	5 U	4400 U	5 U	4400 U	6 U	27 U
Trans-1,4-Dichloro-2-Butene	18	9 J	41000 U	140000 U	16 U	16 U	16 U	17 U	17 U	17 U	80 U	3500 U	16 U	16 U	14000 U	16 U	13000 U	17 U	82 U
Tetrachloroethene	19,000	2 J	13000 U	47000 U	5 U	5 U	5 U	6 U	6	6	15 J	1100 U	5 U	5 U	4400 U	5 U	4400 U	6 U	27 U
Toluene	520,000	120000 D	83000	570000	5 U	5 U	5 U	6 U	6 U	6 U	12000 D	2300	16	5 U	4400 U	3 J	4400 U	6 U	27 U
Trichloroethene	6,100	2 J	13000 U	47000 U	5 U	5 U	5 U	6 U	6 U	6 U	27 U	1100 U	5 U	5 U	4400 U	5 U	4400 U	6 U	27 U
Trichlorofluoromethane	2,000,000	6 U	13000 U	47000 U	5 U	5 U	5 U	6 U	6 U	6 U	27 U	1100 U	5 U	5 U	4400 U	5 U	4400 U	6 U	27 U
Xylenes (total)	210,000	580000 D	380000	2100000	2 BJ	5 U	5 U	6 U	6 U	6 U	140000 D	26000	81	5 U	4400 U	15	4400 U	6 U	9 J
SEMIVOLATILES (ug/kg)																			
2-Methylnaphthalene	---	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	290	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	29,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	29,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	100,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	290,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	88,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	30,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	29,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	190,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	54,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	180,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)																			
Aluminum	100,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	2,700	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	100,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	810,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	---	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	450,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	---	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	750,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	---	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	610,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	41,000,000	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ND - Not detected.
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D - Secondary dilution factor
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Appendix D: Table 1
Soil Sampling Results
Summary of Detected Constituents
PPG Oak Creek

SAMPLE ID SAMPLE LOCATION DEPTH (ft - bgs) SAMPLE DATE PARAMETER	Region IX PRGs	GS-32 0.00-2.0 8/10/91	GS-33 0.00-2.0 8/6/91	GS-34 0.00-2.0 8/6/91	GS-35 0.00-2.0 8/4/91	GS-35 dup 0.00-2.0 8/4/91	GS-36 0.00-2.0 8/8/91	GS-37 0.00-2.0 8/4/91	GS-38 0.00-2.0 8/5/91	GS-39 0.00-2.0 8/6/91	GS-40 0.00-2.0 8/7/91	GS-41 0.00-2.0 8/4/91	GS-42 0.00-2.0 8/4/91	SB-1 0.0-4.0 6/7/00	SB-1 4.0-8.0 6/7/00	SB-2 0.0-4.0 6/7/00	SB-2 4.0-8.0 6/7/00
VOLATILES (ug/kg)																	
1,1,2,2-Tetrachloroethane	900	11 U	11 U	11 U	11 U	11 U	1300 U	11 U	13000 U	33000 U	13000 U	11 U	11 U	0.90 U	90.00 U	0.90 U	0.90 U
2-Butanone (MEK)	28,000,000	11 U	11 U	11 U	6 J	11 U	1300 U	11 U	13000 U	33000 U	26000 U	11 U	11 U	19	1400	89 U	91 U
2-Hexanone	---	17 U	17 U	16 U	16 U	16 U	2100 U	16 U	20000 U	52000 U	41000 U	17 U	17 U	NA	NA	NA	NA
4-Methyl-2-pentanone (MIBK)	2,900,000	17 U	17 U	16 U	22	76	2100 U	1 J	20000 U	52000 U	9900 J	17 U	17 U	16	910 U	14	9 U
Acetone	6,200,000	10 BJ	16 B	64 B	94 B	58 B	1300 U	21 B	13000 U	33000 U	26000 U	17 B	24 B				
Benzene	1,500	6 U	6 U	5 U	5 U	5 U	670 U	5 U	6700 U	17000 U	13000 U	6 U	6 U	1.1	460 U	0.9	0.7
Crotonaldehyde	---	110 U	110 U	110 U	110 U	110 U	13000 U	110 U	130000 U	330000 U	260000 U	110 U	110 U	NA	NA	NA	NA
Chlorobenzene	540,000	6 U	6 U	5 U	1 J	5 U	670 U	5 U	6700 U	17000 U	13000 U	6 U	6 U	NA	NA	NA	NA
Chloroform	520	6 U	6 U	5 U	5 U	5 U	670 U	5 U	6700 U	17000 U	13000 U	6 U	6 U	NA	NA	NA	NA
Ethylmethacrylate	140,000	11 U	11 U	11 U	11 U	11 U	1300 U	11 U	13000 U	33000 U	26000 U	11 U	11 U	NA	NA	NA	NA
Ethylbenzene	230,000	6 U	6 U	5 U	5 U	5 U	670 U	5 U	34000	100000	13000 U	6 U	15	5700	2800	180	0.7
Methylene chloride	21,000	14 B	28 B	22 B	14 B	25 B	500 BJ	17 B	1700 BJ	12000 BJ	14000 BJ	31 B	24 B	1.2	460 U	4 U	4 U
Styrene	1,700,000	6 U	6 U	5 U	5 U	5 U	670 U	5 U	6700 U	17000 U	13000 U	6 U	6 U	4 U	460 U	4 U	4 U
Trans-1,4-Dichloro-2-Butene	18	17 U	17 U	16 U	16 U	16 U	2100 U	16 U	20000 U	52000 U	41000 U	17 U	17 U	NA	NA	NA	NA
Tetrachloroethene	19,000	6 U	6 U	5 U	5 U	5 U	670 U	5 U	6700 U	17000 U	13000 U	6 U	6 U	3.5	90 U	0.9 U	0.9 U
Toluene	520,000	6 U	6 U	5 U	8	12	670 U	5 U	69000	630000	13000 U	6 U	6 U	2.9	240	530	0.9
Trichloroethene	6,100	6 U	6 U	5 U	5 U	5 U	670 U	5 U	6700 U	17000 U	13000 U	6 U	6 U	NA	NA	NA	NA
Trichlorofluoromethane	2,000,000	6 U	6 U	5 U	5 U	5 U	670 U	1 J	6700 U	17000 U	13000 U	6 U	6 U	NA	NA	NA	NA
Xylenes (total)	210,000	6 U	6 U	5 U	24	29	1700	4 J	280000	490000	390000	6 U	29	66000	75000	580	2.8
SEMIVOLATILES (ug/kg)																	
2-Methylnaphthalene	---	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	290	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	29,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	29,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	100,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	290,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	88,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	30,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	29,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	190,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	54,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	180,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)																	
Aluminum	100,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	2,700	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	100,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	810,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	---	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	450,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	---	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	750,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	---	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	610,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	41,000,000	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Soil Sampling Results
Summary of Detected Constituents
PPG Oak Creek

SAMPLE ID SAMPLE LOCATION DEPTH (ft - bgs) SAMPLE DATE PARAMETER	Region IX PRGs	SB-3 0.0-4.0 6/7/00	SB-3 8.0-12.0 6/7/00	SB-4 0.0-4.0 6/7/00	SB-4 4.0-8.0 6/7/00	SB-5 0.0-4.0 6/7/00	SB-5 8.0-12.0 6/7/00	SB-6 0.0-4.0 1/1/01	SB-6 4.0-8.0 1/1/01	SB-7 0.0-4.0 1/1/01	SB-7 4.0-8.0 1/1/01	SB-8 0.0-4.0 1/1/01	SB-8 8.0-12.0 1/1/01	SB-9 0.0-4.0 1/1/01	SB-9 4.0-8.0 1/1/01
VOLATILES (ug/kg)															
1,1,2,2-Tetrachloroethane	900	0.90 U	0.90 U	0.80 U	0.90 U	0.90 U	0.90	0.90 U	90.00 U	0.90 U	98.00 U	0.70 U	0.80 U	0.90 U	0.90 U
2-Butanone (MEK)	28,000,000	5	48	79 U	9	88 U	4	85 U	9000 U	86 U	9800 U	74 U	79 U	87 U	87 U
2-Hexanone	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone (MIBK)	2,900,000	9 U	5200	320	6	9 U	9 U	13	900 U	19	980 U	7 U	8 U	9 U	9 U
Acetone	6,200,000														
Benzene	1,500	2	4 U	4 U	4 U	0.6	1	4 U	450 U	4 U	490 U	4 U	4 U	4 U	4 U
Crotonaldehyde	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	540,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	520	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylmethacrylate	140,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	230,000	3	1100	8	6	0.4	5 U	4 U	890	28	78000	4 U	4 U	29	4 U
Methylene chloride	21,000	0.7	2	1	4 U	0.7	1	4 U	450 U	4 U	490 U	4 U	4 U	4 U	4 U
Styrene	1,700,000	5 U	4 U	4 U	4 U	4 U	5 U	4 U	450 U	4 U	490 U	4 U	4 U	4 U	4 U
Trans-1,4-Dichloro-2-Butene	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	19,000	0.9 U	0.9 U	0.8 U	0.9 U	0.9 U	0.9	8.2	90 U	64	200	0.7 U	0.8 U	0.9 U	0.9 U
Toluene	520,000	22	27 U	1	3	1	2	5	450 U	29	68000	4 U	4 U	4 U	6
Trichloroethene	6,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	2,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	210,000	101	74000	5960	31	2	6	1050	308000	11400	730000	4 U	4 U	4 U	4 U
SEMIVOLATILES (ug/kg)															
2-Methylnaphthalene	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	290,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	88,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	30,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	190,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	54,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	180,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)															
Aluminum	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	810,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	450,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	750,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	610,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	41,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ND - Not detected.
U - Not detected.
J - Estimated.
B - Blank contamination.
NA - Not analyzed.
D - Secondary dilution factor
DUP - Duplicate.

Appendix D: Table 1
Soil Sampling Results
Summary of Detected Constituents
PPG Oak Creek

SAMPLE ID SAMPLE LOCATION DEPTH (ft - bgs) SAMPLE DATE PARAMETER	Region IX PRGs	SB-10 0.0-4.0 1/1/01	SB-10 8.0-12.0 1/1/01	SB-11 0.0-4.0 1/1/01	SB-11 4.0-8.0 1/1/01	SB-11DUP 4.0-8.0 1/1/01	SB-12 0.0-4.0 1/1/01	SB-12 4.0-8.0 1/1/01	SB-13 0.0-4.0 1/1/01	SB-13 8.0-12.0 1/1/01	SB-14 0.0-4.0 1/1/01	SB-14 8.0-12.0 1/1/01	SB-14DUP 8.0-12.0 1/1/01
VOLATILES (ug/kg)													
1,1,2,2-Tetrachloroethane	900	0.90 U	1.00 U	0.90 U	1.00 U	1.00 U	0.90 U	0.90 U	1.00 U	1000.00 U	1.00 U	92.00 U	1.00 U
2-Butanone (MEK)	28,000,000	86 U	120 U	93 U	120 U	120 U	87 U	92 U	98 U	100000 U	96 U	9200 U	100 U
2-Hexanone	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone (MIBK)	2,900,000	9 U	12 U	9 U	12 U	12 U	9 U	9 U	9 U	10000 U	10 U	920 U	10 U
Acetone	6,200,000												
Benzene	1,500	4 U	6 U	5 U	6 U	6 U	4 U	5 U	5 U	5200 U	5.1 U	460 U	5 U
Crotonaldehyde	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	540,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	520	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylmethacrylate	140,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	230,000	4 U	6 U	5 U	6 U	6 U	9.1	5 U	5 U	1600	130	1000	57
Methylene chloride	21,000	4 U	6 U	5 U	6 U	6 U	4 U	5 U	5 U	5200 U	5 U	460 U	5 U
Styrene	1,700,000	4 U	6 U	5 U	6 U	6 U	4 U	5 U	5 U	5200	3800	460 U	5 U
Trans-1,4-Dichloro-2-Butene	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	19,000	0.9 U	1 U	0.9 U	1 U	1 U	0.9 U	0.9 U	1 U	1000 U	1 U	92 U	1 U
Toluene	520,000	4 U	6 U	5 U	6 U	6 U	4 U	5 U	7.3	5200 U	14	460 U	13
Trichloroethene	6,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	2,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	210,000	4 U	6 U	5 U	6 U	6 U	56.8	5 U	17.9	490000	1573	2800	3576
SEMIVOLATILES (ug/kg)													
2-Methylnaphthalene	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	290,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl phthalate	88,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	30,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	190,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	54,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	180,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)													
Aluminum	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	100,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	810,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	450,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	750,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	---	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	610,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	41,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ND - Not detected.
U - Not detected.
J - Estimated.
B - Blank contamination.
NA - Not analyzed.
D - Secondary dilution factor
DUP - Duplicate.

Appendix D. .able 2A
Groundwater Sampling Results (January2001)
Summary of Detected Constituents
PPG Oak Creek

Sample Location	Benzene	Ethyl-benzene	Toluene	Total Xylenes	MIBK (a)	Methylene Chloride	MEK (b)	Styrene	1,1,2,2-Tetra-chloroethane	Tetra-chloroethene
SB-6	ND 0.005	0.58	0.008	2.27	ND 0.01	ND 0.005	ND 0.1	ND 0.005	ND 0.0005	ND 0.0005
SB-7	ND 0.005	**3.000**	0.079	4.63	ND 0.01	ND 0.005	ND 0.1	ND 0.005	ND 0.0005	ND 0.0005
SB-8	ND 0.005	0.079	ND 0.005	ND 0.005	ND 0.01	ND 0.005	ND 0.1	ND 0.005	ND 0.0005	ND 0.0005
SB-9	ND 0.005	0.59	ND0.005	0.075	ND 0.01	ND 0.005	ND 0.1	ND 0.005	ND 0.0005	ND 0.0005
SB-10	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.010	ND 0.005	ND 0.10	ND 0.005	ND 0.0005	ND 0.0005
SB-11	ND 0.005	0.097	ND 0.005	0.247	ND 0.010	ND 0.005	ND 0.10	ND 0.005	ND 0.0005	ND 0.0005
SB-12	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.010	ND 0.005	ND 0.10	ND 0.005	ND 0.0005	ND 0.0005
SB-12 (DUP)	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.010	ND 0.005	ND 0.10	ND 0.005	ND 0.0005	ND 0.0005
SB-13	**0.013**	0.011	0.006	0.034	ND 0.01	ND 0.005	ND 0.1	ND 0.005	ND 0.0005	ND 0.0005
SB-14	0.047	**6.400**	ND 0.005	0.068	ND 0.01	ND 0.005	ND 0.100	ND 0.005	ND 0.0005	ND 0.0005

Notes:
(a) MIBK - Methyl isobutyl ketone or 4-Methyl-2-pentanone.
(b) MEK - Methyl ethyl ketone or 2-butanone.
ND - Not detected
Units: mg/L

Appendix D. Table 2B
Groundwater Sampling Results (May 2002)
Summary of Detected Constituents
PPG Oak Creek

Constituent (ug/L)	LW-2	LW-6	LW-5	TF-1	TF-1 DUP	TF-3	TF-3 DUP	MW-11	MW-12
Acetone	ND 100	ND 100	32 J	58 J	54 J	950 J	1300 J	ND 100	ND 100
Benzene	ND 0.4	ND 0.4	0.48	0.5	0.47	2	1.9	ND 0.4	ND 0.4
2-Butanone	ND 100	ND 100	ND 100	ND 100	ND 100	8500 J	11000	ND 100	ND 100
cis-1,2-Dichloroethene	ND 5	ND 5	ND 5	ND 5	ND 5	0.85 J	0.87 J	ND 5	ND 5
Ethylbenzene	ND 5	0.44 J	160	0.82 J	0.9 J	190 J	150 J	ND 5	ND 5
2-Hexanone	ND 10	ND 10	ND 10	ND 10	ND 10	5.7 J	ND 10	ND 10	ND 10
4-Methyl-2-pentanone	ND 10	ND 10	ND 10	4.7 J	4.2 J	19000	24000	ND 10	ND 10
Naphthalene	ND 1	ND 1	3	2.7	2.7	49	45	ND 1	ND 1
Toluene	ND 5	ND 5	ND 5	ND 5	ND 5	280 J	280 J	ND 5	ND 5
Trichloroethene	ND 1	ND 1	ND 1	ND 1	ND 1	0.28 J	0.34 J	ND 1	ND 1
1,2,4-Trimethylbenzene	ND 5	ND 5	7.9	2.5 J	2.4 J	19	18	ND 5	ND 5
1,3,5-Trimethylbenzene	ND 5	ND 5	ND 5	ND 5	ND 5	2.4 J	1.9 J	ND 5	ND 5
Xylenes (total)	ND 5	0.74 J	180	1.2 J	1.1 J	1300	1300	ND 5	ND 5

ND - Not detected.
J - Estimated Concentration.
DUP - Duplicate.

Appendix D: Table 3
Samples Used in the Risk Evaluation (Screening and/or Risk Characterization)

Medium	Sample Numbers		
Soil [a]	B2-1.0 (1-3)	GS-20 (0-2)	SB-1-0-4[d]
	B5-8.5 (8.5-10.5)	GS-21 (0-2)	SB-1-4-8[d]
	B6-6.0 (6-7)	GS-22 (0-2)	SB-2-0-4[d]
	B7-8.5 (8.5-10.5)	GS-23 (0-2)	SB-2-4-8[d]
	B8-1.0 (1-3)	GS-24 (0-2)	SB-3-0-4[d]
	B9-1.0 (1-3)	GS-25 (0-2)	SB-3-8-12[d]
	B10-6.0 (6-8)	GS-26 (0-2)	SB-4-0-4[d]
	B11-11.0 (11-13)	GS-27 (0-2)	SB-4-4-8[d]
	B11-3.5 (3.5-5.5)	GS-28 (0-2)	SB-5-0-4[d]
	GS-1 (0-2)	GS-29 (0-2)	SB-5-8-12[d]
	GS-2 (0-2)	GS-30 (0-2)	SB-6-0-4[d]
	GS-3 (0-2)	GS-31 (0-2)	SB-6-4-8[d]
	GS-4 (0-2)	GS-32 (0-2)	SB-7-0-4[d]
	GS-5 (0-2)	GS-33 (0-2)	SB-7-4-8[d]
	GS-6 (0-2)	GS-34 (0-2)	SB-8-0-4[d]
	GS-7 (0-2)	GS-35 (0-2)	SB-8-8-12[d]
	GS-8 (0-2)	GS-36 (0-2)	SB-9-0-4[d]
	GS-9 (0-2)	GS-37 (0-2)	SB-9-4-8[d]
	GS-10 (0-2)	GS-38 (0-2)	SB-10-0-4[d]
	GS-11 (0-2)	GS-39 (0-2)	SB-10-8-12[d]
	GS-12 (0-2)	GS-40 (0-2)	SB-11-0-4[d]
	GS-13 (0-2)	GS-41 (0-2)	SB-11-4-8[d]
	GS-14 (0-2)	GS-42 (0-2)	SB-12-0-4[d]
	GS-15 (0-2)	PPG-HA10-01[b] (1.5-3.5)	SB-12-4-8[d]
	GS-16 (0-2)		SB-13-0-4[d]
	GS-17 (0-2)		SB-13-8-12[d]
	GS-18 (0-2)		SB-14-0-4[d]
	GS-19 (0-2)		SB-14-8-12[d]
Groundwater[c]	SB-6	SB-14	MW-12[e]
	SB-7	LW-2[e]	
	SB-8	LW-5[e]	
	SB-9	LW-6[e]	
	SB-10	TF-1[e]	
	SB-11	TF-1 (DUP)[e]	
	SB-12	TF-3[e]	
	SB-12 (DUP)	TF-3 (DUP)[e]	
	SB-13	MW-11[e]	

The values in parenthesis represent the depth interv al in feet.

The last two numbers in the SB series data represent the depth interval (i.e., SB-4-0-4 was taken at the 0 to 4 feet interval.

[a] Source: Warzyn, 1992a, as presented in the RFI Report (ICF Kaiser, 1997), unles otherw ise noted.

[b] Source: RFI, (ICF Kaiser, 1997) (Appendix C).

[c] Source: Corrective Measures Study, January 2001, unless otherwise noted.

[d] Source: Corrective Measures Study, June 2000 and January 2001

[e] Source: Groundwater Sampling Event, May 2002.

Note: The Industrial/Maintenance Worker Soil Sample Set contained only those samples with a depth of 0-2 feet bgs and Construction/Utility Worker Soil Sample Set contained only those samples with a depth of 0-6 feet bgs.

APPENDIX E
STATISTICAL METHODOLOGY AND CALCULATIONS

Appendix E
Statistical Methodology and Calculations
PPG Oak Creek

METHODOLOGY FOR DETERMINING DISTRIBUTION TYPE

The normal distribution is characterized with approximately 68 percent of total observations within 1 standard deviation on either side of the mean of a normal distribution. About 95 percent of observations fall within 2 standard deviations, and more than 99 percent fall within 3 standard deviations of the mean. If a population distribution is not normal, a sample standard deviation will not have these distribution characteristics. The data for each COPC were tested for fit to a normal distribution with the Shapiro-Wilk test (Gilbert, 1987). If the data fit a normal distribution, the arithmetic mean was calculated as:

$$\bar{x} = \frac{\sum x}{n}$$

where: $\bar{x}$ = arithmetic mean

$\sum x$ = the sum of data points

n = the number of data points

and the 95% Upper Confidence Limit (UCL) of the arithmetic mean of the normal distribution was calculated as the exposure point concentration (EPC) in soil. The following formula was used to calculate the 95 percent UCL (assuming a normal distribution).

$$UCL_{95} = \bar{x} + \frac{s \bullet t_{0.05,n-1}}{\sqrt{n}}$$

where:

n = sample size (number of data points);

s = sample standard deviation;

$t_{0.05,n-1}$ = 0.05 critical value for the t_{n-1} distribution;

UCL_{95} = 95 percent upper confidence level for the mean; and

$\bar{x}$ = sample mean (arithmetic average).

Appendix E
Statistical Methodology and Calculations
PPG Oak Creek

Lognormal Distribution Type

If the data exhibit significant lack of fit to a normal distribution, the data were transformed using the natural logarithm and tested for fit to a lognormal distribution with the Shapiro-Wilk test. If the data fit a lognormal distribution, the geometric mean was calculated as:

$$GMy = \text{antilog}\ \frac{1}{n} \sum \log Y$$

where:

	GMy	= geometric mean
	n	= number of data points
	$\sum \log Y$	= the sum of the logarithms of the data-points

and the 95 percent UCL of the geometric mean of the lognormal distribution was calculated as the exposure point concentration (EPC) in soil. The following formula was used to calculate the 95 percent UCL (assuming a lognormal distribution).

$$UCL_{95} = e^{\left(\bar{y} + \left(0.5 \bullet s_y^2\right) + \frac{s_y \bullet H_{0.95,n,sy}}{\sqrt{n-1}}\right)}$$

$$\text{where } \bar{y} = \sum_{i=1}^{n} y_i, \text{ and}$$

$$Sy^2 = \frac{1}{n-1} \sum_{i=1}^{n} (y_i - y)^2$$

Also,

n	=	sample size (number of data points)
s_y	=	sample standard deviation of the n transformed values $y_i = 1n\ x_i$.
UCL_{95}	=	95 percent upper confidence level for the mean;
$\bar{y}$	=	arithmetic mean of the n transformed values $y_i = 1n\ x_i$ *and*

$H_{0.95, n, sy}$ = tabulated value dependent on n and S_y (Gilbert 1987)

Undefined Distribution Type

If the data exhibit significant lack of fit for both a normal and lognormal distribution, then the distribution was undefined and a non-parametric 95 percent UCL was calculated. The data point selected as the nonparametric UCL is the 95 percent UCL rank order on the median (or 50th percentile) of the data set. It is estimated by ranking the data observations from smallest to largest. The rank order of the data point selected as the UCL is estimated from the following equation (Equation 13.22 in Gilbert, 1987). If the calculated rank is greater than the sample size, the maximum detected value is reported. If a fractional rank is calculated, the rank equivalent value is interpolated.

$$u = [(n+1)/2] + \{[Z_{1-\alpha}\sqrt{n}]/2\}$$

where:

u	=	rank order of value selected as upper confidence limit, calculated
n	=	number of samples in the data set
α	=	confidence limit (95 percent)
$Z_{1-\alpha}$	=	normal deviate variable (one-sided) (1.645)-Gilbert, 1987

Appendix E
Statistical Methodology and Calculations
PPG Oak Creek

Statistics for Groundwater sample set	1,2,4-Timethylbenzene	1,3,5-Trimethylbenzene	2-Butanone	2-Hexanone	Acetone	Benzene	cis-1,2-DCE	Ethylbenzene	MIBK	Naphthalene	Toluene	Trichloroethene	Xylenes
No. of data points	7	7	16	7	7	16	7	16	16	7	16	7	16
No. of detects	3	1	1	1	3	5	1	11	2	3	4	1	10
Frequency of detects	42.9%	14.3%	6.3%	14.3%	42.9%	31.3%	14.3%	68.8%	12.5%	42.9%	25.0%	14.3%	62.5%
Minimum of detects	2.5	N/A	N/A	N/A	32	0.5	N/A	0.4	4.5	2.7	6	N/A	0.74
Maximum of detects	19	2.2	9800	5.7	1100	47	0.9	6400	22000	47	280	0.31	4630
Minimum of nondetects	< 5	< 5	< 100	< 10	< 100	< 0.4	< 5	< 5	< 10	< 1	< 5	< 1	< 5
Maximum of nondetects	< 5	< 5	< 100	< 10	< 100	< 5	< 5	< 5	< 10	< 1	< 5	< 1	< 5
Arithmetic Mean (Eq 4.3)	5.63E+00	2.46E+00	6.59E+02	5.10E+00	1.98E+02	5.08E+00	2.27E+00	6.94E+02	1.38E+03	7.81E+00	2.52E+01	4.73E-01	5.51E+02
Arithmetic Std. Dev (Eq 4.4)	6.23E+00	1.13E-01	2.44E+03	2.65E-01	3.98E+02	1.16E+01	6.20E-01	1.69E+03	5.50E+03	1.73E+01	7.06E+01	7.18E-02	1.25E+03
Geometric Mean (Eq 13.1)	3.94E+00	2.45E+00	6.95E+01	5.09E+00	7.41E+01	1.42E+00	2.15E+00	3.05E+01	8.39E+00	1.57E+00	4.73E+00	4.67E-01	2.50E+01
Geometric Std. Dev. (Eq 13.2)	2.26E+00	1.05E+00	3.74E+00	1.05E+00	3.33E+00	4.83E+00	1.50E+00	2.08E+01	8.16E+00	5.52E+00	4.09E+00	1.20E+00	1.86E+01
Distribution	U	U	U	U	U	LQ	U	L	U	U	U	U	LQ
Median (Eq 13.15 & 13.16)	< 5	< 5	< 100	< 10	< 100	< 5	< 5	4.50E+01	< 10	< 1	< 5	< 1	1.83E+01
UCL (95%) - Normal (Eq 11.6)	1.02E+01	2.54E+00	1.73E+03	5.29E+00	4.90E+02	1.02E+01	2.72E+00	1.44E+03	3.79E+03	2.05E+01	5.61E+01	5.26E-01	1.10E+03
UCL (95%) - Lognormal (Eq 13.13)	1.59E+01	2.55E+00	4.99E+02	5.30E+00	1.26E+03	2.19E+01	3.39E+00	4.90E+05	9.51E+02	3.94E+02	4.38E+01	5.49E-01	2.02E+05
UCL (95%) - Nonparametric (Eq 13.22)	1.90E+01	2.20E+00	9.80E+03	5.70E+00	1.10E+03	4.70E+01	8.60E-01	6.40E+03	2.20E+04	4.70E+01	2.80E+02	3.10E-01	4.63E+03
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L

Appendix E
Statistical Methodology and Calculations
PPG Oak Creek

Statistics for 0-2 feet soil sample set	Ethylbenzene	Toluene	Xylene
No. of data points	46	46	46
No. of detects	15	14	25
Frequency of detects	32.6%	30.4%	54.4%
Minimum of detects	1	2	2
Maximum of detects	810000	630000	2100000
Minimum of nondetects	< 5	< 5	< 5
Maximum of nondetects	< 13000	< 13000	< 4400
Arithmetic Mean (Eq 4.3)	2.54E+04	3.08E+04	9.00E+04
Arithmetic Std. Dev (Eq 4.4)	1.22E+05	1.24E+05	3.26E+05
Geometric Mean (Eq 13.1)	4.79E+01	3.48E+01	1.32E+02
Geometric Std. Dev. (Eq 13.2)	4.93E+01	4.93E+01	9.15E+01
Distribution	U	U	U
Median (Eq 13.15 & 13.16)	< 6	< 6	2.10E+01
UCL (95%) - Normal (Eq 11.6)	5.56E+04	6.15E+04	1.71E+05
UCL (95%) - Lognormal (Eq 13.13)	3.87E+06	2.80E+06	4.89E+08
UCL (95%) - Nonparametric (Eq 13.22)	2.61E+01	1.03E+01	2.11E+02
Units	ug/kg	ug/kg	ug/kg

Statistics for 0-6 feet soil sample set	Ethylbenzene	Toluene	Xylene
No. of data points	61	61	61
No. of detects	25	24	36
Frequency of detects	41.0%	39.3%	59.0%
Minimum of detects	0	1	2
Maximum of detects	810000	630000	2100000
Minimum of nondetects	< 4	< 4	< 4
Maximum of nondetects	< 13000	< 13000	< 4400
Arithmetic Mean (Eq 4.3)	1.93E+04	2.32E+04	6.93E+04
Arithmetic Std. Dev (Eq 4.4)	1.06E+05	1.08E+05	2.85E+05
Geometric Mean (Eq 13.1)	3.51E+01	2.23E+01	1.29E+02
Geometric Std. Dev. (Eq 13.2)	3.77E+01	3.50E+01	7.22E+01
Distribution	U	U	U
Median (Eq 13.15 & 13.16)	< 6	< 6	2.90E+01
UCL (95%) - Normal (Eq 11.6)	4.20E+04	4.64E+04	1.30E+05
UCL (95%) - Lognormal (Eq 13.13)	3.71E+05	1.63E+05	4.88E+07
UCL (95%) - Nonparametric (Eq 13.22)	1.97E+01	5.98E+00	2.59E+02
Units	ug/kg	ug/kg	ug/kg

Statistics for 0-12 feet soil sample set	Ethylbenzene	Toluene	Xylene
No. of data points	80	80	80
No. of detects	37	34	49
Frequency of detects	46.3%	42.5%	61.3%
Minimum of detects	0	1	2
Maximum of detects	810000	630000	2100000
Minimum of nondetects	< 4	< 4	< 4
Maximum of nondetects	< 13000	< 13000	< 4400
Arithmetic Mean (Eq 4.3)	1.61E+04	1.87E+04	7.55E+04
Arithmetic Std. Dev (Eq 4.4)	9.29E+04	9.51E+04	2.66E+05
Geometric Mean (Eq 13.1)	4.54E+01	2.58E+01	1.78E+02
Geometric Std. Dev. (Eq 13.2)	4.00E+01	3.26E+01	8.87E+01
Distribution	U	U	U
Median (Eq 13.15 & 13.16)	4.50E+00	3.00E+00	3.10E+01
UCL (95%) - Normal (Eq 11.6)	3.34E+04	3.64E+04	1.25E+05
UCL (95%) - Lognormal (Eq 13.13)	4.23E+05	9.03E+04	1.24E+08
UCL (95%) - Nonparametric (Eq 13.22)	2.69E+01	9.61E+00	5.03E+02
Units	ug/kg	ug/kg	ug/kg

APPENDIX F
FATE AND TRANSPORT MODELING METHODOLOGY AND CALCULATIONS

Appendix F:
Fate and Transport Modeling Calculations
PPG Oak Creek

Domenico's Model of Fate and Transport in Groundwater - Future Exposure at Property Boundary
Maximum Benzene Concentration

Parameters

C(x)	Concentration of chemical at Point of Exposure (POE) (mg/L)	See table below	
RBCw	Concentration of chemical at source area (mg/L)	See table below	
x	Distance from source area to POE (m)	91.4	Site Specific (SB-13 eastward to property boundary)
Alpha-x	Longitudinal groundwater dispersivity (m)	9.1	default
Alpha-y	Transverse groundwater dispersivity (m)	0.91	default
Alpha-z	Vertical groundwater dispersivity (m)	0.001	default
Lambda	First-order degradation rate (1/day) for chemical.	See table below	Howard et. Al, 1991
Pb	Dry Bulk Density (g/cm^3)	1.50	US EPA SSL Guidance, 1996
Foc	Fraction Organic Carbon	0.002	US EPA SSL Guidance, 1996
Koc	Organic Carbon Partition Coefficient (cm^3/g)	See table below	
Kd	Soil Water Partition Coefficient (cm^3/g)	See table below	
v	Groundwater seepage velocity (m/day)	See table below	
R	Constituent retardation factor	See table below	
Sw	Groundwater source term width (m)	41.00	site-specific estimate (135 feet, width of tank field perpendicular to gw flow)
Sd	Groundwater source term thickness (m)	1.70	site-specific estimate (5.5 feet, minimum average depth to gw/thickness of vadose zone)
K	Hydraulic conductivity (m/day)	3.2000	site-specific estimate (information presented in section 8.3.2 of RFI report)
ne	Effective soil porosity	0.30	US EPA SSL Guidance, 1996
dpf	Darcian Pore Factor	0.95	literature value for K = 1E-03 cm/sec (Fetter, 1988)
i	Gradient	0.050	site-specific (based on historic groundwater elevation data)

Equations

R = 1+ (Pb*Kd/ne)

v = K * i / (ne*dpf)

$$\frac{C(x)}{RBCw} = \exp\left(\frac{x}{2\,\text{alpha-x}}\left(1-\sqrt{1+\frac{4\,\text{lamda}\cdot a}{v}}\right)\right) \underbrace{\left(\text{erf}\frac{Sw}{4\sqrt{\text{alpha-y}\cdot x}}\right)}_{\text{Term 1}} \underbrace{\left(\text{erf}\frac{Sd}{2\sqrt{\text{alpha-z}\cdot x}}\right)}_{\text{Term 2}}$$

Calculations

v =	0.56
Term 1=	1.12
erf(Term1)=	0.89
Term 2 =	2.81
erf (Term 2) =	1.00

erf(x) = (1-EXP(-4*(X^2)/3.14159))^0.5 (From Richardson, et al. , 1989)

References: Richardson, et al., 1989. Geochemistry: pathways and processes. Prentice Hall: Englewood Cliffs, NJ.

Chemical	RBCw (mg/L)	Koc	Kd	R	Lambda (1/day)	C(x) (mg/L)
Benzene	0.013	38.00	0.08	1.38	0.0009	9.53E-03

Appendix F:
Fate and Transport Modeling Calculations
PPG Oak Creek

Maximum Ethylbenzene Concentration

Parameters

C(x)	Concentration of chemical at Point of Exposure (POE) (mg/L)	See table below	
RBCw	Concentration of chemical at source area (mg/L)	See table below	
x	Distance from source area to POE (m)	103.6	Site Specific (SB-13 eastward to property boundary)
Alpha-x	Longitudinal groundwater dispersivity (m)	10.4	default
Alpha-y	Transverse groundwater dispersivity (m)	1.04	default
Alpha-z	Vertical groundwater dispersivity (m)	0.001	default
Lambda	First-order degradation rate (1/day) for chemical.	See table below	Howard et. Al, 1991
Pb	Dry Bulk Density (g/cm^3)	1.50	US EPA SSL Guidance, 1996
Foc	Fraction Organic Carbon	0.002	US EPA SSL Guidance, 1996
Koc	Organic Carbon Partition Coefficient (cm^3/g)	See table below	
Kd	Soil Water Partition Coefficient (cm^3/g)	See table below	
v	Groundwater seepage velocity (m/day)	See table below	
R	Constituent retardation factor	See table below	
Sw	Groundwater source term width (m)	41.00	site-specific estimate (135 feet, width of tank field perpendicular to gw flow)
Sd	Groundwater source term thickness (m)	1.70	site-specific estimate (5.5 feet, minimum average depth to gw/thickness of vadose zone)
K	Hydraulic conductivity (m/day)	3.2000	site-specific estimate (information presented in section 8.3.2 of RFI report)
ne	Effective soil porosity	0.30	US EPA SSL Guidance, 1996
dpf	Darcian Pore Factor	0.95	literature value for K = 1E-03 cm/sec (Fetter, 1988)
i	Gradient	0.050	site-specific (based on historic groundwater elevation data)

Equations

R = 1+ (Pb*Kd/ne)

v = K * i / (ne*dpf)

$$\frac{C(x)}{RBCw} = \exp\left(\frac{x}{2\,\text{alpha-x}}\left(1 - \sqrt{1 + \frac{4\,\text{lamda} * \varepsilon}{v}}\right)\right) \underbrace{\text{erf}\frac{Sw}{4\,\text{sqrt(alpha-y} * x)}}_{\text{Term 1}} \underbrace{\text{erf}\frac{Sd}{2\,\text{sqrt(alpha-z} * x)}}_{\text{Term 2}}$$

Calculations

v =	0.56
Term 1=	1.12
erf(Term1)=	0.89
Term 2 =	2.81
erf (Term 2) =	1.00

erf(x) = (1-EXP(-4*(X^2)/3.14159))^0.5 (From Richardson, et al. , 1989)

References: Richardson, et al., 1989. Geochemistry: pathways and processes. Prentice Hall: Englewood Cliffs, NJ.

Chemical	RBCw (mg/L)	Koc	Kd	R	Lambda (1/day)	C(x) (mg/L)
Ethylbenzene	6.400	1288.00	2.58	13.88	0.0030	5.56E-02

Appendix F:
Assumptions of the Domineco Model
PPG Oak Creek

Groundwater Flow direction - Groundwater flow direction in the Tank Farm area is assumed to be eastward if the underdrain system is deactivated (Section 8.3.2 of RFI).

Gradient - The gradient of groundwater flow was determined by calculating gradients from TW-6 to TW-1 and from TW-6 to TW-7. The highest gradient was utilized to err conservatively. The gradient utilized is 0.01 ft/ft.

Max Benzene Concentration and distance - The max location for benzene was at SB-13, approximately 300 feet west of the property line and POC for the evaluation.

Max Ethylbenzene Concentration and distance - The max location for ethylbenzene was at SB-14, approximately 340 feet west of the property line and POC for the evaluation.

Hydraulic conductivity – Conductivity values were presented in the RFI Section 8.3.2 to range from 1.5×10^{-4} to 3.7×10^{-3} cm/s. The higher value was selected for the fate and transport analysis.

Depth to Groundwater – Average depth to groundwater for the site was determined by averaging the depth to groundwater at each well monitored from 1987 through 1992. An average depth was determined for each sampling event and the minimum average depth was chosen to represent the depth to groundwater for the evaluation. The minimum average depth to groundwater is 5.5 feet.

Tank Field Width - The tank field width was estimated to be approximately 135 feet perpendicular to the direction of groundwater flow from site maps.

APPENDIX G
RISK ASSUMPTIONS AND CALCULATIONS FOR INGESTION AND DERMAL CONTACT WITH SOIL AND DERMAL CONTACT WITH GROUNDWATER

File

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

Internal Memorandum

DATE: June 13, 2003

SUBJECT: Risk Evaluation of Tank Farm Area - Final Report (March 2003); PPG Oak Creek Facility (Oak Creek, WI)
WID 059 972 935.

FROM: Mario M. Mangino
Toxicologist, Waste Management Branch

TO: Nate Nemani
Permit Writer, Waste Management Branch

The U.S. EPA has received the above named Report from PPG Industries for its Oak Creek, WI facility. The Report was prepared by Shaw Environmental (Chicago, IL). This Report was required to respond to two previous comment letters from EPA which requested specific revisions to the draft Report.

At your request, I have reviewed this Report with a focus on the revised section titled: Future Construction/Utility Worker. EPA requested PPG to evaluate potential cancer risks and noncancer hazards for dermal contact with groundwater resulting from a future excavation project. The relevant parts of the Report are located on pages 17-18 and Appendix G, Table 3.

Appendix G, Table 3

This Table lists the exposure factors, toxicity factors, and calculations that the Report used to estimate the cancer risk and hazard index for dermal exposure to groundwater contaminants. The exposure factors are appropriate. However, review of the toxicity factors revealed that one of the factors was out of date and should be revised. This factor is the reference dose (RfD) for Xylenes. PPG used a value of 2.0 mg/kg-day. A review of EPA's IRIS file of chemical toxicity information indicated that EPA revised the Xylene file in February 2003. The new RfD value for Xylene is 0.2 mg/kg-day. Because PPG was completing this Report about the same time as the Xylene file was revised, PPG likely overlooked the change in the RfD. If the new Xylene RfD is employed, the values shown in Table 3 would change as follows:

	Reference Dose (RfD)	"HI" Hazard Index
Xylene	2.00E-01	9.60E-02
	SUMMATION:	4.20E-01

Page 18

This page has a table summarizing the estimated cancer risks and hazards for the Construction/Utility Worker. For the lower part of the table labeled: "Dermal Contact with Groundwater," the Noncarcinogenic Hazard Quotient for Xylene should be revised to 0.096, and the Total Hazard should be revised to 0.42.

Recommendation

As we discussed at our meeting, these revisions would not appear to change the outcome of the risk evaluation, i.e., these revisions are not significant enough to raise the Hazard Index to a level for which the EPA would require further action.

Consequently, my recommendation is that this memo should be attached to the Administrative File for the corrective action project *in lieu* of requiring PPG to submit another revised Report to make the above changes.

Please feel free to contact me if any clarification is needed on the explanations provided above.

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Appen Table 1
Calculation of Soil Risks and Hazards, Current and Future Industrial/Maintenance Worker
PPG Oak Creek

Print date: 03/28/03

Site Name: Oak Creek- WI
Incidental Ingestion and Dermal Contact With Surface Soils Constituents
Scenario: Contact with surface soils during daily work activities (0-2 ft)
Receptor: Current and Future Adult Industrial/Maintenance Worker

This table calculates estimated body dose, incremental cancer risk, and hazard indices for ingestion of and dermal contact with soil constituents.
The equations used to calculate body doses, incremental cancer risks, and hazard indices are:

Body Dose = {CS * [(IR * FI) + (SA * AF * ABSd/ABSo)] * CF * EF * ED}/(BW (mg/kg-day)

Hazard Index = Body Dose/Reference Dose (RfD) (mg/kg-day)/(mg/kg-day)

Cancer Risk = Body Dose (mg/kg-day) * Cancer Slope Factor (mg/kg-day)^-1

WHERE:

CS = CONCENTRATION OF CONSTITUENT IN SOIL as 95% UCL (mg/k
IR = INGESTION RATE (mg/day)
FI = FRACTION INGESTED FROM CONTAMINATED SOURCE
SA = SKIN SURFACE AREA (cm^2)
AF = SOIL TO SKIN ADHERENCE FACTOR (mg/cm^2/day)
ABSd = DERMAL ABSORPTION FACTOR (unitless)
ABSo = ORAL ABSORPTION FACTOR (unitless)
CF = CONVERSION FACTOR (10^-6 kg/mg)
EF = EXPOSURE FREQUENCY (days/yr)
ED = EXPOSURE DURATION (years)
BW = BODY WEIGHT (kg)
AT = AVERAGING TIME (period over which exposure is averaged)
CSF = CANCER SLOPE FACTOR (mg/kg-day)^-1
RfD = REFERENCE DOSE OR STANDARD (mg/kg-day)

Constituents	"CS" Concentration (mg/kg)	"IR" Ingest. Rate (mg/day)	"FI" Fraction Ing. (unitless)	"SA" Skin Area (cm^2)	"AF" Adherence Fac (mg/cm^2/day)	"ABSd" Dermal Abs. (unitless)	"ABSo" Oral Abs. (unitless)	"EF" Exp. Freq. (days/yr)	"ED" Exp. Dur-ation (yrs)	"BW" Body Wt. (kg)	"AT" Averaging Time (days)	Body Dose (Ingestion) (mg/kg-day)	Body Dose (Dermal) (mg/kg-day)	Body Dose (Total) (mg/kg-day)	Oral RfD (mg/kg-day)	Oral CSF (mg/kg-day)-1	Oral Hazard index	Dermal Hazard Index	Combined Hazard Index	Oral Cancer Risk	Dermal Cancer Risk	Combined Cancer Risk
Carcinogenic Effects:																						
Ethylbenzene	0.026	50	1.0	2,000	0.07	0.03	1.00	250	25	70	25,550	4.54E-09	3.82E-10	4.92E-09		NA				NA	NA	NA
Toluene	0.01	50	1.0	2,000	0.07	0.03	1.00	250	25	70	25,550	1.75E-09	1.47E-10	1.89E-09		NA				NA	NA	NA
Xylene	0.21	50	1.0	2,000	0.07	0.03	1.00	250	25	70	25,550	3.67E-08	3.08E-09	3.98E-08		NA				NA	NA	NA
Noncarcinogenic Effects:																						
Ethylbenzene	0.026	50	1.0	2,000	0.07	0.03	1.00	250	25	70	9,125	1.27E-08	1.07E-09	1.38E-08	1.00E-01		1.27E-07	1.07E-08	1.38E-07			
Toluene	0.01	50	1.0	2,000	0.07	0.03	1.00	250	25	70	9,125	4.89E-09	4.11E-10	5.30E-09	2.00E-01		2.45E-08	2.05E-09	2.65E-08			
Xylene	0.21	50	1.0	2,000	0.07	0.03	1.00	250	25	70	9,125	1.03E-07	8.63E-09	1.11E-07	2.00E+00		5.14E-08	4.32E-09	5.57E-08			
																SUMMATION	1.5E-07	1.3E-08	1.6E-07	0.0E+00	0.0E+00	0.0E+00

Note: Dermal body dose expressed as administered dose by taking into account oral absorption factor (i.e., by dividing dermal absorbed dose by oral absorption factor).

References: Skin surface area, adherence factor, oral absorption, ingestion rate, exposure frequency, and exposure duration, as per RFI (ICF Kaiser, 1997)
Dermal Absorption as per EPA Region 3- Assessing Dermal Exposure From Soil (EPA/903-K-95-003).
Toxicity information as per EPA, IRIS 2001.
NOTE: Maximum detected concentrations used to determine worst-case scenario.

Apper. . Table 2
Calculation of Soil Risks and Hazards, Future Construction/Utility Worker
PPG Oak Creek

Print date: 03/28/03

Site Name: Oak Creek- WI
Incidental Ingestion and Dermal Contact With Surface Soils Constituents
Scenario: Contact with surface soils during daily work activities (0-6 ft)
Receptor: Future Adult Utility/Construction Worker

This table calculates estimated body dose, incremental cancer risk, and hazard indices for ingestion of and dermal contact with soil constituents.
The equations used to calculate body doses, incremental cancer risks, and hazard indices are:

Body Dose = {CS * [(IR * FI) + (SA * AF * ABSd/ABSo)] * CF * EF * ED}/(BW * AT) (mg/kg-day)

Hazard Index = Body Dose/Reference Dose (RfD) (mg/kg-day)/(mg/kg-day)

Cancer Risk = Body Dose (mg/kg-day) * Cancer Slope Factor (mg/kg-day)^-1

WHERE:

CS = CONCENTRATION OF CONSTITUENT IN SOIL- as 95% UCL (mg/kg)
IR = INGESTION RATE (mg/day)
FI = FRACTION INGESTED FROM CONTAMINATED SOURCE
SA = SKIN SURFACE AREA (cm^2)
AF = SOIL TO SKIN ADHERENCE FACTOR (mg/cm^2/day)
ABSd = DERMAL ABSORPTION FACTOR (unitless)
ABSo = ORAL ABSORPTION FACTOR (unitless)
CF = CONVERSION FACTOR (10^-6 kg/mg)
EF = EXPOSURE FREQUENCY (days/yr)
ED = EXPOSURE DURATION (years)
BW = BODY WEIGHT (kg)
AT = AVERAGING TIME (period over which exposure is averaged)
CSF = CANCER SLOPE FACTOR (mg/kg-day)^-1
RfD = REFERENCE DOSE OR STANDARD (mg/kg-day)

Constituents	"CS" Concentration (mg/kg)	"IR" Ingest. Rate (mg/day)	"FI" Fraction Ing. (unitless)	"SA" Skin Area (cm^2)	"AF" Adherence Fac. (mg/cm^2/day)	"ABSd" Dermal Abs. (unitless)	"ABSo" Oral Abs. (unitless)	"EF" Exp. Freq. (days/yr)	"ED" Exp. Dur-ation (yrs)	"BW" Body Wt. (kg)	"AT" Averaging Time (days)	Body Dose (Ingestion) (mg/kg-day)	Body Dose (Dermal) (mg/kg-day)	Body Dose (Total) (mg/kg-day)	Oral RfD (mg/kg-day)	Oral CSF (mg/kg-day)-1	Oral Hazard index	Dermal Hazard Index	Combined Hazard Index	Oral Cancer Risk	Dermal Cancer Risk	Combined Cancer Risk
Carcinogenic Effects:																						
Ethylbenzene	0.02	480	1.0	2,000	0.07	0.03	1.00	250	1	70	25,550	1.34E-09	1.17E-11	1.35E-09		NA				NA	NA	NA
Toluene	0.006	480	1.0	2,000	0.07	0.03	1.00	250	1	70	25,550	4.03E-10	3.52E-12	4.06E-10		NA				NA	NA	NA
Xylene	0.26	480	1.0	2,000	0.07	0.03	1.00	250	1	70	25,550	1.74E-08	1.53E-10	1.76E-08		NA				NA	NA	NA
Noncarcinogenic Effects:																						
Ethylbenzene	0.02	480	1.0	2,000	0.07	0.03	1.00	250	1	70	365	9.39E-08	8.22E-10	9.48E-08	1.00E-01		9.39E-07	8.22E-09	9.48E-07			
Toluene	0.006	480	1.0	2,000	0.07	0.03	1.00	250	1	70	365	2.82E-08	2.47E-10	2.84E-08	2.00E-01		1.41E-07	1.23E-09	1.42E-07			
Xylene	0.26	480	1.0	2,000	0.07	0.03	1.00	250	1	70	365	1.22E-06	1.07E-08	1.23E-06	2.00E+00		6.11E-07	5.34E-09	6.16E-07			
																SUMMATION:	1.1E-06	9.5E-09	1.1E-06	0.0E+00	0.0E+00	0.0E+00

Note: Dermal body dose expressed as administered dose by taking into account oral absorption factor (i.e., by dividing dermal absorbed dose by oral absorption factor).

References: Skin surface area, adherence factor, oral absorption, as per RFI (ICF Kaiser, 1997)
Dermal Absorption as per EPA Region 3- Assessing Dermal Exposure From Soil (EPA/903-K-95-003).
Toxicity information as per EPA, IRIS 2001.
NOTE: Maximum detected concentrations used to determine worst-case scenario.

Appen Table 3
Calculation of Groundwater Risks and Hazards, Future Construction/Utility Worker
PPG Oak Creek

Print Date: 03/28/03

Site Name PPG Oak Creek, WI
Dermal Contact with Chemical Constituents in Groundwater
Scenario: Construction Worker
Receptor: Adult

This table calculates estimated body dose, incremental cancer risk, and hazard indices from dermal exposure to chemical constituents in water.
The equations used to calculate body doses, incremental cancer risks, and hazard indices are:

$$\text{Body Dose (mg/kg-day)} = \frac{(CW * SA * PC * ET * EF * ED * CFv)}{(BW * AT)} \qquad \frac{\text{Body Dose}}{ABSo} = \text{Adjusted Body Dose}$$

$$\text{Cancer Risk} = \text{Adj. Body Dose (mg/kg-day)} * \text{Cancer Slope Factor (mg/kg-day)}^{-1}$$

$$\text{Hazard Index} = \frac{\text{Adj. Body Dose (mg/kg-day)}}{\text{Reference Dose (mg/kg-day)}}$$

WHERE:

CW = CONCENTRATION OF CONSTITUENT IN WATER (mg/l)
SA = SKIN SURFACE AREA (cm^2)
PC = CHEMICAL-SPECIFIC DERMAL PERMEABILITY CONSTANT (cm/hour)
ET = EXPOSURE TIME (hours/day)
EF = EXPOSURE FREQUENCY (days/year)
ED = EXPOSURE DURATION (years)
CFv = VOLUMETRIC CONVERSION FACTOR (1 liter/1000 cm^3)
BW = BODY WEIGHT (kg)
AT = AVERAGING TIME (days) = 25,550 for carcinogens
AT = AVERAGING TIME (days) = ED * 365 days/year for noncarcinogens
ABSo = ORAL ABSORPTION FACTOR (unitless)

Constituent	"CW" Concentratio (mg/L)	"SA" Skin Area (cm^2)	"ET" Exp. Time (hr/day)	"PC" Perm. Constant (cm/hr)	"EF" Expos. Freq (days/year)	"BW" Body Weight (kg)	"AT" Averaging Time (days)	"ED" Exp. Duratio (years)	Body Dose (mg/kg-day	Oral Absorp. Factor (unitless)	Adjusted Body Dose (mg/kg-day	CSF (mg/kg-day)-1	Dermal Cancer Risk	Reference Dose (RfD) (mg/kg-day)	"HI" Hazard Index
Carcinogen Effects:															
Benzene	2.20E-02	2000	4	1.50E-02	250	70	25,550	1	3.69E-07	1	3.69E-07	5.50E-02	2.03E-08		
Ethylbenzene	6.40E+00	2000	4	4.90E-02	250	70	25,550	1	3.51E-04	1	3.51E-04	NA	NA		
Xylenes (total)	4.63E+00	2000	4	5.30E-02	250	70	25,550	1	2.74E-04	1	2.74E-04	NA	NA		
1,2,4-Trimethylbenzene	1.90E-02	2000	4	6.08E-02	250	70	25,550	1	1.29E-06	1	1.29E-06	NA	NA		
2-Butanone (MEK)	9.80E+00	2000	4	9.60E-04	250	70	25,550	1	1.05E-05	1	1.05E-05	NA	NA		
4-Methyl-2-pentanone (MIBK)	2.20E+01	2000	4	2.70E-03	250	70	25,550	1	6.64E-05	1	6.64E-05	NA	NA		
Acetone	1.10E+00	2000	4	5.20E-04	250	70	25,550	1	6.40E-07	1	6.40E-07	NA	NA		
Naphthalene	4.70E-02	2000	4	4.70E-02	250	70	25,550	1	2.47E-06	1	2.47E-06	NA	NA		
Noncarcinogenic Effects:															
Benzene	2.20E-02	2000	4	1.50E-02	250	70	365	1	2.58E-05	1	2.58E-05			3.00E-03	8.61E-03
Ethylbenzene	6.40E+00	2000	4	4.90E-02	250	70	365	1	2.45E-02	1	2.45E-02			1.00E-01	2.45E-01
Xylenes (total)	4.63E+00	2000	4	5.30E-02	250	70	365	1	1.92E-02	1	1.92E-02			2.00E+00	9.60E-03
1,2,4-Trimethylbenzene	1.90E-02	2000	4	6.08E-02	250	70	365	1	9.04E-05	1	9.04E-05			5.00E-02	1.81E-03
2-Butanone (MEK)	9.80E+00	2000	4	9.60E-04	250	70	365	1	7.36E-04	1	7.36E-04			6.00E-01	1.23E-03
4-Methyl-2-pentanone (MIBK)	2.20E+01	2000	4	2.70E-03	250	70	365	1	4.65E-03	1	4.65E-03			8.00E-02	5.81E-02
Acetone	1.10E+00	2000	4	5.20E-04	250	70	365	1	4.48E-05	1	4.48E-05			1.00E-01	4.48E-04
Naphthalene	4.70E-02	2000	4	4.70E-02	250	70	365	1	1.73E-04	1	1.73E-04			2.00E-02	8.65E-03
												SUMMATION:	2.03E-08	SUMMATION:	3.34E-01

SOURCES: USEPA, 1989, Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final. EPA/540/189/002.
USEPA, 1989, Exposure Factors Handbook, EPA/600/8-89/043.
USEPA, 1992, Dermal Exposure Assessment: Principles and Applications, EPA/600/8-91/01-B.
USEPA, 2001, Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E), Draft EPA/540/99/005.

NOTES: Body Dose (absorbed) converted to Adjusted Body Dose (administered) by dividing by oral absorption factor, as recommended in RAGS (USEPA, 1989) Appendix A) to allow use of CSFs and RfDs based on administered doses.

Calculated permeability constant for the following constituents: Log Kp = -2.8+ 0.66* log Kow - 0.0056*MW (Eq. 3.8). Other values are from the Dermal Guidance.

Constituent	MW	Log Kow
Acetone	58.08	-0.24
1,3,5-Trimethylbenzene	120.19	3.42

APPENDIX H
CALCULATION OF RISKS AND HAZARDS FOR VOLATILIZATION OF CONSTITUENTS IN SOIL TO INDOOR AIR

Appendix H
PPG Oak Creek
Ethylbenzene in Soil

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box) | VERSION 1.2 September, 1998

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
100414	26.9	Ethylbenzene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to top of contamination L_t (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	30	10	SCL		

ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Vadose zone soil organic carbon fraction, f_{oc}^V (unitless)
1.5	0.43	0.3	0.002

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based soil concentration.	

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (mg/kg)	Indoor exposure soil conc., noncarcinogen (mg/kg)	Risk-based indoor exposure soil conc., (mg/kg)	Soil saturation conc., Csat (mg/kg)	Final indoor exposure soil conc., (mg/kg)
NA	NA	NA	1.58E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.1E-04

Appendix H
PPG Oak Creek
Toluene in Soil

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial soil conc., C_R (µg/kg)	Chemical
108883	9.6	Toluene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	**ENTER** Depth below grade to top of contamination, L_t (cm)	**ENTER** Average soil temperature, T_S (°C)	**ENTER** Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	30	10	SCL		

ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	**ENTER** Vadose zone soil organic carbon fraction, f_{oc}^V (unitless)
1.5	0.43	0.3	0.002

ENTER Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)	**ENTER** Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based soil concentration.	

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (mg/kg)	Indoor exposure soil conc., noncarcinogen (mg/kg)	Risk-based indoor exposure soil conc., (mg/kg)	Soil saturation conc., Csat (mg/kg)	Final indoor exposure soil conc., (mg/kg)
NA	NA	NA	3.02E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-04

Appendix H
PPG Oak Creek
Xylene in Soil

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box) | VERSION 1.2 September, 1998

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
95476	503	o-Xylene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to top of contamination L_t (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	30	10	SCL		

ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Vadose zone soil organic carbon fraction, f_{oc}^V (unitless)
1.5	0.43	0.3	0.002

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based soil concentration.	

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (mg/kg)	Indoor exposure soil conc., noncarcinogen (mg/kg)	Risk-based indoor exposure soil conc., (mg/kg)	Soil saturation conc., Csat (mg/kg)	Final indoor exposure soil conc., (mg/kg)
NA	NA	NA	1.66E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.9E-04

APPENDIX I
CALCULATION OF RISKS AND HAZARDS FOR VOLATILIZATION OF CONSTITUENTS IN GROUNDWATER TO INDOOR AIR

Appendix I
Physical Chemical Properties of COPCs for Indoor Air Model
PPG Oak Creek

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	7.8E-06	0.0E+00
78933	2-Butanone (MEK)	1.23E+00	8.08E-02	9.80E-06	2.23E+05	5.33E-03	1.30E-04	25	352.5	535	7,480	0.0E+00	1.02E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	3.0E-03
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95636	1,2,4-Trimethylbenzene	3.72E+03	6.44E-02	7.92E-06	5.70E+01	2.53E-01	6.17E-03	25	442.35	664.3	11,460	0.0E+00	5.95E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
108101	2-Hexanone (MIBK)	6.17E+00	7.50E-02	7.80E-06	1.90E+04	1.60E-02	3.90E-04	25	389.5	571	8,243	0.0E+00	8.05E-02

Appendix I
Calculation of Benzene Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
71432	2.20E+01	Benzene

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, ρβς (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, θως (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
6.5E-08	NA

Appendix I
Calculation of Ethylbenzene Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
100414	6.40E+04	Ethylbenzene

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, ρβς (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, θως (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	7.6E-02

Appendix I
Calculation of Xylene Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
95476	4.63E+03	o-Xylene

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, ρβς (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, θως (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.4E-04

Appendix I
Calculation of 1,2,4-Trimethylbenzene Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
95636	1.90E+01	1,2,4-Trimethylbenzene

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, $\rho\beta_S$ (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, $\theta\omega_S$ (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.0E-03

Appendix I
Calculation of 2-Butanone Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
78933	9.80E+03	2-Butanone (MEK)

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, ρβς (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, θως (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.7E-04

Appendix I
Calculation of 2-Hexanone Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
108101	2.20E+04	2-Hexanone (MIBK)

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, $\rho\beta_S$ (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, $\theta\omega_S$ (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.8E-02

Appendix I
Calculation of Acetone Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
67641	1.10E+03	Acetone

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, ρβς (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, θως (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.2E-05

Appendix I
Calculation of Naphthalene Groundwater Risks to Future Indoor Workers
PPG Oak Creek

Chemical CAS No. (numbers only, no dashes)	Initial groundwater conc., CW (ug/L)	Chemical
91203	4.70E+01	Naphthalene

Depth below grade to bottom of enclosed space floor, LF (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, TS (oC)
15	168	SCL	10

Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, kv (cm2)	Vadose zone soil dry bulk density, ρβς (g/cm3)	Vadose zone soil total porosity, nV (unitless)	Vadose zone soil water-filled porosity, θως (cm3/cm3)
SCL			1.5	0.43	0.3

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, ATC (yrs)	Averaging time for noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	9.4E-04