REVISED
BASELINE ECOLOGICAL AND HUMAN HEALTH RISK ASSESSMENT REPORT

NW NATURAL "GASCO" SITE

Prepared for

NW Natural
220 NW 2nd Avenue
Portland, Oregon 97209

Prepared by

Anchor Environmental, L.L.C.
1423 Third Avenue, Suite 300
Seattle, Washington 98101

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AST	aboveground storage tank
BCF	Bioconcentration factors
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
BTU	british thermal unit
CDM	Camp Dresser McKee
COI	Contaminant of Interest
COPC	Chemicals of Potential Concern
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbons
CTE	Central Tendency Estimate
DEQ	Oregon Department of Environmental Quality
DNAPL	Dense Non-Aqueous Phase Liquid
EC	Exposure Concentrations
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
FAMM	Fuel and Marine Marketing
FS	Feasibility Study
GIS	Geographical Information System
GPS	Global Positioning System
HAI	Hahn and Associates, Inc.
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HPAH	High Molecular Weight Polycyclic Aromatic Hydrocarbons
HQ	Hazard Quotient
HSDB	Hazardous Substances Data Base
IRIS	Integrated Risk Information Systems
KII	Koppers Industries, Inc.
LD50	Lethal Dose 50
LNG	Liquified Natural Gas
LOF	Locality of Facility
LPAH	Low Molecular Weight Polycyclic Aromatic Hydrocarbons
mg/kg	milligrams per kilogram
MGP	Manufactured Gas Plant
msl	mean sea level
OAR	Oregon Administrative Rules
ORNL	Oak Ridge National Laboratories

PacTerm	Pacific Terminal Services, Inc.
PAHs	Polycyclic Aromatic Hydrocarbons
PG&C	Portland Gas and Coke Company
PNO	Pacific Northern Oil
RDL	reporting detection limit
RI	Remedial Investigation
RME	Reasonable Maximum Estimate
ROC	Receptors of Concern
Site	NW Natural "Gasco" Site
SLV	Screening Level Value
TE	Threatened or Endangered
UCL	upper confidence limit
WBZ	Water-Bearing Zone

1 INTRODUCTION

This report provides a Baseline Risk Assessment for the NW Natural "Gasco" Site (Site) following Oregon Department of Environmental Quality (DEQ) guidance (DEQ 2002a and DEQ 2000). The purpose of the risk assessment is to estimate the existing potential risks associated with chemicals present at the Site. Both risks to people (human health) and ecology are evaluated.

Because this risk assessment is being conducted as a part of the Oregon Voluntary Cleanup Program for the upland portions of the Site, the assessment considers risks from chemicals in upland soils, groundwater, and temporary surface water features on the upland portion of the Site. Potential risks in the river associated with sediments, river water, or potential discharges to the river from the upland portions of the Site are not evaluated in this document. These risks are being evaluated as a part of the overall aquatic risk assessment being conducted for the Portland Harbor Superfund Site. The U.S. Environmental Protection Agency (EPA) is leading this effort.

The information here builds on the work of previous investigations including the Site Remedial Investigation (RI; Hahn and Associates, Inc. [HAI] 1998), subsequent data collections, and preliminary risk assessments (Anchor 2001a, Anchor 2001b, and Anchor 2003).

This report is organized into the following sections:

- Site History and Description – location and current conditions (Section 1.1)
- Site Use – identification of current and future land and water use (Section 1.2)
- Summary of Upland Data – review of existing upland data (Section 1.3)
- Summary of Previous Risk Assessments (Section 1.4)
- Assessment Objectives and Scope (Section 1.5)
- Baseline Level II Ecological Screening Risk Assessment (Section 2)
- Baseline Level III Human Health Risk Assessment (Section 3)
- Conclusions (Section 4)

1.1 Site History and Description

The Site history and current Site conditions are described in detail by HAI (1998), to be expanded and supplemented in an RI Report update currently in preparation by HAI. This

section contains a summary of this information to provide context to the risk assessment and unless cited otherwise comes from the RI.

1.1.1 Site History

The Portland Gas & Coke Company (PG&C) purchased the subject property (then undeveloped) around 1910. At that time, the property was approximately 85 acres larger than it is today, as it included what is now the Siltronic property immediately south of the existing site. PG&C built and operated an oil manufactured gas plant (MGP) on the current site footprint between 1913 and 1956. The southern portion of the site was sold by NW Natural Gas in 1962.

1.1.1.1 Manufactured Gas Plant Operations

An extensive description of the production methods used at the PG&C Gasco site as part of oil gas manufacture is provided within an August 1939 document entitled *Report on Portland Gas & Coke Company* (Ebasco Services, Inc. and PG&C); a 1941 paper entitled *Aromatics, Gas and Coke from Heavy Petroleum* (Hall, 1941); a 1952 paper entitled *Oil Gas Manufacture, A Staff-Industry Collaborative Report* (Hall and Kohlhoff, 1952); as well as a June 1987 Camp Dresser & McKee, Inc. (CDM) document entitled *North Doane Lake Site Characterization Work Plan*, (CDM 1987). The following summary of historical MGP operations at the Gasco site was primarily obtained from HAI'S review of these sources, as well as available historical company records.

PG&C constructed an oil MGP, known as the Gasco facility, on the subject property in 1912 and 1913, with operations beginning in late 1913. Company records indicate that site preparation involved the filling of approximately 10 acres of low-lying land with 205,381 cubic yards of material dredged from the Willamette River.

The Gasco facility used the "Pacific Coast Oil Gas Process" throughout the plant's life. This process involved thermal cracking of oil at near atmospheric pressure in a cylindrical shell containing heated refractory checker brick. In this process, heavy oils were introduced to the gasified vessel after pre-heating the checker brick to 2,000°F. These oils were then thermally cracked as they moved downward through the gasifier producing gas, lampblack, and tar. The lampblack and tar was

subsequently removed from the gas after which the gas passed through gas purifiers where sulfur and other impurities were removed. Further, absorption towers were used with light oil to absorb benzol vapors, with the oil subsequently distilled to recover the benzol. The lampblack would be recovered in wash boxes, dried, and then fed to a rotary press, producing cylindrical or pillow shaped briquettes.

During the life of the Gasco plant operations, it is reported that approximately 70,000,000 barrels (2,940,000,000 gallons) of petroleum feedstock (8.4 degree API [specific gravity of 1.011] oil) were processed. This process generated the following products and by-products for each 100 gallons of 8.4 degree API oil used:

- 10,000 cubic feet oil gas
- 283 pounds of lampblack
- 3.8 gallons of tar
- 4.6 gallons of light oil

In 1941 a coke oven was installed at the plant to generate electrode grade coke and high oil gas for re-forming in the existing retorts. The coke ovens produced the following products for each 100 gallons of 8.4 degree API feedstock oil and 90 pounds of lampblack:

- 5,400 cubic feet of oil gas
- 195 pounds coke
- 36 gallons tar
- 6.6 gallons light oil
- 0.6 gallons creosote oil

In addition to the preceding by-products, spent oxide (also called purifier box wastes) was generated from the use of iron oxide (iron-impregnated wood chips) or lime as solid reactants for the removal of sulfur from the oil gas. Spent oxide is primarily a blend of iron sulfides, sulfur, iron oxides and wood substrate and/or lime, however spent oxide material may also contain hydrocarbons that passed through the upstream gas processing equipment, as well as cyanides that would be removed from the gas along with the sulfur. Concentrations of cyanide gas, however, were significant only within coal gas, with cyanide impacts only found in

significant quantities at former coal carbonization sites (Hayes 1996), and not at former oil gasification sites such as Gasco. In addition to the preceding, spent oxide wastes have been found to contain varying amounts arsenic, chromium, copper, lead, nickel, and zinc (Fischer 1999).

Due to the large scale of operations at the Gasco site, economic recovery of many of the by-products typically wasted at other plants of this type, was possible, thereby reducing the quantities of waste from this site. According to information provided within the 1952 Hull and Kohloff paper, gasification by-products were refined to produce the following products at the Gasco site:

- lampblack briquettes
- soft pitch
- specification tars and tar distillates
- specification creosote
- hard pitch
- electrode grade pitch
- crude naphthalene
- crude benzene
- motor fuel
- toluene
- xylene
- solvent naphtha

With regard to by-product reclamation, the plant initially produced pressed lampblack briquettes which were sold in the area as fuel. Company records indicate that in 1914 approximately 11,500 tons of briquettes were sold, with sales increasing to approximately 40,000 tons per year by 1920, and to between 50,000 tons and 60,000 tons by 1940.

In 1923, the gasification process was modified to optimize aromatic generation and light oil recovery for use as motor fuel. Company records indicate that subsequent to 1929 approximately 2,000,000 gallons of "benzol" were produced annually for use in motor fuel, limited only by the volume of light oil available for recovery. Benzol

was sold to the Shell Oil Company, where it was used to blend with gasoline, trade-named "Gasco Motor Fuel" (Ebasco and PG&C 1939).

Tar recovery and refining were incorporated into the process in 1925 to provide tar for use as a road binder. During the first year of production (1925), approximately 70,000 gallons of road binder were sold, with sales growing to approximately 1,200,000 gallons in 1930, and to approximately 1,800,000 gallons in 1937.

As of 1939, the plant had a maximum capacity of 35,000,000 cubic feet of gas per day. The largest year of gas production (prior to 1939) occurred in 1929, when 4,435,676,000 cubic feet of gas were produced. The oil feedstock required to produce stated volume of gas in 1929 was recorded as 43,527,291 gallons (approximately 1 gallon of oil per 100 cubic feet of gas). As an example of the scale of the by-product regeneration, the following by-products were recovered in 1929:

- 49,384 tons of briquettes
- 2,252,640 gallons of light oil
- 1,202,264 gallons of tar
- 20,083 pounds of naphthalene

Once natural gas became available in the 1950s, much of the plant was shut down, with the last full year of plant operation occurring in 1955 (CDM 1987). With the arrival of natural gas, PG&C changed its name to Northwest Natural Gas Company, and more recently to NW Natural. The Northwest Natural Gas Company constructed a liquefied natural gas (LNG) plant at the site in the late 1960s, at which time most of the old gasification plant was demolished and associated underground utilities were removed.

1.1.1.2 MGP Waste Disposal Practices

From 1913 to 1925, only British Thermal Unit (BTU) gas and lampblack briquettes were produced at the Gasco facility, with no known recovery of aromatic hydrocarbons and tars (other than burning for fuel) during the production process. During this timeframe, all wastewaters and tars not usable as fuel would have been

discharged to drainage features/sewers leading from the production area to the Willamette River.

After 1925, when tar refining operations began, the quantity of tar within the waste stream would have been only a small percentage of the total tar produced (CDM 1987). However, prior to plant expansions in 1941, waste by-products from the oil gasification process that did not have a market (wastewater with petroleum emulsions containing lampblack and tars) would have continued to have been discharged to low lying areas of the site and drainage features leading from the production area to the Willamette River (CDM 1987). Historical facility records indicate the primary facility sewer outfall was formerly located south of the current southernmost fuel storage tank area, which discharged to a low area/ditch that then flowed directly to the Willamette River. Further, historical aerial photographs from 1936 and 1940 indicate lampblack placement and effluent discharge (either emanating from the sewer, or from overland discharge) to this area. RI activities completed at the Gasco facility have confirmed the presence of MGP wastes in the area of the former discharge, with the presence of buried bulk tar, oil, and lampblack identified at this portion of the site, as well as the surface expression of a tar body covering sediments in the river adjacent to this area.

Plant expansions in the 1930s and 1940s involved the construction and use of two effluent settling ponds (i.e., tar ponds) on the southeastern portion of the Gasco property, with the ponds operational by 1941. The larger of these ponds, estimated at 2.5 acres, was located near the southeastern corner of the property near the current NW Natural/Siltronic property line, while a small, elongate pond was located immediately south of the larger pond, on the current NW Natural/Siltronic property line. By 1981, the ponds were substantially filled similar to the current configuration on the site.

1.1.1.3 Creosote Formulation, Coal Tar and Pencil Pitch Distribution

Koppers Industries Inc. (KII, Carbon Materials and Chemicals Division), currently leases the southwestern portion of the Gasco site (approximately 6.4 acres), which is addressed as 7540 NW Saint Helens Road, Portland, Oregon. This portion of the

property contains the former MGP light oil plant, tank farm, pitch plant, coke ovens, and tar processing areas.

As described within a 1994 Site Inspection Prioritization Report prepared for the EPA by URS Consultants, Inc., the predecessor to KII, Koppers Company, Inc. (Koppers), operated a coal tar distillation facility at this portion of the property from 1966 to 1973. During this timeframe Koppers produced chemical oil, creosote, and pitch from coal tar distillates (URS, 1994). From 1974 through 1977, Koppers manufactured electrode grade pitch, a product derived from both coal tar and petroleum residuals. From 1977 through the present, Koppers, and now KII, has used the facility as a terminal for the bulk transfer and distribution of liquid creosote coal tar and solid coal tar pitch.

Currently, coal tar pitch is imported via bulk and/or liquid cargo vessels. The product is then stored at the site prior to distribution via tank truck or tank rail cars. Specifically, solid coal tar pitch (e.g., pencil pitch) arrives at the site by truck, while liquid coal tar pitch is imported via a bulk cargo vessel. Liquid coal tar pitch operations at the facility began in 1999, with the objective being the phase out of management of solid pencil pitch. The liquid coal tar pitch is received at the NW Natural Gasco dock on the Willamette River, where it is pumped from the vessel, through a heated pipeline that is about 2,400 feet long, to a storage tank on the KII lease area. KII retains stockpiles of solid pencil pitch on site in a large structure located near the eastern corner of their lease area.

With regard to waste disposal practices, Koppers reportedly generated approximately 1,500 gallons of wastewater per day during the timeframe that the plant was used as a coal tar distillation facility (CDM, 1987). Koppers land-disposed these wastewaters at the eastern portion of their facility, a location immediately southwest of the former tar settling ponds, coinciding with the location of the current pencil pitch storage structure.

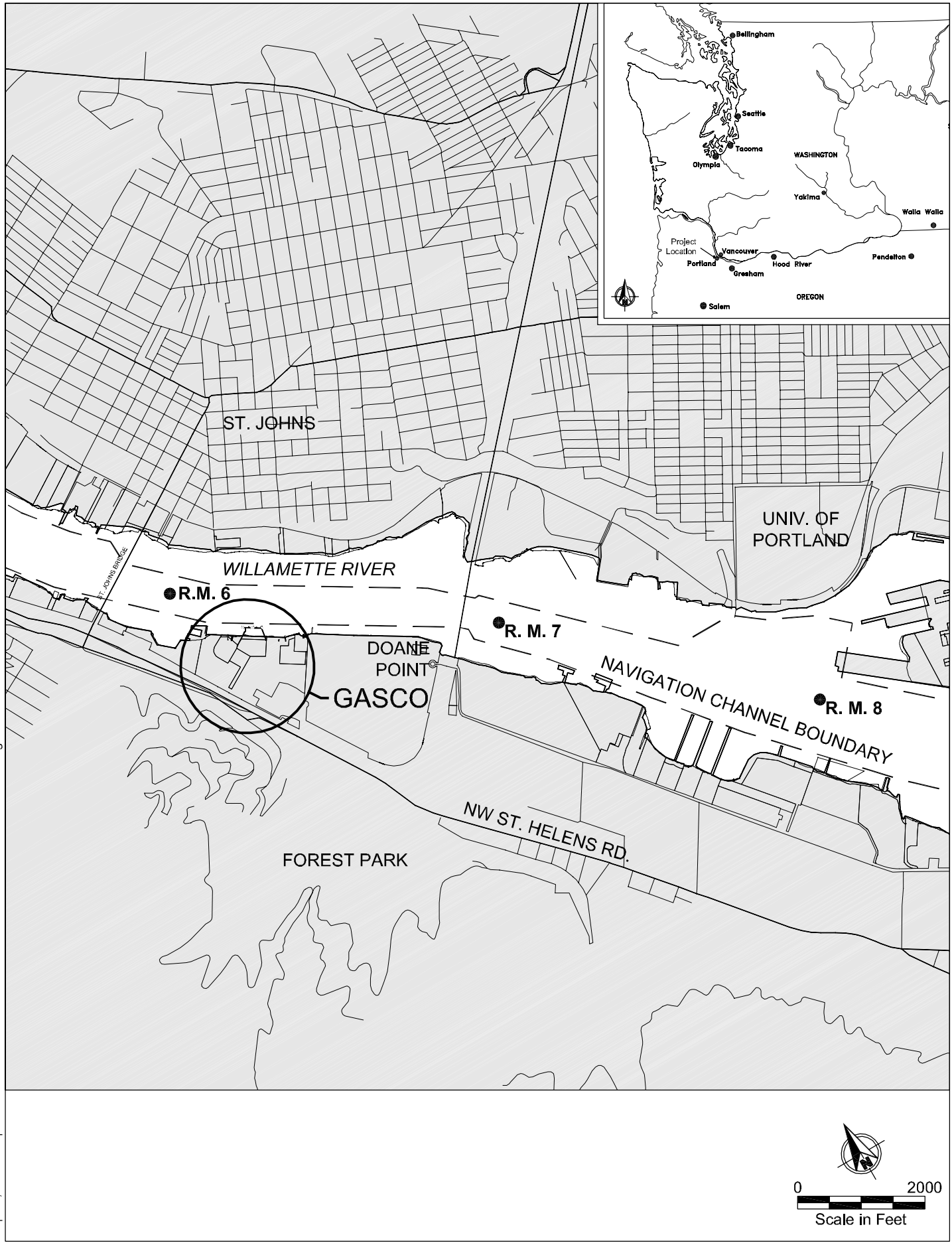
1.1.1.4 Marine Fuel Storage and Distribution

Pacific Terminal Services, Inc. (PacTerm), under contract with Fuel and Marine Marketing (FAMM), operates a fuel storage and distribution facility at the northern portion of the site. From the 1960s until FAMM acquired the operation in 1999, the distribution facility was operated by Pacific Northern Oil (PNO). The terminal receives, stores, blends, and ships marine fuels and lubricants, utilizing both barge and truck for transport. FAMM uses two above-ground storage tank (AST) farms for storage and distribution of fuel. The portion of the site leased by FAMM contains former MGP oil storage tanks, the former oxide reactor area, and spent oxide storage pile area.

1.1.1.5 Liquefied Natural Gas Storage

Northwest Natural Gas constructed the company's first LNG storage tank on the Gasco site in 1969. This LNG storage facility is used to liquefy natural gas during times of low peak demand for storage until the gas is needed during times of peak demand, typically during the winter heating season. In addition to the LNG storage tank, NW Natural maintains LNG storage control and distribution facilities at the site. The portion of the site utilized for LNG storage contains former tar processing area and the former naphthalene plant.

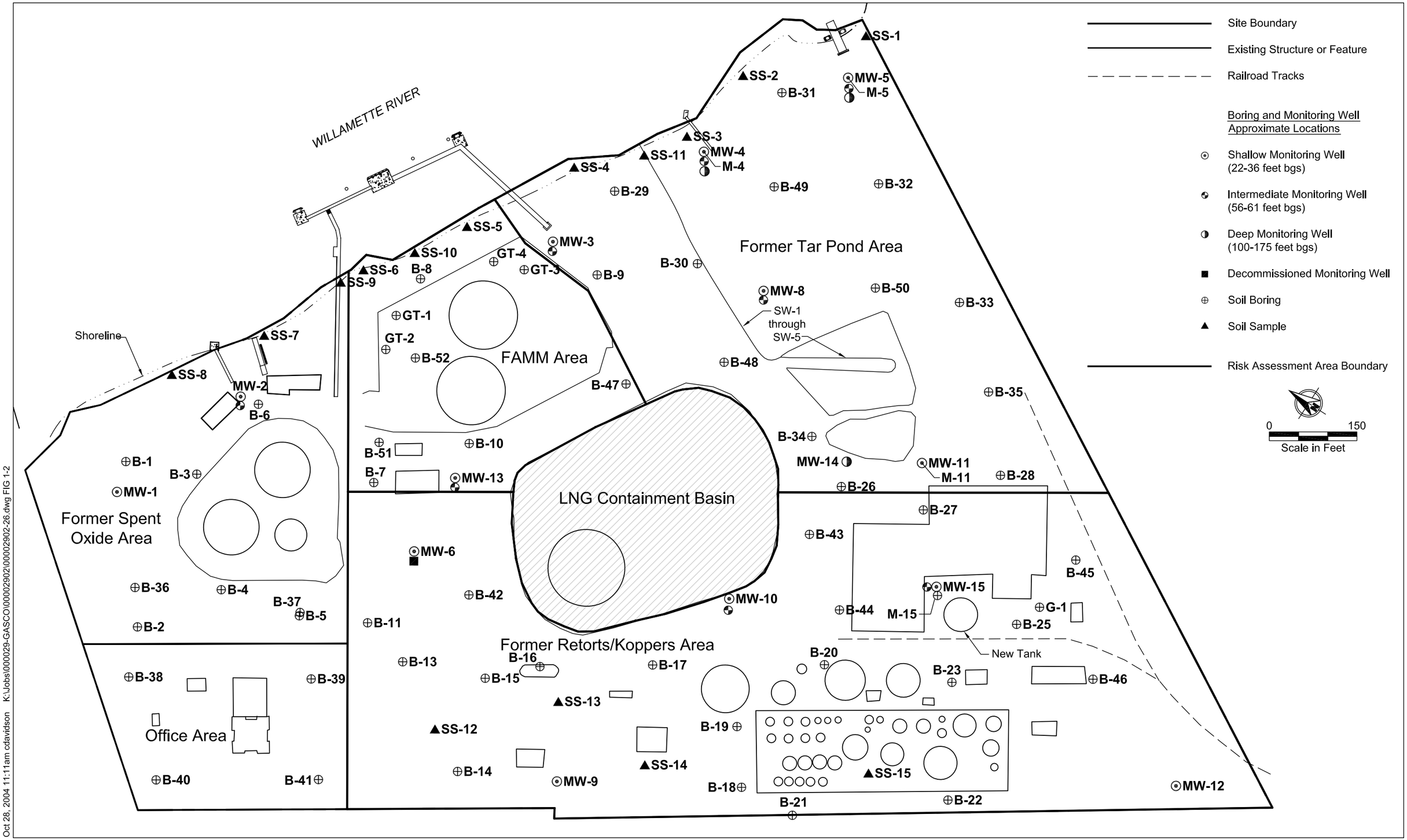
The locations of Site features associated with the NW Natural, KII, and FAMM facilities are shown in Figure 1-2.



Sep 23, 2004 3:24pm dholmer K:\Jobs\000029-GASCO\00002902\00002902-01.dwg FIG 1-1

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 1-1
Vicinity Map
NW Natural "Gasco" Site



Oct 28, 2004 11:11am cdavidson K:\Jobs\000029-GASCO\00002902\00002902-26.dwg FIG 1-2

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 1-2
Site Map
NW Natural "Gasco" Site

1.1.2 Site Description

The Site comprises approximately 45 acres in the North Doane Lake area of Portland and is bounded by St. Helens Road to the southwest, the Willamette River to the northeast, and industrial properties to the northwest and southeast (Figures 1-1 and 1-2). The ground surface at the Site slopes gradually to the northeast towards the Willamette River. Surface elevations range from approximately 38 feet above mean sea level (msl; City of Portland datum) at the southwestern portion of the property to approximately 23 to 30 feet msl at the top of the river bank. The river bank, composed primarily of riprap, slopes steeply to an elevation of approximately 5 to 8 feet msl. Below this elevation the shoreline slopes more gradually. Average monthly river stages, as measured at the Portland Harbor from 1973 to 1990 and converted to the City of Portland datum, range from a low of approximately 6.3 feet msl during August and September, to a high of 10.9 feet msl during May and June (COE 1991).

Site surface features include buildings, storage tanks, and equipment used in ongoing industrial processes at the Site. The Site ranges from mostly paved in the area leased by KII, to gravel, to mixed grass and trees in the former Spent Oxide and Tar Pond Areas. Additional site features include a utility easement that crosses the southwestern portion of the property. Utilities that exist within the easement include oil, gasoline, natural gas, water, and sewer pipelines. In addition to the preceding, numerous utilities (e.g., water, oil, stormwater) exist as part of the site infrastructure. Figure 1-2 presents some of the general Site surface features.

Site Geology

Site geology can be subdivided into three main geologic units: Columbia River Basalt Group, Alluvial Deposits, and Surficial Fill Deposits, which are detailed in HAI 1998. The Columbia River Basalt Group is the oldest and deepest geologic unit at the Site. The depth of the Columbia River Basalt Group inclines steeply, ranging from approximately -20 feet msl at the southern portion of the Site to approximately -175 feet msl near the eastern corner of the Site in the vicinity of the Willamette River.

Overlying the basalt layer at the Site is a Quaternary-age Alluvial Deposit layer composed of unconsolidated sands, silts, and gravels. This layer ranges in thickness

from approximately 30 feet near the southern portion of the Site to over 150 feet along the northern portion of the Site (adjacent to the Willamette River). A silt unit defines the top of the undifferentiated Alluvial Deposits across a majority of the site. The top of this silt unit correlates with the historic ground surface of the Site, prior to development.

Above the Alluvial Deposit layer at the Site is a Surficial Fill layer of mostly poorly graded sands and silty sands ranging in depth from approximately 2 feet (southwestern portion of the Site) to over 30 feet (central and eastern portions of the Site). This Surficial Fill layer consists primarily of hydraulically placed dredge materials, but also includes quarry reject rock, building debris, and miscellaneous MGP-related and Koppers-related (e.g. oil and pencil pitch) by-products such as tar, lampblack, and spent oxide materials.

Site Groundwater

Groundwater can be found in three hydrologic zones at the Site: the Unconfined Surficial Fill Water-Bearing Zone (WBZ), the Semi-Confined Alluvial Sand WBZ, and the confined bedrock aquifers in the Columbia River Basalt. A low permeability silt unit separates the Surficial Fill and the Alluvial Sand WBZs over most of the Site.

Groundwater levels within the Surficial Fill WBZ vary seasonally and average between 9 and 27 feet below ground surface (bgs). Groundwater flow within this unit is directed northeast, towards the Willamette River. A downward hydraulic potential also exists between the surficial fill and the underlying alluvial sand aquifer, although the low permeability silt unit that separates these units restricts vertical flow.

The overall groundwater flow direction within the semi-confined Alluvial Sand WBZ is also directed northeast towards the Willamette River. Hydraulic gradients are greatest in the central portion of the Site, but diminish near the riverbank. Groundwater in the underlying basalt unit exists primarily as isolated confined aquifers in the permeable fracture zones between the individual basalt flows.

1.2 Site Use

The Site has remained industrial since it was first developed in the early 1900s. All subsequent development adjacent to the Site has also been for industrial purposes. In a

memorandum dated July 16, 1998, DEQ determined that the current and reasonably likely future land use for the property is industrial (DEQ 1998).

The 1998 DEQ evaluation was later supplemented in a letter from HAI dated April, 15, 2000 (HAI 2000). The only outstanding issue identified by DEQ in its response on March 1, 2001 (DEQ 2001a), was the potential for the Basalt WBZ to be in the Locality of Facility (LOF) and potentially subject to future industrial uses. NW Natural proposed to provide institutional controls to prevent such use of this zone (NWN 2002), and DEQ agreed (DEQ 2003a). Consequently, no further evaluation of this basalt zone has been conducted either for the RI or this risk assessment. The following subsections summarize the other land and water use determinations that have been made through these previous efforts and discussions.

1.2.1 Off-Site Land

Properties located between the Willamette River and U.S. Highway 30 (St. Helens Road) are currently zoned as industrial and are expected to remain that way. All properties along the Willamette River adjacent to the study area are also zoned industrial. As a result, DEQ has determined that the current and reasonably likely future use of properties located between the river and U.S. Highway 30 is industrial (DEQ 1998).

Properties located immediately west of U.S. Highway 30 are currently undeveloped and are zoned as residential. Although commercial properties are also located along U.S. Highway 30, it appears that current zoning designations favor residential use. Therefore, DEQ has determined that the reasonably likely future use of off-site properties located west of U.S. Highway 30 is residential (DEQ 1998).

1.2.2 On-Site Surface Water

On-site surface water is generally transitory and includes a few on-site ponds and ditches located in the former tar pond and spent oxide areas, and the LNG containment basin. The on-site ponds are seasonal, typically present during the winter and spring months. The on-site ditches contain minimal water most of the year. Because these ponds are seasonal and located within a heavily industrialized area, they are not expected to provide significant habitat for resident aquatic and avian species. The LNG containment basin has historically contained standing water as a result of groundwater

seepage; however, recent pumping by Site personnel has resulted in much lower levels. Furthermore, the LNG containment basin does not contain suitable ecological habitat to support avian or aquatic receptors. Although there are likely no current or future beneficial uses of on-site surface water, pathways that include surface water will be evaluated in this risk assessment.

1.2.3 Off-Site Surface Water

Off-site surface water is not evaluated in this current risk assessment. Off-site surface water risks will be evaluated after completing the Willamette River source control investigations which are currently being completed under the direction of DEQ. In addition, the Siltronic Remedial Investigation/Feasiblity Study (RI/FS) includes similar evaluations of surface water for that site.

1.2.4 On-Site Groundwater

For the Surficial Fill, Alluvial Sand and Basalt WBZs, with the exception of surface water recharge, there are no reasonably likely beneficial future uses. Groundwater from the Surficial Fill and the Alluvial zones has not historically been, nor is it currently, used for any beneficial uses within the study area.

Groundwater within the Basalt WBZ under the Site historically has been used as an industrial water supply. However, because of existing municipal water hook-ups throughout the study area, all industrial uses of groundwater within the study area have been discontinued. Because the City of Portland plans to continue municipal water supply to all users within the study area, the use of groundwater from the Basalt WBZ for an industrial water source is not deemed reasonably likely. NW Natural has agreed to accept institutional controls precluding use of the Basalt WBZ at the property (DEQ. 2001a)

Additionally, the readily available nature of the municipal water supply to any new user, as well as the fact that all property within the vicinity of the LOF is currently connected to the municipal water supply, indicate that the future use of groundwater within the LOF for any purpose other than surface water recharge is not reasonably likely.

1.2.5 Off-Site Groundwater

Off-site groundwater is not included in the LOF and is not evaluated in the current risk assessment.

1.3 Summary of Upland Data

NW Natural and the DEQ entered into an agreement for the completion of an RI/FS (DEQ Agreement No. ECVC-WMCVC-NWR-94-13) for the Site in 1994. RI activities were subsequently implemented by NW Natural in September 1995. The Preliminary Phase I RI (HAI 1998) was completed in 1998. Post-RI results were collected under a supplemental sampling program documented in correspondence from HAI to DEQ dated August 15, 2000. Surface and subsurface soil samples from approximately 21 locations throughout the study area were collected (Figure 1-2). Additional investigations have been conducted since that time, and have been included in quarterly progress reports to DEQ. This section summarizes the results of the groundwater and soil investigations conducted at the Site through the end of 2003. Additional data collections are ongoing for specific purpose (e.g., source control evaluation), but results were not available in time for incorporation into this risk assessment.

1.3.1 Groundwater

Preliminary groundwater sampling occurred in 1995 during the Phase I Preliminary RI. Groundwater monitoring at the Site has occurred on a quarterly basis since completion of the Phase I RI. Prior to 2004, a total of 25 monitoring wells (14 locations with multiple depths) have been installed at the Site (Figure 1-2). Twelve of the wells are screened within the Surficial Fill WBZ, 11 are screened in the Alluvial Sand WBZ and two are screened between the Surficial Fill WBZ and the Alluvial Sand WBZ. Three additional monitoring wells (the MW-16 well cluster) were being installed adjacent to the river at the Site at the time of this revision to assist in ongoing source control evaluation activities.

The Phase I RI (HAI 1998) and associated quarterly reports (e.g., HAI 2002) provide detailed descriptions of the available groundwater quality data for the Site. These groundwater characterization data demonstrate that both the Surficial Fill and portions of the Alluvial Sand WBZs contain elevated concentrations (above area background) of

polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylene (BTEX), and cyanide. In addition, several monitoring well locations contain elevated levels of metals, and some contain low concentrations of phenols and styrene. Elevated chemical concentrations have been detected within the Alluvial Sand WBZ downgradient from the former tar ponds to depths of up to 150 feet bgs, though groundwater samples collected from the lower portion of the Alluvial Sand WBZ in this area are consistently free of the chemicals noted above.

1.3.2 Surface Water

Surface water samples were taken from the temporary pond and drainage ditch present in the Tar Pond area. These data have been compiled by HAI and are summarized in the data tables of HAI (2002).

1.3.3 Soil Data

The majority of the upland soil data for the Site was collected during 1995 and 1996 as part of the Phase I Remedial Investigation (HAI 1998). As of December 2003, in total, 52 soil borings (B-1 through B-52), 15 monitoring well clusters (MW-1 through MW-15), and four geotechnical soil borings (GT-1 through GT-4) were used to evaluated soil contamination at the Site. Figure 1-2 presents an overview of Phase 1 RI sample locations and Appendix A contains a summary of the soil data used in the risk assessment.

Field observations as identified in soil boring logs, and as summarized on HAI data tables (2002) indicate that residual tar, oil, and carbon pitch solids are present in soils at the Gasco site.

Oil and tar have been differentiated in the field by their physical characteristics. Specifically, tars are observed as black, viscous to semi-solid material, while oils are observed as a brown to black liquid or a patchy coating on soils.

Carbon pitch solids refer to a dry black granular or powdery material derived from the coal or petroleum coking process. Two types of carbon pitch solids are known to be present at the site: the first, lampblack, is a by-product of the former Gasco oil gas MGP

process, while the second, pencil pitch or solid carbon pitch, is a Koppers and KII product derived from coal tar. The Gasco operation stored piles of lampblack at the site, which in turn was used for production of lampblack briquettes that were distributed as a fuel source or for use by the aluminum industry. Solid coal tar pitch (pencil pitch), managed on the Site by Koppers and KII, is a raw material supplied to the aluminum industry for use in preparation of carbon anodes. As the physical and chemical properties of lampblack and pencil pitch are similar, it is difficult to distinguish between the two, and therefore both materials may be referred to generically as solid carbon pitch.

Residual oil has been identified in soil borings installed throughout the southern and central portion of the site, primarily corresponding to the locations of the former Light Oil Plant/Koppers Tank Farm and the adjacent rail spur, northeastward through the former Tar Ponds, and northwestward through the area of the former Retort Area. Additionally, two apparently small and isolated areas of residual oil contamination have been identified in borings installed in the vicinity of the former Spent Oxide Storage area (MW-1 and B-1) and the FAMM tank farm (GT-1).

The distribution of oil within soils across the sites suggests that multiple source areas for the contamination exist. However, the widespread nature of oil impacts within the surficial fill across much of the southwestern and southeastern portions of the property make interpretation of individual sources difficult. Even so, the varying depth of residual oil and dense non-aqueous phase liquid (DNAPL) occurrence across the property is indicative of several likely overall sources, including the former Light Oil and Koppers Tank Farm and adjacent railway siding; the former Retort Area; the former Coke Oven/Koppers Land Disposal Area; and the former Tar Settling Ponds/Drainage Area.

In addition to oil, a highly viscous to semi-solid tar was identified during the investigation in a number of soil borings at the Site. Specifically, tar has been identified in soil borings installed throughout the southeastern portion of the site corresponding to the location of the Former Tar Ponds and the former drainage feature. Additionally,

isolated areas of tar were identified at the location of the former Naphthalene Plant (MW-10), and in the FAMM Lease Area at boring B-6.

Soil samples collected in the vicinity of the former tar settling ponds, along with associated fill areas at the Site, contain elevated concentrations (above area background) of PAHs, BTEX, cyanide, and several metals (HAI 1998). Non carcinogenic PAH concentrations at the Site ranged from less than 0.5 milligrams per kilogram (mg/kg) to as high as 20,700 mg/kg. Carcinogenic PAH (cPAH) concentrations ranged from 0.03 to 8,480 mg/kg. The highest PAH and cPAH concentrations were detected in soil borings located near historic shoreline fill materials within the former drainage feature. Total BTEX concentrations in Site soils ranged from 1.3 to 360 mg/kg (maximum values was for benzene), with the highest concentrations detected at inland locations (e.g., boring B-18). Total cyanide concentrations at the Site ranged from 0.17 to 518 mg/kg (at inland boring MW-9). Cyanide detected at the Site is associated with the spent oxide material, which was likely incorporated into fill used at the Site. As such, detectable cyanide concentrations were present over much of the Site.

1.3.4 Contaminants of Interest

Based on the investigations conducted at the Site, a contaminant of interest (COI) list was prepared for use in conducting previous screening level risk assessments (Anchor 2001a). This COI list, which is summarized in Table 1-1, includes those chemicals that were evaluated during the original RI and subsequent Site investigations. Raw data is located in Appendix A.

Table 1-1
Site Contaminants of Interest

Metals and Inorganics	Monocyclic Aromatic Compounds	Polycyclic Aromatic Compounds
Antimony	2,3,4,6-Tetrachlorophenol	Acenaphthene
Arsenic	2,4,5-Trichlorophenol	Acenaphthylene
Beryllium	2,4,6-Trichlorophenol	Anthracene
Cadmium	2,4-Dichlorophenol	Benzo(a)anthracene
Chromium IV	2,4-Dinitrophenol	Benzo(a)pyrene
Copper	2-Chlorophenol	Benzo(b)fluoranthene
Lead	2-Methyl-4,6-Dinitrophenol	Benzo(g,h,i)perylene
Mercury	2-Methylphenol	Benzo(k)fluoranthene
Nickel	2-Nitrophenol	Chrysene
Selenium	3-Methylphenol	Dibenzo(a,h)anthracene
Silver	4-Chloro-3-Methylphenol	Fluoranthene
Thallium	Antimony	Fluorene
Zinc	Arsenic	Indeno(1,2,3-cd)perylene
Cyanide	Beryllium	Naphthalene
	Cadmium	Phenanthrene
	4-Methylphenol	Pyrene
	4-Nitrophenol	
	Benzene	
	Ethylbenzene	
	Pentachlorophenol	
	Phenol	
	Toluene	
	Xylenes	

1.3.5 Locality of Facility and Nature Extent of Contamination

"Locality of Facility," (LOF) as defined within the Oregon Administrative Rules (OAR 340-122-115), means any point where a human or an ecological receptor contacts, or is reasonably likely to come into contact with, facility-related hazardous substances. An evaluation of the Gasco LOF, utilizing a Site conceptual model, hydrogeological framework, and knowledge of the extent and magnitude of contaminant conditions, has previously been prepared by HAI. This evaluation was provided to DEQ in correspondence dated August 1, 1997 (HAI 1997).

As presented in the previous RI Reports, the lateral extent of soil and groundwater contamination associated with the Site has been found to be primarily restricted to the Site boundaries. Two exceptions are the presence of tar and contaminated sediments

within the Willamette River adjacent to the Site and soils and groundwater at the Siltronic facility to the southeast.

Vertically, soil and groundwater impacts have been identified within the Surficial Fill WBZ, as well as within portions of the Alluvial Sand WBZ. The most widespread contaminant impacts at the Site have been found to occur within the Surficial Fill WBZ, while more limited impacts have been identified within the underlying Alluvial Sand WBZ. The silt unit, underlying the Surficial Fill WBZ and defining the top of the alluvial deposits, has acted as a semi-confining unit across the majority of the Site and has prevented the vertical migration of contaminants to the underlying Alluvial Sand WBZ in most areas. There is impact to the upper portion of the Alluvial Sand WBZ downgradient of the primary area of former waste placement (i.e., former effluent discharge area and adjacent tar ponds). Specifically, contaminants have been detected in this region of the Alluvial Sand WBZ from the top of the unit (approximately 45 feet bgs) to maximum depths of between 100 to 150 feet bgs. Groundwater samples collected from the lower portion of the Alluvial Sand WBZ in this area are consistently free of chemical impact. Based on soil and groundwater quality data collected from the deeper Alluvial Sand WBZ across the Site, as well as data collected from the upper WBZ within bedrock during the cathodic well abandonments, there appears to be little potential for the presence of significant Site-related impact to the Basalt WBZ.

Based on the current understanding of Site-related contamination, and based on previous discussions with the DEQ, the LOF, as it pertains to soil and groundwater contamination, has been defined as the boundaries of the Site itself. With regard to the hydrogeologic WBZs, both the Surficial Fill and the Alluvial Sand WBZs beneath the Site are included within the LOF. Site data indicate little potential for the presence of impacts to WBZs within the bedrock. DEQ has previously indicated there was the potential for the Basalt WBZ to be in the LOF and potentially subject to future industrial uses. NW Natural has offered to provide institutional controls to prevent such use of water in the Basalt WBZ (NWN 2002), and DEQ agreed (DEQ 2003a). Consequently, no further evaluation of the Basalt WBZ has been conducted either for the RI or this risk assessment.

Soil and groundwater contamination extends beyond the Site boundary to the southeast to the Siltronic site. A separate investigation is being conducted to evaluate the need for source control to the Willamette River at that site. Thus, the Siltronic site is not included in the Gasco Site LOF.

1.4 Summary of Previous Risk Assessments

A Level II Risk Screening for Human Health and Ecological Receptors was completed for the Site in February 2001 (Anchor 2001a) following DEQ Guidance (DEQ 2002a and 2000). This risk-screening document presented a conceptual Site model, which outlined the potential pathways from chemicals present in Site soils and groundwater to receptors potentially occurring on the Site. DEQ requested additional details regarding pathways and receptor selection (DEQ 2001b). An Interim Technical Memorandum was submitted in response to these comments later in 2001 (Anchor 2001b). Final agreement was reached on the human health and ecological receptors and pathways, as described in letters from DEQ (DEQ 2002b and DEQ 2003a) and NW Natural (NWN 2002). This agreement also established the COPCs for the Site, which are summarized in Table 1-2.

A draft Baseline Level III Ecological and Human Health Risk Assessment was completed in June 2003 (Anchor 2003). Based on comments from DEQ, it was concluded that the ecological portion of the risk assessment would be more efficiently evaluated as a Level II Screening Level assessment, while the Human Health section will continue as a Level III assessment. This approach was agreed to by DEQ Site Manager, Matt McClincy in a meeting on June 11, 2004.

Table 1-2
Site Chemicals of Potential Concern

	Ecological COPC	Human Health COPC
Metals and Inorganics		
Chromium IV	-	X
Zinc	X	-
Monocyclic Aromatic Compounds		
Benzene		X
Xylenes	X	X
Polycyclic Aromatic Compounds		
Acenaphthene	X	-
Acenaphthylene		X
Anthracene	X	-
Benzo(a)anthracene	X	X
Benzo(a)pyrene	X	X
Benzo(b)fluoranthene	X	X
Benzo(g,h,i)perylene	X	X
Benzo(k)fluoranthene	X	X
Chrysene	X	X
Dibenzo(a,h)anthracene	X	X
Fluoranthene	X	-
Fluorene	X	-
Indeno(1,2,3-cd)pyrene	X	X
Naphthalene	X	X
Phenanthrene	X	X
Pyrene	X	-

X = COPC to be assessed in Risk Assessment
\- = Not a COPC

1.5 Assessment Objectives and Scope

The primary objective of the Level II Ecological Risk Assessment (ERA) and the Level III Human Health Risk Assessment (HHRA) is to determine risks related to chemicals in upland matrices in sufficient detail so that the FS can proceed. The risks determined are related to the spatial characteristics of the exposure for each receptor. For example, occupational human health risks are generally associated with areas of the Site where people conduct work. Consequently, this risk assessment does not provide a numeric level or cleanup goal for each matrix. Rather, the risk assessment defines the level of risk that may exist at the Site given the current and likely future Site configuration and uses by

people and organisms. This approach is consistent with DEQ as well as EPA guidance on risk assessment (DEQ 2002a and 2000; EPA 1999).

However, the calculations conducted within this risk assessment can be used in the future FS to determine risk-based cleanup goals or other measures of remediation such as residual risk assessments as needed for that purpose.

As noted above, the scope of this risk assessment is limited to chemicals in upland matrices and does not include evaluation of chemical risks in the Willamette River or due to any potential pathway to the river. These risks are being evaluated in the Portland Harbor RI/FS.

Per DEQ's guidance, this document describes estimates of baseline risks currently present at the Site. NW Natural anticipates that there will be a re-development opportunity for the Site in the former Tar Pond area, and/or a removal action that addresses the elevated soil concentrations present in that area. To that end, parallel with developing this risk assessment, NW Natural has submitted a decision scoping document for a removal action in the former Tar Pond area. The action that is ultimately taken in that area will have a significant effect on reducing Site-wide risks. Therefore, a risk assessment that evaluates residual risk following an action at this location will be presented in future submittals.

2 ECOLOGICAL SCREENING LEVEL RISK ASSESSMENT

This section contains the methods and results of the Level II ERA conducted for the Site. The purpose of the ERA is to determine risks to ecological receptors related to chemicals in upland matrices under existing Site conditions.

2.1 Site Survey

A Site survey was completed in the Level II Risk Screening (Anchor 2001a). The overall objective of the Site survey was to gather the site-specific qualitative and semi-quantitative data necessary for identifying relevant and complete contaminant-pathway-receptor relationships. The survey included a habitat/vegetation inventory and a terrestrial receptor observation.

The survey used visual and physical observations such as the presence of scat, animal tracks, and/or night-time bedding area, as well as actual observations of animals. The survey was conducted by walking the Site and marking the perimeters of all habitat features using a hand-held Global Positioning System (GPS) meter. These features, and their corresponding coordinates, were then transferred to a Geographic Information System (GIS) so that the positions could be added to a Site map.

Five habitat types were identified at the Site and are presented in Figure 2-1:

Beach/riverbank (approximately 1.2 acres)
Industrial/paved (approximately 27.2 acres)
Grass/low shrub (approximately 8.8 acres)
High shrub/tree (approximately 2.6 acres)
Pond/ditch (approximately 1.1 acres)

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Figure 2-1
Ecological Habitats
NW Natural Gasco Site

Type 1 (beach/riverbank) is sparsely vegetated, with algae on the lower elevation soils and some vegetation in the riprap on the bank slope. Woody debris collects along the high water line. Presence of horsetail (*Equisetum arvense*) in several locations along the top of the bank indicates moist soils.

Type 2 (industrial/paved) encompasses much of the Site, particularly the central and western portions. Occasional opportunistic vegetation is found in margins, gravel access roads, and on inactive structures. These isolated plants do not provide cover or habitat.

Type 3 (grass/low shrub) is found in several areas and is occasionally interspersed with Type 4. The soils in Type 3 areas tend to be rockier and less developed than in Type 4. Plants commonly found here include various grass species, thistle (*Cirsium arvense*), cornflower (*Cichorium intybus*), sweet pea (*Lathyrus tingitanus*), Queen Anne's Lace (*Daucus carota*), mullein (*Verbascum thapsus*), teasel (*Dipsacus sylvestris*), tansy (*Tanacetum vulgare*), mugwort (*Artemisia douglasiana*), goldenrod (*Solidago canadensis*), and nettles (*Urtica dioca*). All of these species are common in disturbed areas such as along roads or disused areas. All are regarded as weeds, and most are not native to the Pacific Northwest. Two other invasive plants, scots broom (*Cytisus scoparius*) and himalayan blackberry (*Rubus discolor*) are found as both small shrubs and large shrubs. The large *Cytisus* resembles a small tree, and the large *Rubus* forms dense thickets up to 6 feet high.

Type 4 (high shrub/tree) is found in the north and southeast portions of the Site. The southeast has a number of mature cottonwoods (*Populus balsamifera*) and willows. There are at least three species of willow on Site, possibly *Salix piperi*, *Salix fluviatilis*, and *Salix sitchensis*, but floral parts were not available for positive identification. The trees in the north are not as tall as those on the south, with the exception of three mature trees to the north of the former administration building which may have been intentionally planted. There are several big-leaf maple trees (*Acer macrophyllum*) along the riverbank and in the disused northern part of the Site. The maples appear to be around 15 years old.

Type 5 (pond/ditch) includes the former stormwater/ effluent settling ponds, associated drainage ditch, and the seasonal pond near the northern portion of the site in Spent Oxide area. Common rush (*Juncus effusus*) is found at edge of the ponds and ditch. There is an

alder (*Alnus rubra*) tree by the ditch that is probably about 10 years old. The ponds were completely dry at the August Site visit.

Animals observed on-site during numerous Site visits between March and September 2000 include various species of songbirds, killdeer, insects, deer, Canada geese, egrets, nutria, and dogs. Animal scat indicates use of the Site by geese, dogs, and deer. Larger mammals are suspected to be temporary visitors to the site from their larger habitat in Forest Park. One frog was observed at the ditch, but no aquatic invertebrates or fish were seen. Several animal trails and sleeping areas were noted (see photographs 9-13, Appendix B) indicating use by small mammals.

2.2 Site Specific Ecological Receptors

Per DEQ Guidance (2002a), particular species that are known to exist on or near the site are chosen as representatives for each of the ecological receptor group categories. Thus, it is necessary to have at least one species selected that is representative of each of the potential contaminant pathways.

To begin the species selection process, a working list of species that are potentially present on or around the site was developed. Potential ecological receptors at the Site were identified using existing documentation from previous investigations conducted near the site (e.g., McCormick and Baxter Remedial Investigation [PTI 1992]), information from the Oregon Natural Heritage Program (for rare, threatened, and endangered species), from observations made during Site visits (described above), and from discussions with DEQ.

Terrestrial wildlife species known or projected to inhabit the Site include raccoon (*Procyon lotor*), beaver (*Castor canadensis*), nutria (*Myocaster coypu*), black-tailed deer (*Odocoileus hemion*), dusky-footed wood rat (*Neotoma fuscipes*), opossum (*Didelphis marsupialis*), vagrant and Trowbridge's shrews (*Sorex vagrans* and *S. trowbridgii*), Townsend's and coast moles (*Scapanus townsendii* and *Neurotrichus gibbsii*), and striped skunk (*Mephitis mephitis*). The existing documentation did not include any large mammalian predators, although the two most likely mammalian predators in the area are feral dogs (*Canis familiari*) and coyotes (*Canis latrans*) (Forbes 1990).

Avian species that may potentially utilize the study area while in transit to other more optimal feeding areas, include great blue herons (*Ardea herodias*), double-crested cormorants (*Phalacrocorax autritus*), Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), gulls (*Larus* spp.), woodpeckers (various species), quail (*Callipepla* spp.), and various songbird species. Based on the Audubon Society's list (Davis 1984) for habitat and feeding needs, the two most likely avian species at the Site would be the killdeer (*Charadrius vociferou*) and the Northern flicker (*Colaptes auratus*). Bewick's wren (*Thyromanes bewickii*), European starling (*Sturnus vulgaris*), Brewer's blackbird (*Euphagus cyanocephalus*), and American robin (*Turdus migratorius*) also appear to be likely potential species in the area.

Threatened and endangered species that may potentially utilize the study area habitats include the peregrine falcon and the bald eagle. A search of the Oregon Natural Heritage Program database for rare, threatened, and endangered plant and animal species reported for the study sites did not locate any upland species (Anchor 2001b). But according to a DEQ letter of March 26, 2001, bald eagles have been observed downstream of the Site. Furthermore, there are three peregrine falcon nests along the Willamette River in the Portland area (Audubon Society 2001). The nests are on the Fremont Bridge (the 405 bridge) about 5 miles southeast of the Site, the St. Johns Bridge about 0.25 mile downstream, and the Abernathy/Route 205 bridge about 20 miles upstream. Neither bald eagles nor peregrine falcons have been observed at or near the Site during biological surveys. Of the two species, peregrine falcons would more likely utilize the Site habitat for hunting because their primary diet consists mostly of birds, whereas the bald eagle diet consists mostly of fish. Based on this information, peregrine falcons have been selected as the threatened or endangered (TE) species in this risk assessment, rather than bald eagles.

Representative ecological receptors identified for the Site include garter snake, shrew, killdeer, American kestrel, and TE species (DEQ 2002b). The peregrine falcon was selected as the most likely TE species to have a complete and significant pathway to COPCs. This information was reviewed in detail in Anchor (2001b).

2.3 Relevant and Complete Exposure Pathways

A key step in the ecological risk assessment process is identification of relevant and complete exposure pathways from chemical sources at the Site to potential ecological

receptors. The fate and transport steps that determine potential complete pathways are discussed below.

2.3.1 Chemical Sources

The source of the COPCs discussed in this document is a result of historic operations at the Site. Historic operations have led to direct and indirect transport of COPCs to soils or transitory surface waters (i.e., stormwater) on the Site. From these media, additional transport (desorption from soils or dissolved water transport) to Site groundwater have occurred.

2.3.2 Transport Media

Due to historical operations, chemicals may now be present in soils or groundwater. As rain falls and runs off the Site, some of the chemicals in soils may be either dissolved into stormwater (most likely metals) or transported via movement or erosion of soil particulates (most likely organic compounds). The fate of these chemicals could be temporary on-site water bodies (e.g., puddles, ditches, etc.); redeposition, adsorption, or precipitation to soils; or transport to the Willamette River. Similarly, chemicals may be dissolved or desorbed from soils into groundwater and transported by the groundwater to other soils on the Site or discharged via groundwater flow to the Willamette River. Finally, volatilization from surface soils and waters could take place to the air. Transport to plants and animals can take place from any of these physical media, with the most likely transport being from soils and surface waters to plants and animals via ingestion, adsorption, and/or respiration. COPCs may be further transported by ingestion by predators of plants or other animals.

While transport of chemicals by various means to the Willamette River is potentially possible, potential risks associated with Willamette River water and sediments will be addressed in the aquatic ecological and human health risk assessments. Consequently, aquatic fate and potential risks are not discussed further below.

2.3.3 Points of Environmental Contact

Terrestrial plants and animals may be in contact with soils, transitory surface waters, or airborne COPCs. Theoretically, some larger plants (like trees) could also be in contact

with groundwater. However, there is no well-developed plant community on Site with extensive root systems; therefore, groundwater is expected to be an unlikely point of contact for plants. Similarly, no evidence of extensive burrow systems was observed on Site. Therefore, burrowing to depths of groundwater (greater than 8 feet[1]) by key animal receptors appears unlikely. However, if some burrowers are present, they would likely contact subsurface soils (deeper than 0.2 feet). A depth of 3.5 feet bgs was chosen as a conservative approach to addressing receptors that may burrow extensively (see detailed discussion in Anchor 2001b).

Exposure of plants to surface water (rainwater percolating through soils) is considered significant because this is the primary source of water available for plant growth. However, plant uptake is primarily considered as a function of the soil's chemical concentrations (ORNL 1998). Because these uptake rates are all based on experiments or observations of plants in watered soils, the surface water component can be considered as a part of the soil's uptake path. Surface water is also present intermittently in ponds and ditches at the Site. However, there are no significant aquatic plant communities associated with these intermittent water features. Consequently, a pathway from these surface water features to plants is not considered significant.

Soils that contact animals are assumed to be periodically wetted by surface water (e.g., rain/runoff). Therefore, the primary issue regarding animal exposures to surface water is contact with and use of intermittent surface water features (i.e., ponds and ditches). This exposure is expected to be significant for some but not all animals living on or frequenting the site. Small mammals living in close proximity to intermittent ponds or ditches may drink surface water from these features. Similarly, birds may occasionally drink from or alight on intermittent surface water features. Other animals may rarely, if ever, drink from these intermittent surface water features. Consequently, the surface water pathway may be significant for some animal receptors but not others.

[1] Of the 521 groundwater level measurements taken from 25 wells over 5 years, only five measurements were shallower than 5 feet bgs. The average groundwater level was deeper than 8 feet bgs for all 25 monitoring wells. The 5th percentile groundwater level was shallower than 5 feet bgs at all wells with one exception (MW-9-29 with a 5th percentile level of 4.77 feet bgs).

2.3.4 Exposure Routes at Point of Contact

For an exposure route to exist, an ecological receptor must be present at the point of contact. As discussed in Section 2.2, the potential ecological receptors at this Site are limited due to the Site's industrialized nature. All potential routes of exposure and their likely significance at this Site are:

- Foliar and root (plants) or dermal and ingestion (animals) uptake of chemicals in soils (Relevant and Complete)
- Uptake by the same routes from surface water chemicals (Relevant But Usually Incomplete)
- Uptake by respiration of volatilized airborne chemicals (Likely Insignificant)
- Uptake by ingestion of plants and/or animals (Relevant and Complete)

Of these exposure routes, the most likely and relevant is uptake from soils to plants and animals. Similarly, animals could consume either plants or other animals present at the Site and thus, receive indirect exposures to these soil chemicals.

There are no permanent surface waters on the Site. Although a surface water uptake route may exist at certain times of the year, this would not be a constant source of exposure. Further, the levels of chemicals in transitory surface waters would be mainly determined by the concentrations in surface soils they contact. Consequently, the surface water uptake route of exposure is considered potentially complete but likely not relevant in terms of long-term exposures and potential Site cleanup decisions. However, DEQ has requested that surface water be screened for this site and this screening has been conducted.

Similarly, volatilization from soils to air is potentially possible and likely occurs at some rate on the Site. However, this exposure route would likely be most significant when very high concentrations of highly volatile chemicals and/or physical locations that trap or limit air circulation (such as depressions) exist on the Site. Although some volatile chemicals (like benzene) were found at the Site, they are not the most widespread or most highly concentrated chemicals at the Site. In contrast, PAHs, which are present at higher concentrations on the Site, are relatively non-volatile. Consequently, the air

uptake route is considered potentially complete but relatively insignificant in terms of overall exposure as compared to soils.

2.4 Preliminary Conceptual Site Model

Based on the information discussed in the previous sections, a preliminary conceptual Site model was developed and is shown in Figure 2-2. The likely complete and significant pathways at the Site are from soils to primary plants and animals. It is conceivable that higher level secondary consumers may be exposed to potentially bioaccumalative compounds (PAHs), but due to the limited ecological habitat, the Site is not expected to support appreciable populations of higher level predators.

Because the vast majority of COPCs found in the various Site areas are not volatile chemicals (see Section 2.6), air transport to ecological receptors is not considered a complete or significant pathway. Similarly, although groundwater is shown in the Site conceptual model, it is not expected to contribute appreciably to the doses of chemicals received by either plants or animals. This is because groundwater levels are too deep (greater than 8 feet bgs) for appreciable contact with the types of plant roots (grasses and shrubs) and animals (small mammals or birds) predominant at the Site. The other complete pathways shown, primarily soil and to a lesser extent surface water, are expected to comprise the majority of exposure for plants and animals.

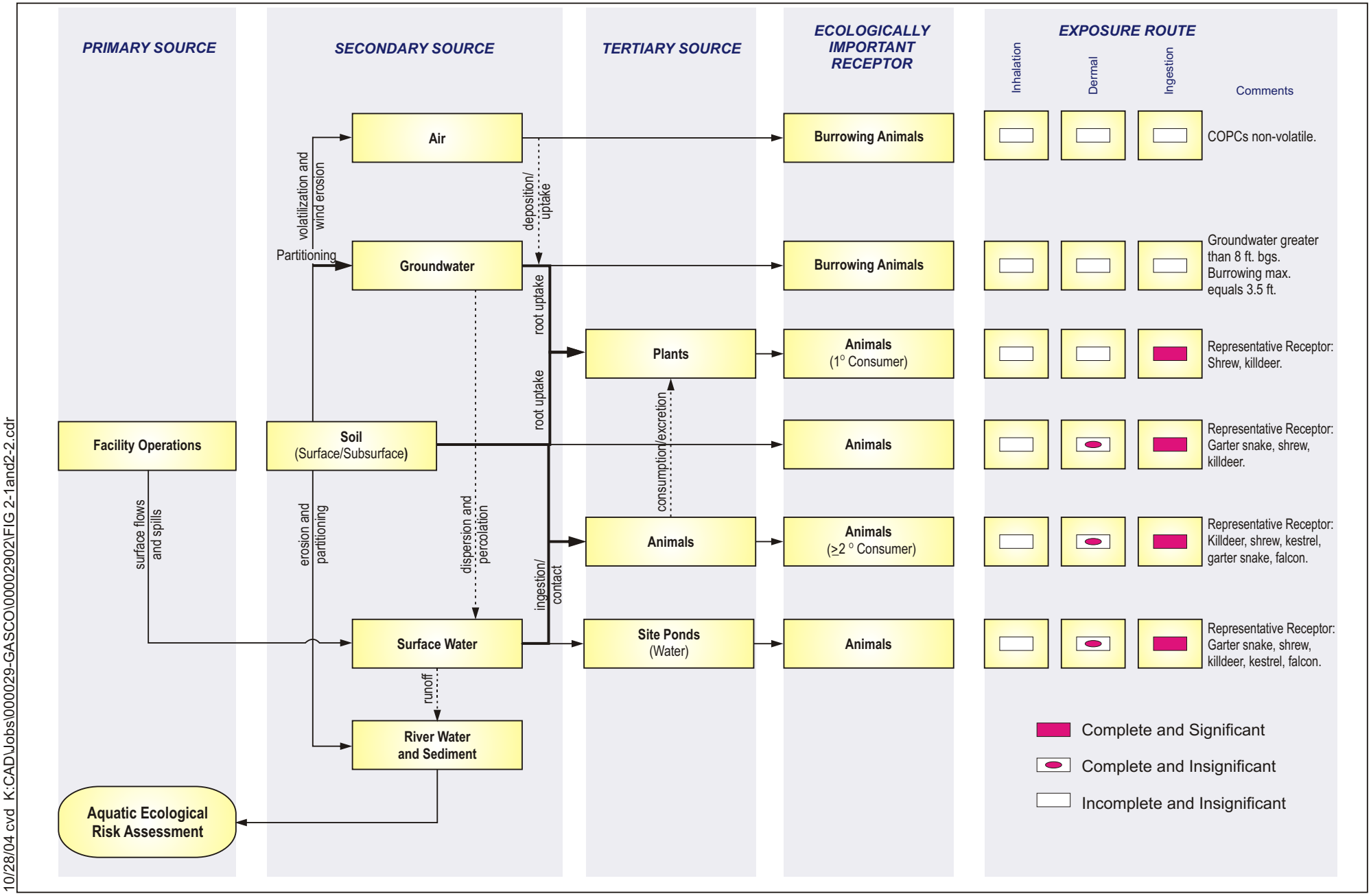

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Figure 2-2
Ecological Conceptual Site Model
NW Natural "Gasco" Site

2.5 Candidate Assessment Endpoints

Based on the information presented in the previous sections, the following candidate assessment endpoints are proposed:

- Protection of mammalian and avian primary consumers (herbivores) from population level effects due to COPCs.
- Protection of endangered avian secondary consumers (predators of soil invertebrates) from individual level effects due to COPCs.

These assessment endpoints represent key ecological receptors (rather than all receptors) potentially present at the Site. These receptors are generalized in terms of species for use in the Level II (Screening) Risk Assessment.

2.6 Contaminants of Potential Ecological Concern

The soil COPCs for the Site were identified in the Level II Risk Screening Report completed in February 2001 (Anchor 2001a). Because new Screening Levels Values (SLVs) have been promulgated since the initial Risk Screening Report was completed, and because additional results have been included in the Site database, chemistry at the Site was re-screened per DEQ 2002 guidance (DEQ 2002a). Both soil chemistry and surface water chemistry results were used in the screening. Consistent with the initial Risk Screening Report, groundwater was not expected to provide relevant and complete pathways for chemicals to the candidate ecological receptors; therefore, this media was not included in the evaluation (see Section 2.4 for more details).

2.6.1 Soil

For this evaluation it was assumed that chemicals in soil were evenly distributed across the ecological receptors' habitat and that foraging occurs randomly within this area. Only soil samples from the upper 3.5 feet bgs were included in this evaluation, consistent with Anchor (2001b). Using subsurface data to a depth of 3.5 feet is considered a conservative approach (more likely to find risks) because potential exposure to contaminants at this depth would only be anticipated for receptors that burrow extensively (DEQ 2004). Other receptors would not be expected to contact subsurface soils extensively. Exposure concentrations (ECs) for terrestrial and avian species exposed to soil within the Site were calculated based on the upper 90th

percentile confidence level on the mean, which is consistent with DEQ (2002a) methods. If the 90th percentile confidence level on the mean was greater than the maximum concentration, then the maximum concentration was used for the EC.

2.6.2 Surface Water

Because surface waters in different locations move relatively rapidly (as compared to soils or groundwater) and mix over time, it was assumed that all surface water samples represent the range of exposure that would be present from surface waters regardless of receptor location. Consequently, ECs for terrestrial and avian species exposed to surface water within the Site were calculated based on the upper 90th percentile confidence level on the mean, which is consistent with DEQ (2002a) methods. If the 90th percentile confidence level on the mean was greater than the maximum concentration, then the maximum concentration was used for the EC. Because the levels of chemicals in transitory surface waters is mainly determined by the concentrations in surface soils they contact (e.g., rain/runoff), only chemicals listed as soil COPCs were used in the surface water screening assessment.

2.6.3 Screening Methodology

Exposure concentrations were compared to DEQ SLVs (2002a) for surface water and soil receptor groups. If an SLV was not available for a particular chemical, a surrogate chemical SLV from the same receptor group was used (noted in Table 2-1). CPAHs that did not have an SLV available were assigned the SLV for benzo(a)pyrene for both soils and surface water. Non-carcinogenic PAHs that did not have an SLV available were assigned the SLV for fluorene for soil and naphthalene for surface water. Because no plant, invertebrate, or aquatic receptors were identified as Site-specific ecological receptors of concern (ROCs) (Section 2.2), SLVs for these groups are compared to exposure concentrations for informational purposes only.

To quantitatively rank SLV exceedances, hazard quotients (HQs) were calculated. An HQ is the ratio of an EC to its respective SLV (HQ=EC/SLV). Therefore, HQs greater than 1 represent an SLV exceedance.

2.6.4 Screening Results

The results of the screening evaluation are summarized in Table 2-1 and Table 2-2. Spatial presentation of the screening results by location is shown in Figure 2-3, Figure 2-4, and Figure 2-5. The value presented in these figures is the maximum HQ from the receptor groups. These figures are for informational purposes, an exceedance at a single location does not necessarily imply risk because the exposure point concentration is based on the 90th percentile upper confidence limit (UCL) on the mean of all the locations. The raw data used for these calculations is shown in Appendix A. Results are summarized in the following subsections based on chemical group.

2.6.4.1 Metals

Zinc was identified as a COPC in the Level II Risk Screening Report (Anchor 2001a). Zinc did not exceed the mammal or invertebrate SLVs for soil. Zinc was not analyzed in surface water and was therefore unavailable for screening. The concentration did exceed the bird and plant SLVs for soil, although it is important to note that the plant SLV is not considered relevant to this evaluation because plant ROCs were not identified in Section 2.2. As shown in Figure 2-3, zinc soil concentrations above SLV criteria were greatest near the Former Spent Oxide Area and at one location by the building in the Koppers area.

Table 2-1
Ecological Screening Results for Soil

Chemical	Unit	EC (90th UCL)	SLV Receptor	SLV	HQ
Acenaphthene [a]	µg/kg	120864	30000	Invertebrates	4
Acenaphthene	µg/kg	120864	20000	Plants	6
Anthracene [a]	µg/kg	84890.6	30000	Invertebrates	2.8
Benzo(a)anthracene [b]	µg/kg	66446.6	125000	Mammals	0.5
Benzo(a)pyrene	µg/kg	77361.6	125000	Mammals	0.6
Benzo(b)fluoranthene [b]	µg/kg	73165.1	125000	Mammals	0.6
Benzo(g,h,i)perylene [b]	µg/kg	63250.9	125000	Mammals	0.5
Benzo(k)fluoranthene [b]	µg/kg	42699.8	125000	Mammals	0.3
Chrysene [b]	µg/kg	84223.2	125000	Mammals	0.7
Dibenzo(a,h)anthracene [b]	µg/kg	12029.5	125000	Mammals	0.1
Fluoranthene [b]	µg/kg	227675	125000	Mammals	1.8
Fluorene	µg/kg	78046.7	30000	Invertebrates	2.6
Indeno(1,2,3-cd)pyrene [b]	µg/kg	49746.2	125000	Mammals	0.4
Naphthalene [a]	µg/kg	585981	30000	Invertebrates	20
Naphthalene	µg/kg	585981	10000	Plants	59
Naphthalene	µg/kg	585981	3900000	Mammals	0.2
Phenanthrene [a]	µg/kg	387563	30000	Invertebrates	13
Pyrene [b]	µg/kg	282185	125000	Mammals	2.3
Xylene	µg/kg	16214.4	100000	Plants	0.2
Xylene	µg/kg	16214.4	120000	Mammals	0.1
Zinc	mg/kg	144.298	50	Plants	2.9
Zinc	mg/kg	144.298	60	Birds	2.4
Zinc	mg/kg	144.298	200	Invertebrates	0.7
Zinc	mg/kg	144.298	20000	Mammals	0

Notes:

Yellow = result exceeds SLV for receptor group of concern
Blue = result exceeds SLV for receptor groups not identified as being of concern
90th UCL calculated per DEQ guidance - using ½ the reporting detection limit (RDL) for non detects
SLVs derived from DEQ guidance for ecological risk assessment - Level II SLV
HQ - Hazard quotient (EC/SLV)
a Fluorene used as surrogate for non-carcinogenic PAHs, no SLV available
b Benzo(a)pyrene used as surrogate for cPAHs, no SLV available

Table 2-2
Ecological Screening Results for Surface Water

Chemical	Unit	EC (90th UCL)	SLV Receptor	SLV	HQ
Acenaphthene [a]	mg/l	1.61E-03	Mammals	284	0.0
Acenaphthylene [a]	mg/l	3.83E-04	Mammals	284	0.0
Anthracene	mg/l	4.04E-04	Aquatic	1.30E-02	0.0
Anthracene [a]	mg/l	4.04E-04	Mammals	284	0.0
Benzo(a)anthracene	mg/l	2.37E-04	Aquatic	2.7E-05	8.8
Benzo(a)anthracene	mg/l	2.37E-04	Mammals	8	0.0
Benzo(a)pyrene	mg/l	3.32E-04	Aquatic	1.4E-05	23.7
Benzo(a)pyrene	mg/l	3.32E-04	Mammals	8	0.0
Benzo(b)fluoranthene [b]	mg/l	6.47E-04	Mammals	8	0.0
Benzo(g,h,i)perylene [b]	mg/l	5.52E-04	Mammals	8	0.0
Benzo(k)fluoranthene [b]	mg/l	2.15E-04	Mammals	8	0.0
Chrysene [b]	mg/l	3.77E-04	Mammals	8	0.0
Dibenzo(a,h)anthracene [b]	mg/l	7.46E-05	Mammals	8	0.0
Fluoranthene	mg/l	6.77E-04	Aquatic	6.16E-03	0.1
Fluoranthene [b]	mg/l	6.77E-04	Mammals	8	0.0
Fluorene	mg/l	7.00E-04	Aquatic	3.90E-03	0.2
Fluorene [a]	mg/l	7.00E-04	Mammals	284	0.0
Indeno(1,2,3-cd)pyrene [b]	mg/l	3.67E-04	Mammals	8	0.0
Naphthalene	mg/l	1.11E-02	Aquatic	6.20E-01	0.0
Naphthalene	mg/l	1.11E-02	Mammals	284	0.0
Phenanthrene	mg/l	8.04E-04	Aquatic	6.30E-03	0.1
Phenanthrene [a]	mg/l	8.04E-04	Mammals	284	0.0
Pyrene [b]	mg/l	6.88E-04	Mammals	8	0.0

Notes:

Blue = result exceeds SLV for receptor groups not identified as being of concern
90th UCL calculated per DEQ guidance - using ½ the RDL for non detects
SLVs derived from DEQ guidance for ecological risk assessment - Level II screening level values
HQ - Hazard quotient (EC/SLV)
a Naphthalene used as surrogate for non-carcinogenic PAHs, no SLV available
b Benzo(a)pyrene used as surrogate for cPAHs, no SLV available

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0 250 500 1,000
Scale in Feet

SLV from DEQ guidance for ecological risk assessment - Level II screening level values
Receptor group with lowest SLV for given contaminant used in this evaluation

Figure 2-3
Zinc Exceedance Factor of SLV Criteria
Soil Upper 3.5 ft bgs
NW Natural Gasco Site

2.6.4.2 Monocyclic Aromatic Hydrocarbons

Of the monocyclic aromatic hydrocarbons, only xylene was identified as a COPC in the Level II Risk Screening Report (Anchor 2001a). Xylene did not exceed any of the soil SLVs, and it was not analyzed in surface water.

2.6.4.3 Polycyclic Aromatic Hydrocarbons

The PAH group had the largest number of concentrations that exceeded soil and surface water SLVs. The majority of the SLV exceedances for both surface water and soils were from receptor groups not identified in Section 2.2 (i.e., not ROCs). Mammal SLVs for soil were exceeded for both fluoranthene and pyrene. In both cases, the surrogate SLV for benzo(a)pyrene was used because no chemical-specific SLVs were available. Because benzo(a)pyrene is considered more carcinogenic than fluoranthene and pyrene, risks were likely overestimated by using it as a surrogate. Plant and invertebrate SLVs for soil were exceeded for six other PAHs, the highest exceedance was the plant SLV for naphthalene. Aquatic SLVs for surface water were exceeded for benzo(a)pyrene and benzo(a)anthracene, although the aquatic life receptor group was not identified in Section 2.2 as being of concern, these screening values were provided for informational purposes only.

Figures 2-4 and 2-5 show individual locations that did exceed soil SLV criteria for PAHs, the majority of which are in the tar pond area. Figure 2-4 spatially presents the HQ by location for the LPAH compounds. Figure 2-5 spatially presents the HQ by location for the HPAH compounds. These figures are for informational purposes, an exceedance at a single location does not necessarily imply risk because the exposure point concentration is based on the 90th percentile UCL of all the locations.

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0 250 500 1,000
Scale in Feet

SLV from DEQ guidance for ecological risk assessment - Level II screening level values
Receptor group with lowest SLV for given contaminant used in this evaluation

Figure 2-4
LPAH Maximum Exceedance Factor of SLV Criteria
Soil Upper 3.5 ft bgs
NW Natural Gasco Site

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0 250 500 1,000
Scale in Feet

SLV from DEQ guidance for ecological risk assessment - Level II screening level values
Receptor group with lowest SLV for given contaminant used in this evaluation

Figure 2-5
HPAH Maximum Exceedance Factor of SLV Criteria
Soil Upper 3.5 ft bgs
NW Natural Gasco Site

DEQ guidance (2002a) recommends a discussion of any COPCs that have the potential to bioaccumulate in the food chain. Of the contaminants screened in this report, only the PAHs have the potential for bioaccumulation. One indicator of the propensity for a chemical to bioaccumulate is based on the log octanol/water (K_{ow}) partition coefficient (EPA 1991). Log K_{ow}s above 3.5 indicate the potential for bioaccumulation, while values of 5 or greater have a relatively high propensity for bioaccumulation in food chains (EPA 1991 and Sample et al. 1997). PAHs have K_{ow} numbers in the 3 to 7 range, which may suggests that some of the Site PAHs may bioaccumulate in the food chain. Bioconcentration factors (BCFs) are also used to evaluate the propensity for a chemical to bioaccumulate and are typically used in Level III risk assessments to calculate uptake rates. Because the BCF is based on the ratio of concentration in media to concentration in organism, BCFs of 1 or less suggests that bioaccumulation is not occurring. All PAH compounds have dietary mammal BCFs that are less than 1, often less than ½ (EPA 2000). Therefore, for the purposes of this report, the propensity for PAHs to bioaccumulate was considered unlikely.

2.7 Known Ecological Effects

The known ecological and toxicological effects of the COPCs are discussed in this section. This section provides potentially important physiochemical and toxicity information for each of the COPCs. COPCs that are a result of analytical detection limit issues are not discussed below. Physiochemical and toxicity information originated from the Hazardous Substances Data Base (HSDB 2000), unless otherwise noted.

2.7.1 Metals

As discussed in Section 2.3.1, for metals only zinc was consistently detected at levels significantly above its respective SLV. Zinc is an essential element for most life and is found in virtually all organisms. Zinc is generally not found in a free elemental state, but most often occurs in the +2 oxidation state in compounds such as zinc sulfide (sphalerite), zinc carbonate (smithsonite) and zinc oxide (zincite). Zinc is expected to have low mobility in soils, but is adsorbed by plants. Because zinc compounds are generally solids, volatilization from soil or water surfaces is not expected to be an

important environmental fate process. Zinc is often measured as strongly adsorbed or associated with suspended solids and sediment in water.

A variety of toxic effects have been observed in terrestrial animals as a result of zinc exposure, depending on the dose. Effects in animals include depressed growth, arthritis, lesions in various internal and reproductive organs, gastrointestinal tract inflammation, defective bone mineralization, decreased egg hatching in birds (ORNL 1996), reduced fetal growth (ORNL 1996), and other effects. There is no evidence to clearly support that zinc is carcinogenic (USEPA classification D). Extremely high levels of zinc in soils have been linked to iron and copper deficiency in plants and inhibition of root growth.

2.7.2 Polycyclic Aromatic Hydrocarbons

As discussed in Section 2.3.3, only fluoranthene and pyrene were detected at levels significantly above respective SLVs. A variety of toxic effects have been observed for the various PAHs. Although a large body of literature exists on the toxicity and carcinogenicity of PAHs, toxicity data for fluoranthene are very limited. No human data were available that addressed the toxicity of fluoranthene. Toxicity studies in animals have shown that fluoranthene exposure can cause eye irritation, nephropathy, increased liver weights, and increased liver enzyme levels. Pyrene has been determined through laboratory testing of terrestrial animals to cause nephropathy (ORNL 2000). Nephropathy is the disease of the kidney most likely via the ingestion pathway.

3 HUMAN HEALTH RISK ASSESSMENT

This section contains the methods and results of the Human Health Risk Assessment (HHRA) conducted for the Site. The purpose of the HHRA is to determine risks to people related to chemicals in upland matrices under existing Site conditions. Note that the sections presented in this HHRA generally follow DEQ Guidance (2000), and differ somewhat from the section headings presented for the ERA presented above.

3.1 Problem Formulation

The basis of the problem formulation has been presented in previous documents submitted to DEQ including the Level II Risk Screening (Anchor 2001a) and the Receptor/Pathway Selection Interim Technical Memorandum (Anchor 2001b). This section summarizes that previous work and presents the most recent version of the problem formulation based on DEQ comments on the previous documents (in particular DEQ 2002). It should be noted that the LOF and the extent of contamination that was used in this problem formulation are summarized in Section 1.3.4.

3.1.1 Contaminants of Potential Concern

The COPCs for the Site were identified in the Level II Risk Screening Report completed in February 2001 (Anchor 2001a). Based on this initial screening level assessment chromium VI, benzene, xylene, and PAHs were carried through to the Level III HHRA.

3.1.2 Potentially Exposed Populations, Exposure Scenarios, and Exposure Routes

Potentially exposed populations were determined during the Level II Risk Screening (Anchor 2001a) and the Receptor Pathway Selection Interim Technical Memorandum (Anchor 2001b) and were modified based on DEQ comments on these documents. This information is summarized here.

The Site is an industrial facility. As such, there are three potential general types of populations that could have current or reasonably likely future exposures to Site chemicals:

- On-site workers expected to be present on a regular basis

- General public that might periodically visit the Site for business purposes or gain unauthorized access to the Site on a one-time or irregular basis
- Residents living near the Site (not a current use)

No commercial, residential, or types of uses other than industrial exist for the Site. The reasonably likely future Site uses for nearby properties are industrial and possibly residential, even though no residential areas currently exist near the Site. Consequently, the discussion of on-site exposures (workers and visitors) considers existing and reasonable likely future exposures as one topic.

On-Site Worker Population

On-site workers have the potential to be exposed on a regular basis. A previous human exposure pathway analysis conducted for the Site (DMA 1997) identified three Site worker populations (or occupations) based on detailed surveys and interviews of Site activities and the exposures likely from each of these observed activities. The three Site worker occupations were:

- NW Natural Gas workers
- Koppers workers
- Pacific Northern Oil workers

These occupations all have moderate levels of exposures to Site media (e.g., soils and air). Thus, these occupations can be evaluated as one population, provided that exposure scenarios, routes, and assumptions are sufficiently conservative to be protective of all three occupations.

In addition, temporary short-term high-level exposures to soils, and potentially groundwater, could occur to excavation workers associated with occasional activities like utilities repair and replacement. These types of exposures would be assessed in a second population group. The exposed worker population for both groups would be adults.

Public Visitor Population

General members of the public that periodically visit the Site could also potentially receive short-term low-level exposures. These types of exposures are expected to be

similar to on-site worker exposures but of a shorter duration and lesser frequency. In addition, people present for business purposes would also be adults. Consequently, this population could be conservatively included in evaluations of on-site workers.

General public exposures could also include people who gain illegal entry to the Site. Illegal entry to the site is highly unlikely. Utilities are federally recognized as potential terrorist targets, and federally required site security measures include security fencing around the entire property and regular security guard visual inspections of the property. Again, the exposures that trespassers might receive would generally be expected to be similar to on-site workers, but of a shorter duration and lesser frequency. One potential exposure to trespassers that would not normally be expected to apply to on-site workers might be consumption of plants or animals (hunting, gathering, fishing, etc.) at the Site. However, the Site does not support any plant or animal population that would reasonably be consumed in any appreciable quantity. (Note that fishing in the Willamette River will be evaluated in the Portland Harbor aquatic risk assessment.) Therefore, trespassers could also be conservatively assessed in the same group as on-site workers.

This approach does not explicitly account for the potential that trespassers could be children. However, this non-conservative assumption is outweighed by the conservative assumption that trespassers would be exposed at a duration and frequency similar to on-site workers, and is further supported by the enhanced security protocols at the site. That is, the smaller averaging time and body weight for children would be outweighed by the greater assumed exposure duration and frequency (i.e., five days a week for eight hours a day).

Nearby Residential Population

Some residentially zoned areas exist across Highway 30, although no residences are currently present. Future nearby residents could conceivably be exposed to chemicals either from air or water transport. In this case, both exposures appear to be unlikely.

Any air transport of chemicals (either volatiles or dust) would be rapidly diluted before contact at residential areas. Assuming that air transport will be evaluated for on-site

worker exposures (see below), the potential risks to off-site residents from airborne exposures could also be conservatively evaluated by the on-site worker assessment. If potential risks were found for workers, air dilution and transport modeling appropriate for off-site residential areas could be pursued.

Site surface water runoff enters the Willamette River and is expected to continue to do so in the future. Potential risks associated with this exposure will be evaluated in the Superfund aquatic risk assessment for Portland Harbor.

Current groundwater conditions at the Site are described in Section 1. In summary, groundwater contamination is limited to within the Site boundaries (except the Siltronic site which is being assessed separately – see Section 1) and the groundwater gradient is towards the river. Further, the entire region is supplied with municipal water. Future residential uses adjacent to the Site would not require wells as a source of water, but would likely rely on the municipal water supply. Consequently, exposure to groundwater in future residential areas is extremely unlikely by all reasonable expectations, both from a beneficial use and from a fate and transport perspective.

Exposure Scenarios

The above indicates the most representative exposure scenarios for this Site are:

- Occupational (on-site workers and visitors)
- Excavation workers involved in temporary excavation activities such as trenches or pits

As discussed above, potential future off-site residential exposures via air, surface water, or groundwater are extremely unlikely to occur. Therefore, a residential scenario is not proposed. The proposed scenarios would be consistent with EPA default scenario descriptions (DEQ 2000). Exposure assumptions in the Level III baseline risk assessment have been set to those defined in DEQ (2000) guidance for "Occupational Adult" and "Excavation Worker."

Exposure Routes

Based on the discussion of likely exposed populations, the following exposure routes were selected:

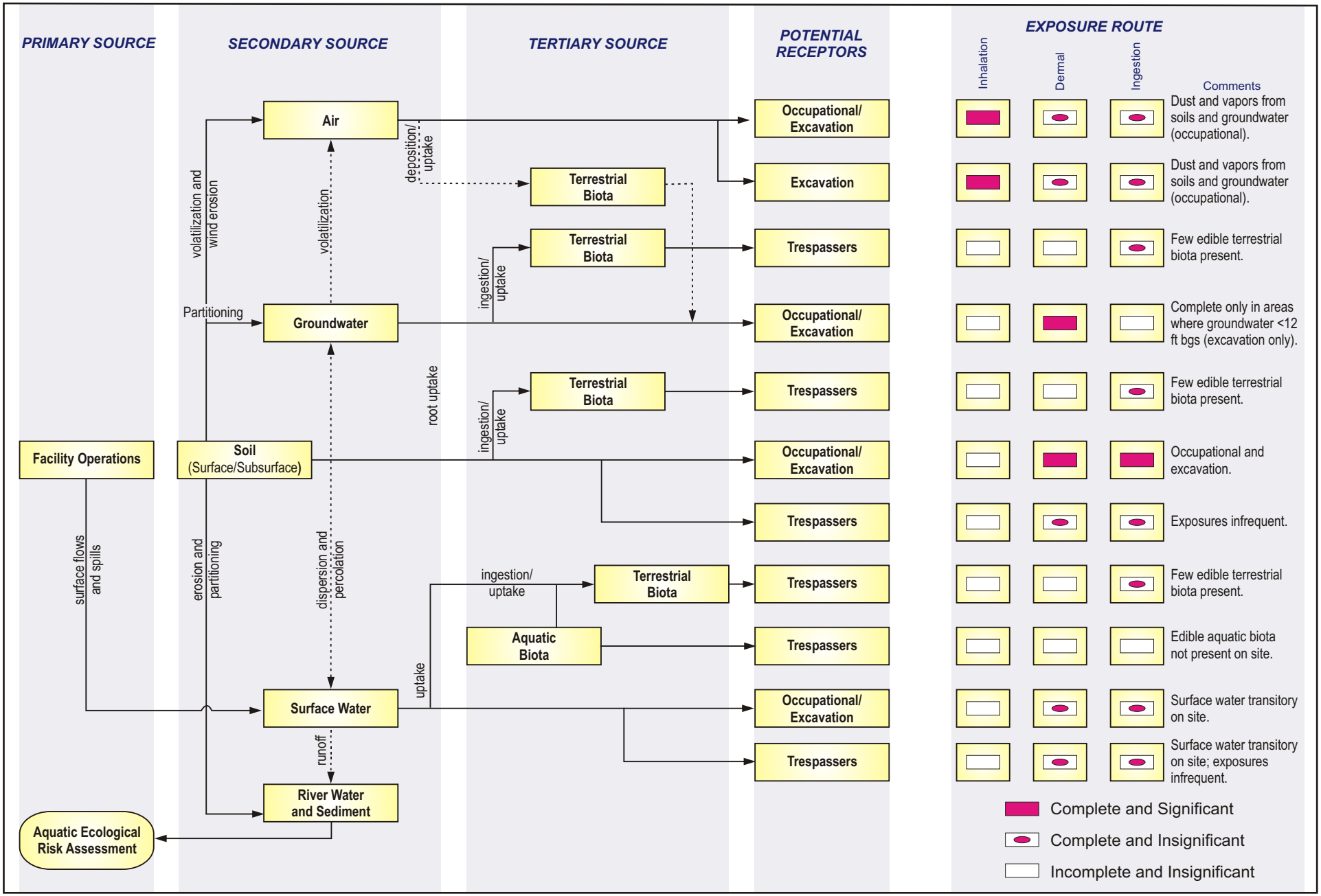
1. Occupational (covers worker, visitor, and trespasser exposures)
   a. Incidental ingestion of soil
   b. Dermal contact with soil
   c. Outdoor inhalation of airborne chemicals (dust and volatiles) from soils and groundwater
   d. Indoor inhalation of airborne volatile chemicals from groundwater
2. Excavation Worker
   a. Incidental ingestion of soil
   b. Dermal contact with soil
   c. Inhalation of airborne chemicals (dust and volatiles) from soils and groundwater
   d. Dermal contact with groundwater (where present at shallower than 12 feet bgs).

The most likely exposure routes are from soils or airborne chemicals from soils. Groundwater is not and will not be used on-site for any purpose. Thus, the groundwater route to industrial workers is incomplete, with the exception of volatilization of chemicals from groundwater through soils to the soil surface. DEQ has indicated that excavation workers would be expected to have exposures up to 12 feet bgs. Consequently, where groundwater frequently occurs above this level, excavation workers' exposure to groundwater via dermal contact is conceivable.

Surface waters are transitory on-site, so any exposures to either type of worker would be of very short duration and frequency, and are expected to be insignificant in comparison to soils exposures. There are no occupations on the Site that routinely bring workers in contact with these transitory surface waters. Further, the concentrations of chemicals in transitory surface waters would be primarily determined by the soils they contact.

3.1.3 Conceptual Site Model

The conceptual Site model is shown in Figure 3-1. The model is based on the exposure populations, scenarios, and routes discussed in the previous sections.



10/19/04 cvd K:CAD\Jobs\000029-GASCO\00002902\FIG 3-1.cdr

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Figure 3-1
Human Health Conceptual Site Model
NW Natural "Gasco" Site

3.2 Exposure Analysis

Exposure analysis quantifies the level of exposure for each of the significant and complete scenarios defined in the previous section. For this Site, the occupations involved generally require workers to be in specific areas of the Site. At the same time, the concentrations of chemicals vary considerably over various portions of the Site. For both of these reasons, the human health exposure analysis (and subsequent risk characterization) was conducted for five sub-areas of the Site shown in Figure 1-2. Using this approach, it can be determined whether certain areas of the Site and/or certain occupations that work within these areas would likely pose risk.

3.2.1 Exposure Point Concentrations

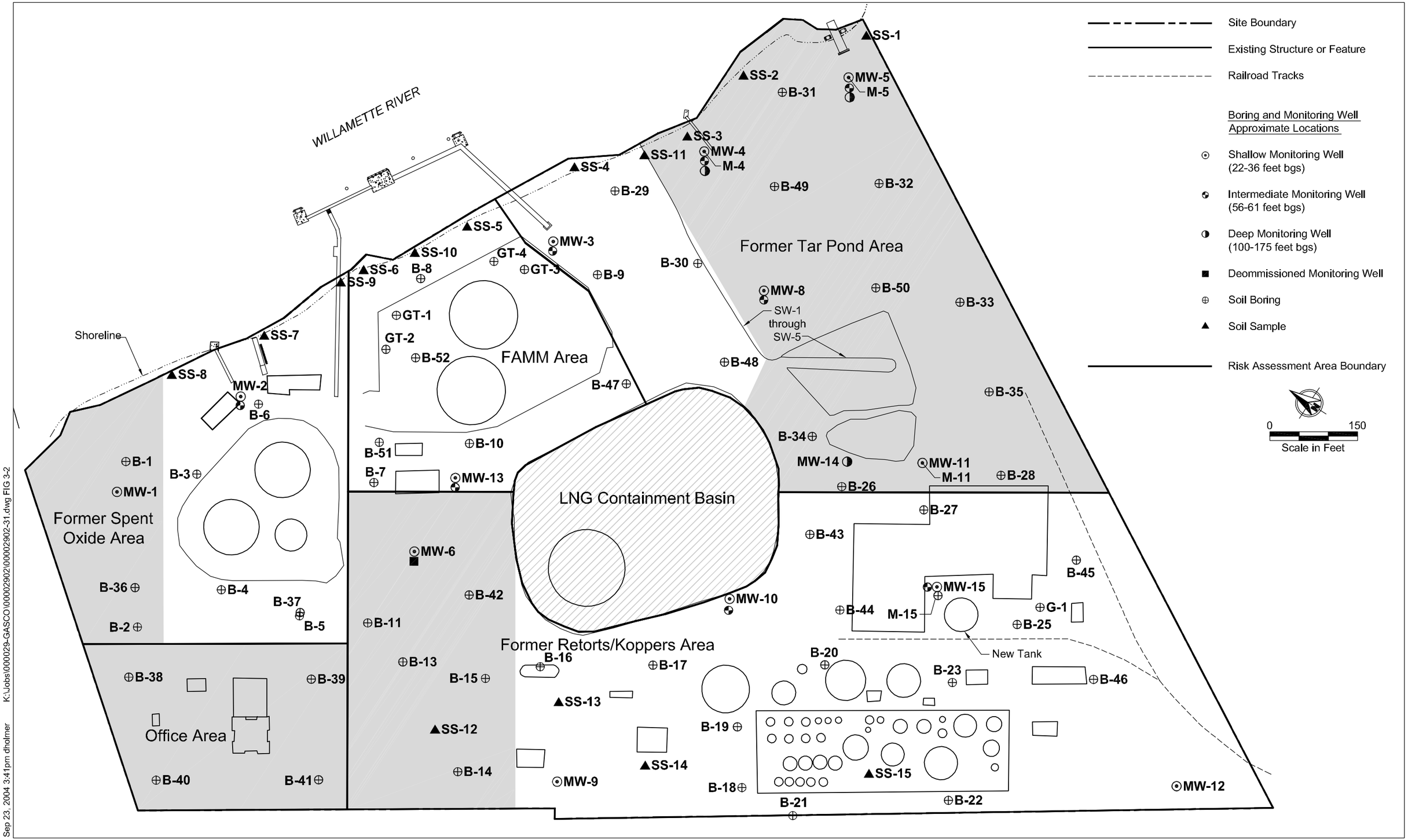
Consistent with the significant and complete pathways shown in Figure 3-1, exposure point concentrations were determined for soils and groundwater. Concentrations were determined for each sub-area shown in Figure 1-2. Sub-areas were further differentiated based on the potential for re-development activities. Areas where re-development may occur are identified in Figure 3-2. It is important to note that for most of these areas no specific re-development plans have been identified by NW Natural. Rather, these areas were primarily identified by the absence of ongoing activities at the request of DEQ. Soils data were vertically segregated within each area into occupational exposures—down to 3.5 feet bgs; and excavation exposures—down to 12 feet bgs in re-development areas and down to 3.5 feet in areas that will not likely be re-developed. Groundwater data from the fill unit were used to determine reasonable maximum estimates (RME) and central tendency estimates (CTE) estimates for each sub-area. If no data were available for particular chemicals from wells screened in the fill unit, data from the alluvial unit were used for those chemicals only. If no relevant groundwater data for particular chemicals was available for that sub-area in either the fill or alluvial unit, then the groundwater concentration was set to zero for that sub-area. Appendix A contains all data used in the determination of exposure point concentrations. Appendix D contains the resulting RME and CTE estimates used for each sub-area and exposure pathway.

Following DEQ guidance (2002a and 2000), the upper 90th confidence limit on the mean was used for the RME, and the mean was used for the CTE within each sub-area. It

should be noted that DEQ guidance (2000) discusses methods of calculating these statistics for both normal and non-normally distributed data. During the Level II Risk Screening, all data sets were summarized using methods that assumed both normal and non-normal distributions. It was found that, in almost all cases, calculations based on assumed normality yielded higher exposure point concentrations. Consequently, both RME and CTE estimates were made using methods that assume normal distributions of data. This is a conservative assumption that would tend to overestimate risks if the data are not-normally distributed in any particular case.

3.2.2 Exposure Estimation

Exposure estimates (or doses) were made for each pathway and each exposure route following the equations in DEQ guidance (2000) wherever applicable. The methods for exposure estimation for each pathway are summarized in Table 3-1. All equation numbers are references to DEQ (2000).



Sep 23, 2004 3:41pm dholmer K:\Jobs\000029-GASCO\00002902\00002902-31.dwg FIG 3-2

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Figure 3-2
Potential Redevelopment Areas
NW Natural "Gasco" Site

Table 3-1
Human Health Exposure Estimate Methods Summary

Scenario	Pathway	Carcinogens	Non-Carcinogens
Occupational	Incidental Ingestion of Soils	Equation A.9	Equation A.10
	Dermal Contact with Soils	Equations A.30, A.32	Equations A.31, A.32
	Inhalation from Soil Vapors	Equations A.41, A.43, A.44, A.45, A.46,.A.47, A.48	Equations A.42, A.43, A.44, A.45, A.46,.A.47, A.48
	Inhalation of Soil Particulates	A.50, A.52, A.53, A.54, A.55	A.51, A.52, A.53, A.54, A.55
	Inhalation from Groundwater Vapors	A.41, A.43, ASTM E1739-95	A.42, A.43, ASTM E1739-95
Excavation Worker	Incidental Ingestion of Soils	Equation A.9	Equation A.10
	Incidental Ingestion of Groundwater	Equation A.12	Equation A.13
	Dermal Contact with Soils	Equations A.30, A.32	Equations A.31, A.32
	Dermal Contact with Groundwater	Equations A.34, A.36, A.37, A.38, A.39	Equations A.35, A.36, A.37, A.38, A.39
	Inhalation from Soil Vapors	Equations A.41, A.43, A.44, A.45, A.46,.A.47, A.48	Equations A.42, A.43, A.44, A.45, A.46,.A.47, A.48
	Inhalation of Soil Particulates	A.50, A.52, A.53, A.54, A.55	A.51, A.52, A.53, A.54, A.55
	Inhalation from Groundwater Vapors	A.41, A.43	A.42, A.43

For the volatilization of groundwater under the occupational scenario, ASTM Method E1739-95 (ASTM 1995) for determination of vapor concentrations in enclosed spaces was used to determine the volatilization factor for groundwater in DEQ Equation A.43. For exposure to vapors from groundwater for excavation workers, a value of 0.5 L/m^3 was used for the water volatilization factor following EPA guidance for residential uses of water (EPA 1991). Although this value is not intended directly for use with excavation workers, it appears to be a reasonable estimate given the close contact with groundwater in an enclosed space that would occur with an excavation worker in a pit or trench. As noted above, excavation worker exposures to groundwater were only considered in sub-areas that have a groundwater levels commonly higher than 12 feet bgs. These areas are the Tar Pond Area, Koppers/Former Retorts Area, and Spent Oxide Area. Appendix A contains Site groundwater level data used to make this determination.

3.2.3 Exposure Factor Values

Where available, exposure factors used were generally consistent with the exposure factor default values contained within Appendix B of DEQ guidance (2000), or updated values in DEQs Risk Based Decision Making for the Remediation of Petroleum-Contaminated Sites (DEQ 2003b). The specific values used for each exposure scenario and pathway are detailed in Appendix B. In addition, some sub-area specific exposure parameters for inhalation (e.g., source area size, percent vegetation coverage, soil organic carbon content, etc.) are shown at the top of risk characterization tables in Appendix D. In most cases, the only times DEQ default values were not used is when they were not provided by DEQ (2000). Parameters where DEQ default values were not available include:

- Height of indoor air space for enclosed vapor exposures was set at 7.5 feet as a general estimate of Site-specific conditions
- Incidental ingestion rate of groundwater for excavation workers was set equal to the EPA (2001) guidance for incidental ingestion of water while swimming
- Groundwater vapor exposure factor for excavation workers was set equal to EPA (1991) guidance on vapor factors for residential exposures to household water (see previous section for explanation)

3.3 Toxicity Analysis

The toxicity analysis generally followed the procedures in DEQ (2000) guidance such that EPA's Integrated Risk Information System (IRIS; EPA 2003) and Health Effects Assessment Summary Tables (HEAST; EPA 1997) values were the preferred sources of toxicity data.

Because three routes of exposure are assessed (ingestion, dermal, and inhalation), toxicity values specific to each exposure route were always selected when they were available. For many chemicals, exposure-route-specific toxicity values are not available. In these cases, extrapolations were made as follows:

- Dermal toxicity values were derived per the EPA Risk Assessment Guidance for Superfund Part E (EPA 2001). GI trac-absorption factors were used to extrapolate oral toxicity slope factors and/or reference doses for chemicals identified as requiring adjustment (Exhibit 4-1, EPA 2001). Chemicals that were identified as not requiring adjustment used available oral toxicity values directly.

- Where inhalation toxicity values were not available, ingestion toxicity values were used consistent with EPA (1996) soils screening methods.

The specific human health toxicity values used for each exposure route are presented in Appendix C.

3.3.1 Toxicity Profiles

Toxicity profiles for all COPCs (chemicals passing through the Level II Risk Screening) are provided in Appendix C.

3.3.2 Toxicity Reference Values

As noted above, the toxicity values used in the risk assessment are provided in Appendix C. Two specific issues should be noted including:

- Slope factors for cPAHs were extrapolated from benzo(a)pyrene consistent with EPA 2003 and EPA 1993.
- Inhalation unit risks provided by EPA (2003) were converted to reference doses and slope factors based on a 20 L/day inhalation rate and a 70 kg body weight per EPA (2001) guidance.

3.4 Risk Characterization

3.4.1 Risk Estimation Methodology

Both occupational and excavation worker risks were characterized by sub-areas shown in Figure 1-2. For each sub-area, both an RME and CTE estimate was made. Risks for non-carcinogenic effects are presented as HQs, which are the calculated exposure dose divided by the toxicity reference value. HQs greater than 1 for any individual chemical indicate a potential risk. Risks for carcinogenic effects are presented as a probability of lifetime cancer risk. Per Oregon regulations (OAR 340-122-0115 and OAR 340-122-0084), cancer risks greater than 1×10^{-6} (or one in 1 million chance of cancer in a lifetime) indicate a potential risk for individual chemicals.

In addition, cumulative risks from multiple chemicals and pathways (exposure routes) were determined per Oregon regulations (OAR 340-122-0084) whereby all risks for each exposure route and each chemical are summed to yield an overall risk (carcinogenic and

non-carcinogenic) for each exposure scenario. That is, the total chemical risks are presented for both the occupational and worker excavation scenarios. Per Oregon regulations, cumulative non-carcinogenic risks with an HQ greater than 1 indicate a potential unacceptable risk for the scenario assessed. Cumulative carcinogenic risks greater than 1×10^{-5} (one in 100,000) indicate potential unacceptable risk for the scenario assessed.

3.4.2 Risk Estimate Results

The risks by sub-area and chemical are shown in Tables 3-2 through 3-5. Tables 3-2 and 3-3 show the occupational scenario risks for the RME and CTE estimates, respectively. Tables 3-4 and 3-5 show the excavation worker scenario risks. All these tables show the total risks for all pathways considered in each of the scenarios. For example, occupational risks for a particular chemical include the summed risks from incidental soil ingestion, dermal contact with soils, inhalation of vapors from soils and groundwater, and inhalation of particulates from soils. The individual risks for each pathway are presented in Appendix D tables. In addition, Tables 3-2 through 3-5 show the total cumulative risks all COPCs for each sub-area at the bottom of each column.

Several of the results presented in the tables are noteworthy. Under the CTE estimates for the occupational scenario, the Spent Oxide, Former Office, and FAMM areas have risks that are confined to one or two chemicals that are just above the acceptable risk levels (Table 3-3).

For the excavation scenario, both the RME and CTE risk estimates are below Oregon risk requirements in the Former Office Area and the FAMM Area. The Spent Oxide and Koppers areas have risks under the CTE estimate that are confined to one or two chemicals that are just above the acceptable risk levels (Table 3-5).

In general, risks are highest in the Koppers and Tar Pond areas for the occupational scenario. It is noteworthy that there are no occupations on the Site that currently require people to access the Tar Pond area on a regular basis. For the excavation scenario, risks tend to be slightly higher in the Koppers Area, and this reflects the relatively high

concentrations of some chemicals at depth in the eastern corner of this area, closest to the Tar Pond Area.

Appendix D tables present risks broken down by exposure route. The cumulative exposure route results are summarized in Table 3-6 for non-carcinogenic risks and Table 3-7 for carcinogenic risks. Only risks above Oregon requirements are presented for the particular pathways. For the occupational scenario, most of the risks are through the vapor inhalation and soil dermal contact pathways, with the exception of soil particulate inhalation in the Koppers area. For the excavation worker scenario, the risks are primarily through the vapor inhalation, groundwater dermal contact, and groundwater ingestion pathways.

Table 3-2
Cumulative Risks for Occupational Exposure - Reasonable Maximum Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	9.89E-03	1.93E-07	6.68E-03	1.15E-07	6.94E-03	1.91E-07	1.56E-02	3.58E-07	3.53E-03	5.07E-08
Monocyclic Aromatic Compounds										
Benzene	1.16E-02	9.65E-07	1.88E-05	1.57E-09	**8.93E+01**	**7.46E-03**	**5.60E+00**	**4.68E-04**	**7.13E+00**	**5.96E-04**
Xylenes	1.34E-02	0.00E+00	1.64E-05	0.00E+00	**1.25E+00**	0.00E+00	5.72E-02	0.00E+00	3.44E-01	0.00E+00
Polyaromatic Compounds										
Acenaphthene	7.24E-05	0.00E+00	3.14E-05	0.00E+00	2.29E-03	0.00E+00	4.60E-05	0.00E+00	2.16E-03	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	7.87E-06	0.00E+00	2.33E-06	0.00E+00	3.27E-04	0.00E+00	4.76E-06	0.00E+00	6.06E-05	0.00E+00
Benzo(a)anthracene	0.00E+00	**2.83E-06**	0.00E+00	**1.35E-06**	0.00E+00	**9.90E-05**	0.00E+00	**3.53E-06**	0.00E+00	**2.90E-05**
Benzo(a)pyrene	0.00E+00	**4.49E-05**	0.00E+00	**1.82E-05**	0.00E+00	**1.34E-03**	0.00E+00	**1.04E-04**	0.00E+00	**4.34E-04**
Benzo(b)fluoranthene	0.00E+00	**4.77E-06**	0.00E+00	**1.56E-06**	0.00E+00	**1.17E-04**	0.00E+00	**9.43E-06**	0.00E+00	**4.31E-05**
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	**1.41E-06**	0.00E+00	**1.10E-06**	0.00E+00	**9.62E-05**	0.00E+00	**3.20E-06**	0.00E+00	**1.34E-05**
Chrysene	0.00E+00	3.15E-08	0.00E+00	1.46E-08	0.00E+00	**1.10E-06**	0.00E+00	4.73E-08	0.00E+00	3.15E-07
Dibenzo(a,h)anthracene	0.00E+00	**5.53E-06**	0.00E+00	**4.00E-06**	0.00E+00	**3.25E-04**	0.00E+00	**1.43E-05**	0.00E+00	**4.37E-05**
Fluoranthene	2.16E-05	0.00E+00	1.08E-05	0.00E+00	7.44E-04	0.00E+00	1.74E-05	0.00E+00	4.88E-04	0.00E+00
Fluorene	2.57E-05	0.00E+00	1.62E-05	0.00E+00	8.19E-04	0.00E+00	1.81E-05	0.00E+00	1.14E-03	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	**3.88E-06**	0.00E+00	**1.28E-06**	0.00E+00	**9.56E-05**	0.00E+00	**7.23E-06**	0.00E+00	**2.08E-05**
Naphthalene	6.33E-02	0.00E+00	6.12E-03	0.00E+00	**2.59E+00**	0.00E+00	1.29E-01	0.00E+00	7.91E-01	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	3.84E-05	0.00E+00	1.56E-05	0.00E+00	9.28E-04	0.00E+00	4.13E-05	0.00E+00	1.02E-03	0.00E+00
Total Occupational Risks	5.41E-03	**6.31E-05**	1.29E-02	**2.77E-05**	**9.47E+01**	**9.54E-03**	**5.83E+00**	**6.10E-04**	**8.50E+00**	**1.18E-03**

Bold values highlight non-cancer HQs greater than 1 or cancer risk greater than 1E-06

Table 3-3
Cumulative Risks for Occupational Exposure - Central Tendency Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	6.43E-03	3.38E-08	5.20E-03	2.44E-08	5.12E-03	3.63E-08	6.81E-03	4.13E-08	2.54E-03	1.01E-08
Monocyclic Aromatic Compounds										
Benzene	8.21E-03	1.65E-07	1.82E-05	3.65E-10	**6.74E+01**	**1.35E-03**	**3.48E+00**	**6.98E-05**	**4.65E+00**	**9.33E-05**
Xylenes	9.44E-03	0.00E+00	1.59E-05	0.00E+00	9.16E-01	0.00E+00	4.43E-02	0.00E+00	2.22E-01	0.00E+00
Polyaromatic Compounds										
Acenaphthene	4.71E-05	0.00E+00	2.07E-05	0.00E+00	9.60E-04	0.00E+00	3.16E-05	0.00E+00	1.12E-03	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	4.98E-06	0.00E+00	1.42E-06	0.00E+00	1.63E-04	0.00E+00	2.33E-06	0.00E+00	3.01E-05	0.00E+00
Benzo(a)anthracene	0.00E+00	3.41E-07	0.00E+00	1.68E-07	0.00E+00	**7.92E-06**	0.00E+00	3.13E-07	0.00E+00	**3.01E-06**
Benzo(a)pyrene	0.00E+00	**5.18E-06**	0.00E+00	**2.22E-06**	0.00E+00	**1.06E-04**	0.00E+00	**8.21E-06**	0.00E+00	**5.21E-05**
Benzo(b)fluoranthene	0.00E+00	5.55E-07	0.00E+00	1.95E-07	0.00E+00	**9.45E-06**	0.00E+00	7.85E-07	0.00E+00	**5.05E-06**
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	1.64E-07	0.00E+00	1.30E-07	0.00E+00	**7.59E-06**	0.00E+00	3.13E-07	0.00E+00	**1.72E-06**
Chrysene	0.00E+00	3.90E-09	0.00E+00	1.80E-09	0.00E+00	8.91E-08	0.00E+00	4.12E-09	0.00E+00	3.56E-08
Dibenzo(a,h)anthracene	0.00E+00	6.99E-07	0.00E+00	4.97E-07	0.00E+00	**2.52E-05**	0.00E+00	**1.16E-06**	0.00E+00	**5.51E-06**
Fluoranthene	1.13E-05	0.00E+00	5.61E-06	0.00E+00	2.64E-04	0.00E+00	7.90E-06	0.00E+00	1.78E-04	0.00E+00
Fluorene	1.80E-05	0.00E+00	9.38E-06	0.00E+00	3.92E-04	0.00E+00	1.02E-05	0.00E+00	6.07E-04	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	4.16E-07	0.00E+00	1.53E-07	0.00E+00	**7.48E-06**	0.00E+00	5.91E-07	0.00E+00	**2.64E-06**
Naphthalene	4.07E-02	0.00E+00	3.60E-03	0.00E+00	**1.83E+00**	0.00E+00	8.37E-02	0.00E+00	5.23E-01	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	1.97E-05	0.00E+00	8.30E-06	0.00E+00	3.29E-04	0.00E+00	1.69E-05	0.00E+00	3.76E-04	0.00E+00
Total Occupational Risks	3.17E-03	7.33E-06	8.89E-03	3.39E-06	**7.12E+01**	**1.52E-03**	**3.63E+00**	**8.12E-05**	**5.55E+00**	**1.63E-04**

Bold values highlight non-cancer HQs greater than 1 or cancer risk greater than 1E-06

Table 3-4
Cumulative Risks for Excavation Workers - Reasonable Maximum Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer	Cancer	Non-Cancer	Cancer	Non-Cancer	Cancer	Non-Cancer	Cancer	Non-Cancer	Cancer
	HQ	Risk	HQ	Risk	HQ	Risk	HQ	Risk	HQ	Risk
Metals										
Chromium	1.21E-02	1.26E-10	1.72E-03	8.05E-11	6.12E-02	1.37E-10	3.18E-03	2.58E-10	4.85E-02	3.57E-11
Monocyclic Aromatic Compounds										
Benzene	2.45E-03	7.78E-09	3.98E-07	1.32E-12	**2.02E+01**	**6.39E-05**	3.53E-06	1.17E-11	**6.37E+00**	**2.02E-05**
Xylenes	7.88E-04	0.00E+00	3.10E-07	0.00E+00	7.90E-02	0.00E+00	2.76E-06	0.00E+00	1.03E-02	0.00E+00
Polyaromatic Compounds										
Acenaphthene	2.44E-02	0.00E+00	4.07E-06	0.00E+00	8.31E-02	0.00E+00	3.64E-06	0.00E+00	1.20E-01	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	4.70E-03	0.00E+00	9.48E-07	0.00E+00	3.38E-03	0.00E+00	1.72E-06	0.00E+00	6.38E-03	0.00E+00
Benzo(a)anthracene	0.00E+00	**1.40E-06**	0.00E+00	1.94E-09	0.00E+00	**1.27E-06**	0.00E+00	5.06E-09	0.00E+00	**2.85E-06**
Benzo(a)pyrene	0.00E+00	**2.98E-05**	0.00E+00	2.62E-08	0.00E+00	**2.30E-05**	0.00E+00	1.49E-07	0.00E+00	**5.43E-05**
Benzo(b)fluoranthene	0.00E+00	**3.31E-06**	0.00E+00	2.24E-09	0.00E+00	**2.47E-06**	0.00E+00	1.35E-08	0.00E+00	**4.85E-06**
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	4.47E-07	0.00E+00	8.68E-10	0.00E+00	3.01E-07	0.00E+00	2.53E-09	0.00E+00	7.68E-07
Chrysene	0.00E+00	2.34E-08	0.00E+00	2.10E-11	0.00E+00	1.13E-08	0.00E+00	6.79E-11	0.00E+00	3.00E-08
Dibenzo(a,h)anthracene	0.00E+00	2.05E-07	0.00E+00	2.91E-09	0.00E+00	3.24E-07	0.00E+00	1.04E-08	0.00E+00	3.69E-07
Fluoranthene	7.49E-02	0.00E+00	7.59E-05	0.00E+00	9.59E-02	0.00E+00	1.20E-04	0.00E+00	1.97E-01	0.00E+00
Fluorene	5.17E-02	0.00E+00	4.47E-06	0.00E+00	7.88E-02	0.00E+00	4.36E-06	0.00E+00	1.33E-01	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	**3.47E-06**	0.00E+00	1.84E-09	0.00E+00	**2.40E-06**	0.00E+00	1.04E-08	0.00E+00	**5.59E-06**
Naphthalene	1.28E-01	0.00E+00	8.32E-05	0.00E+00	**3.59E+00**	0.00E+00	7.82E-04	0.00E+00	**6.38E+00**	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	8.17E-02	0.00E+00	1.09E-04	0.00E+00	9.46E-02	0.00E+00	2.83E-04	0.00E+00	2.44E-01	0.00E+00
Total Excavation Risks	3.82E-01	**3.87E-05**	1.99E-03	3.61E-08	**2.53E+01**	**9.37E-05**	4.38E-03	1.91E-07	**1.39E+01**	**8.90E-05**

Bold values highlight non-cancer HQs greater than 1 or cancer risk greater than 1E-06

Table 3-5
Cumulative Risks for Excavation Workers - Central Tendency Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	8.31E-03	4.51E-11	1.10E-03	3.57E-11	4.64E-02	5.44E-11	1.12E-03	6.19E-11	2.90E-02	1.53E-11
Monocyclic Aromatic Compounds										
Benzene	1.87E-03	2.96E-09	3.59E-07	5.98E-13	**1.25E+01**	**1.98E-05**	3.31E-06	5.51E-12	**4.66E+00**	**7.40E-06**
Xylenes	5.72E-04	0.00E+00	2.97E-07	0.00E+00	5.43E-02	0.00E+00	2.75E-06	0.00E+00	7.49E-03	0.00E+00
Polyaromatic Compounds										
Acenaphthene	1.71E-02	0.00E+00	2.15E-06	0.00E+00	6.25E-02	0.00E+00	1.78E-06	0.00E+00	7.75E-02	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	3.16E-03	0.00E+00	4.57E-07	0.00E+00	2.42E-03	0.00E+00	6.71E-07	0.00E+00	4.30E-03	0.00E+00
Benzo(a)anthracene	0.00E+00	4.30E-07	0.00E+00	3.16E-10	0.00E+00	3.69E-07	0.00E+00	5.89E-10	0.00E+00	9.21E-07
Benzo(a)pyrene	0.00E+00	**9.10E-06**	0.00E+00	4.18E-09	0.00E+00	**6.75E-06**	0.00E+00	1.55E-08	0.00E+00	**1.69E-05**
Benzo(b)fluoranthene	0.00E+00	9.84E-07	0.00E+00	3.68E-10	0.00E+00	7.60E-07	0.00E+00	1.48E-09	0.00E+00	**1.52E-06**
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	1.41E-07	0.00E+00	7.02E-11	0.00E+00	8.27E-08	0.00E+00	1.70E-10	0.00E+00	2.42E-07
Chrysene	0.00E+00	7.28E-09	0.00E+00	3.39E-12	0.00E+00	3.20E-09	0.00E+00	7.76E-12	0.00E+00	9.56E-09
Dibenzo(a,h)anthracene	0.00E+00	6.74E-08	0.00E+00	2.01E-10	0.00E+00	4.54E-08	0.00E+00	4.71E-10	0.00E+00	9.90E-08
Fluoranthene	4.79E-02	0.00E+00	3.82E-05	0.00E+00	6.71E-02	0.00E+00	5.22E-05	0.00E+00	1.31E-01	0.00E+00
Fluorene	3.62E-02	0.00E+00	2.06E-06	0.00E+00	6.15E-02	0.00E+00	1.92E-06	0.00E+00	8.94E-02	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	**1.10E-06**	0.00E+00	2.89E-10	0.00E+00	7.73E-07	0.00E+00	1.11E-09	0.00E+00	**1.69E-06**
Naphthalene	8.66E-02	0.00E+00	5.15E-05	0.00E+00	**2.24E+00**	0.00E+00	3.42E-04	0.00E+00	**4.15E+00**	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.24E-02	0.00E+00	5.66E-05	0.00E+00	6.16E-02	0.00E+00	1.11E-04	0.00E+00	1.61E-01	0.00E+00
Total Excavation Risks	2.55E-01	**1.18E-05**	1.25E-03	5.47E-09	**1.58E+01**	**2.86E-05**	1.63E-03	1.94E-08	**9.59E+00**	**2.88E-05**

Bold values highlight non-cancer HQs greater than 1 or cancer risk greater than 1E-06

Table 3-6
Non-Cancer Cumulative (Hazard Quotients) Risks By Pathway for Occupational and Excavation Worker Exposures

	Indoor Inhalation (GW Vapors)	Outdoor Inhalation (GW + Soil Vapors)	Inhalation Vapors Soil Only	Inhalation Soil Particulates	Soil Dermal Contact	Soil Ingestion	Groundwater Dermal Contact	Groundwater Ingestion
Occupation RME								
Spent Oxide								
Former Office								
Koppers	93.1	94.7						
FAMM	5.7	5.8						
Tar Pond	7.9	8.5						
Occupation CTE								
Spent Oxide								
Former Office								
Koppers	70.1	71.1						
FAMM	3.6	3.6						
Tar Pond	5.2	5.6						
Excavation RME								
Spent Oxide								
Former Office								
Koppers	5.6	6.5					17.7	1.1
FAMM								
Tar Pond	6.3	6.9					6.6	
Excavation CTE								
Spent Oxide								
Former Office								
Koppers	3.7	4.1					11.1	
FAMM								
Tar Pond	4.2	4.6					4.7	

Table 3-7
Cancer Risks By Pathway for Occupational and Excavation Worker Exposures

	Indoor Inhalation (GW Vapors)	Outdoor Inhalation (GW + Soil Vapors)	Inhalation Vapors Soil Only	Inhalation Soil Particulates	Soil Dermal Contact	Soil Ingestion	Groundwater Dermal Contact	Groundwater Ingestion
Occupation RME								
Spent Oxide					6.3E-05			
Former Office					2.7E-05			
Koppers	7.5E-03	7.5E-03		1.1E-05	2.1E-03			
FAMM	4.7E-04	5.8E+00			1.4E-04			
Tar Pond	5.9E-04	6.0E-04			5.8E-04			
Occupation CTE								
Spent Oxide					1.3E-05			
Former Office								
Koppers	1.4E-03	1.4E-03			1.6E-04			
FAMM	7.0E-05	7.0E-05			1.1E-05			
Tar Pond	9.3E-05	9.3E-05			7.0E-05			
Excavation RME								
Spent Oxide							3.9E-05	
Former Office								
Koppers	1.0E-05	1.0E-05					7.8E-05	
FAMM								
Tar Pond							8.3E-05	
Excavation CTE								
Spent Oxide							1.2E-05	
Former Office								
Koppers								
FAMM								
Tar Pond							2.7E-05	

3.5 Uncertainty Analysis

This section discusses the uncertainties associated with the HHRA presented above. Uncertainties associated with the various steps of the assessment are discussed below.

3.5.1 Pathway and Receptor Selection

The uncertainties associated with pathway and receptor selection are primarily a result of selecting pathways and receptors that are intended to be representative of the most likely risks. In some cases, the receptor scenarios are intended to provide information that would be protective of several potentially more specific receptor scenarios. These types of uncertainties can be summarized below at four different levels:

- Occupational Site Uncertainty
- Non-Occupational Site Uncertainty
- Off-site Uncertainty
- Exposure Route Uncertainties

Occupational Site Uncertainty

All Site occupations are represented by two scenarios: general occupational and excavation worker. Some existing Site occupations may have more or less exposure to certain matrices at the Site. In terms of exposure, there are not a wide variety of occupations at the Site (DMA 1997). Most occupations involve some time spent indoors and outdoors, and have periodic direct exposures to soils in various forms. Consequently, a general occupational scenario would appear to cover this potential range. In addition, inclusion of the excavation worker scenario allows for infrequent but more direct contact with soils and even groundwater than would be unlikely to occur for most occupations at the Site. Overall the uncertainty at this level:

- Is relatively low
- Could over- or underestimate risks

Non-Occupational Site Uncertainty

The occupational scenario is assumed to be representative of visitors to the Site, potential trespassers, and similar irregular exposures. The uncertainty associated with this assumption is probably relatively high. However, because the exposure durations and frequencies for visitors and trespassers would be much lower than the occupational

scenario, it is unlikely that this uncertainty would result in underestimating risks to these types of populations. Overall uncertainty at this level:

- Is relatively high
- Likely overestimates risks to non-occupational Site exposures

Off-Site Uncertainty

There are currently no current residential areas near the Site that are measurably affected by chemicals from the Site, and residential land uses are not likely in the foreseeable future. Consequently, not including residential type exposures in this assessment appears appropriate. Overall, the uncertainty at this level:

- Is relatively low
- Is unlikely to underestimate risks

Exposure Route Uncertainties

In general, for each exposure scenario all likely substantial contributors to risk appear to be considered (Figure 3-1). For example, consumption of groundwater does not occur at the Site. Surface waters are transitory, and no Site occupation routinely requires contact with this surface water when they are present. Consumption of biota (plants or animals) is either impossible or highly unlikely. Further, some of the routes that were quantitatively assessed appear to pose little if any risk in any scenario including inhalation of particulates and incidental groundwater ingestion. Consequently, it appears that unlikely sources of risk have been quantitatively assessed and ruled out as reasonable possibilities. Overall, the uncertainty at this level:

- Is moderate
- Is not likely to underestimate overall Site risks

3.5.2 Exposure Analysis

The exposure analysis uses DEQ default parameters in most cases. These default values are generally intended to result in a conservative (overestimated) assessment of risks for most Sites. The uncertainties associated with the exposure analysis are discussed below for each exposure scenario.

Occupational Soils Exposures

The important exposure parameters for occupational soils and their estimated relative uncertainty are:

- Skin surface area – high uncertainty
- Frequency of soil contact – moderate uncertainty
- Exposure frequency days per year – low uncertainty
- Exposure duration – moderate uncertainty
- Ingestion rate of soil – high uncertainty

The exposed ***skin surface area*** to soils is assumed to be between 16 percent and 21 percent of an adult body surface area (EPA 2001). However, actual exposures are likely to vary widely across potential events and occupations. For some occupations, it is reasonably likely that occasional exposures might greatly exceed this surface area. Occupations such as groundskeeper or gardener might fall into this category. However, it appears that skin area exposures for the occupations common on this Site (DMA 1997) would range considerably lower than this parameter in the vast majority of contact cases. Consequently, the likelihood of overestimating risk in this case is estimated to be high.

Frequency of contact is also a value that could range widely over potential occupations. The default value of one contact event per day likely overestimates the exposure for most occupations present at the Site.

Similarly, the ***soil ingestion rate*** could vary widely, but the range used is relatively narrow (between 50 and 100 mg/day). Again, the types of occupations present at the Site probably tend to have lower ingestion rates due to low level contacts with soils. Consequently, risk is potentially overestimated here.

Occupational Inhalation Exposures

Relative to soil contact, the uncertainty associated with estimates of inhalation exposures are estimated to be much higher for almost every parameter. When combined together, this results in a very high cumulative uncertainty. The majority of this uncertainty is primarily due to the estimation of airborne concentrations of chemicals, either vapor or soil particulates. The standard equations used rely on many assumptions regarding the

ability of chemicals to be transported from soils or groundwater to the air. All of these assumptions are highly dependent on myriad site-specific conditions such as soil exposure, soil characteristics, wind conditions, building construction and location, rates of vaporization through complex physical pathways, etc. Therefore, inhalation estimates should be regarded as only broad approximations of the potential exposures likely at the Site. Many of the default values used to estimate airborne concentrations are based on conservative methods from EPA for developing soil screening numbers (EPA 1996). Because the intent of these methods was to identify sites for further risk assessment, use of these methods would be expected to overestimate risks in a large number of site-specific cases.

In addition, default factors specific to some exposures being considered for this Site (e.g., frequency of soil contact for occupational exposures) were not available, and substitute values developed for alternative purposes were used. Again, these substitute values should be regarded as broad approximations, and generally conservative (likely to overestimate risks) estimates were used in selection of these parameters.

Excavation Soils/Groundwater Exposures

The uncertainty issues for estimation of soils/groundwater exposures for excavation workers are similar to those discussed for occupational soil exposures. However, because excavation scenario is very specific to a certain type of work with less broadly defined coverage of multiple occupations, the overall level of uncertainty associated with these estimates is considered lower and includes:

- Skin surface area – moderate uncertainty
- Frequency of soil contact – low uncertainty
- Exposure frequency days per year – low uncertainty
- Exposure duration – moderate uncertainty
- Ingestion rate of soil – moderate uncertainty
- Groundwater ingestion – high uncertainty

Groundwater ingestion rates were based on swimming exposures, because DEQ scenario-specific default values were not available. Because excavation work would rarely require immersion of the head and mouth in groundwater (unlike swimming), the

use of this ingestion rate is expected to considerably overestimate risks for this pathway. However, because groundwater ingestion was generally a very low at-risk pathway (Table 3-6 and Table 3-7), the effect on the overall risk assessment of this assumption appears minimal.

The ***skin surface area*** for both soil and dermal contact could also range relatively widely in the excavation worker scenario. However, as with the soil adherence factor, it is reasonable to assume relatively high rates of exposure for this type of occupation.

Excavation Inhalation Exposures

The uncertainties associated with inhalation exposures for excavation workers are similar to that discussed for the occupational scenario above. In addition, the groundwater volatilization factor used was derived from EPA (1991) estimates of exposures due to indoor domestic water use. The uncertainty here is probably high. However, given the close contact in enclosed spaces typical of indoor domestic water use, it is likely that this assumption overestimates the risks to excavation workers from groundwater.

3.5.3 Toxicity Analysis

The toxicity analysis used values from IRIS and HEAST databases. In general, these values are considered to be of the highest certainty available and considerable evaluation goes into these toxicity values before they are placed in these databases. Consequently, for chemicals that have toxicity values, the uncertainty is expected to be relatively low.

Chemicals Without Toxicity Values

The greatest uncertainty in the toxicity analysis is the absence of adequate toxicity values for some chemicals. In the absence of such values, the quantitative risk assessment assumes zero risk for these chemicals. However, with the exception of chromium VI (for which there is considerable toxicity data), all the COPCs at the Site fall within two broad categories of compounds with similar structures and bioaccumulative properties, namely BTEX and PAH compounds. The individual chemicals within these compound groups are highly co-located in samples at the Site (HAI 1998). It is unlikely

that a substantial area of soils or groundwater exists at the Site where one of the compounds without toxicity information would be found by itself. Consequently, the compounds with adequate toxicity information appear to provide coverage and/or surrogate determination of risk in these circumstances. Because Oregon rules determine unacceptable risk based on individual compounds (as well as cumulative effects) it is unlikely that substantial areas would be designated as "clean" based on the absence of toxicity values for some compounds in this risk assessment.

Estimated Toxicity Values

Where dermal toxicity values were not available (EPA 2001), the oral toxicity value was used following EPA Rags Part E (2001) guidance. For most compounds, this assumption appears to overestimate potential risks. For example, information from Risk Assessment Information System (RAIS 2003) indicates alternative dermal adsorption factors for the following example chemicals:

- Chromium IV – 0.02
- Benzene – 0.97
- Anthracene – 0.76
- Benzo(a)pyrene – 0.31
- Napthalene – 0.80

In every case, except chromium IV these absorption factors would result in higher toxicity values than the default assumption used. This could overestimate uncertainty from several-fold to close to two orders of magnitude.

Where inhalation toxicity values were not available, ingestion toxicity values were used consistent with EPA (1996) soils screening methods. Examination of those chemicals that have both oral and inhalation toxicity values (Appendix B), indicates these values can differ considerably in terms of dose taken into the body. This implies that the uncertainty with the use of oral doses for inhalation route is relatively high. It appears that risks could be either over- or underestimated due to this uncertainty.

Slope factors for cPAHs were extrapolated from benzo(a)pyrene consistent with EPA 2003 and EPA 1993. The uncertainty with the assumption is considered moderate, and could under- or overestimate risks for these compounds.

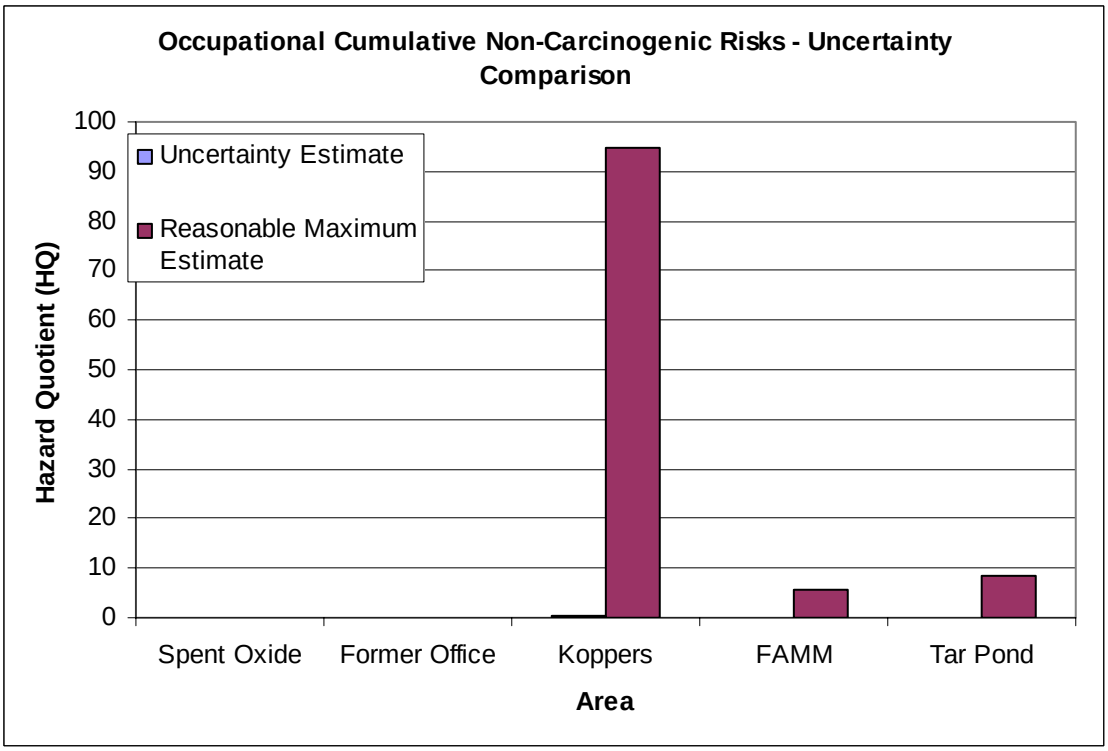
3.5.4 Risk Estimation

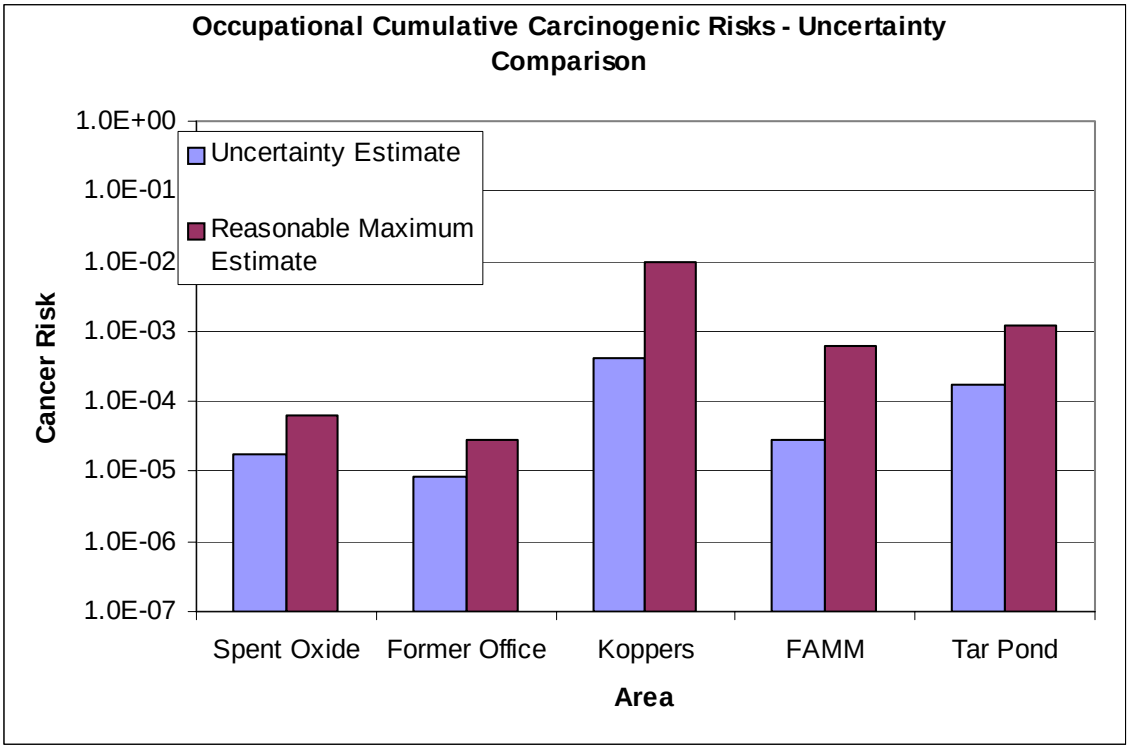
The risk estimation methodology itself (e.g., use of HQs and cancer risk estimates) is well established and the potential uncertainties with such approaches are discussed in standard texts (EPA 2001). Other than this, the primary source of uncertainty associated with the risk estimate derives from the uncertainties in the exposure and toxicity analyses discussed above. In general, the calculations involved are multiplicative. Thus, as these inputs vary, the change in the risk estimate is proportionally changed.

To provide an indication of the effect of the various assumptions in the exposure and toxicity assessments, the uncertainties discussed above were reviewed and the list of moderate to highly uncertain parameters, shown in Table 3-8, was compiled to calculate an uncertainty estimate. These parameters were varied, and the differences in the RME and the uncertainty cumulative risk estimate results are shown in Figures 3-3 and 3-4. Consistent with the above uncertainty discussions, most of these parameters have been varied so that lesser exposure would result. This is consistent with the nature of most of these default type estimates, which in most cases, appear more likely to overestimate rather than underestimate risks at the Site.

Table 3-8
Variance in Exposure Factors and Toxicity Assumptions Used in Quantitative Uncertainty Analysis

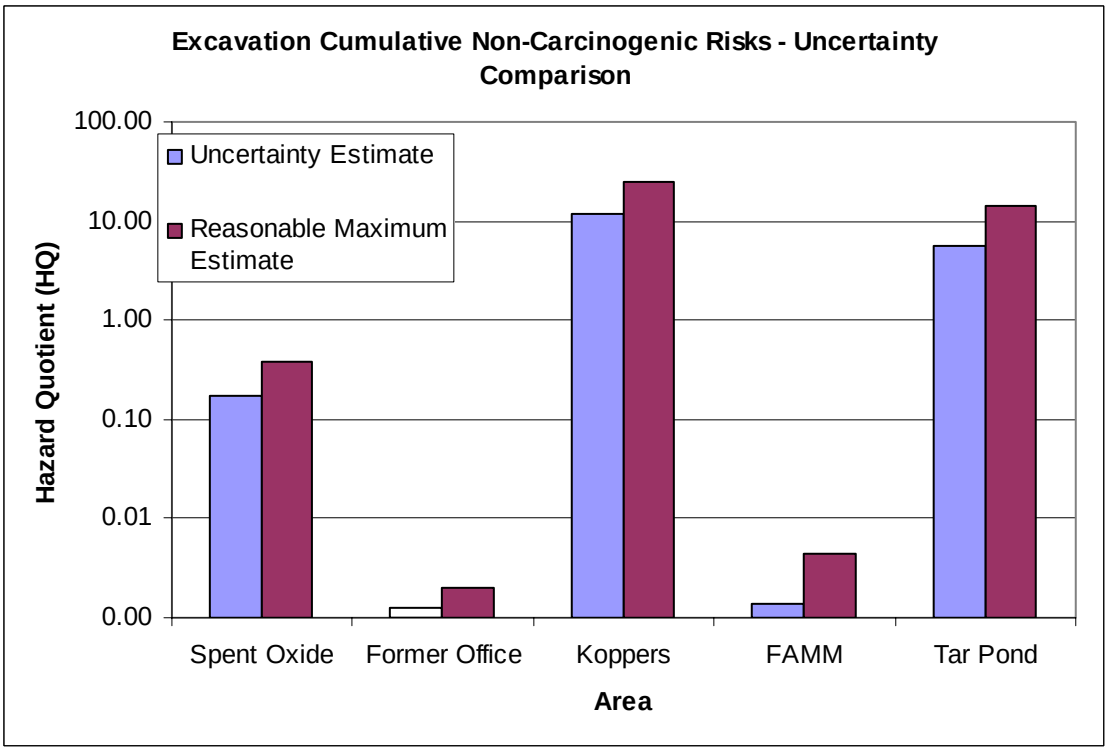
Pathway	Factor	RME or Point Estimate	Uncertainty Reasonable Variance	Units
Occupational				
Soil Dermal Contact	Skin Surface Area	4100	3200	cm^2
Soil Ingestion	Ingestion Rate Soil	100	50	mg/day
Inhalation	Fraction of Floor Area with Cracks	1.00E-04	1.00E-05	unitless
	Source Area	various	0.2 of RME	unitless
	Fraction Contaminated Soil/Groundwater	1	0.5	unitless
All	Exposure Duration	25	15	years
Excavation Worker				
Soil Dermal Contact	Skin Surface Area	4100	3200	cm^2
Soil Ingestion	Ingestion Rate Soil	480	250	mg/day
Groundwater Contact	Skin Surface Area	5700	5200	cm^2
Inhalation	Fraction Contaminated Soil/Groundwater	1	0.5	unitless
	Groundwater Vapor Factor	0.5	0.2	L/m^3
	Source Area	various	0.2 of RME	unitless





ANCHOR ENVIRONMENTAL, L.L.C.

Figure 3-3
Uncertainty Comparison Occupational Exposure
Northwest Natural "Gasco" Site



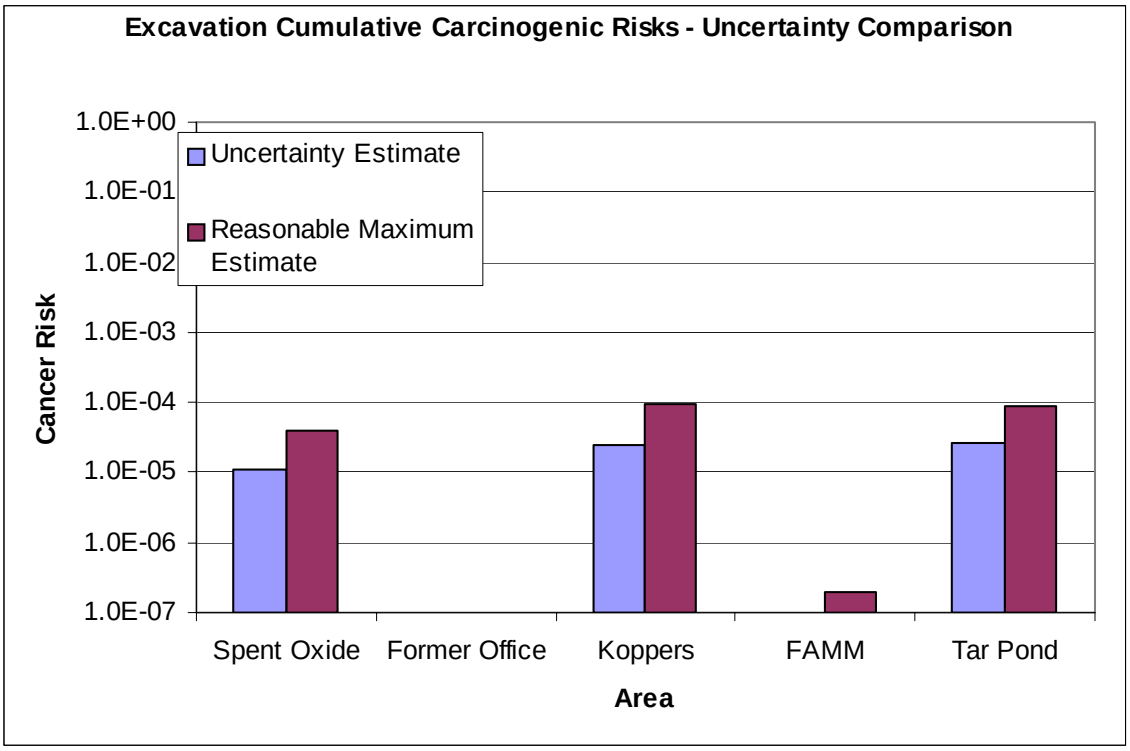


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Figure 3-4
Uncertainty Comparison Excavation Exposure
Northwest Natural "Gasco" Site

As shown in Figure 3-3, when the exposure and toxicity factors are varied over a reasonable range within the uncertainty associated for each parameter, the resulting HQs for occupational risk could be substantially lower. For occupational non-carcinogenic risks, the conclusion of the risk assessment would change from "substantial risk" to "minimal risk" for the Site, because all of the cumulative HQs fall below a value of 1. Similarly, the results for occupational carcinogenic risks fall below 1×10^{-5} at the Former Office Area, and below 1×10^{-4} at the Spent Oxide and FAMM Areas, thus changing the conclusion to "minimal and moderate risk" for these areas. The conclusion for occupational cumulative carcinogenic risks at the Koppers and Tar Pond Areas would not change.

Figure 3-4 shows that using the uncertainty estimates, the conclusions regarding excavation worker both non-carcinogenic and carcinogenic risks of the risk assessment would not greatly change.

Overall, these uncertainties could contribute to changes in both areas and volumes of soils that would be cleaned up. This uncertainty should be addressed in the development of reasonable cleanup levels for the FS.

4 CONCLUSIONS

Overall the results of the risk assessment indicate there are potential risks to ecology and human health from chemicals in the upland portions of the Site. Because exposures to groundwater is minimal in both risk assessments (except for the vapor pathway in the HHRA), the vast majority of the risks come from chemicals in Site soils. For both types of risk assessment, the considerable uncertainties associated with the conservative assumptions used in the risk assessment should be considered when developing cleanup levels during the FS.

4.1 Ecological Risk

The results of the screening level risk assessment identified potential risks to mammalian and avian consumers. Soils exceedances of the SLVs were identified for zinc in birds, and fluoranthene and pyrene for mammals. Although plant and invertebrate groups were not identified as ROCs, soil exceedances for these groups were also identified. Exceedances for bird and mammal SLVs were less than a factor of 3 for the 90th percentile UCL of these chemicals, suggesting that ecological risks are minimal from a Site-wide perspective. Surface water exceedances of the SLVs were only found for aquatic organisms, which were not identified as a receptor group of concern. It should be noted that the areas posing potential risk on the southern side of the property are planned for development that will remove current vegetation and convert this area to full industrial use in the near future.

4.2 Human Health Risk

Benzene and several PAHs pose risks under general occupational and excavation worker exposure scenarios. In general, risks from at least one of these chemicals occurs in all five of the sub-areas of the Site investigated. However, risks were relatively low in the Spent Oxide, FAMM and Former Office Areas, with no risks shown for the excavation scenario in the FAMM or Former Office Areas. Under the CTE, risks were minimal for the Former Office and Spent Oxide Area. General occupational risks were higher than risks for the excavation worker scenario.

There were numerous sources of uncertainty in the human health risk assessment that, taken together, appear to substantially over-predict risks. When reasonable alternate assumptions are made, there are no predicted occupational or excavation risks for the Former Office and FAMM Areas, and minimal risks in the Spent Oxide Area. These

uncertainties could have considerable effect on the cleanup areas and volumes designated for the FS. Again, it should be noted that the areas posing potential risk on the southern side of the property are planned for development that will remove current vegetation and convert this area to full industrial use in the near future.

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APPENDIX A

SITE CHEMISTRY AND GROUNDWATER LEVEL DATA TABLES

Table A-1
Soil Metal Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Chromium mg/kg	Zinc mg/kg
FAMM				
B-47	000829-040	8/29/2000	**2.46**	**35.5**
B-47	000829-041	8/29/2000	**16.1**	**55.2**
B-47	000829-042	8/29/2000	**13.9**	**53**
B-47	000829-043	8/29/2000	**15.1**	**52.5**
B-47	000829-039	8/29/2000	**1.8**	**33.4**
B-51	000828-023	8/28/2000	**70.9**	**114**
B-51	000828-024	8/28/2000	**12.9**	1 U
B-52	000828-026	8/28/2000	1 U	**28.4**
B-52	000828-027	8/28/2000	**11.8**	**35.9**
Office Area				
B-38	000828-014	8/28/2000	**24.7**	**69.3**
B-38	000828-015	8/28/2000	**19.7**	**70.3**
B-39	000828-005	8/28/2000	**15.1**	**55.6**
B-39	000828-004	8/28/2000	**18.9**	**82.7**
B-40	000828-010	8/28/2000	**16.2**	**92.9**
B-40	000828-011	8/28/2000	**13.1**	**36.9**
B-41	000828-007	8/28/2000	**14.7**	**74.4**
B-41	000828-008	8/28/2000	**13.7**	**57.9**
B-41	000828-009	8/28/2000	**12.9**	**36.2**
Retorts/Koppers				
B-42	000828-020	8/28/2000	1 U	**27.5**
B-42	000828-021	8/28/2000	**13.7**	**64.2**
B-43	000829-046	8/29/2000	**11.4**	**35.9**
B-43	000829-047	8/29/2000	**12.3**	**36.8**
B-43	000829-050	8/29/2000	**22.3**	**226**
B-44	000829-051	8/29/2000	**10.8**	**36.1**
B-44	000829-052	8/29/2000	**12.6**	**37.9**
B-45	000829-056	8/29/2000	**16.5**	**60.4**
B-45	000829-054	8/29/2000	**4.96**	**42.3**
B-45	000829-055	8/29/2000	**15.8**	**58.8**
B-46	000829-058	8/29/2000	**11.1**	**71.4**
B-46	000829-059	8/29/2000	**12.5**	**35.7**
B-46	000829-060	8/29/2000	**9.21**	**28.5**
SS-12	000829-061	8/29/2000	**5.55**	**45.9**
SS-13	000829-062	8/29/2000	**1.07**	**32.7**
SS-14	000829-063	8/29/2000	**3.21**	**55.1**
SS-15	000829-064	8/29/2000	**4.94**	**58.5**
SS-15	000829-065	8/29/2000	**5.47**	**37.9**
Spent Oxide				
B-01	950921-B1-05	9/21/1995	**11**	**670**
B-01	950921-B1-01	9/21/1995	**26**	**140**
B-01	950921-B1-02	9/21/1995	**30**	**160**
B-02	950927-B2-05	9/27/1995	**12**	**3000**
B-03	950921-B3-05	9/21/1995	**30 J**	**120 J**
B-36	000828-017	8/28/2000	**18**	**82.8**
B-36	000828-018	8/28/2000	**15.2**	**67.3**
B-36	000828-019	8/28/2000	**6.58**	**45.2**
B-37	000828-001	8/28/2000	**5.43 J**	**49.8**
B-37	000828-002	8/28/2000	**13.5**	**51.9**

Table A-1
Soil Metal Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Chromium mg/kg	Zinc mg/kg
Tar Pond				
B-48	000828-030	8/28/2000	**5.01**	**54.4**
B-48	000828-031	8/28/2000	**8.86**	**43.4**
B-49	000828-036	8/28/2000	**9.26**	**63.9**
B-49	000828-037	8/28/2000	**10.6**	**53**
B-50	000828-035	8/28/2000	**10**	**61.4**
B-50	000828-033	8/28/2000	**11.9**	**67.2**
B-50	000828-034	8/28/2000	**10.2**	**62.6**
Summary				
Number of Samples			**53**	**53**
Number of Detects			**49**	**51**
Percent Detects			**92%**	**96%**
Mean (µg/kg)			**13.26**	**127.73**
90 Percentile UCL (µg/kg)			**15.64**	**220.89**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-2
Soil BTEX Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzene µg/kg	Ethylbenzene µg/kg	Xylene (total) µg/kg	Toluene µg/kg
FAMM						
B-10	950925-B10-04	9/25/1995	300 U	300 U	300 U	300 U
B-47	000829-041	8/29/2000	3.1 U	3.1 U	9.04 U	3.1 U
B-47	000829-042	8/29/2000	2.98 U	2.98 U	8.93 U	2.98 U
B-47	000829-043	8/29/2000	3.09 U	3.09 U	9.26 U	3.09 U
B-47	000829-045	8/29/2000	2.94 U	**16.8**	**61.6**	**4.26**
GT-1	971117-001	11/17/1997	25 U	25 U	75 U	25 U
GT-1	971117-004	11/17/1997	25 U	**34**	**130**	25 U
GT-1	971117-006	11/17/1997	25 U	75 U	75 U	25 U
GT-1	971117-008	11/17/1997	25 U	75 U	75 U	25 U
GT-1	971117-011	11/17/1997	25 U	75 U	75 U	25 U
GT-2	971117-021	11/17/1997	25 UJ	75 UJ	75 UJ	25 UJ
GT-2	971117-012	11/17/1997	25 U	75 U	75 U	25 U
GT-2	971117-017	11/17/1997	**27**	75 U	75 U	25 U
GT-3	971118-032	11/18/1997	25 U	75 U	75 U	25 U
GT-3	971118-023	11/18/1997	25 U	75 U	75 U	25 U
GT-3	971118-026	11/18/1997	25 U	75 U	75 U	25 U
GT-4	971118-034	11/18/1997	25 U	75 U	75 U	25 U
GT-4	971118-038	11/18/1997	25 U	75 U	75 U	25 U
MW-13	971218-M13-02	12/18/1997	25 U	25 U	75 U	25 U
MW-13	971218-M13-03	12/18/1997	25 U	25 U	75 U	25 U
MW-13	971218-M13-04	12/18/1997	25 U	25 U	75 U	25 U
MW-13	971218-M13-05	12/18/1997	25 U	25 U	75 U	25 U
MW-13	971218-M13-08	12/18/1997	**69**	25 U	75 U	25 U
MW-13	971218-M13-11	12/18/1997	25 U	25 U	75 U	25 U
MW-13	971218-M13-17	12/18/1997	25 U	25 U	75 U	25 U
Office Area						
B-38	000828-016	8/28/2000	3.05 U	3.05 U	9.15 U	3.05 U
B-38	000828-015	8/28/2000	2.84 U	2.84 U	8.52 U	2.84 U
B-39	000828-006	8/28/2000	2.78 U	2.78 U	8.33 U	2.78 U
B-39	000828-005	8/28/2000	2.94 U	2.94 U	8.82 U	2.94 U
B-40	000828-011	8/28/2000	2.69 U	2.69 U	8.06 U	2.69 U
B-40	000828-012	8/28/2000	3.29 U	3.29 U	9.87 U	3.29 U
B-41	000828-008	8/28/2000	2.78 U	2.78 U	8.33 U	2.78 U
B-41	000828-009	8/28/2000	2.78 U	2.78 U	8.33 U	2.78 U
Retorts/Koppers						
B-11	950928-B11-06	9/28/1995	300 U	**3400 J**	**3000 J**	300 U
B-13	951006-B13-03	10/6/1995	**28000**	**110000**	**22000**	20000 U
B-15	951006-B15-05	10/6/1995	**7900**	**3900**	**2500**	300 U
B-18	950919-B18-05	9/19/1995	**360000**	**31000**	**220000**	**280000**
B-19	950919-B19-01	9/19/1995	300 U	300 U	300 U	300 U
B-19	950919-B19-03	9/19/1995	**41000**	**39000**	**160000**	**120000**
B-20	950929-B20-03	9/29/1995	**120000 J**	**16000**	**60000**	**64000**
B-22	951003-B22-05	10/3/1995	300 U	300 U	300 U	300 U
B-22	951003-B22-09	10/3/1995	300 U	300 U	300 U	300 U
B-23	951003-B23-12	10/3/1995	300 UJ	300 UJ	300 UJ	300 UJ
B-23	951003-B23-08	10/3/1995	**13000 J**	300 U	**1300**	300 U
B-24	951002-B24-10	10/2/1995	**6800 J**	300 UJ	**340 J**	**2300 J**
B-27	950920-B27-10	9/20/1995	**110000**	30000 U	30000 U	**46000**
B-27	950920-B27-12	9/20/1995	**22000**	600 U	**1200**	**3600**
B-42	000828-021	8/28/2000	2.69 U	2.69 U	8.06 U	2.69 U

Table A-2
Soil BTEX Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzene µg/kg	Ethylbenzene µg/kg	Xylene (total) µg/kg	Toluene µg/kg
Retorts/Koppers (Continued)						
B-42	000828-022	8/28/2000	2.72 U	2.72 U	8.15 U	2.72 U
B-43	000829-046	8/29/2000	2.66 U	2.66 U	7.89 U	2.66 U
B-43	000829-047	8/29/2000	2.69 U	2.69 U	8.06 U	2.69 U
B-43	000829-048	8/29/2000	2.75 U	2.75 U	8.24 U	2.75 U
B-43	000829-049	8/29/2000	2.75 U	2.75 U	8.24 U	2.75 U
B-44	000829-051	8/29/2000	2.63 U	2.63 U	7.89 U	2.63 U
B-44	000829-053	8/29/2000	**56700**	**792**	**8650**	**9210**
B-45	000829-056	8/29/2000	3.33 U	3.33 U	10 U	3.33 U
B-45	000829-057	8/29/2000	2.81 U	2.81 U	8.43 U	2.81 U
B-45	000829-055	8/29/2000	3.33 U	3.33 U	10 U	3.33 U
B-46	000829-059	8/29/2000	2.72 U	2.72 U	8.15 U	2.72 U
B-46	000829-060	8/29/2000	3.12 U	3.12 U	9.38 U	3.12 U
M-15	990628-02	6/28/1999	25 U	25 U	75 U	25 U
MW-06-61	951107-M6-08	11/7/1995	**67000**	**140000**	**56000**	30000 U
MW-06-61	951107-M6-10	11/7/1995	300 U	300 U	300 U	300 U
MW-09-29	951023-M9-04	10/23/1995	300 U	300 U	300 U	300 U
MW-10-61	951108-M10-09	11/8/1995	**43000**	**730**	300 U	**3000**
MW-12-36	951023-M12-06	10/23/1995	3000 U	**3500**	**21000**	**8200**
MW-15-66	990629-12	6/28/1999	25 U	25 U	75 U	25 U
MW-15-66	990629-16	6/28/1999	25 U	25 U	75 U	25 U
MW-15-66	990628-03	6/28/1999	**4800**	**111000**	**289000**	**18400**
Spent Oxide						
B-01	950921-B1-01	9/21/1995	300 U	300 U	300 U	300 U
B-03	950921-B3-05	9/21/1995	300 U	300 U	300 U	300 U
B-36	000828-018	8/28/2000	2.94 U	2.94 U	8.82 U	2.94 U
B-36	000828-019	8/28/2000	3.05 U	3.05 U	9.15 U	3.05 U
B-37	000828-002	8/28/2000	2.66 U	2.66 U	7.89 U	2.66 U
B-37	000828-003	8/28/2000	2.75 U	2.75 U	8.24 U	2.75 U
MW-02-61	981007-M2-01	10/7/1998	25 U	25 U	75 U	25 U
MW-02-61	981007-M2-02	10/7/1998	**30 J**	25 UJ	**170 J**	25 UJ
MW-02-61	981007-M2-03	10/7/1998	25 U	25 U	75 U	25 U
Tar Pond						
B-09	950918-B9-02	9/18/1995	**104000**	**78200**	**102600**	**44200**
B-26	951003-B26-06	10/3/1995	**160000**	**16000**	**90000**	**110000**
B-28	951002-B28-07	10/2/1995	**5500 J**	2000 U	**2300**	2000 U
B-28	951002-B28-11	10/2/1995	**990 J**	300 UJ	300 UJ	300 UJ
B-28	951002-B28-01	10/2/1995	300 U	300 U	300 U	300 U
B-29	950922-B29-15	9/22/1995	**150000**	**35000**	**110000**	**140000**
B-30	950922-B30-06	9/22/1995	**18000**	**12000**	**20000**	**1900**
B-30	950922-B30-12	9/22/1995	**17000**	**2800**	3000 U	3000 U
B-31	950925-B31-01	9/25/1995	300 U	300 U	300 U	300 U
B-31	950925-B31-06	9/25/1995	3000 U	**9100**	**9600**	3000 U
B-32	951003-B32-18	10/3/1995	**950 J**	300 UJ	300 UJ	300 UJ
B-33	951005-B33-03	10/5/1995	**47000**	**29000**	**28000**	**22000**
B-33	951005-B33-14	10/5/1995	**720**	**1000**	**1100**	**820**
B-35	951005-B35-01	10/5/1995	300 U	300 U	300 U	300 U
B-48	000828-031	8/28/2000	**107000**	**103000**	**141000**	**78100**
B-48	000828-032	8/28/2000	**6800**	**15600**	**19800**	**8260**
B-49	000828-038	8/28/2000	**1780**	**18000**	**24500**	**895**
B-49	000828-037	8/28/2000	3.01 U	3.01 U	9.04 U	3.01 U

Table A-2
Soil BTEX Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzene µg/kg	Ethylbenzene µg/kg	Xylene (total) µg/kg	Toluene µg/kg
Tar Pond (Continued)						
B-50	000828-034	8/28/2000	**14300**	**21200**	**43900**	**5680**
B-50	000828-035	8/28/2000	**11600**	**27200**	**31500**	3330 U
MW-04-101	981014-M4-01	10/14/1998	25 U	25 U	75 U	25 U
MW-04-101	981014-M4-02	10/14/1998	25 U	25 U	75 U	25 U
MW-04-101	981014-M4-03	10/14/1998	25 U	25 U	75 U	25 U
MW-04-57	951030-M4-06	10/30/1995	300 U	300 U	300 U	300 U
MW-05-175	981019-M5-01	10/19/1998	25 U	25 U	75 U	25 U
MW-05-175	981019-M5-02	10/19/1998	25 U	25 U	75 U	25 U
MW-05-175	981019-M5-03	10/19/1998	25 U	25 U	75 U	25 U
MW-14-110	981014-M14-01	10/14/1998	**7600**	**10000**	**19000**	**1900**
MW-14-110	981014-M14-02	10/14/1998	**2300**	**5200**	**7700**	1250 U
MW-14-110	981014-M14-03	10/14/1998	**300**	**5000**	**6400**	**600**
MW-14-110	981014-M14-07	10/14/1998	25 UJ	25 UJ	25 UJ	25 UJ
MW-14-110	981016-M14-13	10/16/1998	**680**	25 U	25 U	25 U
Summary						
Number of Samples			**110**	**110**	**110**	**110**
Number of Detects			**28**	**28**	**29**	**22**
Percent Detects			**25%**	**25%**	**26%**	**20%**
Mean (µg/kg)			**14071.64**	**8062.08**	**14028.13**	**9436.18**
90 Percentile UCL (µg/kg)			**21130.41**	**11794.77**	**20759.48**	**14881.78**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene
		Unit	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
		Sample Date					
FAMM							
B-07	950927-B7-05	9/27/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-08	950918-B8-04	9/18/1995	**480**	**4000**	**2800**	**18000**	**47000**
B-08	950918-B8-08	9/18/1995	**180 J**	50 UJ	50 UJ	50 UJ	50 UJ
B-10	950925-B10-04	9/25/1995	50 U	50 U	50 U	50 U	50 U
B-47	000829-039	8/29/2000	50 U	50 U	50 U	**300**	**445**
B-47	000829-040	8/29/2000	50 U	50 U	50 U	50 U	50 U
B-47	000829-041	8/29/2000	**1650**	50 U	**2140**	**8700**	**11400**
B-47	000829-042	8/29/2000	**59500**	5000000 U	**76500**	**42000 J**	**40000 J**
B-47	000829-043	8/29/2000	**100000**	5000000 U	**108000**	**146000 J**	**176000 J**
B-47	000829-045	8/29/2000	**9950**	**1750**	**6250**	**8200**	**12000**
B-51	000828-023	8/28/2000	**60**	**175**	50 U	**1240**	**1740**
B-52	000828-026	8/28/2000	50 U	**130**	**320**	**850**	**1520**
GT-1	971117-004	11/17/1997	**1400**	700 U	**970**	700 U	700 U
GT-1	971117-011	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-1	971117-006	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-1	971117-001	11/17/1997	50 U	50 U	50 U	**270**	**580**
GT-1	971117-008	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-2	971117-012	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-2	971117-017	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-2	971117-021	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-3	971118-023	11/18/1997	**330**	**290**	**110**	**2200**	**3800**
GT-3	971118-026	11/18/1997	50 U	50 U	50 U	50 U	50 U
GT-3	971118-032	11/18/1997	50 U	50 U	50 U	50 U	50 U
GT-4	971118-034	11/18/1997	50 U	50 U	50 U	50 U	50 U
GT-4	971118-038	11/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-03	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-17	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-11	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-10	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-04	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-02	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-08	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-05	12/18/1997	50 U	50 U	50 U	**90**	**61**
SS-05	981112-SS-05	11/12/1998	**590**	**11100**	**2000**	**21900**	**69100**
SS-06	981112-SS-06	11/12/1998	50 U	**78**	50 U	**130**	**360**
SS-10	981112-SS-10	11/12/1998	**140**	**310**	**360**	**2600**	50 U

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
FAMM							
B-07	950927-B7-05	9/27/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-08	950918-B8-04	9/18/1995	**40000**	**58000**	**12000**	**24000**	**6000**
B-08	950918-B8-08	9/18/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-10	950925-B10-04	9/25/1995	50 U	50 U	50 U	50 U	50 U
B-47	000829-039	8/29/2000	**445**	**480**	**315 J**	**365**	**135**
B-47	000829-040	8/29/2000	50 U	50 U	**55 J**	50 U	50 U
B-47	000829-041	8/29/2000	**8450**	**8050**	**7850**	**9450**	**1140**
B-47	000829-042	8/29/2000	**27500 J**	**23500 J**	**29000 J**	**45500 J**	**8000 J**
B-47	000829-043	8/29/2000	**132000 J**	**120000 J**	**127000 J**	**156000 J**	**30000 J**
B-47	000829-045	8/29/2000	**7650**	**10800**	**6850**	**10100**	**1600**
B-51	000828-023	8/28/2000	**1600**	**1820**	**1020**	**1600**	**390**
B-52	000828-026	8/28/2000	**1350**	**1140**	**970**	**1500**	**245**
GT-1	971117-004	11/17/1997	700 U	700 U	700 U	700 U	700 U
GT-1	971117-011	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-1	971117-006	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-1	971117-001	11/17/1997	**500**	**1000**	**160**	**250**	50 U
GT-1	971117-008	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-2	971117-012	11/17/1997	50 U	**84**	50 U	50 U	50 U
GT-2	971117-017	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-2	971117-021	11/17/1997	50 U	50 U	50 U	50 U	50 U
GT-3	971118-023	11/18/1997	**3300**	**4100**	**8400**	**1800**	50 U
GT-3	971118-026	11/18/1997	50 U	50 U	50 U	50 U	50 U
GT-3	971118-032	11/18/1997	50 U	50 U	50 U	50 U	50 U
GT-4	971118-034	11/18/1997	50 U	50 U	50 U	50 U	50 U
GT-4	971118-038	11/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-03	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-17	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-11	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-10	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-04	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-02	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-08	12/18/1997	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-05	12/18/1997	**71**	50 U	50 U	**120**	50 U
SS-05	981112-SS-05	11/12/1998	**60900**	**69900**	**17000**	**29700**	**9400**
SS-06	981112-SS-06	11/12/1998	**370**	**550**	**110**	**150**	**62**
SS-10	981112-SS-10	11/12/1998	**5800**	**3100**	**1600**	**3500**	**520**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Fluoranthene µg/kg	Fluorene µg/kg	Indeno(1,2,3-cd)pyrene µg/kg	Naphthalene µg/kg	Phenanthrene µg/kg	Pyrene µg/kg
FAMM								
B-07	950927-B7-05	9/27/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-08	950918-B8-04	9/18/1995	**26000**	**710**	**38000**	**2300**	**7200**	**52000**
B-08	950918-B8-08	9/18/1995	50 UJ	**63 J**	50 UJ	50 UJ	50 UJ	50 UJ
B-10	950925-B10-04	9/25/1995	50 U	50 U	50 U	50 U	50 U	50 U
B-47	000829-039	8/29/2000	**455**	50 U	**385**	50 U	**180**	**425**
B-47	000829-040	8/29/2000	50 U	50 U	50 U	50 U	50 U	50 U
B-47	000829-041	8/29/2000	**15600**	**675**	**7100**	**85**	**8500**	**15100**
B-47	000829-042	8/29/2000	**136000**	**42000**	**21500 J**	**12000 J**	**166000**	**112000**
B-47	000829-043	8/29/2000	**306000**	**69000**	**108000 J**	**87000 J**	**332000**	**280000**
B-47	000829-045	8/29/2000	**25800**	**4940**	**8150**	**14200**	**24700**	**28400**
B-51	000828-023	8/28/2000	**2780**	**65**	**1530**	**425**	**2020**	**2590**
B-52	000828-026	8/28/2000	**1610**	50 U	**920**	**230**	**825**	**1940**
GT-1	971117-004	11/17/1997	700 U	**2100**	700 U	700 U	700 U	**1700**
GT-1	971117-011	11/17/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-1	971117-006	11/17/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-1	971117-001	11/17/1997	**380**	50 UJ	**480**	50 U	**60 J**	**660 J**
GT-1	971117-008	11/17/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-2	971117-012	11/17/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-2	971117-017	11/17/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-2	971117-021	11/17/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-3	971118-023	11/18/1997	**7500**	50 U	**2400**	**140**	**120**	**8600**
GT-3	971118-026	11/18/1997	**50**	50 U	50 U	50 U	50 U	**49**
GT-3	971118-032	11/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-4	971118-034	11/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
GT-4	971118-038	11/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-03	12/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-17	12/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-11	12/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-10	12/18/1997	50 U	50 U	50 U	50 U	**58**	50 U
MW-13	971218-M13-04	12/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-02	12/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-08	12/18/1997	50 U	50 U	50 U	50 U	50 U	50 U
MW-13	971218-M13-05	12/18/1997	**160**	50 U	50 U	**230**	**93**	**170**
SS-05	981112-SS-05	11/12/1998	**16100**	**610**	**47300**	**5000**	**4700**	**33200**
SS-06	981112-SS-06	11/12/1998	**150**	50 U	**350**	50 U	**58**	**200**
SS-10	981112-SS-10	11/12/1998	**5000**	**120**	**2500**	**230**	**2700**	**6800**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Acenaphthene µg/kg	Acenaphthylene µg/kg	Anthracene µg/kg	Benzo(a)anthracene µg/kg	Benzo(a)pyrene µg/kg
Office Area							
B-38	000828-014	8/28/2000	**130**	50 U	50 U	**1580**	**2080**
B-38	000828-015	8/28/2000	500 U	500 U	500 U	**1150**	**850**
B-38	000828-016	8/28/2000	50 U	50 U	50 U	**95**	50 U
B-39	000828-006	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-39	000828-004	8/28/2000	**85**	**55**	50 U	**1000**	**1360**
B-39	000828-005	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-40	000828-012	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-40	000828-010	8/28/2000	**360**	**65**	**560**	**4860**	**6500**
B-40	000828-011	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-41	000828-007	8/28/2000	**165**	**170**	50 U	**2160**	**3100**
B-41	000828-008	8/28/2000	**130**	**260**	**410**	**1870**	**2860**
B-41	000828-009	8/28/2000	50 U	50 U	50 U	50 U	50 U
Retorts/Koppers							
B-11	950928-B11-06	9/28/1995	**7800**	**610**	**2700**	**830**	**530**
B-11	950928-B11-09	9/28/1995	**71 J**	50 UJ	**94 J**	50 UJ	50 UJ
B-13	951006-B13-03	10/6/1995	**1630000**	**155000**	**578000**	**564000**	**942000**
B-13	951006-B13-07	10/6/1995	50 U	50 U	50 U	50 U	50 U
B-13	951006-B13-10	10/6/1995	50 U	50 U	50 U	50 U	50 U
B-14	950928-B14-03	9/28/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-15	951006-B15-05	10/6/1995	**16100**	**4100**	**6600**	**6800**	**9300**
B-15	951006-B15-08	10/6/1995	50 U	**53**	**130**	50 U	50 U
B-17	950929-B17-05	9/29/1995	**161000**	**10000**	**111000**	**28000**	**16000**
B-17	950929-B17-07	9/29/1995	**78 J**	50 UJ	**86 J**	50 UJ	50 UJ
B-17	950929-B17-01	9/29/1995	**26 J**	**220 J**	**920 J**	**3500 J**	**5700 J**
B-18	950919-B18-05	9/19/1995	**1900**	**160**	**440**	**170**	**74**
B-18	950919-B18-10	9/19/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-19	950919-B19-01	9/19/1995	**6800**	**520**	**212000**	**53100**	**61000**
B-19	950919-B19-03	9/19/1995	**13400**	**4600**	**14400**	**7600**	**5800**
B-19	950920-B19-07	9/20/1995	**500 J**	**170 J**	50 UJ	**54 J**	50 UJ
B-19	950929-B19-08	9/29/1995	**81 J**	50 UJ	**81 J**	**27 J**	50 UJ
B-20	950929-B20-03	9/29/1995	**35800**	**9400**	**122000**	**40400**	**45000**
B-20	950929-B20-07	9/29/1995	**68 J**	**95 J**	**63 J**	**48 J**	**53 J**
B-21	951003-B21-04	10/3/1995	**1300 J**	**440 J**	**200 J**	**120 J**	50 UJ
B-22	951003-B22-05	10/3/1995	**9400**	**76**	**1200**	**630**	**150**
B-22	951003-B22-09	10/3/1995	**78800**	**504**	**17600**	**9200**	**2600**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
Office Area							
B-38	000828-014	8/28/2000	**1800**	**1930**	**1120**	**1760**	**430**
B-38	000828-015	8/28/2000	**1550**	**650**	500 U	**800**	500 U
B-38	000828-016	8/28/2000	**135**	50 U	50 U	**90**	**75**
B-39	000828-006	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-39	000828-004	8/28/2000	**1160**	**1020**	**705**	**1130**	**255**
B-39	000828-005	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-40	000828-012	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-40	000828-010	8/28/2000	**5450**	**5800**	**4140**	**5200**	**1470**
B-40	000828-011	8/28/2000	50 U	50 U	50 U	50 U	50 U
B-41	000828-007	8/28/2000	**2640**	**2560**	**1740**	**2430**	**595**
B-41	000828-008	8/28/2000	**2130**	**2090**	**1580**	**2230**	**420**
B-41	000828-009	8/28/2000	50 U	50 U	50 U	50 U	50 U
Retorts/Koppers							
B-11	950928-B11-06	9/28/1995	**500**	50 U	50 U	**1400**	50 U
B-11	950928-B11-09	9/28/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-13	951006-B13-03	10/6/1995	**752000**	**747000**	**238000**	**811000**	**89900**
B-13	951006-B13-07	10/6/1995	50 U	50 U	50 U	50 U	50 U
B-13	951006-B13-10	10/6/1995	50 U	50 U	50 U	50 U	50 U
B-14	950928-B14-03	9/28/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-15	951006-B15-05	10/6/1995	**9700**	**9000**	**3200**	**9700**	**1000**
B-15	951006-B15-08	10/6/1995	**50**	50 U	**160**	50 U	50 U
B-17	950929-B17-05	9/29/1995	**15000**	**5900**	**5800**	**44000**	**1100**
B-17	950929-B17-07	9/29/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-17	950929-B17-01	9/29/1995	**5600 J**	**5300 J**	**1300 J**	**3600 J**	**670 J**
B-18	950919-B18-05	9/19/1995	**90**	**47**	**32**	**260**	50 U
B-18	950919-B18-10	9/19/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-19	950919-B19-01	9/19/1995	**57600**	**46000**	**29600**	**71400**	**10000**
B-19	950919-B19-03	9/19/1995	**5400**	**5100**	**2400**	**9700**	**960**
B-19	950920-B19-07	9/20/1995	50 UJ	50 UJ	**47 J**	50 UJ	50 UJ
B-19	950929-B19-08	9/29/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-20	950929-B20-03	9/29/1995	**44500**	**29300**	**19000**	**67100**	**4707**
B-20	950929-B20-07	9/29/1995	**60 J**	**55 J**	50 UJ	**54 J**	50 UJ
B-21	951003-B21-04	10/3/1995	**79 J**	50 UJ	**79 J**	**140 J**	50 UJ
B-22	951003-B22-05	10/3/1995	**190**	**55**	**120**	**580**	50 U
B-22	951003-B22-09	10/3/1995	**4000**	**490**	**1700**	**12000**	**150**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Fluoranthene µg/kg	Fluorene µg/kg	Indeno(1,2,3-cd)pyrene µg/kg	Naphthalene µg/kg	Phenanthrene µg/kg	Pyrene µg/kg
Office Area								
B-38	000828-014	8/28/2000	**2940**	50 U	**1620**	50 U	**1110**	**2680**
B-38	000828-015	8/28/2000	**1150**	500 U	**550**	500 U	**1850**	**1850**
B-38	000828-016	8/28/2000	**90**	50 U	50 U	50 U	**135**	**100**
B-39	000828-006	8/28/2000	50 U	50 U	50 U	50 U	50 U	50 U
B-39	000828-004	8/28/2000	**1620**	50 U	**880**	**60**	**520**	**1720**
B-39	000828-005	8/28/2000	50 U	50 U	50 U	50 U	50 U	50 U
B-40	000828-012	8/28/2000	50 U	50 U	50 U	50 U	50 U	50 U
B-40	000828-010	8/28/2000	**7050**	**140**	**4760**	50 U	**3000**	**6800**
B-40	000828-011	8/28/2000	50 U	50 U	50 U	50 U	50 U	50 U
B-41	000828-007	8/28/2000	**3860**	**70**	**2220**	**75**	**1680**	**3820**
B-41	000828-008	8/28/2000	**3260**	100 U	**1490**	**240**	**2260**	**5200**
B-41	000828-009	8/28/2000	50 U	50 U	50 U	50 U	50 U	50 U
Retorts/Koppers								
B-11	950928-B11-06	9/28/1995	**4200**	**6700**	50 U	**915000**	**25200**	**7400**
B-11	950928-B11-09	9/28/1995	**170 J**	**76 J**	50 UJ	50 UJ	**350 J**	**290 J**
B-13	951006-B13-03	10/6/1995	**2350000**	**481000**	**519000**	**13000000**	**2950000**	**3580000**
B-13	951006-B13-07	10/6/1995	50 U	50 U	50 U	50 U	50 U	50 U
B-13	951006-B13-10	10/6/1995	50 UJ	50 U	50 U	50 U	50 UJ	50 U
B-14	950928-B14-03	9/28/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-15	951006-B15-05	10/6/1995	**27700**	**6900**	**6200**	**400000**	**80000**	**41300**
B-15	951006-B15-08	10/6/1995	**240 J**	**38**	50 U	**130**	**590 J**	**400**
B-17	950929-B17-05	9/29/1995	**114000**	**119000**	**4200**	**478000**	**477000**	**224000**
B-17	950929-B17-07	9/29/1995	**72 J**	**62 J**	50 UJ	**160 J**	**320 J**	**110 J**
B-17	950929-B17-01	9/29/1995	**10500 J**	**150 J**	**3700 J**	**93 J**	**4000 J**	**13800 J**
B-18	950919-B18-05	9/19/1995	**1100**	**1800**	**33**	**44800**	**6700**	**1700**
B-18	950919-B18-10	9/19/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-19	950919-B19-01	9/19/1995	**115000**	**20100**	**41500**	**2900**	**91700**	**114000**
B-19	950919-B19-03	9/19/1995	**25400**	**13000**	**3900**	**180000**	**83300**	**33300**
B-19	950920-B19-07	9/20/1995	**180 J**	**770 J**	50 UJ	**76300 J**	**1700 J**	**280 J**
B-19	950929-B19-08	9/29/1995	**130 J**	**97 J**	50 UJ	**1100 J**	**300 J**	**140 J**
B-20	950929-B20-03	9/29/1995	**113000**	**57800**	**23800**	**27800**	**239000**	**214000**
B-20	950929-B20-07	9/29/1995	**180 J**	**110 J**	**40 J**	**11200 J**	**360 J**	**300 J**
B-21	951003-B21-04	10/3/1995	**590 J**	**89 J**	50 UJ	**710 J**	**2500 J**	**860 J**
B-22	951003-B22-05	10/3/1995	**5300**	**5700**	**57**	**310**	**12200**	**4300**
B-22	951003-B22-09	10/3/1995	**65400**	**59900**	**580**	**410**	**160200**	**71700**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Acenaphthene µg/kg	Acenaphthylene µg/kg	Anthracene µg/kg	Benzo(a)anthracene µg/kg	Benzo(a)pyrene µg/kg
Retorts/Koppers (Continued)							
B-23	951003-B23-12	10/3/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-23	951003-B23-08	10/3/1995	**870**	**1200**	**520**	**200**	**200**
B-24	951002-B24-03	10/2/1995	**52400**	**7500**	**34900**	**41900**	**59500**
B-24	951002-B24-10	10/2/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-25	951002-B25-03	10/2/1995	**410**	**150**	**290**	**410**	**780**
B-25	951002-B25-05	10/2/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-27	950920-B27-10	9/20/1995	**53000**	**32600**	**21900**	**17200**	**18300**
B-27	950920-B27-12	9/20/1995	**8600**	**2000**	**3100**	**1900**	**1700**
B-27	950920-B27-15	9/20/1995	**1100 J**	**140 J**	**360 J**	**310 J**	**160 J**
B-42	000828-022	8/28/2000	50 U	**260**	50 U	**255**	**405**
B-42	000828-020	8/28/2000	50 U	50 U	50 U	**120**	**185**
B-42	000828-021	8/28/2000	**220**	50 U	50 U	**2470**	**3260**
B-43	000829-050	8/29/2000	**110000**	5000 U	**139000**	**1490000**	**2020000**
B-43	000829-049	8/29/2000	**2500 J**	500 U	**4000 J**	**27400 J**	**40400 J**
B-43	000829-046	8/29/2000	50 U	**165**	50 U	**355**	**1260**
B-43	000829-048	8/29/2000	**10200 J**	500 U	**14200 J**	**125000 J**	**171000 J**
B-43	000829-047	8/29/2000	50 U	**110**	50 U	**160**	**595**
B-44	000829-051	8/29/2000	50 U	**140**	50 U	**500**	**1320**
B-44	000829-052	8/29/2000	**170**	**4100**	**3170**	**5050**	**6850**
B-44	000829-053	8/29/2000	**125000**	**3480000**	**2580000**	**2450000**	**2780000**
B-45	000829-054	8/29/2000	**2150**	500 U	**4300**	**33600**	**47000**
B-45	000829-055	8/29/2000	50 U	50 U	50 U	50 U	50 U
B-45	000829-056	8/29/2000	50 U	50 U	50 U	50 U	50 U
B-45	000829-057	8/29/2000	50 U	**210**	50 U	**355**	**1050**
B-46	000829-060	8/29/2000	50 U	50 U	50 U	50 U	50 U
B-46	000829-058	8/29/2000	**1300**	500 U	**2450**	**19500**	**30800**
B-46	000829-059	8/29/2000	50 U	**75**	50 U	**135**	**480**
MW-06-61	951107-M6-11	11/7/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-06-61	951107-M6-10	11/7/1995	**220**	50 U	**160**	**42**	50 U
MW-06-61	951107-M6-01	11/7/1995	50 U	50 U	50 U	50 U	50 U
MW-06-61	951107-M6-08	11/7/1995	**2350000**	**25000**	**1420000**	**340000**	**190000**
MW-09-29	951023-M9-01	10/23/1995	**120**	**170**	**310**	**1400 J**	**2500**
MW-09-29	951023-M9-04	10/23/1995	**120**	**1300**	**2000**	**7400 J**	**14400**
MW-09-29	951023-M9-05	10/23/1995	50 U	50 U	**30**	**28 J**	**32**
MW-10-61	951108-M10-01	11/8/1995	**830**	50 U	**1700**	**6700**	**9500**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
Retorts/Koppers (Continued)							
B-23	951003-B23-12	10/3/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-23	951003-B23-08	10/3/1995	**190**	**190**	**97**	**270**	50 U
B-24	951002-B24-03	10/2/1995	**53200**	**42000**	**21300**	**64100**	**5500**
B-24	951002-B24-10	10/2/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-25	951002-B25-03	10/2/1995	**710**	**750**	**250**	**600**	**78**
B-25	951002-B25-05	10/2/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-27	950920-B27-10	9/20/1995	**16300**	**13600**	**6200**	**21000**	**1900**
B-27	950920-B27-12	9/20/1995	**1600**	**1300**	**780**	**2600**	**110**
B-27	950920-B27-15	9/20/1995	**260 J**	**150 J**	**91 J**	**280 J**	50 UJ
B-42	000828-022	8/28/2000	**275**	**675**	**210**	**370**	**90**
B-42	000828-020	8/28/2000	**135**	**180**	**170**	**160**	50 U
B-42	000828-021	8/28/2000	**2470**	**2770**	**1830**	**2680**	**605**
B-43	000829-050	8/29/2000	**1760000**	**1600000**	**1460000**	**1650000**	**500000**
B-43	000829-049	8/29/2000	**35200 J**	**19800 J**	**28000 J**	**29000 J**	**6150 J**
B-43	000829-046	8/29/2000	**950**	**3280 J**	**565**	**595**	**345**
B-43	000829-048	8/29/2000	**146000 J**	**132000 J**	**118000 J**	**138000 J**	**25000 J**
B-43	000829-047	8/29/2000	**545**	**1030 J**	**315**	**275**	**160**
B-44	000829-051	8/29/2000	**1000**	**1550**	**595**	**755**	**245**
B-44	000829-052	8/29/2000	**4580**	**6100**	**3550**	**6250**	**1080**
B-44	000829-053	8/29/2000	**1720000**	**2000000**	**1700000**	**2880000**	**440000**
B-45	000829-054	8/29/2000	**47100**	**23300**	**36600**	**38500**	**7750**
B-45	000829-055	8/29/2000	**60**	50 U	50 U	50 U	50 U
B-45	000829-056	8/29/2000	**85**	50 U	50 U	50 U	50 U
B-45	000829-057	8/29/2000	**980**	**1980**	**635**	**665**	**230**
B-46	000829-060	8/29/2000	**90**	**85**	50 U	50 U	50 U
B-46	000829-058	8/29/2000	**29700**	**15100**	**21900**	**22800**	**4950**
B-46	000829-059	8/29/2000	**385**	**625**	**290**	**190**	**150**
MW-06-61	951107-M6-11	11/7/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-06-61	951107-M6-10	11/7/1995	50 U	50 U	50 U	**66**	50 U
MW-06-61	951107-M6-01	11/7/1995	50 U	50 U	50 U	50 U	50 U
MW-06-61	951107-M6-08	11/7/1995	**170000**	**130000**	**120000**	**450000**	**25000**
MW-09-29	951023-M9-01	10/23/1995	**2700**	**2600**	**880**	**1900**	**420**
MW-09-29	951023-M9-04	10/23/1995	**19600**	**22600**	**5000**	**13300**	**2700**
MW-09-29	951023-M9-05	10/23/1995	**35**	**36**	50 U	**41**	50 U
MW-10-61	951108-M10-01	11/8/1995	**11000**	**6700**	**5100**	**6300**	**1400**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Fluoranthene µg/kg	Fluorene µg/kg	Indeno(1,2,3-cd)pyrene µg/kg	Naphthalene µg/kg	Phenanthrene µg/kg	Pyrene µg/kg
Retorts/Koppers (Continued)								
B-23	951003-B23-12	10/3/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-23	951003-B23-08	10/3/1995	**1400**	**3000**	**160**	**58800**	**8200**	**1600**
B-24	951002-B24-03	10/2/1995	**132000**	**28500**	**31000**	**115000**	**186000**	**217000**
B-24	951002-B24-10	10/2/1995	50 UJ	50 UJ	50 UJ	**140 J**	50 UJ	50 UJ
B-25	951002-B25-03	10/2/1995	**1200**	**530**	**500**	**1200**	**2500**	**2100**
B-25	951002-B25-05	10/2/1995	50 UJ	50 UJ	50 UJ	**450 J**	50 UJ	50 UJ
B-27	950920-B27-10	9/20/1995	**79100**	**45700**	**9600**	**586000**	**208000**	**113000**
B-27	950920-B27-12	9/20/1995	**9900**	**6500**	**915**	**44700**	**26400**	**13300**
B-27	950920-B27-15	9/20/1995	**1300 J**	**880 J**	**110 J**	**1800 J**	**3500 J**	**1800 J**
B-42	000828-022	8/28/2000	**640**	**85**	**395**	**580**	**1360**	**715**
B-42	000828-020	8/28/2000	**205**	50 U	**55**	50 U	**115**	**195**
B-42	000828-021	8/28/2000	**4860**	**80**	**2220**	**180**	**1980**	**4120**
B-43	000829-050	8/29/2000	**1980000**	**55000**	**1460000**	**11000**	**825000**	**1860000**
B-43	000829-049	8/29/2000	**39200 J**	**1150 J**	**18600 J**	500 U	**18800 J**	**46400 J**
B-43	000829-046	8/29/2000	**490 J**	50 U	**2090**	**100**	**105**	**535 J**
B-43	000829-048	8/29/2000	**172000 J**	**5150 J**	**120000 J**	**1200**	**75000 J**	**158000 J**
B-43	000829-047	8/29/2000	**125 J**	50 U	**750**	50 U	50 U	**170 J**
B-44	000829-051	8/29/2000	**530**	50 U	**1110**	50 U	50 U	**715**
B-44	000829-052	8/29/2000	**14500**	**2920**	**4920**	**1210**	**18300**	**17200**
B-44	000829-053	8/29/2000	**8000000**	**1900000**	**1800000**	**8300000**	**14000000**	**8250000**
B-45	000829-054	8/29/2000	**52500**	**1400**	**23700**	500 U	**24800**	**45500**
B-45	000829-055	8/29/2000	50 U	50 U	50 U	50 U	50 U	50 U
B-45	000829-056	8/29/2000	**75**	50 U	50 U	50 U	50 U	50 U
B-45	000829-057	8/29/2000	**360**	50 U	**1400**	50 U	50 U	**490**
B-46	000829-060	8/29/2000	50 U	50 U	**50**	50 U	**135**	50 U
B-46	000829-058	8/29/2000	**29600**	**750**	**14600**	500 U	**14300**	**32400**
B-46	000829-059	8/29/2000	**95**	50 U	**435**	50 U	**135**	**140**
MW-06-61	951107-M6-11	11/7/1995	50 UJ	50 UJ	50 UJ	50 UJ	**56 J**	50 UJ
MW-06-61	951107-M6-10	11/7/1995	**220**	**95**	50 U	**76**	**600**	**340**
MW-06-61	951107-M6-01	11/7/1995	50 U	50 U	50 U	50 U	50 U	50 U
MW-06-61	951107-M6-08	11/7/1995	**1900000**	**990000**	**94000**	**3650000**	**5780000**	**2980000**
MW-09-29	951023-M9-01	10/23/1995	**2200**	**55 J**	**1900**	**87**	**960**	**3300**
MW-09-29	951023-M9-04	10/23/1995	**17900**	**400 J**	**16100**	**1200**	**8600**	**30400**
MW-09-29	951023-M9-05	10/23/1995	**76**	50 UJ	**27**	50 U	**96**	**120**
MW-10-61	951108-M10-01	11/8/1995	**11000**	**230**	**5000**	**81**	**3300**	**9900**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Acenaphthene µg/kg	Acenaphthylene µg/kg	Anthracene µg/kg	Benzo(a)anthracene µg/kg	Benzo(a)pyrene µg/kg
Retorts/Koppers (Continued)							
MW-10-61	951108-M10-02	11/8/1995	**1100**	50 U	**1100**	**10000**	**14000**
MW-10-61	951108-M10-09	11/8/1995	**38**	50 U	**38**	50 U	50 U
MW-12-36	951023-M12-06	10/23/1995	**340**	500 U	**990**	500 UJ	500 U
MW-12-36	951023-M12-01	10/23/1995	**1500**	**230**	**2000**	**8500 J**	**13300**
MW-12-36	951023-M12-07	10/23/1995	50 U	50 U	50 U	50 UJ	50 U
MW-15-66	990629-16	6/28/1999	50 U	50 U	50 U	50 U	50 U
MW-15-66	990629-12	6/28/1999	50 U	50 U	50 U	50 U	50 U
SS-12	000829-061	8/29/2000	50 U	50 U	50 U	**255**	**350**
SS-13	000829-062	8/29/2000	50 U	50 U	50 U	**205**	**275**
SS-14	000829-063	8/29/2000	**125**	50 U	50 U	**1340**	**2010**
SS-15	000829-064	8/29/2000	**2350**	**2500**	**37200 J**	**40700**	**23100**
SS-15	000829-065	8/29/2000	**3100**	500 U	**5550 J**	**42600**	**68500**
Spent Oxide							
B-01	950921-B1-01	9/21/1995	**140 J**	50 U	**140 J**	**1000 J**	**1500 J**
B-01	950921-B1-02	9/21/1995	**510 J**	**410 J**	**1100 J**	**3700 J**	**5200 J**
B-01	950921-B1-05	9/21/1995	**6100**	**5800**	**21700**	**45300**	**55700**
B-01	950921-B1-09	9/21/1995	**130 J**	50 UJ	**240 J**	**190 J**	**170 J**
B-03	950921-B3-05	9/21/1995	**300**	**140**	**3100**	**3200**	**4800**
B-03	950921-B3-07	9/21/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-05	950928-B5-05	9/28/1995	**140 J**	**440 J**	**190 J**	200 UJ	**180 J**
B-06	950927-B6-02	9/27/1995	**21000**	**124000**	**191000**	**574000**	**767000**
B-06	950927-B6-03	9/27/1995	1000 UJ	**550 J**	**2100 J**	**5700 J**	**7100 J**
B-36	000828-017	8/28/2000	**105**	50 U	50 U	**980**	**1380**
B-36	000828-018	8/28/2000	50 U	50 U	50 U	**70**	**100**
B-36	000828-019	8/28/2000	50 U	50 U	50 U	**90**	**50**
B-37	000828-001	8/28/2000	**455**	**60**	**735**	**4700**	**7350**
B-37	000828-002	8/28/2000	50 U	50 U	50 U	**250**	**365**
B-37	000828-003	8/28/2000	50 U	50 U	50 U	50 U	50 U
MW-01-22	951024-M1-01	10/24/1995	50 U	50 U	50 U	**410 J**	**610**
MW-01-22	951024-M1-02	10/24/1995	200 U	200 U	200 U	**910 J**	**1700**
MW-01-22	951024-M1-06	10/24/1995	50 U	50 U	**190**	50 UJ	50 U
MW-02-32	951106-M2-01	11/6/1995	**47**	**83**	**140**	**730**	**1100**
MW-02-32	951106-M2-06	11/6/1995	**200**	50 U	50 U	**39**	**40**
MW-02-61	981007-M2-01	10/7/1998	**1300**	500 U	**2300**	**9700**	**12800**
MW-02-61	981007-M2-03	10/7/1998	50 U	50 U	**70**	50 U	50 U
MW-02-61	981007-M2-02	10/7/1998	100 U	**30400**	**34200**	**315000**	**432000**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
Retorts/Koppers (Continued)							
MW-10-61	951108-M10-02	11/8/1995	**17000**	**9000**	**6200**	**7500**	**2200**
MW-10-61	951108-M10-09	11/8/1995	50 U	50 U	50 U	50 U	50 U
MW-12-36	951023-M12-06	10/23/1995	500 U	500 U	500 U	**270**	500 U
MW-12-36	951023-M12-01	10/23/1995	**15300**	**10800**	**5200**	**12300**	**2200**
MW-12-36	951023-M12-07	10/23/1995	50 U	50 U	50 U	50 U	50 U
MW-15-66	990629-16	6/28/1999	50 U	50 U	50 U	50 U	50 U
MW-15-66	990629-12	6/28/1999	50 U	50 U	50 U	50 U	50 U
SS-12	000829-061	8/29/2000	**350**	**215**	**290**	**265**	**90**
SS-13	000829-062	8/29/2000	**275**	**195**	**220**	**235**	**85**
SS-14	000829-063	8/29/2000	**1740**	**1340**	**1520**	**1600**	**385**
SS-15	000829-064	8/29/2000	**34400**	**12000**	**25600**	**58500**	**3450 J**
SS-15	000829-065	8/29/2000	**60500**	**33800**	**47400**	**49400**	**11400 J**
Spent Oxide							
B-01	950921-B1-01	9/21/1995	**1600 J**	**1300 J**	**520 J**	**1400 J**	**220 J**
B-01	950921-B1-02	9/21/1995	**5600 J**	**5100 J**	**1700 J**	**5600 J**	**840 J**
B-01	950921-B1-05	9/21/1995	**72300**	**65800**	**26700**	**82800**	**7700**
B-01	950921-B1-09	9/21/1995	**210 J**	**170 J**	**56 J**	**190 J**	50 UJ
B-03	950921-B3-05	9/21/1995	**5200**	**4200**	**1900**	**4100**	**640**
B-03	950921-B3-07	9/21/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-05	950928-B5-05	9/28/1995	**200 J**	**1100 J**	200 UJ	200 UJ	200 UJ
B-06	950927-B6-02	9/27/1995	**972000**	**1080000**	**370000**	**833000**	**159000**
B-06	950927-B6-03	9/27/1995	**8800 J**	**9600 J**	**3500 J**	**7600 J**	**1100 J**
B-36	000828-017	8/28/2000	**1230**	**600**	**1050**	**1160**	**215**
B-36	000828-018	8/28/2000	**110**	**130**	**65**	**80**	50 U
B-36	000828-019	8/28/2000	**120**	50 U	50 U	**55**	50 U
B-37	000828-001	8/28/2000	**6500**	**6300**	**4920**	**5850**	**1670**
B-37	000828-002	8/28/2000	**330**	**475**	**250**	**300**	**95**
B-37	000828-003	8/28/2000	50 U	50 U	50 U	50 U	50 U
MW-01-22	951024-M1-01	10/24/1995	**660**	**1000**	50 U	**640 J**	50 U
MW-01-22	951024-M1-02	10/24/1995	**1500**	**2300**	**740**	**1300 J**	**400**
MW-01-22	951024-M1-06	10/24/1995	50 U	50 U	50 U	50 U	50 U
MW-02-32	951106-M2-01	11/6/1995	**1200**	**1000**	**490**	**830**	**160**
MW-02-32	951106-M2-06	11/6/1995	**36**	50 U	50 U	**37**	50 U
MW-02-61	981007-M2-01	10/7/1998	**13100**	**11300**	500 U	**8800**	**1900**
MW-02-61	981007-M2-03	10/7/1998	50 U	50 U	50 U	50 U	50 U
MW-02-61	981007-M2-02	10/7/1998	**563000**	**490000**	**179000**	**334000**	**87800**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Fluoranthene µg/kg	Fluorene µg/kg	Indeno(1,2,3-cd)pyrene µg/kg	Naphthalene µg/kg	Phenanthrene µg/kg	Pyrene µg/kg
Retorts/Koppers (Continued)								
MW-10-61	951108-M10-02	11/8/1995	**14000**	**360**	**7200**	**130**	**5200**	**12000**
MW-10-61	951108-M10-09	11/8/1995	**78**	50 U	50 U	**230**	**220**	**160**
MW-12-36	951023-M12-06	10/23/1995	**970**	**400 J**	500 U	**230**	**4000**	**1400**
MW-12-36	951023-M12-01	10/23/1995	**12400**	**540 J**	**8700**	**340**	**5800**	**17100**
MW-12-36	951023-M12-07	10/23/1995	50 U	50 UJ	50 U	50 U	50 U	50 U
MW-15-66	990629-16	6/28/1999	50 U	50 U	50 U	50 U	50 U	50 U
MW-15-66	990629-12	6/28/1999	50 U	50 U	50 U	50 U	50 U	50 U
SS-12	000829-061	8/29/2000	**375**	50 U	**195**	50 U	**215**	**325**
SS-13	000829-062	8/29/2000	**1040**	50 U	**165**	50 U	**750**	**275**
SS-14	000829-063	8/29/2000	**2220**	**50**	**1200**	50 U	**930**	**2040**
SS-15	000829-064	8/29/2000	**198000**	**3200**	**11500 J**	500 U	**57500**	**152000**
SS-15	000829-065	8/29/2000	**71500**	**1750**	**34700 J**	500 U	**32400**	**65000**
Spent Oxide								
B-01	950921-B1-01	9/21/1995	**1300 J**	**55 J**	**930 J**	**73 J**	**880 J**	**2300 J**
B-01	950921-B1-02	9/21/1995	**5700 J**	**340 J**	**3500 J**	**460 J**	**5800 J**	**10400 J**
B-01	950921-B1-05	9/21/1995	**140000**	**9600**	**46200**	**313000**	**142000**	**239000**
B-01	950921-B1-09	9/21/1995	**360 J**	**140 J**	**110 J**	**210 J**	**2200 J**	**650 J**
B-03	950921-B3-05	9/21/1995	**5900**	**200**	**3200**	**160**	**3100**	**8900**
B-03	950921-B3-07	9/21/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-05	950928-B5-05	9/28/1995	**340 J**	200 UJ	**560 J**	200 UJ	200 UJ	**490 J**
B-06	950927-B6-02	9/27/1995	**1680000**	**73800**	**738000**	**884000**	**1180000**	**2840000**
B-06	950927-B6-03	9/27/1995	**10200 J**	1000 UJ	**6400 J**	1000 UJ	**5500 J**	**18300 J**
B-36	000828-017	8/28/2000	**1520**	50 U	**575**	**105**	**700**	**1470**
B-36	000828-018	8/28/2000	**155**	50 U	**90**	**120**	**70**	**170**
B-36	000828-019	8/28/2000	**80**	50 U	50 U	50 U	**135**	**105**
B-37	000828-001	8/28/2000	**8550**	**200**	**5050**	**55**	**3960**	**7500**
B-37	000828-002	8/28/2000	**540**	50 U	**375**	50 U	**210**	**515**
B-37	000828-003	8/28/2000	50 U	50 U	50 U	50 U	50 U	50 U
MW-01-22	951024-M1-01	10/24/1995	**710**	50 U	**750**	50 U	50 U	**1000**
MW-01-22	951024-M1-02	10/24/1995	**790**	200 U	**1800**	200 U	200 U	**1400**
MW-01-22	951024-M1-06	10/24/1995	**32**	50 U	50 U	50 U	**150**	**89**
MW-02-32	951106-M2-01	11/6/1995	**1400**	50 U	**690**	**53**	**570**	**1800**
MW-02-32	951106-M2-06	11/6/1995	50 U	50 U	50 U	**80**	50 U	50 U
MW-02-61	981007-M2-01	10/7/1998	**14300**	500 U	**8000**	**600**	**9000**	**16900**
MW-02-61	981007-M2-03	10/7/1998	**74**	50 U	50 U	**280 J**	50 U	50 U
MW-02-61	981007-M2-02	10/7/1998	**591000**	**12900**	**389000**	**923000**	**309000**	**735000**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Acenaphthene µg/kg	Acenaphthylene µg/kg	Anthracene µg/kg	Benzo(a)anthracene µg/kg	Benzo(a)pyrene µg/kg
Spent Oxide (Continued)							
SS-07	981112-SS-07	11/12/1998	**640**	**2800**	**1300**	**12800**	**23700**
SS-08	981112-SS-08	11/12/1998	50 U	50 U	50 U	50 U	50 U
SS-09	981112-SS-09	11/12/1998	**380**	**190**	**1300**	**3700**	**3400**
Tar Pond							
B-09	950918-B9-02	9/18/1995	**558000**	**457000**	**603000**	**472000**	**487000**
B-09	950918-B9-09	9/18/1995	**1900**	**170**	**1300**	**1600**	**2100**
B-09	950918-B9-10	9/18/1995	50 UJ	50 UJ	**54 J**	50 UJ	50 UJ
B-26	951003-B26-01	10/3/1995	**92**	50 U	**97**	**730**	**990**
B-26	951003-B26-06	10/3/1995	**608000**	**449000**	**1220000**	**124000**	**138000**
B-26	951003-B26-13	10/3/1995	**59**	**46**	**51**	50 U	50 U
B-28	951002-B28-07	10/2/1995	**23800**	**3700**	**11200**	**19100**	**42700**
B-28	951002-B28-11	10/2/1995	**57 J**	50 UJ	50 UJ	50 UJ	50 UJ
B-28	951002-B28-01	10/2/1995	**730**	**260 J**	**4600**	**6100**	**8600**
B-28	951002-B28-02	10/2/1995	**1100**	**860 J**	**1800**	**9500**	**14100**
B-29	950922-B29-01	9/22/1995	**400**	**7300**	**3300**	**10500**	**32500**
B-29	950922-B29-15	9/22/1995	**9210000**	**77600**	**1650000**	**1540000**	**571000**
B-29	950925-B29-17	9/25/1995	**1100 J**	**330 J**	**1000 J**	**560 J**	**510 J**
B-29	950925-B29-18	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-30	950922-B30-12	9/22/1995	**15200**	**68800**	**28700**	**14300**	**22000**
B-30	950922-B30-06	9/22/1995	**220000**	**228000**	**417000**	**167000**	**182000**
B-30A	950922-B30-01	9/22/1995	**9200**	**13400**	**16000**	**49800**	**99600**
B-31	950925-B31-11	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-31	950925-B31-06	9/25/1995	**1120000**	**50600**	**473000**	**319000**	**374000**
B-31	950925-B31-08	9/25/1995	**72 J**	50 UJ	**180 J**	**280 J**	**700 J**
B-31	950925-B31-10	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-31	950925-B31-01	9/25/1995	**110**	**1300**	**590**	**2100**	**4800**
B-32	951004-B32-18	10/4/1995	**64**	50 U	**61**	50 U	50 U
B-32	951004-B32-15	10/4/1995	**1330000**	**39000**	**1280000**	**259000**	**386000**
B-32	951004-B32-03	10/4/1995	**990000**	**807000**	**1190000**	**495000**	**585000**
B-32	951004-B32-01	10/4/1995	**90**	**1700**	**530**	**2900**	**7400**
B-33	951005-B33-01	10/5/1995	**1300**	**29100**	**9900**	**34600**	**129000**
B-33	951005-B33-02	10/5/1995	**1700**	**230**	**960**	**1900**	**2800**
B-33	951005-B33-03	10/5/1995	**369000**	**133000**	**263000**	**181000**	**225000**
B-33	951005-B33-14	10/5/1995	**3400**	1000 U	**2100**	1000 U	**700**
B-33	951006-B33-18	10/6/1995	**60 J**	**350 J**	**120 J**	**45 J**	**370 J**
B-34	950926-B34-01	9/26/1995	**990**	**460**	**1500**	**6000**	**9900**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
Spent Oxide (Continued)							
SS-07	981112-SS-07	11/12/1998	**25000**	**22200**	**6900**	**14300**	**1900**
SS-08	981112-SS-08	11/12/1998	50 U	50 U	50 U	50 U	50 U
SS-09	981112-SS-09	11/12/1998	**6600**	**2500**	**1700**	**4300**	**500**
Tar Pond							
B-09	950918-B9-02	9/18/1995	**420000**	**344000**	**139000**	**601000**	**56500**
B-09	950918-B9-09	9/18/1995	**1800**	**1800**	**660**	**1900**	**220**
B-09	950918-B9-10	9/18/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-26	951003-B26-01	10/3/1995	**1200**	**840**	**490**	**770**	**160**
B-26	951003-B26-06	10/3/1995	**134000**	**171000**	**57000**	**265000**	**20700**
B-26	951003-B26-13	10/3/1995	50 U	50 U	50 U	50 U	50 U
B-28	951002-B28-07	10/2/1995	**33400**	**39500**	**12600**	**30200**	**3600**
B-28	951002-B28-11	10/2/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-28	951002-B28-01	10/2/1995	**10100**	**8200**	**4300**	**8200**	**1600**
B-28	951002-B28-02	10/2/1995	**14900**	**12300**	**6300**	**9500**	**2400**
B-29	950922-B29-01	9/22/1995	**31700**	**41800**	**11600**	**19300**	**4800**
B-29	950922-B29-15	9/22/1995	**758000**	**230000**	**308000**	**1810000**	**46100**
B-29	950925-B29-17	9/25/1995	**450 J**	**300 J**	**120 J**	**680 J**	**54 J**
B-29	950925-B29-18	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-30	950922-B30-12	9/22/1995	**17400**	**17700**	**7400**	**19800**	**1800**
B-30	950922-B30-06	9/22/1995	**167000**	**125000**	**71900**	**245000**	**16500**
B-30A	950922-B30-01	9/22/1995	**110000**	**129000**	**45000**	**75400**	**20200**
B-31	950925-B31-11	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-31	950925-B31-06	9/25/1995	**321000**	**364000**	**119000**	**394000**	**45100**
B-31	950925-B31-08	9/25/1995	**350 J**	**270 J**	**110 J**	**390 J**	**39 J**
B-31	950925-B31-10	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-31	950925-B31-01	9/25/1995	**5400**	**6800**	**1800**	**3000**	**980**
B-32	951004-B32-18	10/4/1995	50 U	50 U	50 U	50 U	50 U
B-32	951004-B32-15	10/4/1995	**285000**	**354000**	**81000**	**427000**	**52000**
B-32	951004-B32-03	10/4/1995	**500000**	**529000**	**292000**	**824000**	**87300**
B-32	951004-B32-01	10/4/1995	**6900**	**12400**	**2500**	**5600**	**1800**
B-33	951005-B33-01	10/5/1995	**124000**	**202000**	**44000**	**70000**	**32700**
B-33	951005-B33-02	10/5/1995	**2400**	**2100**	**880**	**2500**	**290**
B-33	951005-B33-03	10/5/1995	**185000**	**152000**	**72100**	**262000**	**21300**
B-33	951005-B33-14	10/5/1995	**570**	**620**	1000 U	**1100**	1000 U
B-33	951006-B33-18	10/6/1995	**54 J**	**47 J**	50 UJ	**56 J**	50 UJ
B-34	950926-B34-01	9/26/1995	**10000**	**9500**	**4500**	**9600**	**1600**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Fluoranthene µg/kg	Fluorene µg/kg	Indeno(1,2,3-cd)pyrene µg/kg	Naphthalene µg/kg	Phenanthrene µg/kg	Pyrene µg/kg
Spent Oxide (Continued)								
SS-07	981112-SS-07	11/12/1998	**15000**	**410**	**23700**	**1800**	**6900**	**24200**
SS-08	981112-SS-08	11/12/1998	50 U	50 U	50 U	50 U	50 U	50 U
SS-09	981112-SS-09	11/12/1998	**10000**	**390**	**2200**	**550**	**7000**	**10800**
Tar Pond								
B-09	950918-B9-02	9/18/1995	**1350000**	**464000**	**246000**	**7560000**	**3410000**	**2270000**
B-09	950918-B9-09	9/18/1995	**4400**	**990**	**1200**	**8300**	**7800**	**7400**
B-09	950918-B9-10	9/18/1995	**80 J**	50 UJ	50 UJ	50 UJ	**200 J**	**130 J**
B-26	951003-B26-01	10/3/1995	**1500**	50 U	**790**	50 U	**460**	**1200**
B-26	951003-B26-06	10/3/1995	**949000**	**681000**	**123000**	**6420000**	**2630000**	**1540000**
B-26	951003-B26-13	10/3/1995	**66**	**59**	50 U	**550**	**190 J**	**99**
B-28	951002-B28-07	10/2/1995	**66100**	**14000**	**25600**	**102000**	**74000**	**110000**
B-28	951002-B28-11	10/2/1995	50 UJ	50 UJ	50 UJ	**2200 J**	**41 J**	50 UJ
B-28	951002-B28-01	10/2/1995	**9700**	**246**	**6600**	**300**	**4600**	**12700**
B-28	951002-B28-02	10/2/1995	**17300**	**550**	**8800**	**880**	**9200**	**25700**
B-29	950922-B29-01	9/22/1995	**9400**	**470**	**28400**	**2400**	**3400**	**22800**
B-29	950922-B29-15	9/22/1995	**8480000**	**4530000**	**181000**	**7400000**	**15500000**	**6530000**
B-29	950925-B29-17	9/25/1995	**1600 J**	**840 J**	**240 J**	**770 J**	**5100 J**	**2800 J**
B-29	950925-B29-18	9/25/1995	50 UJ	50 UJ	50 UJ	**180 J**	50 UJ	50 UJ
B-30	950922-B30-12	9/22/1995	**53300**	**31000**	**11600**	**327000**	**126000**	**91000**
B-30	950922-B30-06	9/22/1995	**739000**	**310000**	**89300**	**1730000**	**1260000**	**808000**
B-30A	950922-B30-01	9/22/1995	**110500**	**5900**	**100000**	**9400**	**37300**	**133800**
B-31	950925-B31-11	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-31	950925-B31-06	9/25/1995	**1290000**	**422000**	**274000**	**2880000**	**2620000**	**1600000**
B-31	950925-B31-08	9/25/1995	**880 J**	**63 J**	**220 J**	50 UJ	**540 J**	**1400 J**
B-31	950925-B31-10	9/25/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
B-31	950925-B31-01	9/25/1995	**1600**	**58**	**4900**	**300**	**710**	**3700**
B-32	951004-B32-18	10/4/1995	**130**	**47**	50 U	**380**	**310**	**210**
B-32	951004-B32-15	10/4/1995	**1180000**	**520000**	**238000**	**11100000**	**2440000**	**1990000**
B-32	951004-B32-03	10/4/1995	**2050000**	**810000**	**373000**	**11100000**	**4560000**	**3580000**
B-32	951004-B32-01	10/4/1995	**2700**	**110**	**7700**	**820**	**660**	**7400**
B-33	951005-B33-01	10/5/1995	**29500**	**1600**	**141000**	**9100**	**10500**	**87100**
B-33	951005-B33-02	10/5/1995	**6400**	**850**	**1500**	**1500**	**4100**	**7400**
B-33	951005-B33-03	10/5/1995	**527000**	**266000**	**108000**	**3460000**	**1190000**	**824000**
B-33	951005-B33-14	10/5/1995	**3400**	**1500**	1000 U	**37000**	**8600**	**5400**
B-33	951006-B33-18	10/6/1995	**180 J**	**120 J**	50 UJ	**3500 J**	**470 J**	**310 J**
B-34	950926-B34-01	9/26/1995	**11700**	**440**	**7600**	**1100**	**5600**	**13600**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Acenaphthene µg/kg	Acenaphthylene µg/kg	Anthracene µg/kg	Benzo(a)anthracene µg/kg	Benzo(a)pyrene µg/kg
Tar Pond (Continued)							
B-34	950926-B34-05	9/26/1995	**253000**	**452000**	**1289000**	**227000**	**356000**
B-35	951005-B35-01	10/5/1995	100000 U	**540**	**880**	**2200**	**4100**
B-35	951005-B35-06	10/5/1995	**532000**	**1960000**	**880000**	**613000**	**954000**
B-35	951005-B35-10	10/5/1995	**520**	**280**	**270**	**130**	**170**
B-48	000828-031	8/28/2000	**725000**	50 U	**590000**	**425000**	**475000**
B-48	000828-032	8/28/2000	**114000**	**30000**	**77500**	**77000**	**88000**
B-49	000828-038	8/28/2000	**199000**	**43000**	**121000**	**116000**	**132000**
B-49	000828-037	8/28/2000	**650**	**12500**	**2100**	**28500**	**114000**
B-50	000828-034	8/28/2000	**145000**	**16000**	**86000**	**69000**	**76500**
B-50	000828-035	8/28/2000	**344000**	**330000**	**342000**	**244000**	**259000**
M-11	951102-M11-01	11/2/1995	**730**	**910**	**820**	**8100**	**10000**
M-11	951102-M11-09	11/2/1995	**850**	**83**	**210**	**160**	**77**
M-11	951102-M11-10	11/2/1995	**800 J**	**89 J**	**400 J**	**260 J**	**160 J**
MW-03-56	951101-M3-10	11/1/1995	**190**	**140**	**140**	**530**	**840**
MW-03-56	951101-M3-13	11/1/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-03-56	951101-M3-17	11/1/1995	50 U	50 U	50 U	50 U	50 U
MW-03-56	951101-M3-18	11/1/1995	50 U	50 U	50 U	50 U	50 U
MW-04-101	981014-M4-01	10/14/1998	**1100**	**25100**	**7900**	**67800**	**183000**
MW-04-101	981014-M4-02	10/14/1998	50 U	50 U	50 U	50 U	**100**
MW-04-101	981014-M4-03	10/14/1998	50 U	50 U	50 U	**130**	**230**
MW-04-57	951030-M4-01	10/30/1995	5000 U	**4400**	**2600**	**10000**	**28000**
MW-04-57	951030-M4-06	10/30/1995	**65000**	100000 U	**110000**	**190000**	**210000**
MW-04-57	951030-M4-15	10/30/1995	**30**	50 U	50 U	50 U	50 U
MW-05-175	981019-M5-01	10/19/1998	**470**	**1600**	**950**	**7100**	**16300**
MW-05-175	981019-M5-02	10/19/1998	**1700**	**640**	**2000**	**3200**	**4300**
MW-05-175	981019-M5-03	10/19/1998	50 U	50 U	50 U	50 U	50 U
MW-05-175	981020-M5-09	10/20/1998	50 U	50 U	50 U	50 U	50 U
MW-05-32	951027-M5-10	10/27/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-05-32	951027-M5-01	10/27/1995	50 U	50 U	50 U	**130**	**150**
MW-05-32	951027-M5-05	10/27/1995	**19000**	**15000**	**41000**	**115000**	**208000**
MW-05-32	951027-M5-07	10/27/1995	50 UJ	50 UJ	**72 J**	**67 J**	**51 J**
MW-08-56	951025-M8-15	10/25/1995	50 U	50 U	**57**	50 UJ	50 U
MW-08-56	951025-M8-01	10/25/1995	500 U	**3200**	**1800**	**12000 J**	**41700**
MW-08-56	951025-M8-11	10/25/1995	**740 J**	**300 J**	**220 J**	**170 J**	**150 J**
MW-14-110	981014-M14-01	10/14/1998	**42300**	**138000**	**1400**	**357000**	**400000**
MW-14-110	981014-M14-02	10/14/1998	**10600**	**21900**	**23000**	**116000**	**136000**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
Tar Pond (Continued)							
B-34	950926-B34-05	9/26/1995	**256000**	**318000**	**153000**	**383000**	**41000**
B-35	951005-B35-01	10/5/1995	**4000**	**4500**	**1500**	**4100**	**590**
B-35	951005-B35-06	10/5/1995	**780000**	**714000**	**269000**	**809000**	**91500**
B-35	951005-B35-10	10/5/1995	**140**	**140**	**68**	**180**	50 U
B-48	000828-031	8/28/2000	**225000**	**365000**	**285000**	**535000**	**55000**
B-48	000828-032	8/28/2000	**54500**	**65000**	**51000**	**92000**	**11000**
B-49	000828-038	8/28/2000	**77000**	**106000**	**71500**	**140000**	**17000**
B-49	000828-037	8/28/2000	**66000**	**105000**	**40000**	**39400**	**9400**
B-50	000828-034	8/28/2000	**41500**	**58000**	**44000**	**86000**	**9000**
B-50	000828-035	8/28/2000	**150000**	**207000**	**142000**	**284000**	**33500**
M-11	951102-M11-01	11/2/1995	**18000**	**12000**	**6000**	**6900**	**2300**
M-11	951102-M11-09	11/2/1995	**110**	**63**	**46**	**130**	50 U
M-11	951102-M11-10	11/2/1995	**140 J**	**110 J**	**70 J**	**260 J**	50 UJ
MW-03-56	951101-M3-10	11/1/1995	**830**	**960**	**300**	**510**	**98**
MW-03-56	951101-M3-13	11/1/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-03-56	951101-M3-17	11/1/1995	50 U	50 U	50 U	50 U	50 U
MW-03-56	951101-M3-18	11/1/1995	**44**	**40**	50 U	50 U	50 U
MW-04-101	981014-M4-01	10/14/1998	**209000**	1000 U	**49900**	**82100**	**21100**
MW-04-101	981014-M4-02	10/14/1998	**100**	50 U	50 U	**57**	50 U
MW-04-101	981014-M4-03	10/14/1998	**250**	50 U	50 U	**160**	50 U
MW-04-57	951030-M4-01	10/30/1995	**26000**	**35000**	**10000**	**15000**	**4000**
MW-04-57	951030-M4-06	10/30/1995	**200000**	**190000**	**68000**	**180000**	**24000**
MW-04-57	951030-M4-15	10/30/1995	50 U	50 U	50 U	50 U	50 U
MW-05-175	981019-M5-01	10/19/1998	**14400**	**15100**	**3500**	**9300**	**2100**
MW-05-175	981019-M5-02	10/19/1998	**3900**	**3600**	**1400**	**3600**	**530**
MW-05-175	981019-M5-03	10/19/1998	50 U	50 U	50 U	50 U	50 U
MW-05-175	981020-M5-09	10/20/1998	50 U	50 U	50 U	50 U	50 U
MW-05-32	951027-M5-10	10/27/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-05-32	951027-M5-01	10/27/1995	**220**	**150**	**77**	**130**	50 U
MW-05-32	951027-M5-05	10/27/1995	**170000**	**153000**	**58000**	**130000**	**25000**
MW-05-32	951027-M5-07	10/27/1995	**39 J**	**44 J**	50 UJ	**85 J**	50 UJ
MW-08-56	951025-M8-15	10/25/1995	50 U	50 U	50 U	50 U	50 U
MW-08-56	951025-M8-01	10/25/1995	**39600**	**56500**	**13800**	**20500 J**	**9100**
MW-08-56	951025-M8-11	10/25/1995	**120 J**	**130 J**	**53 J**	**210 J**	50 UJ
MW-14-110	981014-M14-01	10/14/1998	**411000**	1000 U	**99200**	**343000**	1000 U
MW-14-110	981014-M14-02	10/14/1998	**133000**	**90200**	**37300**	**152000**	1000 U

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
		Unit	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
		Sample Date						
Tar Pond (Continued)								
B-34	950926-B34-05	9/26/1995	**849000**	**409000**	**223000**	**5420000**	**1580000**	**1290000**
B-35	951005-B35-01	10/5/1995	**4000**	100000 U	**3000**	**340**	**2200**	**6700**
B-35	951005-B35-06	10/5/1995	**2600000**	**982000**	**497000**	**20700000**	**4890000**	**4330000**
B-35	951005-B35-10	10/5/1995	**500**	**280**	**96**	**4300**	**1400**	**820**
B-48	000828-031	8/28/2000	**1460000**	**545000**	**270000**	**835000**	**3020000**	**1640000**
B-48	000828-032	8/28/2000	**212000**	**65000**	**51000**	**755000**	**386000**	**258000**
B-49	000828-038	8/28/2000	**334000**	**121000**	**80500**	**1300000**	**750000**	**384000**
B-49	000828-037	8/28/2000	**22800**	500 U	**46100**	**6200**	**8950**	**60500**
B-50	000828-034	8/28/2000	**220000**	**82000**	**43500**	**76000**	**434000**	**254000**
B-50	000828-035	8/28/2000	**875000**	**310000**	**160000**	**4100000**	**1810000**	**995000**
M-11	951102-M11-01	11/2/1995	**12000**	**300**	**9200**	**370**	**4200**	**14000**
M-11	951102-M11-09	11/2/1995	**940**	**650**	**47**	**1500**	**2100**	**910**
M-11	951102-M11-10	11/2/1995	**1400 J**	**650 J**	**76 J**	**2000 J**	**3100 J**	**1400 J**
MW-03-56	951101-M3-10	11/1/1995	**1400**	**160**	**610**	**650**	**770**	**2000**
MW-03-56	951101-M3-13	11/1/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-03-56	951101-M3-17	11/1/1995	50 U	50 U	50 U	50 U	50 U	50 U
MW-03-56	951101-M3-18	11/1/1995	**31**	50 U	50 U	50 U	50 U	**42**
MW-04-101	981014-M4-01	10/14/1998	**53200**	**1500**	**110000**	**6100**	**13600**	**145000**
MW-04-101	981014-M4-02	10/14/1998	50 U	50 U	50 U	50 U	50 U	**110**
MW-04-101	981014-M4-03	10/14/1998	**210**	50 U	50 U	50 U	50 U	**460**
MW-04-57	951030-M4-01	10/30/1995	**12000**	5000 U	**21000**	**1700**	**3400**	**22000**
MW-04-57	951030-M4-06	10/30/1995	**640000**	**49000**	100000 U	**25000**	**480000**	**830000**
MW-04-57	951030-M4-15	10/30/1995	**53**	50 U	50 U	**80**	**33**	**67**
MW-05-175	981019-M5-01	10/19/1998	**10500**	**390**	**10500**	**540**	**2600**	**17000**
MW-05-175	981019-M5-02	10/19/1998	**11000**	**1200**	**2600**	**240**	**13000**	**14300**
MW-05-175	981019-M5-03	10/19/1998	50 U	50 U	50 U	50 U	50 U	50 U
MW-05-175	981020-M5-09	10/20/1998	50 U	50 U	50 U	50 U	50 U	50 U
MW-05-32	951027-M5-10	10/27/1995	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
MW-05-32	951027-M5-01	10/27/1995	**200**	50 U	**110**	50 U	**73**	**190**
MW-05-32	951027-M5-05	10/27/1995	**330000**	**16000**	**104000**	**8100**	**113000**	**437000**
MW-05-32	951027-M5-07	10/27/1995	**170 J**	50 UJ	50 UJ	50 UJ	**150 J**	**230 J**
MW-08-56	951025-M8-15	10/25/1995	**65**	50 U	50 U	**310**	**110**	**100**
MW-08-56	951025-M8-01	10/25/1995	**6700**	50 U	**46200**	**2200**	**1400**	**26100**
MW-08-56	951025-M8-11	10/25/1995	**600 J**	**480 J**	**80 J**	**2600 J**	**1500 J**	**710 J**
MW-14-110	981014-M14-01	10/14/1998	**1390000**	**57000**	1000 U	**36800**	**411000**	**2190000**
MW-14-110	981014-M14-02	10/14/1998	**292000**	**14200**	**58100**	**12900**	**118000**	**482000**

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene
		Unit	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
		Sample Date					
Tar Pond (Continued)							
MW-14-110	981014-M14-03	10/14/1998	**39300**	**6600**	**37100**	**71300**	**82500**
MW-14-110	981014-M14-07	10/14/1998	**390**	**360**	**360**	**310**	**360**
MW-14-110	981016-M14-13	10/16/1998	50 U	50 U	50 U	50 U	50 U
MW-14-110	981019-M14-20	10/19/1998	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
SS-01	981112-SS-01	11/12/1998	50 U	**64**	50 U	**210**	**440**
SS-02	981112-SS-02	11/12/1998	50 U	**200**	**80**	**790**	**1500**
SS-03	981112-SS-03	11/12/1998	**100**	**1900**	50 U	**4700**	**14100**
SS-04	981112-SS-04	11/12/1998	**83**	**500**	**250**	**1300**	**2900**
SS-11	981112-SS-11	11/12/1998	50 U	50 U	50 U	**61**	**130**
Summary							
Number of Samples			**220**	**220**	**220**	**220**	**220**
Number of Detects			**106**	**94**	**105**	**121**	**127**
Percent Detects			**48%**	**43%**	**48%**	**55%**	**58%**
Mean (µg/kg)			**99873.00**	**88533.25**	**75506.18**	**59677.71**	**70226.35**
90 Percentile UCL (µg/kg)			**173617.34**	**149303.20**	**108123.58**	**86000.26**	**99754.13**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Benzo(b)fluoranthene µg/kg	Benzo(g,h,i)perylene µg/kg	Benzo(k)fluoranthene µg/kg	Chrysene µg/kg	Dibenzo(a,h)anthracene µg/kg
Tar Pond (Continued)							
MW-14-110	981014-M14-03	10/14/1998	**74600**	**57000**	**24000**	**94800**	50 U
MW-14-110	981014-M14-07	10/14/1998	**330**	**320**	50 U	**350**	50 U
MW-14-110	981016-M14-13	10/16/1998	50 U	50 U	50 U	50 U	50 U
MW-14-110	981019-M14-20	10/19/1998	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
SS-01	981112-SS-01	11/12/1998	**460**	**500**	**140**	**230**	**68**
SS-02	981112-SS-02	11/12/1998	**1500**	**1600**	**470**	**930**	**220**
SS-03	981112-SS-03	11/12/1998	**14200**	**14400**	**3500**	**6200**	**1500**
SS-04	981112-SS-04	11/12/1998	**3100**	**3100**	**880**	**1700**	**490**
SS-11	981112-SS-11	11/12/1998	**140**	**150**	50 U	**66**	50 U
Summary							
Number of Samples			**220**	**220**	**220**	**220**	**220**
Number of Detects			**134**	**121**	**115**	**128**	**102**
Percent Detects			**61%**	**55%**	**52%**	**58%**	**46%**
Mean (µg/kg)			**59817.63**	**55924.46**	**33930.66**	**75486.19**	**10286.94**
90 Percentile UCL (µg/kg)			**82988.45**	**79189.80**	**51532.48**	**107089.58**	**15591.89**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-3
Soil PAH Results

Location	Sample ID	Chemical Name / Unit / Sample Date	Fluoranthene µg/kg	Fluorene µg/kg	Indeno(1,2,3-cd)pyrene µg/kg	Naphthalene µg/kg	Phenanthrene µg/kg	Pyrene µg/kg
Tar Pond (Continued)								
MW-14-110	981014-M14-03	10/14/1998	**194000**	**33000**	**42600**	**93300**	**250000**	**310000**
MW-14-110	981014-M14-07	10/14/1998	**1200**	**450**	**200**	**2100**	**2300**	**1800**
MW-14-110	981016-M14-13	10/16/1998	50 U	50 U	50 U	50 U	50 U	50 U
MW-14-110	981019-M14-20	10/19/1998	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
SS-01	981112-SS-01	11/12/1998	**290**	50 U	**350**	50 U	**100**	**370**
SS-02	981112-SS-02	11/12/1998	**1200**	50 U	**1200**	**88**	**220**	**1600**
SS-03	981112-SS-03	11/12/1998	**3400**	**130**	**10300**	**900**	**970**	**8500**
SS-04	981112-SS-04	11/12/1998	**1400**	**59**	**2400**	**230**	**610**	**2200**
SS-11	981112-SS-11	11/12/1998	**75**	50 U	**100**	50 U	50 U	**99**
Summary								
Number of Samples			**220**	**220**	**220**	**220**	**220**	**220**
Number of Detects			**139**	**93**	**118**	**108**	**130**	**139**
Percent Detects			**63%**	**42%**	**54%**	**49%**	**59%**	**63%**
Mean (µg/kg)			**204895.21**	**67748.12**	**43804.73**	**526008.12**	**345028.81**	**255639.86**
90 Percentile UCL (µg/kg)			**301783.74**	**107324.23**	**63407.73**	**773898.55**	**520818.43**	**358693.93**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
FAMM						
MW-13-30	980602-MW13-30-12	6/2/1998	--	**0.009**	--	**0.008**
MW-13-30	980826-MW13-30-11	8/26/1998	--	0.005 U	--	**0.014**
MW-13-30	981119-MW13-30-19	11/19/1998	--	0.005 U	--	0.005 U
MW-13-30	990217-MW13-30-014	2/17/1999	--	0.005 U	--	**0.018**
MW-13-30	990513-MW13-30-13	5/13/1999	--	0.005 U	--	0.005 U
MW-13-30	991028-MW13-30-20	10/28/1999	--	0.005 U	--	0.005 U
MW-13-30	000403-MW13-30-120	4/3/2000	--	0.005 U	--	0.005 U
MW-13-30	001005-MW13-30-18	10/5/2000	--	0.005 U	--	0.005 U
MW-13-30	010329-MW13-30-119	3/29/2001	--	0.005 U	--	0.005 U
MW-13-30	020405-MW13-30-116	4/5/2002	0.005 U	0.005 U	0.005 U	**0.0122**
MW-13-30	030319-MW13-30-115	3/19/2003	--	0.003 U	--	0.02 U
MW-13-61	980602-MW13-61-13	6/2/1998	--	**0.013**	--	**0.028**
MW-13-61	980825-MW13-61-03	8/25/1998	--	**0.036**	--	**0.042**
MW-13-61	981116-MW13-61-03	11/16/1998	--	**0.018**	--	**0.044**
MW-13-61	990512-MW13-61-04	5/12/1999	--	**0.066**	--	**0.038**
MW-13-61	991026-MW13-61-03	10/26/1999	--	**0.01**	--	**0.017**
MW-13-61	000328-MW13-61-104	3/28/2000	--	**0.0095**	--	**0.0144**
MW-13-61	001004-MW13-61-03	10/4/2000	--	**0.017**	--	**0.0253**
MW-13-61	010327-MW13-61-103	3/27/2001	--	**0.0146**	--	**0.0166**
MW-13-61	011009-MW13-61-106	10/9/2001	--	0.005 U	--	**0.0117**
MW-13-61	020403-MW13-61-102	4/3/2002	--	0.005 U	--	**0.0479**
MW-13-61	020924-MW13-61-106	9/24/2002	0.0056 U	0.005 U	**0.0079**	**0.011**
MW-13-61	030317-MW13-61-101	3/17/2003	--	0.015 U	--	0.02 U
Retorts/Koppers						
MW-06-32	951207-MW6-32-01	12/7/1995	--	0.005 U	--	0.005 U
MW-06-32	960319-MW6-32-01	3/19/1996	--	0.005 U	--	**0.005**
MW-06-32	960617-MW6-32-01	6/17/1996	--	0.005 U	--	0.005 U
MW-06-32	960930-MW6-32-01	9/30/1996	--	0.005 U	--	0.005 U
MW-06-32	970224-MW6-32-01	2/25/1997	--	0.005 U	--	0.005 U
MW-06-32	970826-MW6-32-01	8/26/1997	--	0.005 U	--	0.005 U
MW-06-32	980216-MW6-32-01	2/16/1998	--	0.005 U	--	**0.005**
MW-06-61	960319-MW6-61-01	3/19/1996	--	**0.005**	--	**0.015**
MW-06-61	960620-MW6-61-01	6/20/1996	--	0.005 U	--	0.005 U
MW-06-61	961001-MW6-61-01	10/1/1996	--	0.005 U	--	**0.01**
MW-06-61	970225-MW6-61-01	2/25/1997	--	0.005 U	--	0.005 U
MW-06-61	970828-MW6-61-01	8/28/1997	--	**0.014**	--	**0.2**
MW-09-29	960318-MW9-29-01	3/18/1996	--	0.005 U	--	0.005 U
MW-09-29	960618-MW9-29-01	6/18/1996	--	**0.23**	--	**0.097**
MW-09-29	961001-MW9-29-01	10/1/1996	--	**0.047**	--	**0.037**
MW-09-29	970225-MW9-29-01	2/25/1997	--	**0.021**	--	**0.022**
MW-09-29	970827-MW9-29-01	8/27/1997	--	**0.035**	--	**0.03**
MW-09-29	980217-MW9-29-01	2/17/1998	--	**0.021**	--	**0.25**
MW-09-29	980602-MW9-29-07	6/2/1998	--	**0.037**	--	--
MW-09-29	981116-MW9-29-02	11/16/1998	--	**0.071**	--	--
MW-09-29	990511-MW9-29-03	5/11/1999	--	**0.018**	--	--
MW-09-29	991026-MW9-29-02	10/26/1999	--	**0.22**	--	**0.14**
MW-09-29	000328-MW9-29-102	3/28/2000	0.005 U	0.005 U	--	0.005 U
MW-09-29	010327-MW9-29-102	3/27/2001	--	**0.225**	--	**0.0914**
MW-09-29	020403-MW9-29-101	4/3/2002	0.005 U	**0.0063**	**0.0186**	**0.0198**

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
Retorts/Koppers (Continued)						
MW-09-29	030318-MW9-29-103	3/18/2003	--	0.0015 U	--	0.02 U
MW-10-25	951207-MW10-25-01	12/7/1995	--	**0.11**	--	**0.95**
MW-10-25	960320-MW10-25-01	3/20/1996	--	**0.089**	--	**0.86**
MW-10-25	960617-MW10-25-01	6/17/1996	--	**0.043**	--	**0.48**
MW-10-25	960930-MW10-25-01	9/30/1996	--	**0.13**	--	**1.3**
MW-10-25	970224-MW10-25-01	2/25/1997	**0.16**	**0.17**	--	**1.3**
MW-10-25	970827-MW10-25-01	8/27/1997	**0.23**	**0.36**	--	**3**
MW-10-25	980216-MW10-25-01	2/16/1998	**0.18**	**0.16**	--	**1.5**
MW-10-25	980601-MW10-25-02	6/1/1998	**0.12**	**0.12**	--	--
MW-10-61	960321-MW10-61-01	3/21/1996	--	**0.027**	--	**0.025**
MW-10-61	960620-MW10-61-01	6/20/1996	--	0.005 U	--	**0.008**
MW-10-61	961002-MW10-61-01	10/2/1996	--	**0.016**	--	**0.012**
MW-10-61	970226-MW10-61-01	2/26/1997	--	**0.018**	--	**0.015**
MW-10-61	970828-MW10-61-01	8/28/1997	--	0.005 U	--	0.005 U
MW-10-61	980218-MW10-61-01	2/18/1998	--	**0.01**	--	**0.015**
MW-10-61	980603-MW10-61-16	6/3/1998	--	**0.009**	--	--
MW-10-61	981117-MW10-61-08	11/17/1998	--	**0.017**	--	--
MW-10-61	990512-MW10-61-06	5/12/1999	--	**0.026**	--	--
MW-10-61	991026-MW10-61-05	10/26/1999	--	**0.0084**	--	**0.11**
MW-10-61	000329-MW10-61-105	3/29/2000	--	**0.0144**	--	**0.0474**
MW-10-61	011010-MW10-61-109	10/10/2001	--	0.0015 U	--	0.005 U
MW-10-61	020404-MW10-61-109	4/4/2002	0.005 U	**0.0321**	0.005 U	**0.0339**
MW-10-61	020924-MW10-61-104	9/24/2002	0.0056 U	**0.0056**	**0.0061**	**0.014**
MW-10-61	030319-MW10-61-111	3/19/2003	--	**0.0062**	--	0.02 U
MW-12-36	951207-MW12-36-01	12/7/1995	--	0.005 U	--	**0.012**
MW-12-36	991028-MW12-36-18	10/28/1999	--	**0.0084**	--	**0.011**
MW-15-50	991029-MW15-50-25	10/29/1999	--	0.005 U	--	**0.0096**
MW-15-50	000403-MW15-50-125	4/3/2000	--	0.005 U	--	**0.0202**
MW-15-50	000615-MW15-50-105	6/15/2000	--	**0.006**	--	**0.0359**
MW-15-50	000615-MW15-50-106	6/15/2000	--	0.005 U	--	**0.0388**
MW-15-50	001005-MW15-50-14	10/5/2000	--	**0.0176**	--	**0.0393**
MW-15-50	001221-MW15-50-105	12/21/2000	--	**0.0585**	--	**0.0272**
MW-15-50	001221-MW15-50-106	12/21/2000	--	**0.0193**	--	**0.0334**
MW-15-50	010330-MW15-50-124	3/30/2001	--	**0.0058**	--	**0.0107**
MW-15-50	011010-MW15-50-111	10/10/2001	--	0.0015 U	--	**0.0646**
MW-15-50	011010-MW15-50-112	10/10/2001	--	0.0015 U	--	**0.0412**
MW-15-50	011214-MW15-50-104	12/14/2001	--	0.005 U	--	**0.0089**
MW-15-50	011214-MW15-50-105	12/14/2001	--	0.005 U	--	**0.0084**
MW-15-50	020405-MW15-50-119	4/5/2002	--	0.005 U	--	**0.0204**
MW-15-50	020711-MW15-50-105	7/11/2002	--	**0.0189**	--	**0.0972**
MW-15-50	020711-MW15-50-104	7/11/2002	--	**0.0187**	--	**0.0929**
MW-15-50	020925-MW15-50-110	9/25/2002	0.0056 U	**0.017**	**0.0068**	**0.092**
MW-15-50	020925-MW15-50-111	9/25/2002	--	**0.045**	--	**0.24**
MW-15-50	021218-MW15-50-107	12/18/2002	0.0056 U	0.005 U	**0.012**	**0.034**
MW-15-50	030321-MW15-50-122	3/21/2003	0.0011 U	**0.0056**	**0.056**	**0.045**
MW-15-50	030603-MW15-50-105	6/3/2003	0.0011 U	0.001 U	0.022 U	0.02 U
MW-15-66	991026-MW15-66-07	10/26/1999	--	0.005 U	--	0.005 U
MW-15-66	000329-MW15-66-108	3/29/2000	--	0.005 U	--	0.005 U
MW-15-66	000615-MW15-66-104	6/15/2000	--	0.005 U	--	**0.0214**

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
Retorts/Koppers (Continued)						
MW-15-66	001005-MW15-66-08	10/5/2000	--	0.005 U	--	0.005 U
MW-15-66	001221-MW15-66-104	12/21/2000	--	0.005 U	--	0.005 U
MW-15-66	010328-MW15-66-107	3/28/2001	--	0.005 U	--	0.005 U
MW-15-66	011010-MW15-66-110	10/10/2001	--	0.0015 U	--	**0.0241**
MW-15-66	011213-MW15-66-103	12/13/2001	--	0.005 U	--	**0.0133**
MW-15-66	020404-MW15-66-107	4/4/2002	--	0.005 U	--	0.005 U
MW-15-66	020711-MW15-66-103	7/11/2002	--	0.005 U	--	0.005 U
MW-15-66	020925-MW15-66-109	9/25/2002	--	0.005 U	--	0.005 U
MW-15-66	021218-MW15-66-106	12/18/2002	--	0.005 U	--	0.005 U
MW-15-66	021218-MW15-66-105	12/18/2002	--	0.005 U	--	**0.0057**
MW-15-66	030318-MW15-66-107	3/18/2003	--	0.015 U	--	0.02 U
MW-15-66	030603-MW15-66-104	6/3/2003	--	0.001 U	--	0.02 U
Spent Oxide						
MW-01-22	960319-MW1-22-01	3/19/1996	--	**0.01**	--	**0.066**
MW-01-22	960618-MW1-22-01	6/18/1996	--	0.005 U	--	**0.024**
MW-01-22	961001-MW1-22-01	10/1/1996	**0.022**	**0.023**	--	**0.17**
MW-01-22	970225-MW1-22-01	2/25/1997	--	0.005 U	--	**0.028**
MW-01-22	970225-MW1-22-02	2/25/1997	--	0.005 U	--	**0.024**
MW-01-22	970827-MW1-22-01	8/27/1997	--	**0.018**	--	**0.16**
MW-01-22	970827-MW1-22-02	8/27/1997	--	0.05 U	--	**0.53**
MW-01-22	980217-MW1-22-01	2/17/1998	--	0.005 U	--	**0.05**
MW-01-22	980602-MW1-32-11	6/2/1998	--	**0.006**	--	**0.13**
MW-01-22	980826-MW1-22-10	8/26/1998	--	--	--	0.005 U
MW-01-22	981118-MW1-22-15	11/18/1998	--	**0.008**	--	**0.086**
MW-01-22	990216-MW1-22-012	2/16/1999	--	--	--	**0.051**
MW-01-22	990513-MW1-22-11	5/13/1999	--	0.005 U	--	**0.025**
MW-01-22	990824-MW1-22-15	8/24/1999	--	**0.02**	--	**0.52**
MW-01-22	991028-MW1-22-16	10/28/1999	**0.009**	**0.011**	**0.027**	**0.063**
MW-01-22	000330-MW1-22-116	3/30/2000	--	0.005 U	--	**0.0341**
MW-01-22	010329-MW1-22-115	3/29/2001	--	0.005 U	--	**0.0503**
MW-02-32	960618-MW2-32-01	6/18/1996	--	0.005 U	--	0.005 U
MW-02-32	961001-MW2-32-01	10/1/1996	--	0.005 U	--	**0.01**
MW-02-32	970225-MW2-32-01	2/25/1997	--	0.005 U	--	**0.007**
MW-02-32	970827-MW2-32-01	8/27/1997	--	0.005 U	--	**0.008**
MW-02-32	980217-MW2-32-01	2/17/1998	--	0.005 U	--	0.005 U
MW-02-32	980601-MW2-32-05	6/1/1998	--	0.005 U	--	--
MW-02-32	981117-MW2-32-10	11/17/1998	--	0.005 U	--	--
MW-02-32	990513-MW2-32-10	5/13/1999	--	0.005 U	--	--
MW-02-32	991027-MW2-32-12	10/27/1999	--	0.005 U	--	0.005 U
MW-02-32	000329-MW2-32-112	3/29/2000	--	0.005 U	--	**0.0158**
MW-02-32	010328-MW2-32-111	3/28/2001	--	0.005 U	--	0.005 U
MW-02-61	981116-MW2-61-04	11/16/1998	--	0.005 U	--	0.005 U
MW-02-61	990216-MW2-61-006	2/16/1999	--	0.005 U	--	0.03 U
MW-02-61	990512-MW2-61-05	5/12/1999	--	0.005 U	--	0.005 U
MW-02-61	990823-MW2-61-07	8/23/1999	--	0.005 U	--	0.01 U
MW-02-61	991026-MW2-61-04	10/26/1999	--	0.005 U	--	0.005 U
MW-02-61	000328-MW2-61-104	3/28/2000	--	0.005 U	--	0.005 U
MW-02-61	001004-MW2-61-04	10/4/2000	--	0.005 U	--	0.005 U
MW-02-61	010328-MW2-61-104	3/28/2001	--	0.005 U	--	0.005 U

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
Spent Oxide (Continued)						
MW-02-61	011009-MW2-61-104	10/9/2001	--	0.005 U	--	0.01 U
MW-02-61	020403-MW2-61-103	4/3/2002	--	0.005 U	--	**0.0091**
MW-02-61	020924-MW2-61-103	9/24/2002	--	0.005 U	--	0.005 U
MW-02-61	030318-MW2-61-104	3/18/2003	--	0.015 U	--	0.02 U
Tar Pond						
MW-03-26	960318-MW3-26-02	3/18/1996	--	0.005 U	--	**0.005**
MW-03-26	960618-MW3-26-01	6/18/1996	--	0.005 U	--	**0.014**
MW-03-26	961001-MW3-26-01	10/1/1996	0.005 U	**0.44**	--	**0.98**
MW-03-26	970225-MW3-26-01	2/25/1997	--	**0.006**	--	**0.017**
MW-03-26	970827-MW3-26-01	8/27/1997	0.005 U	**0.39**	--	**0.71**
MW-03-26	980218-MW3-26-01	2/18/1998	--	**0.017**	--	**0.04**
MW-03-26	980602-MW3-26-09	6/2/1998	--	0.005 U	--	**0.028**
MW-03-26	980826-MW3-26-08	8/26/1998	--	0.005 U	--	**0.005**
MW-03-26	981117-MW3-26-12	11/17/1998	0.005 U	**0.22**	--	**0.61**
MW-03-26	990216-MW3-26-010	2/16/1999	--	**0.0078**	--	**0.063**
MW-03-26	990514-MW3-26-23	5/14/1999	--	0.005 U	--	**0.024**
MW-03-26	990824-MW3-26-12	8/24/1999	--	**0.096**	--	**0.064**
MW-03-26	991027-MW3-26-14	10/27/1999	0.005 U	**1**	0.005 U	**0.59**
MW-03-26	000330-MW3-26-113	3/30/2000	--	0.005 U	--	**0.0713**
MW-03-26	001005-MW3-26-11	10/5/2000	--	**0.0386**	--	**0.0696**
MW-03-26	010328-MW3-26-113	3/28/2001	--	**0.0149**	--	**0.0304**
MW-03-56	951206-MW3-56-01	12/6/1995	--	0.005 U	--	**0.005**
MW-03-56	960319-MW3-56-01	3/19/1996	--	0.005 U	--	0.005 U
MW-03-56	980602-MW3-56-14	6/2/1998	--	**0.007**	--	--
MW-03-56	981118-MW3-56-16	11/18/1998	--	0.005 U	--	--
MW-03-56	990514-MW3-56-24	5/14/1999	--	**0.0064**	--	--
MW-03-56	990824-MW3-56-16	8/24/1999	--	0.005 U	--	0.01 U
MW-03-56	991028-MW3-56-17	10/28/1999	--	0.005 U	--	0.005 U
MW-03-56	000330-MW3-56-117	3/30/2000	--	**0.0457**	--	**0.0631**
MW-03-56	001005-MW3-56-13	10/5/2000	0.005 U	**0.0064**	**0.0119**	**0.0129**
MW-03-56	010329-MW3-56-116	3/29/2001	--	**0.0053**	--	**0.0072**
MW-03-56	020404-MW3-56-111	4/4/2002	--	0.005 U	--	**0.0082**
MW-03-56	030319-MW3-56-112	3/19/2003	--	0.003 U	--	0.02 U
MW-04-101	981117-MW4-101-09	11/17/1998	--	0.005 U	--	0.005 U
MW-04-101	990216-MW4-101-007	2/16/1999	--	0.005 U	--	0.03 U
MW-04-101	990514-MW4-101-20	5/14/1999	--	0.005 U	--	0.005 U
MW-04-101	990824-MW4-101-09	8/24/1999	--	0.005 U	--	0.01 U
MW-04-101	991027-MW4-101-11	10/27/1999	--	0.005 U	--	0.005 U
MW-04-101	000329-MW4-101-111	3/29/2000	--	0.005 U	--	**0.0069**
MW-04-101	001005-MW4-101-09	10/5/2000	--	0.005 U	--	0.005 U
MW-04-101	010328-MW4-101-110	3/28/2001	--	0.005 U	--	0.005 U
MW-04-101	011009-MW4-101-103	10/9/2001	--	0.005 U	--	0.01 U
MW-04-101	020404-MW4-101-110	4/4/2002	0.005 U	0.005 U	0.015 U	**0.0054**
MW-04-101	020924-MW4-101-102	9/24/2002	0.0056 U	0.005 U	**0.0086**	**0.0077**
MW-04-101	030318-MW4-101-109	3/18/2003	--	0.015 U	--	0.02 U
MW-04-35	960618-MW4-35-01	6/18/1996	--	0.005 U	--	0.005 U
MW-04-35	961001-MW4-35-01	10/1/1996	--	0.005 U	--	**0.008**
MW-04-35	970225-MW4-35-01	2/25/1997	--	0.005 U	--	0.005 U
MW-04-35	970827-MW4-57-01	8/27/1997	--	0.005 U	--	0.005 U

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
Tar Pond (Continued)						
MW-04-35	980217-MW4-35-01	2/17/1998	--	**0.007**	--	**0.005**
MW-04-35	980601-MW4-35-06	6/1/1998	--	0.005 U	--	--
MW-04-35	981117-MW4-35-11	11/17/1998	--	0.005 U	--	--
MW-04-35	990514-MW4-35-21	5/14/1999	--	0.005 U	--	--
MW-04-35	991027-MW4-35-13	10/27/1999	--	**0.044**	--	**0.067**
MW-04-35	000330-MW4-35-114	3/30/2000	--	0.001 U	--	0.005 U
MW-04-35	001005-MW4-35-10	10/5/2000	--	**0.111**	--	**0.252**
MW-04-35	010328-MW4-35-112	3/28/2001	--	0.005 U	--	0.005 U
MW-04-57	960321-MW4-57-01	3/21/1996	--	0.005 U	--	0.005 U
MW-04-57	960620-MW4-57-01	6/20/1996	--	0.005 U	--	0.005 U
MW-04-57	961002-MW4-57-01	10/2/1996	--	0.005 U	--	0.005 U
MW-04-57	970226-MW4-57-01	2/26/1997	--	0.005 U	--	0.005 U
MW-04-57	970828-MW4-35-01	8/28/1997	--	0.005 U	--	0.005 U
MW-04-57	980218-MW4-57-01	2/18/1998	--	0.005 U	--	0.005 U
MW-04-57	980603-MW4-57-18	6/3/1998	--	0.005 U	--	--
MW-04-57	981119-MW4-57-20	11/19/1998	--	0.005 U	--	--
MW-04-57	990514-MW4-57-22	5/14/1999	--	0.005 U	--	--
MW-04-57	990825-MW4-57-17	8/25/1999	--	0.005 U	--	0.01 U
MW-04-57	991028-MW4-57-21	10/28/1999	0.005 U	**0.015**	0.005 U	**0.014**
MW-04-57	000403-MW4-57-121	4/3/2000	--	0.005 U	--	**0.0259**
MW-04-57	001006-MW4-57-19	10/6/2000	--	0.005 U	--	0.005 U
MW-04-57	010329-MW4-57-120	3/29/2001	--	0.005 U	--	0.005 U
MW-04-57	020405-MW4-57-117	4/5/2002	0.005 U	0.005 U	0.005 U	0.005 U
MW-04-57	030320-MW4-57-117	3/20/2003	--	0.001 U	--	0.02 U
MW-05-100	981118-MW5-100-14	11/18/1998	--	0.005 U	--	**0.006**
MW-05-100	990217-MW5-100-018	2/17/1999	--	0.005 U	--	**0.028**
MW-05-100	990514-MW5-100-18	5/14/1999	--	0.005 U	--	**0.0091**
MW-05-100	990825-MW5-100-18	8/25/1999	--	0.005 U	--	0.01 U
MW-05-100	991028-MW5-100-19	10/28/1999	--	0.005 U	--	0.005 U
MW-05-100	000330-MW5-100-119	3/30/2000	--	0.005 U	--	0.005 U
MW-05-100	001005-MW5-100-15	10/5/2000	--	0.005 U	--	0.005 U
MW-05-100	001005-MW5-100-16	10/5/2000	--	0.005 U	--	0.005 U
MW-05-100	010329-MW5-100-118	3/29/2001	--	0.005 U	--	0.005 U
MW-05-100	020405-MW5-100-115	4/5/2002	--	0.005 U	--	**0.0072**
MW-05-100	020405-MW5-100-114	4/5/2002	0.005 U	0.005 U	0.005 U	**0.0051**
MW-05-100	030319-MW5-100-114	3/19/2003	--	0.003 U	--	0.02 U
MW-05-175	981116-MW5-175-07	11/16/1998	--	0.005 U	--	0.005 U
MW-05-175	990215-MW5-175-003	2/15/1999	--	0.005 U	--	0.04 U
MW-05-175	990512-MW5-175-07	5/12/1999	--	0.005 U	--	0.005 U
MW-05-175	990823-MW5-175-03	8/23/1999	--	0.005 U	--	0.01 U
MW-05-175	991026-MW5-175-06	10/26/1999	--	0.005 U	--	0.005 U
MW-05-175	000329-MW5-175-106	3/29/2000	--	0.005 U	--	0.005 U
MW-05-175	001004-MW5-175-05	10/4/2000	--	0.005 U	--	0.005 U
MW-05-175	010328-MW5-175-105	3/28/2001	--	0.005 U	--	0.005 U
MW-05-175	011009-MW5-175-102	10/9/2001	--	0.005 U	--	0.01 U
MW-05-175	020404-MW5-175-105	4/4/2002	--	0.005 U	--	**0.0055**
MW-05-175	020924-MW5-175-101	9/24/2002	0.0056 U	0.005 U	**0.0069**	**0.015**
MW-05-175	030318-MW5-175-105	3/18/2003	--	0.015 U	--	0.02 U
MW-05-32	960620-MW5-32-01	6/20/1996	--	0.005 U	--	0.005 U

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
Tar Pond (Continued)						
MW-05-32	961001-MW5-32-01	10/1/1996	0.005 U	**0.11**	--	**0.4**
MW-05-32	970225-MW5-32-01	2/25/1997	--	0.005 U	--	**0.006**
MW-05-32	970827-MW5-32-01	8/27/1997	--	**0.011**	--	**0.024**
MW-05-32	980217-MW5-32-01	2/17/1998	--	**0.022**	--	**0.016**
MW-05-32	980602-MW5-32-10	6/2/1998	--	**0.022**	--	--
MW-05-32	981118-MW5-32-13	11/18/1998	--	**0.099**	--	--
MW-05-32	990514-MW5-32-17	5/14/1999	0.005 U	0.005 U	--	--
MW-05-32	991027-MW5-32-15	10/27/1999	0.005 U	**0.28**	0.005 U	**0.54**
MW-05-32	000330-MW5-32-115	3/30/2000	0.005 U	**0.014**	--	**0.0407**
MW-05-32	001005-MW5-32-12	10/5/2000	--	**0.0458**	--	**0.0963**
MW-05-32	010329-MW5-32-114	3/29/2001	--	**0.061**	--	**0.117**
MW-08-29	951207-MW8-29-01	12/7/1995	--	**0.031**	--	**0.3**
MW-08-29	960321-MW8-29-01	3/21/1996	--	**0.008**	--	**0.26**
MW-08-29	960619-MW8-29-02	6/20/1996	--	0.005 U	--	**0.014**
MW-08-29	961002-MW8-29-01	10/2/1996	--	0.005 U	--	0.005 U
MW-08-29	970226-MW8-29-01	2/26/1997	--	0.005 U	--	**0.01**
MW-08-29	970828-MW8-29-01	8/28/1997	--	0.005 U	--	**0.2**
MW-08-29	980218-MW8-29-01	2/18/1998	--	0.005 U	--	**0.21**
MW-08-56	951207-MW8-56-01	12/7/1995	--	**0.048**	--	**0.27**
MW-08-56	960321-MW8-56-01	3/21/1996	--	**0.021**	--	**0.24**
MW-08-56	960620-MW8-56-01	6/20/1996	--	0.005 U	--	**0.1**
MW-08-56	961002-MW8-56-01	10/2/1996	--	**0.02**	--	**0.023**
MW-08-56	970226-MW8-56-01	2/26/1997	--	**0.07**	--	**0.05**
MW-08-56	970828-MW8-56-01	8/28/1997	--	0.005 U	--	**0.007**
MW-08-56	980218-MW8-56-01	2/18/1998	--	**0.027**	--	**0.22**
MW-08-56	020405-MW8-56-118	4/5/2002	--	**0.0382**	--	**0.0362**
MW-08-56	030320-MW8-56-120	3/20/2003	0.0011 U	0.001 U	0.022 U	0.02 U
MW-11-32	951207-MW11-32-01	12/7/1995	--	0.005 U	--	0.005 U
MW-11-32	960320-MW11-32-01	3/20/1996	--	0.005 U	--	**0.008**
MW-11-32	960930-MW11-32-01	9/30/1996	--	0.005 U	--	0.005 U
MW-11-32	960930-MW11-32-02	9/30/1996	--	0.005 U	--	0.005 U
MW-11-32	970224-MW11-32-01	2/25/1997	--	0.005 U	--	0.005 U
MW-11-32	970826-MW11-32-01	8/26/1997	--	0.005 U	--	0.005 U
MW-11-32	980216-MW11-32-01	2/16/1998	--	0.005 U	--	0.005 U
MW-14-110	981116-MW14-110-06	11/16/1998	--	0.005 U	--	0.005 U
MW-14-110	990216-MW14-110-005	2/16/1999	--	0.005 U	--	**0.03**
MW-14-110	990512-MW14-110-09	5/12/1999	--	0.005 U	--	0.005 U
MW-14-110	990823-MW14-110-06	8/23/1999	--	0.005 U	--	0.01 U
MW-14-110	991027-MW14-110-09	10/27/1999	--	0.005 U	--	0.005 U
MW-14-110	991027-MW14-110-10	10/27/1999	--	0.005 U	--	**0.0054**
MW-14-110	000329-MW14-110-109	3/29/2000	--	0.005 U	--	**0.0107**
MW-14-110	000329-MW14-110-110	3/29/2000	--	0.005 U	--	0.005 U
MW-14-110	000615-MW14-110-102	6/15/2000	--	0.005 U	--	0.005 U
MW-14-110	001005-MW14-110-06	10/5/2000	--	0.005 U	--	0.005 U
MW-14-110	001220-MW14-110-102	12/20/2000	--	0.005 U	--	0.005 U
MW-14-110	010328-MW14-110-108	3/28/2001	--	0.005 U	--	0.005 U
MW-14-110	011009-MW14-110-105	10/9/2001	--	0.005 U	--	0.01 U
MW-14-110	011213-MW14-110-101	12/13/2001	--	0.005 U	--	**0.0104**
MW-14-110	020404-MW14-110-108	4/4/2002	--	0.005 U	--	0.005 U

Table A-4
Groundwater Metal Results

Location	Sample ID	Chemical Name	Chromium	Chromium	Zinc	Zinc
		Total/Dissolved	D	T	D	T
		Unit	mg/l	mg/l	mg/l	mg/l
		Sample Date				
Tar Pond (Continued)						
MW-14-110	020711-MW14-110-101	7/11/2002	--	0.005 U	--	0.005 U
MW-14-110	020924-MW14-110-105	9/24/2002	--	0.005 U	--	0.005 U
MW-14-110	021217-MW14-110-102	12/17/2002	--	0.005 U	--	0.005 U
MW-14-110	030318-MW14-110-108	3/18/2003	--	0.015 U	--	0.02 U
MW-14-110	030602-MW14-110-101	6/2/2003	0.0011 U	0.001 U	0.022 U	0.02 U
Summary						
Number of Samples			**33**	**294**	**21**	**274**
Number of Detects			**6**	**96**	**10**	**154**
Percent Detects			**18%**	**33%**	**48%**	**56%**
Mean (µg/L)			**0.03**	**0.02**	**0.01**	**0.08**
90 Percentile UCL (µg/L)			**0.04**	**0.03**	**0.02**	**0.11**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
FAMM						
B-08	950918-BW8-01	9/18/1995	0.5 U	0.5 U	**0.86**	**0.85**
MW-13-30	980217-MW13-30-01	2/17/1998	**6900**	**370**	150 U	50 U
MW-13-30	980602-MW13-30-12	6/2/1998	**5200**	**380**	**120**	**13**
MW-13-30	980826-MW13-30-11	8/26/1998	**13900**	**550**	**220**	**20**
MW-13-30	981119-MW13-30-19	11/19/1998	**550**	**110**	**53**	**4.3**
MW-13-30	990217-MW13-30-014	2/17/1999	**2360**	**407**	**229**	**11.1**
MW-13-30	990513-MW13-30-13	5/13/1999	**896**	**261**	**175**	**8.9**
MW-13-30	991028-MW13-30-20	10/28/1999	**650**	**147**	**56.5**	10 U
MW-13-30	000403-MW13-30-120	4/3/2000	**5550**	**175**	**77.4**	**5.67**
MW-13-30	001005-MW13-30-18	10/5/2000	**577**	**344**	**302**	50 U
MW-13-30	010329-MW13-30-119	3/29/2001	**290**	**122**	30 U	10 U
MW-13-30	020405-MW13-30-116	4/5/2002	**79.9**	**227**	**295**	**309**
MW-13-30	030319-MW13-30-115	3/19/2003	**1400**	**330**	**110**	**9.2**
MW-13-61	980218-MW13-61-01	2/18/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	980602-MW13-61-13	6/2/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	980825-MW13-61-03	8/25/1998	**2.1**	0.5 U	1.5 U	0.5 U
MW-13-61	981116-MW13-61-03	11/16/1998	**1.4**	0.5 U	1.5 U	0.5 U
MW-13-61	990512-MW13-61-04	5/12/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	991026-MW13-61-03	10/26/1999	**1.39**	0.5 U	1.5 U	0.5 U
MW-13-61	000328-MW13-61-104	3/28/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	001004-MW13-61-03	10/4/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	010327-MW13-61-103	3/27/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	011009-MW13-61-106	10/9/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	020403-MW13-61-102	4/3/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	020924-MW13-61-106	9/24/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-13-61	030317-MW13-61-101	3/17/2003	0.5 U	0.5 U	1.5 U	0.5 U
Retorts/Koppers						
B-19	950920-BW19-02	9/20/1995	**100000**	**1600**	**11000**	**39000**
B-21	951003-BW21-01	10/3/1995	0.5 U	**1.9**	**3.3**	**1.2**
MW-06-32	951207-MW6-32-01	12/7/1995	**3000**	**960**	**740**	**150**
MW-06-32	960319-MW6-32-01	3/19/1996	**640**	**400**	**270**	**22**
MW-06-32	960617-MW6-32-01	6/17/1996	**410**	**280**	**410**	**40**
MW-06-32	960930-MW6-32-01	9/30/1996	**1100**	**470**	**320**	**34**
MW-06-32	970224-MW6-32-01	2/25/1997	**1100**	**370**	**80**	**22**
MW-06-32	970826-MW6-32-01	8/26/1997	**1200**	**420**	**280**	**27**
MW-06-32	980216-MW6-32-01	2/16/1998	**1700**	**650**	750 U	250 U
MW-06-32	980601-MW6-32-04	6/1/1998	**1200**	**300**	**190**	**32**
MW-06-61	951206-MW6-61-01	12/6/1995	**6.7**	**8.9**	**5.8**	**0.71**
MW-06-61	960319-MW6-61-01	3/19/1996	**11**	**9.2**	**5.3**	**0.68**
MW-06-61	960620-MW6-61-01	6/20/1996	**8.4**	**6**	**3.3**	0.5 U
MW-06-61	961001-MW6-61-01	10/1/1996	**20**	**16**	**8**	**0.93**
MW-06-61	970225-MW6-61-01	2/25/1997	**82**	**79**	**41**	**6.1**
MW-06-61	970828-MW6-61-01	8/28/1997	**130**	**180**	**120**	**11**
MW-09-29	951205-MW9-29-01	12/5/1995	0.5 U	0.5 U	0.5 U	0.5 U
MW-09-29	960318-MW9-29-01	3/18/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-09-29	960618-MW9-29-01	6/18/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-09-29	961001-MW9-29-01	10/1/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-09-29	970225-MW9-29-01	2/25/1997	0.5 U	0.5 U	0.5 U	0.5 U
MW-09-29	970827-MW9-29-01	8/27/1997	0.5 U	0.5 U	1.5 U	0.5 U

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Retorts/Koppers (Continued)						
MW-09-29	980217-MW9-29-01	2/17/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	980602-MW9-29-07	6/2/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	981116-MW9-29-02	11/16/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	990511-MW9-29-03	5/11/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	991026-MW9-29-02	10/26/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	000328-MW9-29-102	3/28/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	010327-MW9-29-102	3/27/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	020403-MW9-29-101	4/3/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-09-29	030318-MW9-29-103	3/18/2003	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-25	951207-MW10-25-01	12/7/1995	**120000**	**2000**	**9200**	**42000**
MW-10-25	960320-MW10-25-01	3/20/1996	**32000**	**3100**	**13000**	**38000**
MW-10-25	960617-MW10-25-01	6/17/1996	**28000**	**2500**	**8600**	**32000**
MW-10-25	960930-MW10-25-01	9/30/1996	**17000**	200 U	**4500**	**5000**
MW-10-25	970224-MW10-25-01	2/25/1997	**180000**	**1300**	**6800**	**54000**
MW-10-25	970827-MW10-25-01	8/27/1997	**168000**	**850**	**6000**	**54000**
MW-10-25	980216-MW10-25-01	2/16/1998	**186000**	**880**	**6500**	**51100**
MW-10-25	980601-MW10-25-02	6/1/1998	**93800**	**670**	**3900**	**30900**
MW-10-61	951206-MW10-61-01	12/6/1995	**75**	**26**	**110**	**130**
MW-10-61	960321-MW10-61-01	3/21/1996	**4.1**	**2.9**	**8.5**	**1.6**
MW-10-61	960620-MW10-61-01	6/20/1996	**0.9**	**1.1**	**1.7**	0.5 U
MW-10-61	961002-MW10-61-01	10/2/1996	**0.56**	**0.69**	**1.1**	0.5 U
MW-10-61	970226-MW10-61-01	2/26/1997	0.5 U	0.5 U	0.5 U	0.5 U
MW-10-61	970828-MW10-61-01	8/28/1997	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	980218-MW10-61-01	2/18/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	980603-MW10-61-16	6/3/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	981117-MW10-61-08	11/17/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	990512-MW10-61-06	5/12/1999	0.5 U	0.5 U	1.5 U	**0.692**
MW-10-61	991026-MW10-61-05	10/26/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	000329-MW10-61-105	3/29/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	011010-MW10-61-109	10/10/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	020404-MW10-61-109	4/4/2002	1 U	1 U	2 U	1 U
MW-10-61	020924-MW10-61-104	9/24/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-10-61	030319-MW10-61-111	3/19/2003	0.5 U	0.5 U	1.5 U	0.5 U
MW-12-36	951207-MW12-36-01	12/7/1995	**95**	**170**	**590**	**410**
MW-12-36	960321-MW12-36-01	3/21/1996	**170**	**110**	**550**	**180**
MW-12-36	960620-MW12-36-01	6/20/1996	**250**	**120**	**440**	**250**
MW-12-36	961002-MW12-36-01	10/2/1996	**330**	**130**	**510**	**390**
MW-12-36	970226-MW12-36-01	2/26/1997	**260**	**120**	**470**	**310**
MW-12-36	970828-MW12-36-01	8/28/1997	**230**	**110**	**430**	**430**
MW-12-36	980218-MW12-36-01	2/18/1998	**140**	**82**	**280**	**370**
MW-12-36	980603-MW12-36-17	6/3/1998	**150**	**74**	**340**	**350**
MW-12-36	981119-MW12-36-18	11/19/1998	**140**	**99**	**360**	**370**
MW-12-36	990513-MW12-36-12	5/13/1999	**226**	**171**	**554**	**621**
MW-12-36	991028-MW12-36-18	10/28/1999	**309**	**293**	**797**	**802**
MW-12-36	000330-MW12-36-118	3/30/2000	**326**	**296**	**700**	**675**
MW-12-36	010329-MW12-36-117	3/29/2001	**99.3**	**168**	**307**	**380**
MW-12-36	020404-MW12-36-112	4/4/2002	**146**	**235**	**501**	**351**
MW-12-36	030319-MW12-36-113	3/19/2003	**200**	**290**	**680**	**400**
MW-15-50	990728-MW15-50-04	7/28/1999	**95100**	**223**	**2420**	**863**

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Retorts/Koppers (Continued)						
MW-15-50	991029-MW15-50-25	10/29/1999	**8910**	**59.2**	**500**	**134**
MW-15-50	000403-MW15-50-125	4/3/2000	**44800**	**222**	**2300**	**620**
MW-15-50	000615-MW15-50-105	6/15/2000	**1490**	**6.62**	**42**	**14.3**
MW-15-50	000615-MW15-50-106	6/15/2000	**1270**	**5.16**	**28.4**	**10**
MW-15-50	001005-MW15-50-14	10/5/2000	**2700**	**3.83**	**15.2**	**5.65**
MW-15-50	001221-MW15-50-105	12/21/2000	**40200**	**176**	**1620**	**356**
MW-15-50	001221-MW15-50-106	12/21/2000	**46200**	125 U	**1070**	125 U
MW-15-50	010330-MW15-50-124	3/30/2001	**47600**	**133**	**1250**	**270**
MW-15-50	010628-MW15-50-105	6/28/2001	**2580**	25 U	75 U	25 U
MW-15-50	010628-MW15-50-106	6/28/2001	**3420**	25 U	75 U	25 U
MW-15-50	011010-MW15-50-112	10/10/2001	**44700**	**210**	**970**	**109**
MW-15-50	011010-MW15-50-111	10/10/2001	**44000**	**208**	**960**	**110**
MW-15-50	011214-MW15-50-104	12/14/2001	**64000**	500 U	1500 U	500 U
MW-15-50	011214-MW15-50-105	12/14/2001	**63000**	500 U	1500 U	500 U
MW-15-50	020405-MW15-50-119	4/5/2002	**57000**	1 U	2 U	1 U
MW-15-50	020711-MW15-50-104	7/11/2002	**53500**	250 U	750 U	250 U
MW-15-50	020711-MW15-50-105	7/11/2002	**58000**	250 U	750 U	250 U
MW-15-50	020925-MW15-50-110	9/25/2002	**49000**	**230**	**1300**	**320**
MW-15-50	020925-MW15-50-111	9/25/2002	**50000**	**250**	**1400**	**340**
MW-15-50	021218-MW15-50-107	12/18/2002	**48000**	**260**	**1600**	**450**
MW-15-50	030321-MW15-50-122	3/21/2003	**49000**	250 U	750 U	**310**
MW-15-50	030603-MW15-50-105	6/3/2003	**47000**	**260**	**1300**	**300**
MW-15-66	990728-MW15-66-03	7/28/1999	**3.61**	0.5 U	1.5 U	0.5 U
MW-15-66	990823-MW15-66-04	8/23/1999	**0.72**	0.5 U	1.5 U	0.5 U
MW-15-66	991026-MW15-66-07	10/26/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	000329-MW15-66-108	3/29/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	000615-MW15-66-104	6/15/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	001005-MW15-66-08	10/5/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	001221-MW15-66-104	12/21/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	010328-MW15-66-107	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	010628-MW15-66-104	6/28/2001	**1.65**	0.5 U	1.5 U	0.5 U
MW-15-66	011010-MW15-66-110	10/10/2001	0.5 U	0.5 U	1.51 U	0.5 U
MW-15-66	011213-MW15-66-103	12/13/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	020404-MW15-66-107	4/4/2002	1 U	1 U	2 U	1 U
MW-15-66	020711-MW15-66-103	7/11/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	020925-MW15-66-109	9/25/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	021218-MW15-66-106	12/18/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	021218-MW15-66-105	12/18/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	030318-MW15-66-107	3/18/2003	0.5 U	0.5 U	1.5 U	0.5 U
MW-15-66	030603-MW15-66-104	6/3/2003	**31**	0.5 U	1.5 U	0.5 U

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Spent Oxide						
B-01	950921-BW1-01	9/21/1995	**6.9**	**3.1**	**56**	**2.5**
B-05	950925-BW05-01	9/29/1995	0.5 U	0.5 U	**1.4**	**0.97**
MW-01-22	951207-MW1-22-01	12/7/1995	**13**	**1.8**	**3.2**	**2**
MW-01-22	960319-MW1-22-01	3/19/1996	**3.5**	**2.3**	**23**	**3.5**
MW-01-22	960618-MW1-22-01	6/18/1996	**2.4**	**3.2**	**15**	**9.5**
MW-01-22	961001-MW1-22-01	10/1/1996	**8.5**	**7.7**	**72**	**9**
MW-01-22	970225-MW1-22-01	2/25/1997	**3.2**	0.5 U	**8.5**	**1.7**
MW-01-22	970225-MW1-22-02	2/25/1997	**1.5**	**0.7**	**11**	**1.6**
MW-01-22	970827-MW1-22-01	8/27/1997	**7.5**	**6.9**	**62**	**8.2**
MW-01-22	970827-MW1-22-02	8/27/1997	**6.7**	**6.2**	**55**	**7.4**
MW-01-22	980217-MW1-22-01	2/17/1998	0.5 U	0.5 U	**1.6**	0.5 U
MW-01-22	980602-MW1-32-11	6/2/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-01-22	980826-MW1-22-10	8/26/1998	**7.1**	**6.8**	**60**	**8.2**
MW-01-22	981118-MW1-22-15	11/18/1998	10 U	10 U	30 U	10 U
MW-01-22	990216-MW1-22-012	2/16/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-01-22	990513-MW1-22-11	5/13/1999	**0.643**	0.5 U	**2.04**	**0.704**
MW-01-22	990824-MW1-22-15	8/24/1999	**7.12**	**5.89**	**50.4**	**8.42**
MW-01-22	991028-MW1-22-16	10/28/1999	**7.64**	**7.24**	**40.8**	**10.6**
MW-01-22	000330-MW1-22-116	3/30/2000	**0.859**	**0.616**	**7.02**	**1.43**
MW-01-22	010329-MW1-22-115	3/29/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	951206-MW2-32-01	12/6/1995	**6**	**4.2**	**2.4**	0.5 U
MW-02-32	960318-MW2-32-01	3/18/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-02-32	960618-MW2-32-01	6/18/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-02-32	961001-MW2-32-01	10/1/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-02-32	970225-MW2-32-01	2/25/1997	0.5 U	0.5 U	0.5 U	0.5 U
MW-02-32	970827-MW2-32-01	8/27/1997	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	980217-MW2-32-01	2/17/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	980601-MW2-32-05	6/1/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	980825-MW2-32-04	8/25/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	981117-MW2-32-10	11/17/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	990216-MW2-32-008	2/16/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	990513-MW2-32-10	5/13/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	990824-MW2-32-10	8/24/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	991027-MW2-32-12	10/27/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	000329-MW2-32-112	3/29/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-32	010328-MW2-32-111	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	981116-MW2-61-04	11/16/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	990216-MW2-61-006	2/16/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	990512-MW2-61-05	5/12/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	990823-MW2-61-07	8/23/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	991026-MW2-61-04	10/26/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	000328-MW2-61-104	3/28/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	001004-MW2-61-04	10/4/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	010328-MW2-61-104	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	011009-MW2-61-104	10/9/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	020403-MW2-61-103	4/3/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	020924-MW2-61-103	9/24/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-02-61	030318-MW2-61-104	3/18/2003	0.5 U	0.5 U	1.5 U	0.5 U

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Tar Pond						
B-31	950925-BW31-01	9/25/1995	**3**	**10**	**13**	**1.6**
M-04	981014-BW4-01	10/14/1998	**12**	0.5 U	1.5 U	0.5 U
M-04	981014-BW4-02	10/14/1998	**1.5**	0.5 U	**1.9**	0.5 U
M-05	981020-BW5-05	10/20/1998	**8.5**	**1.1**	**6.2**	0.5 U
M-05	981020-BW5-03	10/20/1998	**2100**	**39**	**440**	**3.7**
M-05	981020-BW5-06	10/20/1998	**2000**	**150**	**270**	**3.2**
M-05	981020-BW5-07	10/20/1998	**5.3**	0.5 U	1.5 U	0.5 U
M-05	981020-BW5-08	10/20/1998	**18**	**1.8**	1.5 U	0.5 U
M-05	981020-BW5-04	10/20/1998	**2000**	**37**	**470**	5 U
MW-03-26	951206-MW3-26-01	12/6/1995	**30**	**0.65**	**1.4**	**0.98**
MW-03-26	960318-MW3-26-02	3/18/1996	**1300**	**2.2**	**5.6**	**5**
MW-03-26	960618-MW3-26-01	6/18/1996	**2300**	10 U	**27**	**22**
MW-03-26	961001-MW3-26-01	10/1/1996	**0.55**	0.5 U	**2.4**	**0.95**
MW-03-26	970225-MW3-26-01	2/25/1997	**130**	0.5 U	0.5 U	0.5 U
MW-03-26	970827-MW3-26-01	8/27/1997	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	980217-MW3-26-01	2/17/1998	**2**	0.5 U	1.5 U	0.5 U
MW-03-26	980602-MW3-26-09	6/2/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	980826-MW3-26-08	8/26/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	981117-MW3-26-12	11/17/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	990216-MW3-26-010	2/16/1999	**89.9**	0.5 U	1.5 U	0.5 U
MW-03-26	990514-MW3-26-23	5/14/1999	**587**	0.5 U	1.5 U	**1.11**
MW-03-26	990824-MW3-26-12	8/24/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	991027-MW3-26-14	10/27/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	000330-MW3-26-113	3/30/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	001005-MW3-26-11	10/5/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-26	010328-MW3-26-113	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-03-56	951206-MW3-56-01	12/6/1995	**1200**	**34**	**90**	**24**
MW-03-56	960319-MW3-56-01	3/19/1996	**730**	**27**	**66**	**16**
MW-03-56	960620-MW3-56-01	6/20/1996	**730**	**26**	**73**	**7.1**
MW-03-56	961002-MW3-56-01	10/2/1996	**450**	**11**	**27**	5 U
MW-03-56	970226-MW3-56-01	2/26/1997	**750**	5 U	5 U	5 U
MW-03-56	970828-MW3-56-01	8/28/1997	**340**	**2.5**	**11**	**0.9**
MW-03-56	980218-MW3-56-01	2/18/1998	**520**	**2.9**	**15**	**0.89**
MW-03-56	980218-MW3-56-02	2/18/1998	**520**	**4**	**19**	**1.1**
MW-03-56	980602-MW3-56-14	6/2/1998	**580**	10 U	30 U	**25**
MW-03-56	980602-MW3-56-15	6/2/1998	**630**	10 U	30 U	10 U
MW-03-56	980826-MW3-56-12	8/26/1998	**430**	**2.8**	**13**	**0.96**
MW-03-56	981118-MW3-56-16	11/18/1998	**630**	0.5 U	1.5 U	0.5 U
MW-03-56	981118-MW3-56-17	11/18/1998	**610**	0.5 U	1.5 U	0.5 U
MW-03-56	990217-MW3-56-015	2/17/1999	**760**	5 U	15 U	5 U
MW-03-56	990514-MW3-56-24	5/14/1999	**90.2**	0.5 U	**2.32**	0.5 U
MW-03-56	990824-MW3-56-16	8/24/1999	**610**	5 U	**20.8**	**5.03**
MW-03-56	991028-MW3-56-17	10/28/1999	**390**	**60.4**	**192**	**63.4**
MW-03-56	000330-MW3-56-117	3/30/2000	**167**	**0.993**	**7.36**	0.5 U
MW-03-56	001005-MW3-56-13	10/5/2000	**53.2**	0.5 U	**2.09**	0.5 U
MW-03-56	010329-MW3-56-116	3/29/2001	**157**	**115**	**913**	50 U
MW-03-56	020404-MW3-56-111	4/4/2002	**340**	0.5 U	**7.8**	0.5 U
MW-03-56	030319-MW3-56-112	3/19/2003	**430**	5 U	15 U	5 U
MW-04-101	981117-MW4-101-09	11/17/1998	**32**	**3.3**	**2.1**	0.5 U
MW-04-101	990216-MW4-101-007	2/16/1999	**18.9**	**1.9**	1.5 U	0.5 U

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Tar Pond (Continued)						
MW-04-101	990514-MW4-101-19	5/14/1999	**95**	**10.4**	**2.05**	0.5 U
MW-04-101	990514-MW4-101-20	5/14/1999	**99.4**	**13**	1.5 U	0.5 U
MW-04-101	990824-MW4-101-09	8/24/1999	**53.1**	**4.76**	7.5 U	**3**
MW-04-101	991027-MW4-101-11	10/27/1999	**7.25**	**4.17**	1.5 U	0.5 U
MW-04-101	000329-MW4-101-111	3/29/2000	**3.96**	**1.33**	1.5 U	0.5 U
MW-04-101	001005-MW4-101-09	10/5/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-04-101	010328-MW4-101-110	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-04-101	011009-MW4-101-103	10/9/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-04-101	020404-MW4-101-110	4/4/2002	**5.17**	0.5 U	1.5 U	0.5 U
MW-04-101	020924-MW4-101-102	9/24/2002	**43**	0.5 U	1.5 U	0.5 U
MW-04-101	030318-MW4-101-109	3/18/2003	**120 A**	2.5 U	7.5 U	2.5 U
MW-04-35	951206-MW4-35-01	12/6/1995	**0.54**	0.5 U	0.5 U	0.5 U
MW-04-35	960318-MW4-35-01	3/18/1996	**17**	0.5 U	**1.3**	**0.96**
MW-04-35	960318-MW4-35-02	3/18/1996	**18**	0.5 U	**2.1**	**0.82**
MW-04-35	960618-MW4-35-01	6/18/1996	**5.9**	0.5 U	**0.61**	0.5 U
MW-04-35	961001-MW4-35-01	10/1/1996	**5.9**	0.5 U	**1.4**	0.5 U
MW-04-35	970225-MW4-35-01	2/25/1997	**14**	0.5 U	0.5 U	0.5 U
MW-04-35	970827-MW4-57-01	8/27/1997	**8.8**	0.5 U	**1.7**	0.5 U
MW-04-35	980217-MW4-35-01	2/17/1998	**15**	0.5 U	1.5 U	0.5 U
MW-04-35	980601-MW4-35-06	6/1/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-04-35	980826-MW4-35-06	8/26/1998	**10**	0.5 U	1.5 U	0.5 U
MW-04-35	980826-MW4-35-07	8/26/1998	**10**	0.5 U	1.5 U	0.5 U
MW-04-35	981117-MW4-35-11	11/17/1998	**17**	**0.99**	1.5 U	0.5 U
MW-04-35	990216-MW4-35-009	2/16/1999	**31**	0.5 U	1.5 U	0.5 U
MW-04-35	990514-MW4-35-21	5/14/1999	**16**	0.5 U	1.5 U	0.5 U
MW-04-35	990824-MW4-35-11	8/24/1999	5 U	5 U	1.5 U	0.5 U
MW-04-35	991027-MW4-35-13	10/27/1999	**13.9**	0.5 U	**2.45**	**1.16**
MW-04-35	000330-MW4-35-114	3/30/2000	**5.39**	0.5 U	1.5 U	0.5 U
MW-04-35	001005-MW4-35-10	10/5/2000	**10.4**	0.5 U	1.5 U	0.5 U
MW-04-35	010328-MW4-35-112	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-04-57	951205-MW4-57-01	12/5/1995	**9600**	**590**	**290**	**72**
MW-04-57	960321-MW4-57-01	3/21/1996	**11000**	**520**	**270**	50 U
MW-04-57	960620-MW4-57-01	6/20/1996	**10000**	**480**	200 U	200 U
MW-04-57	961002-MW4-57-01	10/2/1996	**14000**	**580**	**400**	100 U
MW-04-57	970226-MW4-57-01	2/26/1997	**16000**	**630**	**130**	**34**
MW-04-57	970828-MW4-35-01	8/28/1997	**12000**	**360**	150 U	50 U
MW-04-57	980218-MW4-57-01	2/18/1998	**15600**	**530**	**240**	**35**
MW-04-57	980603-MW4-57-18	6/3/1998	**10100**	**540**	**170**	**58**
MW-04-57	980826-MW4-57-13	8/26/1998	**13800**	**560**	**280**	**37**
MW-04-57	981119-MW4-57-20	11/19/1998	**11100**	**470**	**110**	25 U
MW-04-57	990217-MW4-57-016	2/17/1999	**14400**	**639**	**220**	**10.6**
MW-04-57	990514-MW4-57-22	5/14/1999	**15900**	**750**	150 U	50 U
MW-04-57	990825-MW4-57-17	8/25/1999	**17500**	**493**	150 U	**54.8**
MW-04-57	991028-MW4-57-21	10/28/1999	**6900**	**461**	**144**	**12**
MW-04-57	000403-MW4-57-121	4/3/2000	**19300**	**452**	**137**	**8.64**
MW-04-57	001006-MW4-57-19	10/6/2000	**15000**	**574**	300 U	100 U
MW-04-57	010329-MW4-57-120	3/29/2001	**18800**	**730**	150 U	50 U
MW-04-57	020405-MW4-57-117	4/5/2002	**18800**	**805**	1000 U	500 U
MW-04-57	030320-MW4-57-117	3/20/2003	**17000**	**770**	300 U	100 U
MW-05-100	981118-MW5-100-14	11/18/1998	**5000**	**330**	**320**	5 U

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Tar Pond (Continued)						
MW-05-100	990217-MW5-100-018	2/17/1999	**6650**	**244**	**242**	25 U
MW-05-100	990514-MW5-100-18	5/14/1999	**11400**	**613**	**611**	**6.75**
MW-05-100	990825-MW5-100-18	8/25/1999	**11800**	**534**	750 U	250 U
MW-05-100	991028-MW5-100-19	10/28/1999	**10300**	**644**	**552**	50 U
MW-05-100	000330-MW5-100-119	3/30/2000	**9550**	**575**	**525**	25 U
MW-05-100	001005-MW5-100-15	10/5/2000	**9180**	**513**	**472**	50 U
MW-05-100	001005-MW5-100-16	10/5/2000	**9020**	**468**	**412**	100 U
MW-05-100	010329-MW5-100-118	3/29/2001	**9560**	**436**	300 U	100 U
MW-05-100	020405-MW5-100-115	4/5/2002	**8950**	500 U	1000 U	500 U
MW-05-100	020405-MW5-100-114	4/5/2002	**8750**	500 U	1000 U	500 U
MW-05-100	030319-MW5-100-114	3/19/2003	**6600 J**	**400 J**	**250 J**	25 U
MW-05-175	981116-MW5-175-07	11/16/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	990215-MW5-175-003	2/15/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	990512-MW5-175-07	5/12/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	990823-MW5-175-03	8/23/1999	0.5 U	0.5 U	1.5 U	**1.16**
MW-05-175	991026-MW5-175-06	10/26/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	000329-MW5-175-106	3/29/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	001004-MW5-175-05	10/4/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	010328-MW5-175-105	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	011009-MW5-175-102	10/9/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	020404-MW5-175-105	4/4/2002	1 U	1 U	2 U	1 U
MW-05-175	020924-MW5-175-101	9/24/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-175	030318-MW5-175-105	3/18/2003	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	951205-MW5-32-01	12/5/1995	0.5 U	0.5 U	0.5 U	0.5 U
MW-05-32	960319-MW5-32-01	3/19/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-05-32	960620-MW5-32-01	6/20/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-05-32	961001-MW5-32-01	10/1/1996	0.5 U	0.5 U	0.5 U	0.5 U
MW-05-32	970225-MW5-32-01	2/25/1997	0.5 U	0.5 U	0.5 U	0.5 U
MW-05-32	970827-MW5-32-01	8/27/1997	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	980217-MW5-32-01	2/17/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	980602-MW5-32-10	6/2/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	980826-MW5-32-09	8/26/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	981118-MW5-32-13	11/18/1998	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	990216-MW5-32-011	2/16/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	990514-MW5-32-17	5/14/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	990824-MW5-32-13	8/24/1999	**0.749**	**0.68**	**1.74**	**0.742**
MW-05-32	991027-MW5-32-15	10/27/1999	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	000330-MW5-32-115	3/30/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	001005-MW5-32-12	10/5/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-05-32	010329-MW5-32-114	3/29/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-08-29	951207-MW8-29-01	12/7/1995	**2100**	**200**	**320**	**510**
MW-08-29	960321-MW8-29-01	3/21/1996	**1700**	**170**	**400**	**380**
MW-08-29	960619-MW8-29-02	6/20/1996	**1300**	**170**	**380**	**310**
MW-08-29	961002-MW8-29-01	10/2/1996	**770**	**130**	**270**	**210**
MW-08-29	970226-MW8-29-01	2/26/1997	**860**	**150**	**250**	**200**
MW-08-29	970828-MW8-29-01	8/28/1997	**390**	**110**	**190**	**130**
MW-08-29	980218-MW8-29-01	2/18/1998	**620**	**170**	**250**	**220**
MW-08-29	980603-MW8-29-19	6/3/1998	**700**	**250**	**310**	**320**
MW-08-29	981119-MW8-29-22	11/19/1998	**260**	**93**	**130**	**80**
MW-08-29	990513-MW8-29-14	5/13/1999	**209**	**58.6**	**92.5**	**64.7**

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Tar Pond (Continued)						
MW-08-29	991029-MW8-29-23	10/29/1999	**168**	**51.4**	**70.8**	**50.3**
MW-08-29	000403-MW8-29-123	4/3/2000	**181**	**46.2**	75 U	**49.5**
MW-08-29	010330-MW8-29-123	3/30/2001	**104**	**19**	**33.5**	**17.4**
MW-08-56	951207-MW8-56-01	12/7/1995	**13000**	**850**	**1300**	**1700**
MW-08-56	960321-MW8-56-01	3/21/1996	**17000**	**730**	**1600**	**820**
MW-08-56	960620-MW8-56-01	6/20/1996	**17000**	**740**	**1100**	**650**
MW-08-56	961002-MW8-56-01	10/2/1996	**20000**	**900**	**1800**	**690**
MW-08-56	970226-MW8-56-01	2/26/1997	**19000**	**820**	**1100**	**630**
MW-08-56	970828-MW8-56-01	8/28/1997	**17000**	**510**	**810**	**350**
MW-08-56	980218-MW8-56-01	2/18/1998	**20200**	**740**	**1100**	**410**
MW-08-56	980603-MW8-56-21	6/3/1998	**17900**	**940**	**1300**	**470**
MW-08-56	981119-MW8-56-23	11/19/1998	**18200**	**730**	**890**	**350**
MW-08-56	990513-MW8-56-15	5/13/1999	**20600**	**663**	**763**	**254**
MW-08-56	991029-MW8-56-24	10/29/1999	**9890**	**990**	**1100**	**352**
MW-08-56	000403-MW8-56-124	4/3/2000	**17800**	**828**	**830**	**228**
MW-08-56	010330-MW8-56-122	3/30/2001	**21600**	**820**	**458**	125 U
MW-08-56	020405-MW8-56-118	4/5/2002	**26400**	**1000**	2 U	1 U
MW-08-56	030320-MW8-56-120	3/20/2003	**20000 A**	**940 A**	**930 A**	**260 A**
MW-11-32	951207-MW11-32-01	12/7/1995	**25000**	**480**	**2800**	**5400**
MW-11-32	960320-MW11-32-01	3/20/1996	**24000**	**970**	**2400**	**4300**
MW-11-32	960617-MW11-32-01	6/17/1996	**2800**	**1000**	**1940**	**2000**
MW-11-32	960930-MW11-32-01	9/30/1996	**17000**	**900**	**1760**	**3300**
MW-11-32	970224-MW11-32-01	2/25/1997	**21000**	**750**	**1800**	**4100**
MW-11-32	970826-MW11-32-01	8/26/1997	**15000**	**1100**	**2500**	**4400**
MW-11-32	980216-MW11-32-01	2/16/1998	**12600**	**930**	**2100**	**3800**
MW-11-32	980601-MW11-32-03	6/1/1998	**16800**	**810**	**1800**	**4000**
MW-14-110	981116-MW14-110-06	11/16/1998	**3.2**	0.5 U	1.5 U	0.5 U
MW-14-110	990216-MW14-110-005	2/16/1999	**12.7**	**0.604**	1.5 U	0.5 U
MW-14-110	990512-MW14-110-09	5/12/1999	**22.1**	**1.88**	**2.4**	0.5 U
MW-14-110	990823-MW14-110-06	8/23/1999	**45.6**	**1.85**	**2.09**	**0.752**
MW-14-110	991027-MW14-110-10	10/27/1999	**29.7**	**1.52**	1.5 U	**0.569**
MW-14-110	991027-MW14-110-09	10/27/1999	**28.6**	**1.45**	1.5 U	**0.814**
MW-14-110	000329-MW14-110-109	3/29/2000	**7.84**	**0.733**	1.5 U	0.5 U
MW-14-110	000329-MW14-110-110	3/29/2000	**8.9**	**0.825**	1.5 U	**0.502**
MW-14-110	000615-MW14-110-102	6/15/2000	**4.85**	0.5 U	1.5 U	0.5 U
MW-14-110	001005-MW14-110-06	10/5/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	001220-MW14-110-102	12/20/2000	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	010328-MW14-110-108	3/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	010628-MW14-110-102	6/28/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	011009-MW14-110-105	10/9/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	011213-MW14-110-101	12/13/2001	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	020404-MW14-110-108	4/4/2002	1 U	1 U	2 U	1 U
MW-14-110	020711-MW14-110-101	7/11/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	020924-MW14-110-105	9/24/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	021217-MW14-110-102	12/17/2002	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	030318-MW14-110-108	3/18/2003	0.5 U	0.5 U	1.5 U	0.5 U
MW-14-110	030602-MW14-110-101	6/2/2003	0.5 U	0.5 U	1.5 U	0.5 U

Table A-5
Groundwater BTEX Results

Location	Sample ID	Chemical Name	Benzene	Ethylbenzene	Xylene (total)	Toluene
		Total/Dissolved	T	T	T	T
		Unit	µg/l	µg/l	µg/l	µg/l
		Sample Date				
Summary						
Number of Samples			**380**	**381**	**381**	**381**
Number of Detects			**238**	**179**	**172**	**150**
Percent Detects			**63%**	**47%**	**45%**	**39%**
Mean (µg/L)			**7088.77**	**169.68**	**402.04**	**1060.17**
90 Percentile UCL (µg/L)			**8900.28**	**198.86**	**512.13**	**1587.68**

Bold = Detected Values

U = Undetected Values

J = Estimated Values

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
FAMM								
MW-13-30	980217-MW13-30-01	2/17/1998	--	**190**	--	**1.6**	--	**7.3**
MW-13-30	980602-MW13-30-12	6/2/1998	--	**300**	--	1000 U	--	**16**
MW-13-30	980826-MW13-30-11	8/26/1998	--	**160**	--	**1.8**	--	**11**
MW-13-30	981119-MW13-30-19	11/19/1998	--	**210**	--	**1.4**	--	**16**
MW-13-30	990217-MW13-30-014	2/17/1999	--	**144**	--	**1.13**	--	**9.6**
MW-13-30	990513-MW13-30-13	5/13/1999	--	**163**	--	**1.59**	--	**10.6**
MW-13-30	991028-MW13-30-20	10/28/1999	--	**130**	--	20000 U	--	**132**
MW-13-30	000403-MW13-30-120	4/3/2000	--	**297**	--	**1.62**	--	**8.39**
MW-13-30	001005-MW13-30-18	10/5/2000	--	**142**	--	**0.96**	--	**6.3**
MW-13-30	010329-MW13-30-119	3/29/2001	--	**147**	--	**1.11**	--	**6.11**
MW-13-30	020405-MW13-30-116	4/5/2002	--	**149**	--	**0.9**	--	**6.77**
MW-13-30	030319-MW13-30-115	3/19/2003	--	**160**	--	**1.6**	--	**9.2**
MW-13-61	980218-MW13-61-01	2/18/1998	--	100 U	--	100 U	--	100 U
MW-13-61	980602-MW13-61-13	6/2/1998	--	100 U	--	100 U	--	100 U
MW-13-61	980825-MW13-61-03	8/25/1998	--	100 U	--	100 U	--	100 U
MW-13-61	981116-MW13-61-03	11/16/1998	--	100 U	--	100 U	--	100 U
MW-13-61	990512-MW13-61-04	5/12/1999	--	100 U	--	100 U	--	100 U
MW-13-61	991026-MW13-61-03	10/26/1999	--	100 U	--	**0.14**	--	100 U
MW-13-61	000328-MW13-61-104	3/28/2000	--	100 U	--	100 U	--	100 U
MW-13-61	001004-MW13-61-03	10/4/2000	--	**0.11**	--	100 U	--	100 U
MW-13-61	010327-MW13-61-103	3/27/2001	--	100 U	--	100 U	--	100 U
MW-13-61	011009-MW13-61-106	10/9/2001	--	**0.11**	--	100 U	--	100 U
MW-13-61	020403-MW13-61-102	4/3/2002	--	100 U	--	100 U	--	100 U
MW-13-61	020924-MW13-61-106	9/24/2002	--	100 U	--	100 U	--	100 U
MW-13-61	030317-MW13-61-101	3/17/2003	--	100 U	--	100 U	--	100 U
Retorts/Koppers								
B-19	950920-BW19-02	9/20/1995	--	**39000**	--	**7700**	--	**3100**
B-21	951003-BW21-01	10/3/1995	--	**110000**	--	**1830**	--	**2660**
MW-06-32	951207-MW6-32-01	12/7/1995	--	**23000**	--	**220**	--	**14000**
MW-06-32	960319-MW6-32-01	3/19/1996	**220**	**280**	**2**	**2.6**	**5.1**	**24**
MW-06-32	960617-MW6-32-01	6/17/1996	--	**310**	--	**2.4**	--	**29**
MW-06-32	960930-MW6-32-01	9/30/1996	--	**620**	--	**7.8**	--	**190**
MW-06-32	970224-MW6-32-01	2/25/1997	--	**260**	--	**2.7**	--	**13**
MW-06-32	970826-MW6-32-01	8/26/1997	--	**350**	--	5000 U	--	**29**
MW-06-32	980216-MW6-32-01	2/16/1998	--	**560**	--	**7.1**	--	**96**
Retorts/Koppers (Continued)								
MW-06-32	980601-MW6-32-04	6/1/1998	--	**410**	--	10000 U	--	**50**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
FAMM							
MW-13-30	980217-MW13-30-01	2/17/1998	--	100 U	--	100 U	--
MW-13-30	980602-MW13-30-12	6/2/1998	--	1000 U	--	1000 U	--
MW-13-30	980826-MW13-30-11	8/26/1998	--	100 U	--	100 U	--
MW-13-30	981119-MW13-30-19	11/19/1998	--	100 U	--	100 U	--
MW-13-30	990217-MW13-30-014	2/17/1999	--	100 U	--	100 U	--
MW-13-30	990513-MW13-30-13	5/13/1999	--	100 U	--	100 U	--
MW-13-30	991028-MW13-30-20	10/28/1999	--	20000 U	--	20000 U	--
MW-13-30	000403-MW13-30-120	4/3/2000	--	100 U	--	100 U	--
MW-13-30	001005-MW13-30-18	10/5/2000	--	100 U	--	100 U	--
MW-13-30	010329-MW13-30-119	3/29/2001	--	100 U	--	100 U	--
MW-13-30	020405-MW13-30-116	4/5/2002	--	100 U	--	100 U	--
MW-13-30	030319-MW13-30-115	3/19/2003	--	100 U	--	100 U	--
MW-13-61	980218-MW13-61-01	2/18/1998	--	100 U	--	100 U	--
MW-13-61	980602-MW13-61-13	6/2/1998	--	100 U	--	100 U	--
MW-13-61	980825-MW13-61-03	8/25/1998	--	100 U	--	100 U	--
MW-13-61	981116-MW13-61-03	11/16/1998	--	100 U	--	100 U	--
MW-13-61	990512-MW13-61-04	5/12/1999	--	100 U	--	100 U	--
MW-13-61	991026-MW13-61-03	10/26/1999	--	100 U	--	100 U	--
MW-13-61	000328-MW13-61-104	3/28/2000	--	100 U	--	100 U	--
MW-13-61	001004-MW13-61-03	10/4/2000	--	100 U	--	100 U	--
MW-13-61	010327-MW13-61-103	3/27/2001	--	100 U	--	100 U	--
MW-13-61	011009-MW13-61-106	10/9/2001	--	100 U	--	100 U	--
MW-13-61	020403-MW13-61-102	4/3/2002	--	100 U	--	100 U	--
MW-13-61	020924-MW13-61-106	9/24/2002	--	100 U	--	100 U	--
MW-13-61	030317-MW13-61-101	3/17/2003	--	100 U	--	100 U	--
Retorts/Koppers							
B-19	950920-BW19-02	9/20/1995	--	**260**	--	100 U	--
B-21	951003-BW21-01	10/3/1995	--	**530**	--	**340**	--
MW-06-32	951207-MW6-32-01	12/7/1995	--	**2400**	--	**690**	--
MW-06-32	960319-MW6-32-01	3/19/1996	100 U	**1.9**	100 U	**0.79**	100 U
MW-06-32	960617-MW6-32-01	6/17/1996	--	**4.5**	--	**2.5**	--
MW-06-32	960930-MW6-32-01	9/30/1996	--	**66**	--	**29**	--
MW-06-32	970224-MW6-32-01	2/25/1997	--	2000 U	--	2000 U	--
MW-06-32	970826-MW6-32-01	8/26/1997	--	**4.4**	--	**2.2**	--
MW-06-32	980216-MW6-32-01	2/16/1998	--	**48**	--	**24**	--
Retorts/Koppers (Continued)							
MW-06-32	980601-MW6-32-04	6/1/1998	--	**6.2**	--	**2.6**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
FAMM						
MW-13-30	980217-MW13-30-01	2/17/1998	100 U	--	100 U	--
MW-13-30	980602-MW13-30-12	6/2/1998	1000 U	--	1000 U	--
MW-13-30	980826-MW13-30-11	8/26/1998	100 U	--	100 U	--
MW-13-30	981119-MW13-30-19	11/19/1998	100 U	--	100 U	--
MW-13-30	990217-MW13-30-014	2/17/1999	100 U	--	100 U	--
MW-13-30	990513-MW13-30-13	5/13/1999	100 U	--	100 U	--
MW-13-30	991028-MW13-30-20	10/28/1999	20000 U	--	20000 U	--
MW-13-30	000403-MW13-30-120	4/3/2000	100 U	--	100 U	--
MW-13-30	001005-MW13-30-18	10/5/2000	100 U	--	100 U	--
MW-13-30	010329-MW13-30-119	3/29/2001	100 U	--	100 U	--
MW-13-30	020405-MW13-30-116	4/5/2002	100 U	--	100 U	--
MW-13-30	030319-MW13-30-115	3/19/2003	100 U	--	100 U	--
MW-13-61	980218-MW13-61-01	2/18/1998	100 U	--	100 U	--
MW-13-61	980602-MW13-61-13	6/2/1998	100 U	--	100 U	--
MW-13-61	980825-MW13-61-03	8/25/1998	100 U	--	100 U	--
MW-13-61	981116-MW13-61-03	11/16/1998	100 U	--	100 U	--
MW-13-61	990512-MW13-61-04	5/12/1999	100 U	--	100 U	--
MW-13-61	991026-MW13-61-03	10/26/1999	100 U	--	100 U	--
MW-13-61	000328-MW13-61-104	3/28/2000	100 U	--	100 U	--
MW-13-61	001004-MW13-61-03	10/4/2000	100 U	--	100 U	--
MW-13-61	010327-MW13-61-103	3/27/2001	100 U	--	100 U	--
MW-13-61	011009-MW13-61-106	10/9/2001	100 U	--	100 U	--
MW-13-61	020403-MW13-61-102	4/3/2002	100 U	--	100 U	--
MW-13-61	020924-MW13-61-106	9/24/2002	100 U	--	100 U	--
MW-13-61	030317-MW13-61-101	3/17/2003	100 U	--	100 U	--
Retorts/Koppers						
B-19	950920-BW19-02	9/20/1995	**160**	--	100 U	--
B-21	951003-BW21-01	10/3/1995	**660**	--	**370**	--
MW-06-32	951207-MW6-32-01	12/7/1995	**750**	--	**280**	--
MW-06-32	960319-MW6-32-01	3/19/1996	**0.85**	100 U	**0.3**	100 U
MW-06-32	960617-MW6-32-01	6/17/1996	**2.4**	--	**0.9**	--
MW-06-32	960930-MW6-32-01	9/30/1996	**32**	--	**6.4**	--
MW-06-32	970224-MW6-32-01	2/25/1997	2000 U	--	2000 U	--
MW-06-32	970826-MW6-32-01	8/26/1997	**2.2**	--	**0.65**	--
MW-06-32	980216-MW6-32-01	2/16/1998	**27**	--	**9.2**	--
Retorts/Koppers (Continued)						
MW-06-32	980601-MW6-32-04	6/1/1998	**3**	--	**0.98**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
FAMM							
MW-13-30	980217-MW13-30-01	2/17/1998	100 U	--	100 U	--	100 U
MW-13-30	980602-MW13-30-12	6/2/1998	1000 U	--	1000 U	--	1000 U
MW-13-30	980826-MW13-30-11	8/26/1998	100 U	--	100 U	--	100 U
MW-13-30	981119-MW13-30-19	11/19/1998	100 U	--	100 U	--	100 U
MW-13-30	990217-MW13-30-014	2/17/1999	100 U	--	100 U	--	100 U
MW-13-30	990513-MW13-30-13	5/13/1999	100 U	--	100 U	--	100 U
MW-13-30	991028-MW13-30-20	10/28/1999	20000 U	--	20000 U	--	20000 U
MW-13-30	000403-MW13-30-120	4/3/2000	100 U	--	100 U	--	100 U
MW-13-30	001005-MW13-30-18	10/5/2000	100 U	--	100 U	--	100 U
MW-13-30	010329-MW13-30-119	3/29/2001	100 U	--	100 U	--	100 U
MW-13-30	020405-MW13-30-116	4/5/2002	100 U	--	100 U	--	100 U
MW-13-30	030319-MW13-30-115	3/19/2003	100 U	--	100 U	--	100 U
MW-13-61	980218-MW13-61-01	2/18/1998	100 U	--	100 U	--	100 U
MW-13-61	980602-MW13-61-13	6/2/1998	100 U	--	100 U	--	100 U
MW-13-61	980825-MW13-61-03	8/25/1998	100 U	--	100 U	--	100 U
MW-13-61	981116-MW13-61-03	11/16/1998	100 U	--	100 U	--	100 U
MW-13-61	990512-MW13-61-04	5/12/1999	100 U	--	100 U	--	100 U
MW-13-61	991026-MW13-61-03	10/26/1999	100 U	--	100 U	--	100 U
MW-13-61	000328-MW13-61-104	3/28/2000	100 U	--	100 U	--	100 U
MW-13-61	001004-MW13-61-03	10/4/2000	100 U	--	100 U	--	100 U
MW-13-61	010327-MW13-61-103	3/27/2001	100 U	--	100 U	--	100 U
MW-13-61	011009-MW13-61-106	10/9/2001	100 U	--	100 U	--	100 U
MW-13-61	020403-MW13-61-102	4/3/2002	100 U	--	100 U	--	100 U
MW-13-61	020924-MW13-61-106	9/24/2002	100 U	--	100 U	--	100 U
MW-13-61	030317-MW13-61-101	3/17/2003	100 U	--	100 U	--	100 U
Retorts/Koppers							
B-19	950920-BW19-02	9/20/1995	100 U	--	**280**	--	100 U
B-21	951003-BW21-01	10/3/1995	**270**	--	**790**	--	**70**
MW-06-32	951207-MW6-32-01	12/7/1995	**280**	--	**3100**	--	**50**
MW-06-32	960319-MW6-32-01	3/19/1996	**0.3**	100 U	**2.5**	100 U	100 U
MW-06-32	960617-MW6-32-01	6/17/1996	**0.87**	--	**5**	--	**0.23**
MW-06-32	960930-MW6-32-01	9/30/1996	**12**	--	**63**	--	**1.5**
MW-06-32	970224-MW6-32-01	2/25/1997	2000 U	--	2000 U	--	2000 U
MW-06-32	970826-MW6-32-01	8/26/1997	**0.82**	--	**4.8**	--	500 U
MW-06-32	980216-MW6-32-01	2/16/1998	**7**	--	**47**	--	**1.7**
Retorts/Koppers (Continued)							
MW-06-32	980601-MW6-32-04	6/1/1998	**0.85**	--	**6.4**	--	**0.19**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
FAMM								
MW-13-30	980217-MW13-30-01	2/17/1998	--	**3.5**	--	**52**	--	100 U
MW-13-30	980602-MW13-30-12	6/2/1998	--	**5.1**	--	**85**	--	1000 U
MW-13-30	980826-MW13-30-11	8/26/1998	--	**3.7**	--	**45**	--	100 U
MW-13-30	981119-MW13-30-19	11/19/1998	--	**2.8**	--	**59**	--	100 U
MW-13-30	990217-MW13-30-014	2/17/1999	--	**2.54**	--	**34.8**	--	100 U
MW-13-30	990513-MW13-30-13	5/13/1999	--	**2.73**	--	**51.8**	--	100 U
MW-13-30	991028-MW13-30-20	10/28/1999	--	20000 U	--	**42**	--	20000 U
MW-13-30	000403-MW13-30-120	4/3/2000	--	**3.09**	--	**77.3**	--	100 U
MW-13-30	001005-MW13-30-18	10/5/2000	--	**2.7**	--	**46**	--	100 U
MW-13-30	010329-MW13-30-119	3/29/2001	--	**2.3**	--	**46.6**	--	100 U
MW-13-30	020405-MW13-30-116	4/5/2002	--	**3.19**	--	**44.8**	--	100 U
MW-13-30	030319-MW13-30-115	3/19/2003	--	**3.9**	--	**48**	--	100 U
MW-13-61	980218-MW13-61-01	2/18/1998	--	100 U	--	100 U	--	100 U
MW-13-61	980602-MW13-61-13	6/2/1998	--	100 U	--	100 U	--	100 U
MW-13-61	980825-MW13-61-03	8/25/1998	--	100 U	--	100 U	--	100 U
MW-13-61	981116-MW13-61-03	11/16/1998	--	100 U	--	100 U	--	100 U
MW-13-61	990512-MW13-61-04	5/12/1999	--	100 U	--	100 U	--	100 U
MW-13-61	991026-MW13-61-03	10/26/1999	--	100 U	--	100 U	--	100 U
MW-13-61	000328-MW13-61-104	3/28/2000	--	100 U	--	100 U	--	100 U
MW-13-61	001004-MW13-61-03	10/4/2000	--	100 U	--	100 U	--	100 U
MW-13-61	010327-MW13-61-103	3/27/2001	--	100 U	--	100 U	--	100 U
MW-13-61	011009-MW13-61-106	10/9/2001	--	100 U	--	100 U	--	100 U
MW-13-61	020403-MW13-61-102	4/3/2002	--	100 U	--	100 U	--	100 U
MW-13-61	020924-MW13-61-106	9/24/2002	--	100 U	--	100 U	--	100 U
MW-13-61	030317-MW13-61-101	3/17/2003	--	100 U	--	100 U	--	100 U
Retorts/Koppers								
B-19	950920-BW19-02	9/20/1995	--	**5100**	--	**20000**	--	100 U
B-21	951003-BW21-01	10/3/1995	--	**5040**	--	**21000**	--	**270**
MW-06-32	951207-MW6-32-01	12/7/1995	--	**22000**	--	**4600**	--	**200**
MW-06-32	960319-MW6-32-01	3/19/1996	**1.3**	**16**	**42**	**61**	100 U	**0.22**
MW-06-32	960617-MW6-32-01	6/17/1996	--	**27**	--	**82**	--	**0.74**
MW-06-32	960930-MW6-32-01	9/30/1996	--	**320**	--	**210**	--	100 U
MW-06-32	970224-MW6-32-01	2/25/1997	--	2000 U	--	**64**	--	2000 U
MW-06-32	970826-MW6-32-01	8/26/1997	--	**33**	--	**97**	--	**0.58**
MW-06-32	980216-MW6-32-01	2/16/1998	--	**220**	--	**170**	--	**7.2**
Retorts/Koppers (Continued)								
MW-06-32	980601-MW6-32-04	6/1/1998	--	**38**	--	**100**	--	**0.74**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
FAMM								
MW-13-30	980217-MW13-30-01	2/17/1998	--	**69**	--	**100**	--	**2.7**
MW-13-30	980602-MW13-30-12	6/2/1998	--	**610**	--	**160**	--	**4.8**
MW-13-30	980826-MW13-30-11	8/26/1998	--	**420**	--	**98**	--	**2.8**
MW-13-30	981119-MW13-30-19	11/19/1998	--	**7.6**	--	**100**	--	**2.2**
MW-13-30	990217-MW13-30-014	2/17/1999	--	**506**	--	**70.6**	--	**1.92**
MW-13-30	990513-MW13-30-13	5/13/1999	--	**735**	--	**68.4**	--	**2.5**
MW-13-30	991028-MW13-30-20	10/28/1999	--	**460**	--	**56**	--	20000 U
MW-13-30	000403-MW13-30-120	4/3/2000	--	**240**	--	**90.5**	--	**2.94**
MW-13-30	001005-MW13-30-18	10/5/2000	--	**146**	--	**64**	--	**2.34**
MW-13-30	010329-MW13-30-119	3/29/2001	--	**241**	--	**77.3**	--	**1.54**
MW-13-30	020405-MW13-30-116	4/5/2002	--	**188**	--	**57.1**	--	**1.89**
MW-13-30	030319-MW13-30-115	3/19/2003	--	**700**	--	**83**	--	**2.7**
MW-13-61	980218-MW13-61-01	2/18/1998	--	100 U	--	100 U	--	100 U
MW-13-61	980602-MW13-61-13	6/2/1998	--	100 U	--	100 U	--	100 U
MW-13-61	980825-MW13-61-03	8/25/1998	--	100 U	--	100 U	--	100 U
MW-13-61	981116-MW13-61-03	11/16/1998	--	**0.2**	--	100 U	--	100 U
MW-13-61	990512-MW13-61-04	5/12/1999	--	**0.26**	--	100 U	--	100 U
MW-13-61	991026-MW13-61-03	10/26/1999	--	**0.48**	--	100 U	--	100 U
MW-13-61	000328-MW13-61-104	3/28/2000	--	100 U	--	100 U	--	100 U
MW-13-61	001004-MW13-61-03	10/4/2000	--	**0.57**	--	100 U	--	100 U
MW-13-61	010327-MW13-61-103	3/27/2001	--	100 U	--	100 U	--	100 U
MW-13-61	011009-MW13-61-106	10/9/2001	--	**0.17**	--	100 U	--	100 U
MW-13-61	020403-MW13-61-102	4/3/2002	--	100 U	--	100 U	--	100 U
MW-13-61	020924-MW13-61-106	9/24/2002	--	100 U	--	100 U	--	100 U
MW-13-61	030317-MW13-61-101	3/17/2003	--	100 U	--	100 U	--	100 U
Retorts/Koppers								
B-19	950920-BW19-02	9/20/1995	--	**6500000**	--	**29000**	--	**5600**
B-21	951003-BW21-01	10/3/1995	--	**560000**	--	**17000**	--	**5420**
MW-06-32	951207-MW6-32-01	12/7/1995	--	**42000**	--	**61000**	--	**25000**
MW-06-32	960319-MW6-32-01	3/19/1996	**1600**	**1800**	**68**	**140**	**1.7**	**16**
MW-06-32	960617-MW6-32-01	6/17/1996	--	**1200**	--	**170**	--	**40**
MW-06-32	960930-MW6-32-01	9/30/1996	--	**1900**	--	**970**	--	**330**
MW-06-32	970224-MW6-32-01	2/25/1997	--	**830**	--	**130**	--	**8.5**
MW-06-32	970826-MW6-32-01	8/26/1997	--	**1300**	--	**220**	--	**25**
MW-06-32	980216-MW6-32-01	2/16/1998	--	**1200**	--	**840**	--	**290**
Retorts/Koppers (Continued)								
MW-06-32	980601-MW6-32-04	6/1/1998	--	**1300**	--	**280**	--	**46**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-06-61	951206-MW6-61-01	12/6/1995	--	**160**	--	**1.4**	--	**29**
MW-06-61	960319-MW6-61-01	3/19/1996	--	**29**	--	**0.24**	--	**9.6**
MW-06-61	960620-MW6-61-01	6/20/1996	--	**21**	--	**0.3**	--	**6.1**
MW-06-61	961001-MW6-61-01	10/1/1996	--	**16**	--	1000 U	--	**4.8**
MW-06-61	970225-MW6-61-01	2/25/1997	--	**32**	--	2000 U	--	**4**
MW-06-61	970828-MW6-61-01	8/28/1997	--	**210**	--	**2.4**	--	**17**
MW-09-29	951205-MW9-29-01	12/5/1995	--	100 U	--	**0.1**	--	**0.15**
MW-09-29	960318-MW9-29-01	3/18/1996	--	**0.11**	--	100 U	--	**0.18**
MW-09-29	960618-MW9-29-01	6/18/1996	--	100 U	--	100 U	--	**0.15**
MW-09-29	961001-MW9-29-01	10/1/1996	--	100 U	--	100 U	--	**0.12**
MW-09-29	970225-MW9-29-01	2/25/1997	--	100 U	--	100 U	--	100 U
MW-09-29	970827-MW9-29-01	8/27/1997	--	100 U	--	100 U	--	100 U
MW-09-29	980217-MW9-29-01	2/17/1998	--	100 U	--	100 U	--	100 U
MW-09-29	980602-MW9-29-07	6/2/1998	--	100 U	--	100 U	--	100 U
MW-09-29	981116-MW9-29-02	11/16/1998	--	100 U	--	100 U	--	100 U
MW-09-29	990511-MW9-29-03	5/11/1999	--	100 U	--	100 U	--	100 U
MW-09-29	991026-MW9-29-02	10/26/1999	--	100 U	--	100 U	--	100 U
MW-09-29	000328-MW9-29-102	3/28/2000	--	100 U	--	100 U	--	100 U
MW-09-29	010327-MW9-29-102	3/27/2001	--	100 U	--	100 U	--	100 U
MW-09-29	020403-MW9-29-101	4/3/2002	--	100 U	--	100 U	--	100 U
MW-09-29	030318-MW9-29-103	3/18/2003	--	100 U	--	100 U	--	100 U
MW-10-25	951207-MW10-25-01	12/7/1995	--	**31**	--	**88**	--	**16**
MW-10-25	960320-MW10-25-01	3/20/1996	--	**70**	--	**98**	--	**11**
MW-10-25	960617-MW10-25-01	6/17/1996	--	**75**	--	**130**	--	**14**
MW-10-25	960930-MW10-25-01	9/30/1996	--	**140**	--	**87**	--	**39**
MW-10-25	970224-MW10-25-01	2/25/1997	--	**210**	--	**81**	--	**30**
MW-10-25	970827-MW10-25-01	8/27/1997	--	**72**	--	**59**	--	**11**
MW-10-25	980216-MW10-25-01	2/16/1998	--	**100**	--	**87**	--	**19**
MW-10-25	980601-MW10-25-02	6/1/1998	--	**140**	--	**150**	--	**26**
MW-10-61	951206-MW10-61-01	12/6/1995	--	**39**	--	**17**	--	**12**
MW-10-61	960321-MW10-61-01	3/21/1996	--	**5.8**	--	**2.2**	--	**4.7**
MW-10-61	960620-MW10-61-01	6/20/1996	--	**2.1**	--	**0.98**	--	**2.2**
MW-10-61	961002-MW10-61-01	10/2/1996	--	**0.88**	--	**0.54**	--	**1.5**
MW-10-61	970226-MW10-61-01	2/26/1997	--	**0.73**	--	**0.45**	--	**1**
Retorts/Koppers (Continued)								
MW-10-61	970828-MW10-61-01	8/28/1997	--	**0.33**	--	**0.11**	--	**0.55**
MW-10-61	980218-MW10-61-01	2/18/1998	--	**0.13**	--	100 U	--	**0.12**
MW-10-61	980603-MW10-61-16	6/3/1998	--	**0.18**	--	100 U	--	**0.13**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-06-61	951206-MW6-61-01	12/6/1995	--	**2.7**	--	**0.73**	--
MW-06-61	960319-MW6-61-01	3/19/1996	--	**1.1**	--	**0.33**	--
MW-06-61	960620-MW6-61-01	6/20/1996	--	**1.4**	--	**0.5**	--
MW-06-61	961001-MW6-61-01	10/1/1996	--	**2**	--	1000 U	--
MW-06-61	970225-MW6-61-01	2/25/1997	--	2000 U	--	2000 U	--
MW-06-61	970828-MW6-61-01	8/28/1997	--	**1.5**	--	**0.62**	--
MW-09-29	951205-MW9-29-01	12/5/1995	--	100 U	--	100 U	--
MW-09-29	960318-MW9-29-01	3/18/1996	--	100 U	--	100 U	--
MW-09-29	960618-MW9-29-01	6/18/1996	--	100 U	--	100 U	--
MW-09-29	961001-MW9-29-01	10/1/1996	--	100 U	--	100 U	--
MW-09-29	970225-MW9-29-01	2/25/1997	--	100 U	--	100 U	--
MW-09-29	970827-MW9-29-01	8/27/1997	--	100 U	--	100 U	--
MW-09-29	980217-MW9-29-01	2/17/1998	--	100 U	--	100 U	--
MW-09-29	980602-MW9-29-07	6/2/1998	--	100 U	--	100 U	--
MW-09-29	981116-MW9-29-02	11/16/1998	--	100 U	--	100 U	--
MW-09-29	990511-MW9-29-03	5/11/1999	--	100 U	--	100 U	--
MW-09-29	991026-MW9-29-02	10/26/1999	--	100 U	--	100 U	--
MW-09-29	000328-MW9-29-102	3/28/2000	--	100 U	--	100 U	--
MW-09-29	010327-MW9-29-102	3/27/2001	--	100 U	--	100 U	--
MW-09-29	020403-MW9-29-101	4/3/2002	--	100 U	--	100 U	--
MW-09-29	030318-MW9-29-103	3/18/2003	--	100 U	--	100 U	--
MW-10-25	951207-MW10-25-01	12/7/1995	--	**4**	--	**3.4**	--
MW-10-25	960320-MW10-25-01	3/20/1996	--	**1.3**	--	**1.4**	--
MW-10-25	960617-MW10-25-01	6/17/1996	--	**1.1**	--	**1.8**	--
MW-10-25	960930-MW10-25-01	9/30/1996	--	**20**	--	**15**	--
MW-10-25	970224-MW10-25-01	2/25/1997	--	**21**	--	**15**	--
MW-10-25	970827-MW10-25-01	8/27/1997	--	**4.4**	--	**4.3**	--
MW-10-25	980216-MW10-25-01	2/16/1998	--	**14**	--	**12**	--
MW-10-25	980601-MW10-25-02	6/1/1998	--	**8.2**	--	**7**	--
MW-10-61	951206-MW10-61-01	12/6/1995	--	**0.39**	--	100 U	--
MW-10-61	960321-MW10-61-01	3/21/1996	--	**0.75**	--	**0.36**	--
MW-10-61	960620-MW10-61-01	6/20/1996	--	**0.54**	--	**0.28**	--
MW-10-61	961002-MW10-61-01	10/2/1996	--	**0.48**	--	**0.25**	--
MW-10-61	970226-MW10-61-01	2/26/1997	--	**0.41**	--	**0.13**	--
Retorts/Koppers (Continued)							
MW-10-61	970828-MW10-61-01	8/28/1997	--	**0.21**	--	100 U	--
MW-10-61	980218-MW10-61-01	2/18/1998	--	**0.24**	--	100 U	--
MW-10-61	980603-MW10-61-16	6/3/1998	--	**0.42**	--	**0.27**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-06-61	951206-MW6-61-01	12/6/1995	**0.77**	--	**0.32**	--
MW-06-61	960319-MW6-61-01	3/19/1996	**0.33**	--	**0.13**	--
MW-06-61	960620-MW6-61-01	6/20/1996	**0.48**	--	**0.21**	--
MW-06-61	961001-MW6-61-01	10/1/1996	1000 U	--	1000 U	--
MW-06-61	970225-MW6-61-01	2/25/1997	2000 U	--	2000 U	--
MW-06-61	970828-MW6-61-01	8/28/1997	**0.66**	--	**0.22**	--
MW-09-29	951205-MW9-29-01	12/5/1995	100 U	--	100 U	--
MW-09-29	960318-MW9-29-01	3/18/1996	100 U	--	100 U	--
MW-09-29	960618-MW9-29-01	6/18/1996	100 U	--	100 U	--
MW-09-29	961001-MW9-29-01	10/1/1996	100 U	--	100 U	--
MW-09-29	970225-MW9-29-01	2/25/1997	100 U	--	100 U	--
MW-09-29	970827-MW9-29-01	8/27/1997	100 U	--	100 U	--
MW-09-29	980217-MW9-29-01	2/17/1998	100 U	--	100 U	--
MW-09-29	980602-MW9-29-07	6/2/1998	100 U	--	100 U	--
MW-09-29	981116-MW9-29-02	11/16/1998	100 U	--	100 U	--
MW-09-29	990511-MW9-29-03	5/11/1999	100 U	--	100 U	--
MW-09-29	991026-MW9-29-02	10/26/1999	100 U	--	100 U	--
MW-09-29	000328-MW9-29-102	3/28/2000	100 U	--	100 U	--
MW-09-29	010327-MW9-29-102	3/27/2001	100 U	--	100 U	--
MW-09-29	020403-MW9-29-101	4/3/2002	100 U	--	100 U	--
MW-09-29	030318-MW9-29-103	3/18/2003	100 U	--	100 U	--
MW-10-25	951207-MW10-25-01	12/7/1995	**2.9**	--	**2.5**	--
MW-10-25	960320-MW10-25-01	3/20/1996	**1.2**	--	**0.91**	--
MW-10-25	960617-MW10-25-01	6/17/1996	**1.2**	--	**1.1**	--
MW-10-25	960930-MW10-25-01	9/30/1996	**12**	--	**9.9**	--
MW-10-25	970224-MW10-25-01	2/25/1997	**13**	--	**11**	--
MW-10-25	970827-MW10-25-01	8/27/1997	**3.5**	--	**2.5**	--
MW-10-25	980216-MW10-25-01	2/16/1998	**11**	--	**8.1**	--
MW-10-25	980601-MW10-25-02	6/1/1998	**6.7**	--	**4.8**	--
MW-10-61	951206-MW10-61-01	12/6/1995	100 U	--	100 U	--
MW-10-61	960321-MW10-61-01	3/21/1996	**0.34**	--	**0.28**	--
MW-10-61	960620-MW10-61-01	6/20/1996	**0.24**	--	**0.22**	--
MW-10-61	961002-MW10-61-01	10/2/1996	**0.23**	--	**0.17**	--
MW-10-61	970226-MW10-61-01	2/26/1997	**0.15**	--	100 U	--
Retorts/Koppers (Continued)						
MW-10-61	970828-MW10-61-01	8/28/1997	100 U	--	100 U	--
MW-10-61	980218-MW10-61-01	2/18/1998	**0.16**	--	100 U	--
MW-10-61	980603-MW10-61-16	6/3/1998	**0.27**	--	**0.21**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-06-61	951206-MW6-61-01	12/6/1995	**0.34**	--	**3.4**	--	100 U
MW-06-61	960319-MW6-61-01	3/19/1996	**0.13**	--	**1.4**	--	100 U
MW-06-61	960620-MW6-61-01	6/20/1996	**0.25**	--	**1.5**	--	100 U
MW-06-61	961001-MW6-61-01	10/1/1996	1000 U	--	**1.8**	--	1000 U
MW-06-61	970225-MW6-61-01	2/25/1997	2000 U	--	2000 U	--	2000 U
MW-06-61	970828-MW6-61-01	8/28/1997	**0.23**	--	**1.7**	--	100 U
MW-09-29	951205-MW9-29-01	12/5/1995	100 U	--	100 U	--	100 U
MW-09-29	960318-MW9-29-01	3/18/1996	100 U	--	100 U	--	100 U
MW-09-29	960618-MW9-29-01	6/18/1996	100 U	--	100 U	--	100 U
MW-09-29	961001-MW9-29-01	10/1/1996	100 U	--	100 U	--	100 U
MW-09-29	970225-MW9-29-01	2/25/1997	100 U	--	100 U	--	100 U
MW-09-29	970827-MW9-29-01	8/27/1997	100 U	--	100 U	--	100 U
MW-09-29	980217-MW9-29-01	2/17/1998	100 U	--	100 U	--	100 U
MW-09-29	980602-MW9-29-07	6/2/1998	100 U	--	100 U	--	100 U
MW-09-29	981116-MW9-29-02	11/16/1998	100 U	--	100 U	--	100 U
MW-09-29	990511-MW9-29-03	5/11/1999	100 U	--	100 U	--	100 U
MW-09-29	991026-MW9-29-02	10/26/1999	100 U	--	100 U	--	100 U
MW-09-29	000328-MW9-29-102	3/28/2000	100 U	--	100 U	--	100 U
MW-09-29	010327-MW9-29-102	3/27/2001	100 U	--	100 U	--	100 U
MW-09-29	020403-MW9-29-101	4/3/2002	100 U	--	100 U	--	100 U
MW-09-29	030318-MW9-29-103	3/18/2003	100 U	--	100 U	--	100 U
MW-10-25	951207-MW10-25-01	12/7/1995	**1.3**	--	**4.6**	--	1000 U
MW-10-25	960320-MW10-25-01	3/20/1996	**0.55**	--	**0.78**	--	300 U
MW-10-25	960617-MW10-25-01	6/17/1996	**0.62**	--	**0.87**	--	**0.25**
MW-10-25	960930-MW10-25-01	9/30/1996	**3.9**	--	**19**	--	**1.7**
MW-10-25	970224-MW10-25-01	2/25/1997	**3.4**	--	**16**	--	1000 U
MW-10-25	970827-MW10-25-01	8/27/1997	**1.2**	--	**4.2**	--	1000 U
MW-10-25	980216-MW10-25-01	2/16/1998	**3.6**	--	**11**	--	**1.1**
MW-10-25	980601-MW10-25-02	6/1/1998	**1.9**	--	**7.2**	--	**0.7**
MW-10-61	951206-MW10-61-01	12/6/1995	100 U	--	**0.33**	--	100 U
MW-10-61	960321-MW10-61-01	3/21/1996	**0.12**	--	**0.8**	--	100 U
MW-10-61	960620-MW10-61-01	6/20/1996	**0.12**	--	**0.68**	--	100 U
MW-10-61	961002-MW10-61-01	10/2/1996	100 U	--	**0.42**	--	100 U
MW-10-61	970226-MW10-61-01	2/26/1997	100 U	--	**0.35**	--	100 U
Retorts/Koppers (Continued)							
MW-10-61	970828-MW10-61-01	8/28/1997	100 U	--	**0.18**	--	100 U
MW-10-61	980218-MW10-61-01	2/18/1998	100 U	--	100 U	--	100 U
MW-10-61	980603-MW10-61-16	6/3/1998	**0.11**	--	**0.36**	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-06-61	951206-MW6-61-01	12/6/1995	--	**24**	--	**48**	--	**0.23**
MW-06-61	960319-MW6-61-01	3/19/1996	--	**13**	--	**9.7**	--	100 U
MW-06-61	960620-MW6-61-01	6/20/1996	--	**9.9**	--	**7.5**	--	**0.14**
MW-06-61	961001-MW6-61-01	10/1/1996	--	**9.9**	--	**5.4**	--	1000 U
MW-06-61	970225-MW6-61-01	2/25/1997	--	**3.5**	--	**7.7**	--	2000 U
MW-06-61	970828-MW6-61-01	8/28/1997	--	**17**	--	**47**	--	**0.17**
MW-09-29	951205-MW9-29-01	12/5/1995	--	**0.12**	--	100 U	--	100 U
MW-09-29	960318-MW9-29-01	3/18/1996	--	**0.29**	--	**0.15**	--	100 U
MW-09-29	960618-MW9-29-01	6/18/1996	--	100 U	--	100 U	--	100 U
MW-09-29	961001-MW9-29-01	10/1/1996	--	100 U	--	100 U	--	100 U
MW-09-29	970225-MW9-29-01	2/25/1997	--	100 U	--	100 U	--	100 U
MW-09-29	970827-MW9-29-01	8/27/1997	--	100 U	--	100 U	--	100 U
MW-09-29	980217-MW9-29-01	2/17/1998	--	100 U	--	100 U	--	100 U
MW-09-29	980602-MW9-29-07	6/2/1998	--	100 U	--	100 U	--	100 U
MW-09-29	981116-MW9-29-02	11/16/1998	--	100 U	--	100 U	--	100 U
MW-09-29	990511-MW9-29-03	5/11/1999	--	100 U	--	100 U	--	100 U
MW-09-29	991026-MW9-29-02	10/26/1999	--	100 U	--	100 U	--	100 U
MW-09-29	000328-MW9-29-102	3/28/2000	--	100 U	--	100 U	--	100 U
MW-09-29	010327-MW9-29-102	3/27/2001	--	100 U	--	100 U	--	100 U
MW-09-29	020403-MW9-29-101	4/3/2002	--	100 U	--	100 U	--	100 U
MW-09-29	030318-MW9-29-103	3/18/2003	--	100 U	--	100 U	--	100 U
MW-10-25	951207-MW10-25-01	12/7/1995	--	**21**	--	**33**	--	**1.8**
MW-10-25	960320-MW10-25-01	3/20/1996	--	**8.8**	--	**39**	--	**0.67**
MW-10-25	960617-MW10-25-01	6/17/1996	--	**1.6**	--	**49**	--	**0.95**
MW-10-25	960930-MW10-25-01	9/30/1996	--	**95**	--	**90**	--	**7**
MW-10-25	970224-MW10-25-01	2/25/1997	--	1000 U	--	**95**	--	**5.9**
MW-10-25	970827-MW10-25-01	8/27/1997	--	**22**	--	**41**	--	**2**
MW-10-25	980216-MW10-25-01	2/16/1998	--	**59**	--	**62**	--	**5.4**
MW-10-25	980601-MW10-25-02	6/1/1998	--	**45**	--	**82**	--	**3.4**
MW-10-61	951206-MW10-61-01	12/6/1995	--	**12**	--	**28**	--	100 U
MW-10-61	960321-MW10-61-01	3/21/1996	--	**7.3**	--	**1.5**	--	**0.18**
MW-10-61	960620-MW10-61-01	6/20/1996	--	**4.4**	--	**0.22**	--	**0.14**
MW-10-61	961002-MW10-61-01	10/2/1996	--	**4.1**	--	**0.16**	--	**0.12**
MW-10-61	970226-MW10-61-01	2/26/1997	--	**3.5**	--	**0.1**	--	100 U
Retorts/Koppers (Continued)								
MW-10-61	970828-MW10-61-01	8/28/1997	--	**2.2**	--	100 U	--	100 U
MW-10-61	980218-MW10-61-01	2/18/1998	--	**1.1**	--	100 U	--	100 U
MW-10-61	980603-MW10-61-16	6/3/1998	--	**1.7**	--	100 U	--	**0.12**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-06-61	951206-MW6-61-01	12/6/1995	--	**250**	--	**200**	--	**24**
MW-06-61	960319-MW6-61-01	3/19/1996	--	**66**	--	**53**	--	**13**
MW-06-61	960620-MW6-61-01	6/20/1996	--	**44**	--	**30**	--	**16**
MW-06-61	961001-MW6-61-01	10/1/1996	--	**76**	--	**25**	--	**12**
MW-06-61	970225-MW6-61-01	2/25/1997	--	**290**	--	**23**	--	**4.9**
MW-06-61	970828-MW6-61-01	8/28/1997	--	**1000**	--	**130**	--	**23**
MW-09-29	951205-MW9-29-01	12/5/1995	--	**0.44**	--	**0.37**	--	**0.11**
MW-09-29	960318-MW9-29-01	3/18/1996	--	100 U	--	**0.6**	--	**0.27**
MW-09-29	960618-MW9-29-01	6/18/1996	--	100 U	--	100 U	--	100 U
MW-09-29	961001-MW9-29-01	10/1/1996	--	**0.28**	--	100 U	--	100 U
MW-09-29	970225-MW9-29-01	2/25/1997	--	100 U	--	100 U	--	100 U
MW-09-29	970827-MW9-29-01	8/27/1997	--	100 U	--	100 U	--	100 U
MW-09-29	980217-MW9-29-01	2/17/1998	--	100 U	--	100 U	--	100 U
MW-09-29	980602-MW9-29-07	6/2/1998	--	100 U	--	100 U	--	100 U
MW-09-29	981116-MW9-29-02	11/16/1998	--	100 U	--	100 U	--	100 U
MW-09-29	990511-MW9-29-03	5/11/1999	--	100 U	--	100 U	--	100 U
MW-09-29	991026-MW9-29-02	10/26/1999	--	100 U	--	100 U	--	100 U
MW-09-29	000328-MW9-29-102	3/28/2000	--	100 U	--	100 U	--	100 U
MW-09-29	010327-MW9-29-102	3/27/2001	--	100 U	--	100 U	--	100 U
MW-09-29	020403-MW9-29-101	4/3/2002	--	100 U	--	100 U	--	100 U
MW-09-29	030318-MW9-29-103	3/18/2003	--	100 U	--	100 U	--	100 U
MW-10-25	951207-MW10-25-01	12/7/1995	--	**13000**	--	**85**	--	**22**
MW-10-25	960320-MW10-25-01	3/20/1996	--	**8800**	--	**86**	--	**6.7**
MW-10-25	960617-MW10-25-01	6/17/1996	--	**9900**	--	**82**	--	**6.6**
MW-10-25	960930-MW10-25-01	9/30/1996	--	**9600**	--	**310**	--	**80**
MW-10-25	970224-MW10-25-01	2/25/1997	--	**9000**	--	**340**	--	1000 U
MW-10-25	970827-MW10-25-01	8/27/1997	--	**6700**	--	**100**	--	**20**
MW-10-25	980216-MW10-25-01	2/16/1998	--	**8500**	--	**210**	--	**62**
MW-10-25	980601-MW10-25-02	6/1/1998	--	**11400**	--	**230**	--	**49**
MW-10-61	951206-MW10-61-01	12/6/1995	--	**620**	--	**90**	--	**11**
MW-10-61	960321-MW10-61-01	3/21/1996	--	**43**	--	**28**	--	**7.1**
MW-10-61	960620-MW10-61-01	6/20/1996	--	**13**	--	**15**	--	**5.4**
MW-10-61	961002-MW10-61-01	10/2/1996	--	**4.6**	--	**8.5**	--	**3.2**
MW-10-61	970226-MW10-61-01	2/26/1997	--	**3.3**	--	**4.1**	--	**3.8**
Retorts/Koppers (Continued)								
MW-10-61	970828-MW10-61-01	8/28/1997	--	**0.78**	--	**1.1**	--	**2.3**
MW-10-61	980218-MW10-61-01	2/18/1998	--	**0.29**	--	**0.22**	--	**1.5**
MW-10-61	980603-MW10-61-16	6/3/1998	--	**0.26**	--	**0.15**	--	**2**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-10-61	981117-MW10-61-08	11/17/1998	--	100 U	--	**0.15**	--	100 U
MW-10-61	990512-MW10-61-06	5/12/1999	--	100 U	--	100 U	--	100 U
MW-10-61	991026-MW10-61-05	10/26/1999	--	100 U	--	100 U	--	100 U
MW-10-61	000329-MW10-61-105	3/29/2000	--	100 U	--	100 U	--	100 U
MW-10-61	011010-MW10-61-109	10/10/2001	--	100 U	--	100 U	--	100 U
MW-10-61	020404-MW10-61-109	4/4/2002	--	100 U	--	100 U	--	100 U
MW-10-61	020924-MW10-61-104	9/24/2002	--	100 U	--	100 U	--	100 U
MW-10-61	030319-MW10-61-111	3/19/2003	--	100 U	--	100 U	--	100 U
MW-12-36	951207-MW12-36-01	12/7/1995	--	**400**	--	**7.8**	--	**21**
MW-12-36	960321-MW12-36-01	3/21/1996	--	**250**	--	**3.3**	--	**16**
MW-12-36	960620-MW12-36-01	6/20/1996	--	**160**	--	**2.4**	--	**11**
MW-12-36	961002-MW12-36-01	10/2/1996	--	**140**	--	**2**	--	**10**
MW-12-36	970226-MW12-36-01	2/26/1997	--	**100**	--	**1.7**	--	100 U
MW-12-36	970828-MW12-36-01	8/28/1997	--	**79**	--	**1.4**	--	**7.7**
MW-12-36	980218-MW12-36-01	2/18/1998	--	**71**	--	**0.78**	--	**2.6**
MW-12-36	980603-MW12-36-17	6/3/1998	--	**77**	--	**1.1**	--	**5.9**
MW-12-36	981119-MW12-36-18	11/19/1998	--	**52**	--	**0.64**	--	**2.4**
MW-12-36	990513-MW12-36-12	5/13/1999	--	**47.9**	--	**0.79**	--	**2.28**
MW-12-36	991028-MW12-36-18	10/28/1999	--	**60**	--	**0.95**	--	**2.2**
MW-12-36	000330-MW12-36-118	3/30/2000	--	**63.8**	--	**1.21**	--	**3.9**
MW-12-36	010329-MW12-36-117	3/29/2001	--	**51.5**	--	**0.69**	--	**3.11**
MW-12-36	020404-MW12-36-112	4/4/2002	--	**37.5**	--	**0.46**	--	**1.98**
MW-12-36	030319-MW12-36-113	3/19/2003	--	**35**	--	**0.47**	--	**2.1**
MW-15-50	990728-MW15-50-04	7/28/1999	--	**50**	--	**8510**	--	10000 U
MW-15-50	991029-MW15-50-25	10/29/1999	--	20000 U	--	**20**	--	20000 U
MW-15-50	000403-MW15-50-125	4/3/2000	--	**22**	--	**41.6**	--	**2.91**
MW-15-50	000615-MW15-50-105	6/15/2000	--	**2.91**	--	**0.59**	--	**4.11**
MW-15-50	000615-MW15-50-106	6/15/2000	--	**2.96**	--	**0.77**	--	**4.1**
MW-15-50	001005-MW15-50-14	10/5/2000	--	**1.51**	--	**0.96**	--	**1.47**
MW-15-50	001221-MW15-50-105	12/21/2000	--	**43.5**	--	**66.1**	--	**6.14**
MW-15-50	001221-MW15-50-106	12/21/2000	--	**52.4**	--	**70.6**	--	**6.58**
MW-15-50	010330-MW15-50-124	3/30/2001	--	**35.4**	--	**59**	--	**9.58**
Retorts/Koppers (Continued)								
MW-15-50	011010-MW15-50-111	10/10/2001	--	**18.1**	--	**29.7**	--	**2.19**
MW-15-50	011010-MW15-50-112	10/10/2001	--	**44.6**	--	**60.4**	--	**4.2**
MW-15-50	011214-MW15-50-104	12/14/2001	--	**26.8**	--	**43.8**	--	**3**
MW-15-50	011214-MW15-50-105	12/14/2001	--	**27.8**	--	**45.9**	--	**3.1**
MW-15-50	020405-MW15-50-119	4/5/2002	--	**20**	--	**30**	--	**3.29**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-10-61	981117-MW10-61-08	11/17/1998	--	**0.56**	--	**0.78**	--
MW-10-61	990512-MW10-61-06	5/12/1999	--	**0.18**	--	**0.11**	--
MW-10-61	991026-MW10-61-05	10/26/1999	--	**0.11**	--	100 U	--
MW-10-61	000329-MW10-61-105	3/29/2000	--	**0.11**	--	100 U	--
MW-10-61	011010-MW10-61-109	10/10/2001	--	100 U	--	100 U	--
MW-10-61	020404-MW10-61-109	4/4/2002	--	100 U	--	100 U	--
MW-10-61	020924-MW10-61-104	9/24/2002	--	**0.11**	--	100 U	--
MW-10-61	030319-MW10-61-111	3/19/2003	--	100 U	--	100 U	--
MW-12-36	951207-MW12-36-01	12/7/1995	--	**1.5**	--	**0.22**	--
MW-12-36	960321-MW12-36-01	3/21/1996	--	**0.38**	--	100 U	--
MW-12-36	960620-MW12-36-01	6/20/1996	--	**0.4**	--	100 U	--
MW-12-36	961002-MW12-36-01	10/2/1996	--	**0.47**	--	100 U	--
MW-12-36	970226-MW12-36-01	2/26/1997	--	**0.63**	--	100 U	--
MW-12-36	970828-MW12-36-01	8/28/1997	--	**0.43**	--	100 U	--
MW-12-36	980218-MW12-36-01	2/18/1998	--	**0.51**	--	100 U	--
MW-12-36	980603-MW12-36-17	6/3/1998	--	1000 U	--	1000 U	--
MW-12-36	981119-MW12-36-18	11/19/1998	--	**0.49**	--	100 U	--
MW-12-36	990513-MW12-36-12	5/13/1999	--	**0.53**	--	100 U	--
MW-12-36	991028-MW12-36-18	10/28/1999	--	**0.35**	--	100 U	--
MW-12-36	000330-MW12-36-118	3/30/2000	--	**0.59**	--	**0.21**	--
MW-12-36	010329-MW12-36-117	3/29/2001	--	**0.4**	--	100 U	--
MW-12-36	020404-MW12-36-112	4/4/2002	--	**0.28**	--	100 U	--
MW-12-36	030319-MW12-36-113	3/19/2003	--	**0.31**	--	100 U	--
MW-15-50	990728-MW15-50-04	7/28/1999	--	10000 U	--	10000 U	--
MW-15-50	991029-MW15-50-25	10/29/1999	--	20000 U	--	20000 U	--
MW-15-50	000403-MW15-50-125	4/3/2000	--	**0.79**	--	**0.55**	--
MW-15-50	000615-MW15-50-105	6/15/2000	--	**43.6**	--	**57.1**	--
MW-15-50	000615-MW15-50-106	6/15/2000	--	**40**	--	**53.5**	--
MW-15-50	001005-MW15-50-14	10/5/2000	--	**10.7**	--	**16.4**	--
MW-15-50	001221-MW15-50-105	12/21/2000	--	**26.1**	--	**32.2**	--
MW-15-50	001221-MW15-50-106	12/21/2000	--	**33.1**	--	**40.8**	--
MW-15-50	010330-MW15-50-124	3/30/2001	--	**11.2**	--	**13.4**	--
Retorts/Koppers (Continued)							
MW-15-50	011010-MW15-50-111	10/10/2001	--	**2.47**	--	**2.95**	--
MW-15-50	011010-MW15-50-112	10/10/2001	--	**7.6**	--	**9.3**	--
MW-15-50	011214-MW15-50-104	12/14/2001	--	**0.35**	--	**0.1**	--
MW-15-50	011214-MW15-50-105	12/14/2001	--	**0.42**	--	**0.17**	--
MW-15-50	020405-MW15-50-119	4/5/2002	--	**1.57**	--	**1.76**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-10-61	981117-MW10-61-08	11/17/1998	**0.61**	--	**0.58**	--
MW-10-61	990512-MW10-61-06	5/12/1999	**0.1**	--	100 U	--
MW-10-61	991026-MW10-61-05	10/26/1999	100 U	--	100 U	--
MW-10-61	000329-MW10-61-105	3/29/2000	100 U	--	100 U	--
MW-10-61	011010-MW10-61-109	10/10/2001	100 U	--	100 U	--
MW-10-61	020404-MW10-61-109	4/4/2002	100 U	--	100 U	--
MW-10-61	020924-MW10-61-104	9/24/2002	100 U	--	100 U	--
MW-10-61	030319-MW10-61-111	3/19/2003	100 U	--	100 U	--
MW-12-36	951207-MW12-36-01	12/7/1995	**0.36**	--	**0.1**	--
MW-12-36	960321-MW12-36-01	3/21/1996	100 U	--	100 U	--
MW-12-36	960620-MW12-36-01	6/20/1996	100 U	--	100 U	--
MW-12-36	961002-MW12-36-01	10/2/1996	100 U	--	100 U	--
MW-12-36	970226-MW12-36-01	2/26/1997	100 U	--	100 U	--
MW-12-36	970828-MW12-36-01	8/28/1997	100 U	--	100 U	--
MW-12-36	980218-MW12-36-01	2/18/1998	100 U	--	100 U	--
MW-12-36	980603-MW12-36-17	6/3/1998	1000 U	--	1000 U	--
MW-12-36	981119-MW12-36-18	11/19/1998	100 U	--	100 U	--
MW-12-36	990513-MW12-36-12	5/13/1999	100 U	--	100 U	--
MW-12-36	991028-MW12-36-18	10/28/1999	100 U	--	100 U	--
MW-12-36	000330-MW12-36-118	3/30/2000	**0.14**	--	**0.18**	--
MW-12-36	010329-MW12-36-117	3/29/2001	100 U	--	100 U	--
MW-12-36	020404-MW12-36-112	4/4/2002	100 U	--	100 U	--
MW-12-36	030319-MW12-36-113	3/19/2003	100 U	--	100 U	--
MW-15-50	990728-MW15-50-04	7/28/1999	10000 U	--	10000 U	--
MW-15-50	991029-MW15-50-25	10/29/1999	20000 U	--	20000 U	--
MW-15-50	000403-MW15-50-125	4/3/2000	**0.51**	--	**0.25**	--
MW-15-50	000615-MW15-50-105	6/15/2000	**45.5**	--	**41.8**	--
MW-15-50	000615-MW15-50-106	6/15/2000	**44.1**	--	**40.2**	--
MW-15-50	001005-MW15-50-14	10/5/2000	**19.7**	--	**8.14**	--
MW-15-50	001221-MW15-50-105	12/21/2000	**39.6**	--	**24**	--
MW-15-50	001221-MW15-50-106	12/21/2000	**48.7**	--	**30.3**	--
MW-15-50	010330-MW15-50-124	3/30/2001	**11.8**	--	**15.1**	--
Retorts/Koppers (Continued)						
MW-15-50	011010-MW15-50-111	10/10/2001	**2.62**	--	**1.77**	--
MW-15-50	011010-MW15-50-112	10/10/2001	**8.4**	--	**6.4**	--
MW-15-50	011214-MW15-50-104	12/14/2001	**0.1**	--	100 U	--
MW-15-50	011214-MW15-50-105	12/14/2001	**0.14**	--	100 U	--
MW-15-50	020405-MW15-50-119	4/5/2002	**1.33**	--	**1.5**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-10-61	981117-MW10-61-08	11/17/1998	**0.2**	--	**0.57**	--	100 U
MW-10-61	990512-MW10-61-06	5/12/1999	100 U	--	**0.18**	--	100 U
MW-10-61	991026-MW10-61-05	10/26/1999	100 U	--	**0.13**	--	100 U
MW-10-61	000329-MW10-61-105	3/29/2000	100 U	--	**0.13**	--	100 U
MW-10-61	011010-MW10-61-109	10/10/2001	100 U	--	100 U	--	100 U
MW-10-61	020404-MW10-61-109	4/4/2002	100 U	--	**0.11**	--	100 U
MW-10-61	020924-MW10-61-104	9/24/2002	100 U	--	**0.14**	--	100 U
MW-10-61	030319-MW10-61-111	3/19/2003	100 U	--	100 U	--	100 U
MW-12-36	951207-MW12-36-01	12/7/1995	**0.17**	--	**1.4**	--	100 U
MW-12-36	960321-MW12-36-01	3/21/1996	100 U	--	**0.35**	--	100 U
MW-12-36	960620-MW12-36-01	6/20/1996	100 U	--	**0.4**	--	100 U
MW-12-36	961002-MW12-36-01	10/2/1996	100 U	--	**0.33**	--	100 U
MW-12-36	970226-MW12-36-01	2/26/1997	100 U	--	**0.31**	--	100 U
MW-12-36	970828-MW12-36-01	8/28/1997	100 U	--	**0.24**	--	100 U
MW-12-36	980218-MW12-36-01	2/18/1998	100 U	--	**0.18**	--	100 U
MW-12-36	980603-MW12-36-17	6/3/1998	1000 U	--	1000 U	--	1000 U
MW-12-36	981119-MW12-36-18	11/19/1998	100 U	--	**0.3**	--	100 U
MW-12-36	990513-MW12-36-12	5/13/1999	100 U	--	100 U	--	100 U
MW-12-36	991028-MW12-36-18	10/28/1999	100 U	--	**0.25**	--	100 U
MW-12-36	000330-MW12-36-118	3/30/2000	**0.16**	--	**0.51**	--	100 U
MW-12-36	010329-MW12-36-117	3/29/2001	100 U	--	**0.29**	--	100 U
MW-12-36	020404-MW12-36-112	4/4/2002	100 U	--	**0.22**	--	100 U
MW-12-36	030319-MW12-36-113	3/19/2003	100 U	--	100 U	--	100 U
MW-15-50	990728-MW15-50-04	7/28/1999	10000 U	--	10000 U	--	10000 U
MW-15-50	991029-MW15-50-25	10/29/1999	20000 U	--	20000 U	--	20000 U
MW-15-50	000403-MW15-50-125	4/3/2000	**0.49**	--	**0.73**	--	100 U
MW-15-50	000615-MW15-50-105	6/15/2000	**38.5**	--	**40.5**	--	**8.95**
MW-15-50	000615-MW15-50-106	6/15/2000	**36.3**	--	**38.3**	--	**8.87**
MW-15-50	001005-MW15-50-14	10/5/2000	**6.97**	--	**9.88**	--	**2.52**
MW-15-50	001221-MW15-50-105	12/21/2000	**14.8**	--	**20.8**	--	**4.13**
MW-15-50	001221-MW15-50-106	12/21/2000	**18.1**	--	**26.5**	--	**4.96**
MW-15-50	010330-MW15-50-124	3/30/2001	**18.9**	--	**12.4**	--	**5.4**
Retorts/Koppers (Continued)							
MW-15-50	011010-MW15-50-111	10/10/2001	**2.08**	--	**2.37**	--	**0.47**
MW-15-50	011010-MW15-50-112	10/10/2001	**7.4**	--	**8**	--	**1.8**
MW-15-50	011214-MW15-50-104	12/14/2001	**0.1**	--	**0.33**	--	100 U
MW-15-50	011214-MW15-50-105	12/14/2001	**0.13**	--	**0.41**	--	100 U
MW-15-50	020405-MW15-50-119	4/5/2002	**1.39**	--	**1.81**	--	**0.61**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-10-61	981117-MW10-61-08	11/17/1998	--	**0.86**	--	100 U	--	**0.34**
MW-10-61	990512-MW10-61-06	5/12/1999	--	**0.73**	--	100 U	--	100 U
MW-10-61	991026-MW10-61-05	10/26/1999	--	**0.54**	--	100 U	--	100 U
MW-10-61	000329-MW10-61-105	3/29/2000	--	**0.48**	--	100 U	--	100 U
MW-10-61	011010-MW10-61-109	10/10/2001	--	**0.28**	--	100 U	--	100 U
MW-10-61	020404-MW10-61-109	4/4/2002	--	**0.43**	--	100 U	--	100 U
MW-10-61	020924-MW10-61-104	9/24/2002	--	**0.53**	--	100 U	--	100 U
MW-10-61	030319-MW10-61-111	3/19/2003	--	**0.45**	--	100 U	--	100 U
MW-12-36	951207-MW12-36-01	12/7/1995	--	**28**	--	**170**	--	100 U
MW-12-36	960321-MW12-36-01	3/21/1996	--	**18**	--	**110**	--	100 U
MW-12-36	960620-MW12-36-01	6/20/1996	--	**18**	--	**81**	--	100 U
MW-12-36	961002-MW12-36-01	10/2/1996	--	**25**	--	**59**	--	100 U
MW-12-36	970226-MW12-36-01	2/26/1997	--	**24**	--	**40**	--	100 U
MW-12-36	970828-MW12-36-01	8/28/1997	--	**19**	--	**33**	--	100 U
MW-12-36	980218-MW12-36-01	2/18/1998	--	**17**	--	**25**	--	100 U
MW-12-36	980603-MW12-36-17	6/3/1998	--	**22**	--	**30**	--	1000 U
MW-12-36	981119-MW12-36-18	11/19/1998	--	**14**	--	**21**	--	100 U
MW-12-36	990513-MW12-36-12	5/13/1999	--	**7.47**	--	**19.2**	--	100 U
MW-12-36	991028-MW12-36-18	10/28/1999	--	**7.52**	--	**23.7**	--	100 U
MW-12-36	000330-MW12-36-118	3/30/2000	--	**9.51**	--	**25.5**	--	**0.13**
MW-12-36	010329-MW12-36-117	3/29/2001	--	**7.34**	--	**21.6**	--	100 U
MW-12-36	020404-MW12-36-112	4/4/2002	--	**5.14**	--	**16.6**	--	100 U
MW-12-36	030319-MW12-36-113	3/19/2003	--	**5.9**	--	**16**	--	100 U
MW-15-50	990728-MW15-50-04	7/28/1999	--	10000 U	--	**83**	--	10000 U
MW-15-50	991029-MW15-50-25	10/29/1999	--	20000 U	--	20000 U	--	20000 U
MW-15-50	000403-MW15-50-125	4/3/2000	--	**6.01**	--	**23.6**	--	**0.24**
MW-15-50	000615-MW15-50-105	6/15/2000	--	**69.7**	--	**1.66**	--	**33.5**
MW-15-50	000615-MW15-50-106	6/15/2000	--	**65.2**	--	**1.71**	--	**32.6**
MW-15-50	001005-MW15-50-14	10/5/2000	--	**15.5**	--	**1.06**	--	**8.21**
MW-15-50	001221-MW15-50-105	12/21/2000	--	**40.1**	--	**74.6**	--	**21.3**
MW-15-50	001221-MW15-50-106	12/21/2000	--	**50.3**	--	**78**	--	**27**
MW-15-50	010330-MW15-50-124	3/30/2001	--	**22.7**	--	**45.7**	--	**14.4**
Retorts/Koppers (Continued)								
MW-15-50	011010-MW15-50-111	10/10/2001	--	**5.33**	--	**26**	--	**1.56**
MW-15-50	011010-MW15-50-112	10/10/2001	--	**12.7**	--	**53.9**	--	**5.7**
MW-15-50	011214-MW15-50-104	12/14/2001	--	**3.29**	--	**34.3**	--	100 U
MW-15-50	011214-MW15-50-105	12/14/2001	--	**3.28**	--	**36.1**	--	100 U
MW-15-50	020405-MW15-50-119	4/5/2002	--	**5.75**	--	**26**	--	**1.29**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-10-61	981117-MW10-61-08	11/17/1998	--	**0.1**	--	100 U	--	**1.1**
MW-10-61	990512-MW10-61-06	5/12/1999	--	100 U	--	100 U	--	100 U
MW-10-61	991026-MW10-61-05	10/26/1999	--	100 U	--	100 U	--	**0.58**
MW-10-61	000329-MW10-61-105	3/29/2000	--	100 U	--	100 U	--	**0.37**
MW-10-61	011010-MW10-61-109	10/10/2001	--	100 U	--	100 U	--	**0.33**
MW-10-61	020404-MW10-61-109	4/4/2002	--	100 U	--	100 U	--	**0.3**
MW-10-61	020924-MW10-61-104	9/24/2002	--	100 U	--	100 U	--	**0.6**
MW-10-61	030319-MW10-61-111	3/19/2003	--	100 U	--	100 U	--	**0.5**
MW-12-36	951207-MW12-36-01	12/7/1995	--	**2500**	--	**230**	--	**17**
MW-12-36	960321-MW12-36-01	3/21/1996	--	**1400**	--	**200**	--	**12**
MW-12-36	960620-MW12-36-01	6/20/1996	--	**1200**	--	**130**	--	**18**
MW-12-36	961002-MW12-36-01	10/2/1996	--	**990**	--	**130**	--	**18**
MW-12-36	970226-MW12-36-01	2/26/1997	--	**760**	--	**88**	--	**18**
MW-12-36	970828-MW12-36-01	8/28/1997	--	**620**	--	**61**	--	**18**
MW-12-36	980218-MW12-36-01	2/18/1998	--	**530**	--	**52**	--	**9.2**
MW-12-36	980603-MW12-36-17	6/3/1998	--	**480**	--	**62**	--	**19**
MW-12-36	981119-MW12-36-18	11/19/1998	--	**350**	--	**38**	--	**8.3**
MW-12-36	990513-MW12-36-12	5/13/1999	--	**374**	--	**31.3**	--	**7.93**
MW-12-36	991028-MW12-36-18	10/28/1999	--	**409**	--	**35.9**	--	**6.06**
MW-12-36	000330-MW12-36-118	3/30/2000	--	**490**	--	**45.9**	--	**7.24**
MW-12-36	010329-MW12-36-117	3/29/2001	--	**284**	--	**39.4**	--	**6.71**
MW-12-36	020404-MW12-36-112	4/4/2002	--	**287**	--	**23.5**	--	**3.2**
MW-12-36	030319-MW12-36-113	3/19/2003	--	**280**	--	**24**	--	**5.4**
MW-15-50	990728-MW15-50-04	7/28/1999	--	**9700**	--	**117**	--	10000 U
MW-15-50	991029-MW15-50-25	10/29/1999	--	**716**	--	**26**	--	20000 U
MW-15-50	000403-MW15-50-125	4/3/2000	--	**5480**	--	**25.9**	--	**5.16**
MW-15-50	000615-MW15-50-105	6/15/2000	--	**1.23**	--	**25**	--	**60.1**
MW-15-50	000615-MW15-50-106	6/15/2000	--	**1.23**	--	**23.8**	--	**57.3**
MW-15-50	001005-MW15-50-14	10/5/2000	--	**2.8**	--	**6.44**	--	**16.7**
MW-15-50	001221-MW15-50-105	12/21/2000	--	**9200**	--	**10.9**	--	**36.9**
MW-15-50	001221-MW15-50-106	12/21/2000	--	**8180**	--	**12.6**	--	**50.7**
MW-15-50	010330-MW15-50-124	3/30/2001	--	**6860**	--	**76.1**	--	**22.4**
Retorts/Koppers (Continued)								
MW-15-50	011010-MW15-50-111	10/10/2001	--	**3700**	--	**37.2**	--	**4.26**
MW-15-50	011010-MW15-50-112	10/10/2001	--	**59100**	--	**78.3**	--	**14.6**
MW-15-50	011214-MW15-50-104	12/14/2001	--	**4510**	--	**42.8**	--	**2.27**
MW-15-50	011214-MW15-50-105	12/14/2001	--	**5870**	--	**45.6**	--	**2.33**
MW-15-50	020405-MW15-50-119	4/5/2002	--	**4220**	--	**34**	--	**3.67**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-15-50	020711-MW15-50-104	7/11/2002	--	**19.7**	--	**31.3**	--	**4**
MW-15-50	020711-MW15-50-105	7/11/2002	--	**27.6**	--	**41.6**	--	2000 U
MW-15-50	020925-MW15-50-110	9/25/2002	--	**38**	--	**55**	--	**8**
MW-15-50	020925-MW15-50-111	9/25/2002	--	**40**	--	**58**	--	**6.3**
MW-15-50	021218-MW15-50-107	12/18/2002	--	**50**	--	**78**	--	5000 U
MW-15-50	030321-MW15-50-122	3/21/2003	--	**24**	--	**36**	--	10000 U
MW-15-50	030603-MW15-50-105	6/3/2003	--	**18**	--	**32**	--	1000 U
MW-15-66	990728-MW15-66-03	7/28/1999	--	**0.11**	--	100 U	--	100 U
MW-15-66	991026-MW15-66-07	10/26/1999	--	100 U	--	100 U	--	100 U
MW-15-66	000329-MW15-66-108	3/29/2000	--	100 U	--	100 U	--	**0.11**
MW-15-66	000615-MW15-66-104	6/15/2000	--	**0.14**	--	100 U	--	**0.39**
MW-15-66	001005-MW15-66-08	10/5/2000	--	100 U	--	100 U	--	100 U
MW-15-66	001221-MW15-66-104	12/21/2000	--	100 U	--	100 U	--	100 U
MW-15-66	010328-MW15-66-107	3/28/2001	--	100 U	--	100 U	--	100 U
MW-15-66	011010-MW15-66-110	10/10/2001	--	100 U	--	100 U	--	100 U
MW-15-66	011213-MW15-66-103	12/13/2001	--	100 U	--	100 U	--	100 U
MW-15-66	020404-MW15-66-107	4/4/2002	--	100 U	--	100 U	--	100 U
MW-15-66	020711-MW15-66-103	7/11/2002	--	100 U	--	100 U	--	100 U
MW-15-66	020925-MW15-66-109	9/25/2002	--	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-105	12/18/2002	--	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-106	12/18/2002	--	100 U	--	100 U	--	100 U
MW-15-66	030318-MW15-66-107	3/18/2003	--	100 U	--	100 U	--	100 U
MW-15-66	030603-MW15-66-104	6/3/2003	--	100 U	--	100 U	--	100 U
Spent Oxide								
B-01	950921-BW1-01	9/21/1995	--	**7400**	--	**220**	--	**1500**
B-05	950925-BW05-01	9/29/1995	--	**13000**	--	**140**	--	**1200**
MW-01-22	951207-MW1-22-01	12/7/1995	--	**11**	--	**2.6**	--	**52**
MW-01-22	960319-MW1-22-01	3/19/1996	--	**9.6**	--	**0.33**	--	**4.1**
MW-01-22	960618-MW1-22-01	6/18/1996	--	**7.6**	--	**0.26**	--	**3.3**
MW-01-22	961001-MW1-22-01	10/1/1996	--	**55**	--	**0.98**	--	**15**
MW-01-22	970225-MW1-22-01	2/25/1997	--	**3.7**	--	100 U	--	**1.6**
MW-01-22	970225-MW1-22-02	2/25/1997	--	**3.2**	--	100 U	--	**1.6**
MW-01-22	970827-MW1-22-01	8/27/1997	--	**70**	--	**1.6**	--	**16**
MW-01-22	970827-MW1-22-02	8/27/1997	--	**66**	--	100 U	--	**19**
MW-01-22	980217-MW1-22-01	2/17/1998	--	**1.2**	--	100 U	--	**1.5**
MW-01-22	980602-MW1-32-11	6/2/1998	--	**3.3**	--	**0.89**	--	**14**
MW-01-22	980826-MW1-22-10	8/26/1998	--	**75**	--	**2.9**	--	**51**
MW-01-22	981118-MW1-22-15	11/18/1998	--	**58**	--	100 U	--	**9.1**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-15-50	020711-MW15-50-104	7/11/2002	--	**2.5**	--	**2.9**	--
MW-15-50	020711-MW15-50-105	7/11/2002	--	**3.4**	--	**4.4**	--
MW-15-50	020925-MW15-50-110	9/25/2002	--	**10**	--	**15**	--
MW-15-50	020925-MW15-50-111	9/25/2002	--	**3.3**	--	**3.2**	--
MW-15-50	021218-MW15-50-107	12/18/2002	--	5000 U	--	**22**	--
MW-15-50	030321-MW15-50-122	3/21/2003	--	10000 U	--	10000 U	--
MW-15-50	030603-MW15-50-105	6/3/2003	--	1000 U	--	1000 U	--
MW-15-66	990728-MW15-66-03	7/28/1999	--	**0.15**	--	**0.16**	--
MW-15-66	991026-MW15-66-07	10/26/1999	--	100 U	--	100 U	--
MW-15-66	000329-MW15-66-108	3/29/2000	--	**0.57**	--	**0.77**	--
MW-15-66	000615-MW15-66-104	6/15/2000	--	**1.93**	--	**2.64**	--
MW-15-66	001005-MW15-66-08	10/5/2000	--	**0.23**	--	**0.32**	--
MW-15-66	001221-MW15-66-104	12/21/2000	--	**0.14**	--	**0.15**	--
MW-15-66	010328-MW15-66-107	3/28/2001	--	**0.11**	--	**0.14**	--
MW-15-66	011010-MW15-66-110	10/10/2001	--	100 U	--	100 U	--
MW-15-66	011213-MW15-66-103	12/13/2001	--	100 U	--	100 U	--
MW-15-66	020404-MW15-66-107	4/4/2002	--	100 U	--	100 U	--
MW-15-66	020711-MW15-66-103	7/11/2002	--	100 U	--	100 U	--
MW-15-66	020925-MW15-66-109	9/25/2002	--	100 U	--	100 U	--
MW-15-66	021218-MW15-66-105	12/18/2002	--	100 U	--	100 U	--
MW-15-66	021218-MW15-66-106	12/18/2002	--	100 U	--	100 U	--
MW-15-66	030318-MW15-66-107	3/18/2003	--	100 U	--	100 U	--
MW-15-66	030603-MW15-66-104	6/3/2003	--	**0.6**	--	**0.85**	--
Spent Oxide							
B-01	950921-BW1-01	9/21/1995	--	100 U	--	100 U	--
B-05	950925-BW05-01	9/29/1995	--	100 U	--	100 U	--
MW-01-22	951207-MW1-22-01	12/7/1995	--	**24**	--	**12**	--
MW-01-22	960319-MW1-22-01	3/19/1996	--	**1.2**	--	**0.64**	--
MW-01-22	960618-MW1-22-01	6/18/1996	--	**0.59**	--	**0.34**	--
MW-01-22	961001-MW1-22-01	10/1/1996	--	**1.7**	--	**1.3**	--
MW-01-22	970225-MW1-22-01	2/25/1997	--	**0.36**	--	**0.12**	--
MW-01-22	970225-MW1-22-02	2/25/1997	--	**0.72**	--	**0.31**	--
MW-01-22	970827-MW1-22-01	8/27/1997	--	**3.8**	--	**3.9**	--
MW-01-22	970827-MW1-22-02	8/27/1997	--	**5.2**	--	**5.6**	--
MW-01-22	980217-MW1-22-01	2/17/1998	--	**1.1**	--	**0.76**	--
MW-01-22	980602-MW1-32-11	6/2/1998	--	**15**	--	**18**	--
MW-01-22	980826-MW1-22-10	8/26/1998	--	**24**	--	**32**	--
MW-01-22	981118-MW1-22-15	11/18/1998	--	**0.61**	--	**0.72**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-15-50	020711-MW15-50-104	7/11/2002	**2.6**	--	**2.1**	--
MW-15-50	020711-MW15-50-105	7/11/2002	**3.6**	--	**3.4**	--
MW-15-50	020925-MW15-50-110	9/25/2002	**11**	--	**9.1**	--
MW-15-50	020925-MW15-50-111	9/25/2002	**2.6**	--	**1.8**	--
MW-15-50	021218-MW15-50-107	12/18/2002	5000 U	--	**25**	--
MW-15-50	030321-MW15-50-122	3/21/2003	10000 U	--	10000 U	--
MW-15-50	030603-MW15-50-105	6/3/2003	1000 U	--	1000 U	--
MW-15-66	990728-MW15-66-03	7/28/1999	**0.26**	--	**0.14**	--
MW-15-66	991026-MW15-66-07	10/26/1999	100 U	--	100 U	--
MW-15-66	000329-MW15-66-108	3/29/2000	**0.59**	--	**0.66**	--
MW-15-66	000615-MW15-66-104	6/15/2000	**1.96**	--	**2.04**	--
MW-15-66	001005-MW15-66-08	10/5/2000	**0.4**	--	100 U	--
MW-15-66	001221-MW15-66-104	12/21/2000	**0.19**	--	**0.13**	--
MW-15-66	010328-MW15-66-107	3/28/2001	**0.11**	--	100 U	--
MW-15-66	011010-MW15-66-110	10/10/2001	100 U	--	100 U	--
MW-15-66	011213-MW15-66-103	12/13/2001	100 U	--	100 U	--
MW-15-66	020404-MW15-66-107	4/4/2002	100 U	--	100 U	--
MW-15-66	020711-MW15-66-103	7/11/2002	100 U	--	100 U	--
MW-15-66	020925-MW15-66-109	9/25/2002	100 U	--	100 U	--
MW-15-66	021218-MW15-66-105	12/18/2002	100 U	--	100 U	--
MW-15-66	021218-MW15-66-106	12/18/2002	100 U	--	100 U	--
MW-15-66	030318-MW15-66-107	3/18/2003	100 U	--	100 U	--
MW-15-66	030603-MW15-66-104	6/3/2003	**0.64**	--	**0.77**	--
Spent Oxide						
B-01	950921-BW1-01	9/21/1995	100 U	--	100 U	--
B-05	950925-BW05-01	9/29/1995	100 U	--	100 U	--
MW-01-22	951207-MW1-22-01	12/7/1995	**13**	--	**9.3**	--
MW-01-22	960319-MW1-22-01	3/19/1996	**0.7**	--	**0.41**	--
MW-01-22	960618-MW1-22-01	6/18/1996	**0.33**	--	**0.21**	--
MW-01-22	961001-MW1-22-01	10/1/1996	**1.4**	--	**0.99**	--
MW-01-22	970225-MW1-22-01	2/25/1997	**0.13**	--	100 U	--
MW-01-22	970225-MW1-22-02	2/25/1997	**0.34**	--	**0.13**	--
MW-01-22	970827-MW1-22-01	8/27/1997	**4**	--	**2.6**	--
MW-01-22	970827-MW1-22-02	8/27/1997	**5.4**	--	**3.8**	--
MW-01-22	980217-MW1-22-01	2/17/1998	**0.8**	--	**0.58**	--
MW-01-22	980602-MW1-32-11	6/2/1998	**21**	--	**13**	--
MW-01-22	980826-MW1-22-10	8/26/1998	**37**	--	**22**	--
MW-01-22	981118-MW1-22-15	11/18/1998	**0.7**	--	**0.41**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-15-50	020711-MW15-50-104	7/11/2002	**2.7**	--	**3.1**	--	1000 U
MW-15-50	020711-MW15-50-105	7/11/2002	**5.4**	--	**5.6**	--	2000 U
MW-15-50	020925-MW15-50-110	9/25/2002	**10**	--	**12**	--	1000 U
MW-15-50	020925-MW15-50-111	9/25/2002	**3**	--	**3.7**	--	1000 U
MW-15-50	021218-MW15-50-107	12/18/2002	5000 U	--	5000 U	--	5000 U
MW-15-50	030321-MW15-50-122	3/21/2003	10000 U	--	10000 U	--	10000 U
MW-15-50	030603-MW15-50-105	6/3/2003	1000 U	--	1000 U	--	1000 U
MW-15-66	990728-MW15-66-03	7/28/1999	100 U	--	**0.15**	--	100 U
MW-15-66	991026-MW15-66-07	10/26/1999	100 U	--	100 U	--	100 U
MW-15-66	000329-MW15-66-108	3/29/2000	**0.6**	--	**0.67**	--	**0.18**
MW-15-66	000615-MW15-66-104	6/15/2000	**1.61**	--	**1.91**	--	**0.57**
MW-15-66	001005-MW15-66-08	10/5/2000	**0.17**	--	**0.24**	--	100 U
MW-15-66	001221-MW15-66-104	12/21/2000	**0.1**	--	**0.12**	--	100 U
MW-15-66	010328-MW15-66-107	3/28/2001	**0.12**	--	**0.13**	--	100 U
MW-15-66	011010-MW15-66-110	10/10/2001	100 U	--	100 U	--	100 U
MW-15-66	011213-MW15-66-103	12/13/2001	100 U	--	100 U	--	100 U
MW-15-66	020404-MW15-66-107	4/4/2002	100 U	--	100 U	--	100 U
MW-15-66	020711-MW15-66-103	7/11/2002	100 U	--	100 U	--	100 U
MW-15-66	020925-MW15-66-109	9/25/2002	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-105	12/18/2002	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-106	12/18/2002	100 U	--	100 U	--	100 U
MW-15-66	030318-MW15-66-107	3/18/2003	100 U	--	100 U	--	100 U
MW-15-66	030603-MW15-66-104	6/3/2003	**0.77**	--	**0.69**	--	100 U
Spent Oxide							
B-01	950921-BW1-01	9/21/1995	100 U	--	**90**	--	100 U
B-05	950925-BW05-01	9/29/1995	100 U	--	100 U	--	100 U
MW-01-22	951207-MW1-22-01	12/7/1995	**4.8**	--	**32**	--	**1.3**
MW-01-22	960319-MW1-22-01	3/19/1996	**0.28**	--	**1.6**	--	100 U
MW-01-22	960618-MW1-22-01	6/18/1996	**0.14**	--	**0.68**	--	100 U
MW-01-22	961001-MW1-22-01	10/1/1996	1000 U	--	**1.8**	--	1000 U
MW-01-22	970225-MW1-22-01	2/25/1997	100 U	--	**0.3**	--	100 U
MW-01-22	970225-MW1-22-02	2/25/1997	**0.12**	--	**0.64**	--	100 U
MW-01-22	970827-MW1-22-01	8/27/1997	**1.4**	--	**4.8**	--	1000 U
MW-01-22	970827-MW1-22-02	8/27/1997	**2**	--	**6.7**	--	1000 U
MW-01-22	980217-MW1-22-01	2/17/1998	**0.26**	--	**0.98**	--	**0.1**
MW-01-22	980602-MW1-32-11	6/2/1998	**6.7**	--	**21**	--	**1.8**
MW-01-22	980826-MW1-22-10	8/26/1998	**12**	--	**37**	--	**3.6**
MW-01-22	981118-MW1-22-15	11/18/1998	**0.29**	--	**0.78**	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-15-50	020711-MW15-50-104	7/11/2002	--	**7.9**	--	**26.6**	--	**1.7**
MW-15-50	020711-MW15-50-105	7/11/2002	--	**11.6**	--	**35.8**	--	**2.4**
MW-15-50	020925-MW15-50-110	9/25/2002	--	**21**	--	**47**	--	**7.3**
MW-15-50	020925-MW15-50-111	9/25/2002	--	**12**	--	**50**	--	**1.4**
MW-15-50	021218-MW15-50-107	12/18/2002	--	**36**	--	**70**	--	**20**
MW-15-50	030321-MW15-50-122	3/21/2003	--	10000 U	--	**32**	--	10000 U
MW-15-50	030603-MW15-50-105	6/3/2003	--	**1.9**	--	**22**	--	1000 U
MW-15-66	990728-MW15-66-03	7/28/1999	--	**0.3**	--	100 U	--	**0.11**
MW-15-66	991026-MW15-66-07	10/26/1999	--	100 U	--	100 U	--	100 U
MW-15-66	000329-MW15-66-108	3/29/2000	--	**0.96**	--	100 U	--	**0.53**
MW-15-66	000615-MW15-66-104	6/15/2000	--	**3.32**	--	100 U	--	**1.55**
MW-15-66	001005-MW15-66-08	10/5/2000	--	**0.41**	--	100 U	--	100 U
MW-15-66	001221-MW15-66-104	12/21/2000	--	**0.21**	--	100 U	--	**0.1**
MW-15-66	010328-MW15-66-107	3/28/2001	--	**0.2**	--	100 U	--	100 U
MW-15-66	011010-MW15-66-110	10/10/2001	--	100 U	--	100 U	--	100 U
MW-15-66	011213-MW15-66-103	12/13/2001	--	100 U	--	100 U	--	100 U
MW-15-66	020404-MW15-66-107	4/4/2002	--	**0.12**	--	100 U	--	100 U
MW-15-66	020711-MW15-66-103	7/11/2002	--	100 U	--	100 U	--	100 U
MW-15-66	020925-MW15-66-109	9/25/2002	--	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-105	12/18/2002	--	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-106	12/18/2002	--	100 U	--	100 U	--	100 U
MW-15-66	030318-MW15-66-107	3/18/2003	--	100 U	--	100 U	--	100 U
MW-15-66	030603-MW15-66-104	6/3/2003	--	**1.2**	--	100 U	--	**0.45**
Spent Oxide								
B-01	950921-BW1-01	9/21/1995	--	**1300**	--	**4500**	--	100 U
B-05	950925-BW05-01	9/29/1995	--	**1400**	--	**9800**	--	100 U
MW-01-22	951207-MW1-22-01	12/7/1995	--	**74**	--	**16**	--	**6.3**
MW-01-22	960319-MW1-22-01	3/19/1996	--	**4.4**	--	**7.3**	--	**0.29**
MW-01-22	960618-MW1-22-01	6/18/1996	--	**2.5**	--	**6.2**	--	**0.15**
MW-01-22	961001-MW1-22-01	10/1/1996	--	**7**	--	**59**	--	1000 U
MW-01-22	970225-MW1-22-01	2/25/1997	--	**1.8**	--	**3.1**	--	100 U
MW-01-22	970225-MW1-22-02	2/25/1997	--	**2.1**	--	**2.9**	--	**0.1**
MW-01-22	970827-MW1-22-01	8/27/1997	--	**12**	--	**75**	--	**2.1**
MW-01-22	970827-MW1-22-02	8/27/1997	--	**14**	--	**73**	--	**3.2**
MW-01-22	980217-MW1-22-01	2/17/1998	--	**2.7**	--	**1.4**	--	**0.48**
MW-01-22	980602-MW1-32-11	6/2/1998	--	**25**	--	**4.9**	--	**9.6**
MW-01-22	980826-MW1-22-10	8/26/1998	--	**55**	--	**78**	--	**16**
MW-01-22	981118-MW1-22-15	11/18/1998	--	**3.6**	--	**51**	--	**0.32**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-15-50	020711-MW15-50-104	7/11/2002	--	**3640**	--	**41.2**	--	**7.6**
MW-15-50	020711-MW15-50-105	7/11/2002	--	**5580**	--	**52.6**	--	**10.6**
MW-15-50	020925-MW15-50-110	9/25/2002	--	**7700**	--	**82**	--	**19**
MW-15-50	020925-MW15-50-111	9/25/2002	--	**7700**	--	**76**	--	**10**
MW-15-50	021218-MW15-50-107	12/18/2002	--	**7000**	--	**160**	--	**33**
MW-15-50	030321-MW15-50-122	3/21/2003	--	**4900**	--	**50**	--	10000 U
MW-15-50	030603-MW15-50-105	6/3/2003	--	**3300**	--	**29**	--	**2.1**
MW-15-66	990728-MW15-66-03	7/28/1999	--	**0.57**	--	**0.17**	--	**0.34**
MW-15-66	991026-MW15-66-07	10/26/1999	--	100 U	--	100 U	--	100 U
MW-15-66	000329-MW15-66-108	3/29/2000	--	100 U	--	**0.33**	--	**0.96**
MW-15-66	000615-MW15-66-104	6/15/2000	--	100 U	--	**1.07**	--	**2.92**
MW-15-66	001005-MW15-66-08	10/5/2000	--	100 U	--	**0.14**	--	**0.43**
MW-15-66	001221-MW15-66-104	12/21/2000	--	100 U	--	100 U	--	**0.2**
MW-15-66	010328-MW15-66-107	3/28/2001	--	100 U	--	**0.1**	--	**0.19**
MW-15-66	011010-MW15-66-110	10/10/2001	--	100 U	--	100 U	--	100 U
MW-15-66	011213-MW15-66-103	12/13/2001	--	100 U	--	100 U	--	100 U
MW-15-66	020404-MW15-66-107	4/4/2002	--	100 U	--	100 U	--	100 U
MW-15-66	020711-MW15-66-103	7/11/2002	--	100 U	--	100 U	--	100 U
MW-15-66	020925-MW15-66-109	9/25/2002	--	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-105	12/18/2002	--	100 U	--	100 U	--	100 U
MW-15-66	021218-MW15-66-106	12/18/2002	--	100 U	--	100 U	--	100 U
MW-15-66	030318-MW15-66-107	3/18/2003	--	100 U	--	100 U	--	**0.1**
MW-15-66	030603-MW15-66-104	6/3/2003	--	100 U	--	**0.34**	--	**1.1**
Spent Oxide								
B-01	950921-BW1-01	9/21/1995	--	**140000**	--	**19000**	--	**1700**
B-05	950925-BW05-01	9/29/1995	--	**940**	--	**6900**	--	**1400**
MW-01-22	951207-MW1-22-01	12/7/1995	--	**39**	--	**100**	--	**68**
MW-01-22	960319-MW1-22-01	3/19/1996	--	**90**	--	**15**	--	**4.6**
MW-01-22	960618-MW1-22-01	6/18/1996	--	**75**	--	**12**	--	**2.9**
MW-01-22	961001-MW1-22-01	10/1/1996	--	**440**	--	**130**	--	**6**
MW-01-22	970225-MW1-22-01	2/25/1997	--	**47**	--	**6.5**	--	**1.9**
MW-01-22	970225-MW1-22-02	2/25/1997	--	**44**	--	**5.5**	--	**2.5**
MW-01-22	970827-MW1-22-01	8/27/1997	--	**550**	--	**230**	--	**11**
MW-01-22	970827-MW1-22-02	8/27/1997	--	**350**	--	**170**	--	**12**
MW-01-22	980217-MW1-22-01	2/17/1998	--	**4.7**	--	**3.5**	--	**3.2**
MW-01-22	980602-MW1-32-11	6/2/1998	--	**3.3**	--	**23**	--	**29**
MW-01-22	980826-MW1-22-10	8/26/1998	--	**390**	--	**240**	--	**62**
MW-01-22	981118-MW1-22-15	11/18/1998	--	**340**	--	**100**	--	**3.2**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-01-22	990216-MW1-22-012	2/16/1999	--	**0.33**	--	100 U	--	**1.21**
MW-01-22	990513-MW1-22-11	5/13/1999	--	**2.31**	--	100 U	--	**1.67**
MW-01-22	990824-MW1-22-15	8/24/1999	--	**62.3**	--	**1.42**	--	**16.2**
MW-01-22	991028-MW1-22-16	10/28/1999	--	**48.5**	--	**0.56**	--	**6.58**
MW-01-22	000330-MW1-22-116	3/30/2000	--	**4.52**	--	100 U	--	**2.22**
MW-01-22	010329-MW1-22-115	3/29/2001	--	**2.32**	--	**0.18**	--	**4.14**
MW-02-32	951206-MW2-32-01	12/6/1995	--	**4**	--	**0.29**	--	**0.28**
MW-02-32	960318-MW2-32-01	3/18/1996	--	**4**	--	**0.16**	--	**0.1**
MW-02-32	960618-MW2-32-01	6/18/1996	--	**1.5**	--	**0.23**	--	**0.15**
MW-02-32	961001-MW2-32-01	10/1/1996	--	**8.4**	--	**0.14**	--	**0.16**
MW-02-32	970225-MW2-32-01	2/25/1997	--	**1.1**	--	100 U	--	100 U
MW-02-32	970827-MW2-32-01	8/27/1997	--	**16**	--	**0.17**	--	**0.19**
MW-02-32	980217-MW2-32-01	2/17/1998	--	**4.2**	--	**0.11**	--	100 U
MW-02-32	980601-MW2-32-05	6/1/1998	--	**2.2**	--	100 U	--	100 U
MW-02-32	980825-MW2-32-04	8/25/1998	--	**4**	--	**0.11**	--	100 U
MW-02-32	981117-MW2-32-10	11/17/1998	--	100 U	--	100 U	--	100 U
MW-02-32	990216-MW2-32-008	2/16/1999	--	**17.9**	--	**0.45**	--	100 U
MW-02-32	990513-MW2-32-10	5/13/1999	--	**8.08**	--	**0.1**	--	100 U
MW-02-32	990824-MW2-32-10	8/24/1999	--	**5.08**	--	100 U	--	**0.12**
MW-02-32	991027-MW2-32-12	10/27/1999	--	100 U	--	100 U	--	100 U
MW-02-32	000329-MW2-32-112	3/29/2000	--	**1.55**	--	100 U	--	100 U
MW-02-32	010328-MW2-32-111	3/28/2001	--	100 U	--	100 U	--	100 U
MW-02-61	981116-MW2-61-04	11/16/1998	--	100 U	--	100 U	--	100 U
MW-02-61	990216-MW2-61-006	2/16/1999	--	100 U	--	100 U	--	100 U
MW-02-61	990512-MW2-61-05	5/12/1999	--	100 U	--	100 U	--	100 U
MW-02-61	990823-MW2-61-07	8/23/1999	--	100 U	--	100 U	--	100 U
MW-02-61	991026-MW2-61-04	10/26/1999	--	100 U	--	100 U	--	100 U
MW-02-61	000328-MW2-61-104	3/28/2000	--	100 U	--	100 U	--	100 U
Spent Oxide (Continued)								
MW-02-61	001004-MW2-61-04	10/4/2000	--	100 U	--	100 U	--	100 U
MW-02-61	010328-MW2-61-104	3/28/2001	--	100 U	--	100 U	--	100 U
MW-02-61	011009-MW2-61-104	10/9/2001	--	100 U	--	100 U	--	100 U
MW-02-61	020403-MW2-61-103	4/3/2002	--	100 U	--	100 U	--	100 U
MW-02-61	020924-MW2-61-103	9/24/2002	--	100 U	--	100 U	--	100 U
MW-02-61	030318-MW2-61-104	3/18/2003	--	100 U	--	100 U	--	100 U
Tar Pond								
B-31	950925-BW31-01	9/25/1995	--	**96000**	--	**2700**	--	**15000**
MW-03-26	951206-MW3-26-01	12/6/1995	--	**1.5**	--	**2.7**	--	**2.3**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-01-22	990216-MW1-22-012	2/16/1999	--	**0.72**	--	**0.76**	--
MW-01-22	990513-MW1-22-11	5/13/1999	--	**0.66**	--	**0.55**	--
MW-01-22	990824-MW1-22-15	8/24/1999	--	**10.6**	--	**12.1**	--
MW-01-22	991028-MW1-22-16	10/28/1999	--	**1.48**	--	**1.58**	--
MW-01-22	000330-MW1-22-116	3/30/2000	--	**0.21**	--	100 U	--
MW-01-22	010329-MW1-22-115	3/29/2001	--	**2.31**	--	**2.22**	--
MW-02-32	951206-MW2-32-01	12/6/1995	--	100 U	--	100 U	--
MW-02-32	960318-MW2-32-01	3/18/1996	--	100 U	--	100 U	--
MW-02-32	960618-MW2-32-01	6/18/1996	--	100 U	--	100 U	--
MW-02-32	961001-MW2-32-01	10/1/1996	--	100 U	--	100 U	--
MW-02-32	970225-MW2-32-01	2/25/1997	--	100 U	--	100 U	--
MW-02-32	970827-MW2-32-01	8/27/1997	--	100 U	--	**0.1**	--
MW-02-32	980217-MW2-32-01	2/17/1998	--	100 U	--	100 U	--
MW-02-32	980601-MW2-32-05	6/1/1998	--	100 U	--	100 U	--
MW-02-32	980825-MW2-32-04	8/25/1998	--	**0.17**	--	**0.35**	--
MW-02-32	981117-MW2-32-10	11/17/1998	--	100 U	--	100 U	--
MW-02-32	990216-MW2-32-008	2/16/1999	--	100 U	--	100 U	--
MW-02-32	990513-MW2-32-10	5/13/1999	--	100 U	--	100 U	--
MW-02-32	990824-MW2-32-10	8/24/1999	--	100 U	--	100 U	--
MW-02-32	991027-MW2-32-12	10/27/1999	--	100 U	--	100 U	--
MW-02-32	000329-MW2-32-112	3/29/2000	--	100 U	--	100 U	--
MW-02-32	010328-MW2-32-111	3/28/2001	--	100 U	--	100 U	--
MW-02-61	981116-MW2-61-04	11/16/1998	--	100 U	--	100 U	--
MW-02-61	990216-MW2-61-006	2/16/1999	--	100 U	--	100 U	--
MW-02-61	990512-MW2-61-05	5/12/1999	--	100 U	--	100 U	--
MW-02-61	990823-MW2-61-07	8/23/1999	--	100 U	--	100 U	--
MW-02-61	991026-MW2-61-04	10/26/1999	--	100 U	--	100 U	--
MW-02-61	000328-MW2-61-104	3/28/2000	--	100 U	--	100 U	--
Spent Oxide (Continued)							
MW-02-61	001004-MW2-61-04	10/4/2000	--	100 U	--	100 U	--
MW-02-61	010328-MW2-61-104	3/28/2001	--	100 U	--	100 U	--
MW-02-61	011009-MW2-61-104	10/9/2001	--	100 U	--	100 U	--
MW-02-61	020403-MW2-61-103	4/3/2002	--	100 U	--	100 U	--
MW-02-61	020924-MW2-61-103	9/24/2002	--	100 U	--	100 U	--
MW-02-61	030318-MW2-61-104	3/18/2003	--	100 U	--	100 U	--
Tar Pond							
B-31	950925-BW31-01	9/25/1995	--	**2400**	--	**2400**	--
MW-03-26	951206-MW3-26-01	12/6/1995	--	**2.8**	--	**4.1**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-01-22	990216-MW1-22-012	2/16/1999	**0.85**	--	**0.52**	--
MW-01-22	990513-MW1-22-11	5/13/1999	**0.65**	--	**0.45**	--
MW-01-22	990824-MW1-22-15	8/24/1999	**9.2**	--	**11.3**	--
MW-01-22	991028-MW1-22-16	10/28/1999	**1.19**	--	**1.21**	--
MW-01-22	000330-MW1-22-116	3/30/2000	100 U	--	100 U	--
MW-01-22	010329-MW1-22-115	3/29/2001	**1.95**	--	**2**	--
MW-02-32	951206-MW2-32-01	12/6/1995	100 U	--	100 U	--
MW-02-32	960318-MW2-32-01	3/18/1996	100 U	--	100 U	--
MW-02-32	960618-MW2-32-01	6/18/1996	100 U	--	100 U	--
MW-02-32	961001-MW2-32-01	10/1/1996	100 U	--	**0.1**	--
MW-02-32	970225-MW2-32-01	2/25/1997	100 U	--	100 U	--
MW-02-32	970827-MW2-32-01	8/27/1997	100 U	--	**0.14**	--
MW-02-32	980217-MW2-32-01	2/17/1998	100 U	--	100 U	--
MW-02-32	980601-MW2-32-05	6/1/1998	100 U	--	100 U	--
MW-02-32	980825-MW2-32-04	8/25/1998	**0.37**	--	**0.47**	--
MW-02-32	981117-MW2-32-10	11/17/1998	100 U	--	100 U	--
MW-02-32	990216-MW2-32-008	2/16/1999	100 U	--	100 U	--
MW-02-32	990513-MW2-32-10	5/13/1999	100 U	--	100 U	--
MW-02-32	990824-MW2-32-10	8/24/1999	100 U	--	**0.18**	--
MW-02-32	991027-MW2-32-12	10/27/1999	100 U	--	100 U	--
MW-02-32	000329-MW2-32-112	3/29/2000	100 U	--	100 U	--
MW-02-32	010328-MW2-32-111	3/28/2001	100 U	--	100 U	--
MW-02-61	981116-MW2-61-04	11/16/1998	100 U	--	100 U	--
MW-02-61	990216-MW2-61-006	2/16/1999	100 U	--	100 U	--
MW-02-61	990512-MW2-61-05	5/12/1999	100 U	--	100 U	--
MW-02-61	990823-MW2-61-07	8/23/1999	100 U	--	100 U	--
MW-02-61	991026-MW2-61-04	10/26/1999	100 U	--	100 U	--
MW-02-61	000328-MW2-61-104	3/28/2000	100 U	--	100 U	--
Spent Oxide (Continued)						
MW-02-61	001004-MW2-61-04	10/4/2000	100 U	--	100 U	--
MW-02-61	010328-MW2-61-104	3/28/2001	100 U	--	100 U	--
MW-02-61	011009-MW2-61-104	10/9/2001	100 U	--	100 U	--
MW-02-61	020403-MW2-61-103	4/3/2002	100 U	--	100 U	--
MW-02-61	020924-MW2-61-103	9/24/2002	100 U	--	100 U	--
MW-02-61	030318-MW2-61-104	3/18/2003	100 U	--	100 U	--
Tar Pond						
B-31	950925-BW31-01	9/25/1995	**2100**	--	**1600**	--
MW-03-26	951206-MW3-26-01	12/6/1995	**4.7**	--	**3.9**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-01-22	990216-MW1-22-012	2/16/1999	100 U	--	**0.88**	--	100 U
MW-01-22	990513-MW1-22-11	5/13/1999	**0.25**	--	**0.75**	--	100 U
MW-01-22	990824-MW1-22-15	8/24/1999	**7.97**	--	**17.3**	--	**2.08**
MW-01-22	991028-MW1-22-16	10/28/1999	**1.02**	--	**2.27**	--	**0.2**
MW-01-22	000330-MW1-22-116	3/30/2000	100 U	--	**0.21**	--	100 U
MW-01-22	010329-MW1-22-115	3/29/2001	**1.42**	--	**3.03**	--	**0.66**
MW-02-32	951206-MW2-32-01	12/6/1995	100 U	--	100 U	--	100 U
MW-02-32	960318-MW2-32-01	3/18/1996	100 U	--	100 U	--	100 U
MW-02-32	960618-MW2-32-01	6/18/1996	100 U	--	100 U	--	100 U
MW-02-32	961001-MW2-32-01	10/1/1996	100 U	--	100 U	--	100 U
MW-02-32	970225-MW2-32-01	2/25/1997	100 U	--	100 U	--	100 U
MW-02-32	970827-MW2-32-01	8/27/1997	100 U	--	100 U	--	100 U
MW-02-32	980217-MW2-32-01	2/17/1998	100 U	--	100 U	--	100 U
MW-02-32	980601-MW2-32-05	6/1/1998	100 U	--	100 U	--	100 U
MW-02-32	980825-MW2-32-04	8/25/1998	100 U	--	**0.2**	--	100 U
MW-02-32	981117-MW2-32-10	11/17/1998	100 U	--	100 U	--	100 U
MW-02-32	990216-MW2-32-008	2/16/1999	100 U	--	100 U	--	100 U
MW-02-32	990513-MW2-32-10	5/13/1999	100 U	--	100 U	--	100 U
MW-02-32	990824-MW2-32-10	8/24/1999	100 U	--	100 U	--	100 U
MW-02-32	991027-MW2-32-12	10/27/1999	100 U	--	100 U	--	100 U
MW-02-32	000329-MW2-32-112	3/29/2000	100 U	--	100 U	--	100 U
MW-02-32	010328-MW2-32-111	3/28/2001	100 U	--	100 U	--	100 U
MW-02-61	981116-MW2-61-04	11/16/1998	100 U	--	100 U	--	100 U
MW-02-61	990216-MW2-61-006	2/16/1999	100 U	--	100 U	--	100 U
MW-02-61	990512-MW2-61-05	5/12/1999	100 U	--	100 U	--	100 U
MW-02-61	990823-MW2-61-07	8/23/1999	100 U	--	100 U	--	100 U
MW-02-61	991026-MW2-61-04	10/26/1999	100 U	--	100 U	--	100 U
MW-02-61	000328-MW2-61-104	3/28/2000	100 U	--	100 U	--	100 U
Spent Oxide (Continued)							
MW-02-61	001004-MW2-61-04	10/4/2000	100 U	--	100 U	--	100 U
MW-02-61	010328-MW2-61-104	3/28/2001	100 U	--	100 U	--	100 U
MW-02-61	011009-MW2-61-104	10/9/2001	100 U	--	100 U	--	100 U
MW-02-61	020403-MW2-61-103	4/3/2002	100 U	--	100 U	--	100 U
MW-02-61	020924-MW2-61-103	9/24/2002	100 U	--	100 U	--	100 U
MW-02-61	030318-MW2-61-104	3/18/2003	100 U	--	100 U	--	100 U
Tar Pond							
B-31	950925-BW31-01	9/25/1995	**970**	--	**3900**	--	**210**
MW-03-26	951206-MW3-26-01	12/6/1995	**1.5**	--	**4.6**	--	**0.54**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-01-22	990216-MW1-22-012	2/16/1999	--	**1.91**	--	**0.49**	--	**0.32**
MW-01-22	990513-MW1-22-11	5/13/1999	--	**2.12**	--	**3.26**	--	**0.31**
MW-01-22	990824-MW1-22-15	8/24/1999	--	**24.6**	--	**64.1**	--	**8.94**
MW-01-22	991028-MW1-22-16	10/28/1999	--	**6.51**	--	**51.5**	--	**0.95**
MW-01-22	000330-MW1-22-116	3/30/2000	--	**2.84**	--	**4.63**	--	100 U
MW-01-22	010329-MW1-22-115	3/29/2001	--	**6.73**	--	**3.35**	--	**1.77**
MW-02-32	951206-MW2-32-01	12/6/1995	--	**0.48**	--	**0.32**	--	100 U
MW-02-32	960318-MW2-32-01	3/18/1996	--	100 U	--	100 U	--	100 U
MW-02-32	960618-MW2-32-01	6/18/1996	--	100 U	--	**0.22**	--	100 U
MW-02-32	961001-MW2-32-01	10/1/1996	--	**0.12**	--	**0.23**	--	100 U
MW-02-32	970225-MW2-32-01	2/25/1997	--	100 U	--	**0.15**	--	100 U
MW-02-32	970827-MW2-32-01	8/27/1997	--	100 U	--	**0.21**	--	**0.1**
MW-02-32	980217-MW2-32-01	2/17/1998	--	100 U	--	**0.19**	--	100 U
MW-02-32	980601-MW2-32-05	6/1/1998	--	100 U	--	**0.19**	--	100 U
MW-02-32	980825-MW2-32-04	8/25/1998	--	**0.26**	--	**0.12**	--	**0.3**
MW-02-32	981117-MW2-32-10	11/17/1998	--	100 U	--	100 U	--	100 U
MW-02-32	990216-MW2-32-008	2/16/1999	--	100 U	--	100 U	--	100 U
MW-02-32	990513-MW2-32-10	5/13/1999	--	100 U	--	**0.26**	--	100 U
MW-02-32	990824-MW2-32-10	8/24/1999	--	100 U	--	**0.15**	--	**0.11**
MW-02-32	991027-MW2-32-12	10/27/1999	--	100 U	--	100 U	--	100 U
MW-02-32	000329-MW2-32-112	3/29/2000	--	100 U	--	**0.26**	--	100 U
MW-02-32	010328-MW2-32-111	3/28/2001	--	100 U	--	100 U	--	100 U
MW-02-61	981116-MW2-61-04	11/16/1998	--	100 U	--	100 U	--	100 U
MW-02-61	990216-MW2-61-006	2/16/1999	--	100 U	--	100 U	--	100 U
MW-02-61	990512-MW2-61-05	5/12/1999	--	100 U	--	100 U	--	100 U
MW-02-61	990823-MW2-61-07	8/23/1999	--	100 U	--	100 U	--	100 U
MW-02-61	991026-MW2-61-04	10/26/1999	--	100 U	--	100 U	--	100 U
MW-02-61	000328-MW2-61-104	3/28/2000	--	100 U	--	100 U	--	100 U
Spent Oxide (Continued)								
MW-02-61	001004-MW2-61-04	10/4/2000	--	100 U	--	100 U	--	100 U
MW-02-61	010328-MW2-61-104	3/28/2001	--	100 U	--	100 U	--	100 U
MW-02-61	011009-MW2-61-104	10/9/2001	--	100 U	--	100 U	--	100 U
MW-02-61	020403-MW2-61-103	4/3/2002	--	100 U	--	100 U	--	100 U
MW-02-61	020924-MW2-61-103	9/24/2002	--	100 U	--	100 U	--	100 U
MW-02-61	030318-MW2-61-104	3/18/2003	--	100 U	--	100 U	--	100 U
Tar Pond								
B-31	950925-BW31-01	9/25/1995	--	**16000**	--	**29000**	--	**1300**
MW-03-26	951206-MW3-26-01	12/6/1995	--	**8.5**	--	**1.2**	--	**2.8**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-01-22	990216-MW1-22-012	2/16/1999	--	**0.11**	--	**0.89**	--	**2.28**
MW-01-22	990513-MW1-22-11	5/13/1999	--	**0.64**	--	**1.37**	--	**2.34**
MW-01-22	990824-MW1-22-15	8/24/1999	--	**340**	--	**204**	--	**24.8**
MW-01-22	991028-MW1-22-16	10/28/1999	--	**186**	--	**109**	--	**6.43**
MW-01-22	000330-MW1-22-116	3/30/2000	--	**42.4**	--	**3.03**	--	**2.29**
MW-01-22	010329-MW1-22-115	3/29/2001	--	**3.97**	--	**6.78**	--	**8.23**
MW-02-32	951206-MW2-32-01	12/6/1995	--	**45**	--	**0.51**	--	**0.67**
MW-02-32	960318-MW2-32-01	3/18/1996	--	100 U	--	100 U	--	**0.28**
MW-02-32	960618-MW2-32-01	6/18/1996	--	**0.09**	--	100 U	--	**0.41**
MW-02-32	961001-MW2-32-01	10/1/1996	--	**0.22**	--	**0.23**	--	**0.93**
MW-02-32	970225-MW2-32-01	2/25/1997	--	100 U	--	100 U	--	**0.37**
MW-02-32	970827-MW2-32-01	8/27/1997	--	**0.17**	--	100 U	--	**0.96**
MW-02-32	980217-MW2-32-01	2/17/1998	--	100 U	--	100 U	--	**0.52**
MW-02-32	980601-MW2-32-05	6/1/1998	--	100 U	--	100 U	--	**0.82**
MW-02-32	980825-MW2-32-04	8/25/1998	--	100 U	--	**0.11**	--	**0.64**
MW-02-32	981117-MW2-32-10	11/17/1998	--	100 U	--	100 U	--	100 U
MW-02-32	990216-MW2-32-008	2/16/1999	--	**0.1**	--	100 U	--	100 U
MW-02-32	990513-MW2-32-10	5/13/1999	--	100 U	--	100 U	--	**0.58**
MW-02-32	990824-MW2-32-10	8/24/1999	--	100 U	--	**0.11**	--	**0.54**
MW-02-32	991027-MW2-32-12	10/27/1999	--	100 U	--	100 U	--	100 U
MW-02-32	000329-MW2-32-112	3/29/2000	--	100 U	--	100 U	--	**0.42**
MW-02-32	010328-MW2-32-111	3/28/2001	--	100 U	--	100 U	--	100 U
MW-02-61	981116-MW2-61-04	11/16/1998	--	**0.33**	--	100 U	--	100 U
MW-02-61	990216-MW2-61-006	2/16/1999	--	**0.37**	--	100 U	--	100 U
MW-02-61	990512-MW2-61-05	5/12/1999	--	**0.54**	--	100 U	--	100 U
MW-02-61	990823-MW2-61-07	8/23/1999	--	100 U	--	100 U	--	100 U
MW-02-61	991026-MW2-61-04	10/26/1999	--	100 U	--	100 U	--	100 U
MW-02-61	000328-MW2-61-104	3/28/2000	--	100 U	--	100 U	--	100 U
Spent Oxide (Continued)								
MW-02-61	001004-MW2-61-04	10/4/2000	--	100 U	--	100 U	--	100 U
MW-02-61	010328-MW2-61-104	3/28/2001	--	100 U	--	100 U	--	100 U
MW-02-61	011009-MW2-61-104	10/9/2001	--	100 U	--	100 U	--	100 U
MW-02-61	020403-MW2-61-103	4/3/2002	--	100 U	--	100 U	--	100 U
MW-02-61	020924-MW2-61-103	9/24/2002	--	100 U	--	100 U	--	100 U
MW-02-61	030318-MW2-61-104	3/18/2003	--	100 U	--	100 U	--	100 U
Tar Pond								
B-31	950925-BW31-01	9/25/1995	--	**420000**	--	**76000**	--	**25000**
MW-03-26	951206-MW3-26-01	12/6/1995	--	**30**	--	**4.7**	--	**9.4**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-03-26	960318-MW3-26-02	3/18/1996	--	**2.5**	--	**1.4**	--	**1.1**
MW-03-26	960618-MW3-26-01	6/18/1996	--	**5.5**	--	**2.6**	--	**1.5**
MW-03-26	961001-MW3-26-01	10/1/1996	--	100 U	--	**9.5**	--	100 U
MW-03-26	970225-MW3-26-01	2/25/1997	--	**0.79**	--	**0.32**	--	**0.1**
MW-03-26	970827-MW3-26-01	8/27/1997	--	**1.3**	--	**1.7**	--	**1.1**
MW-03-26	980217-MW3-26-01	2/17/1998	--	**0.18**	--	**0.5**	--	**0.24**
MW-03-26	980602-MW3-26-09	6/2/1998	--	**0.3**	--	**1.6**	--	**1.5**
MW-03-26	980826-MW3-26-08	8/26/1998	--	10000 U	--	**19**	--	10000 U
MW-03-26	981117-MW3-26-12	11/17/1998	--	1000 U	--	**1.7**	--	1000 U
MW-03-26	990216-MW3-26-010	2/16/1999	--	100 U	--	100 U	--	**0.11**
MW-03-26	990514-MW3-26-23	5/14/1999	--	**1.57**	--	**0.4**	--	**0.3**
MW-03-26	990824-MW3-26-12	8/24/1999	--	**0.71**	--	**0.21**	--	**0.21**
MW-03-26	991027-MW3-26-14	10/27/1999	--	100 U	--	**0.3**	--	**0.18**
MW-03-26	000330-MW3-26-113	3/30/2000	--	**0.59**	--	**0.27**	--	**0.22**
MW-03-26	001005-MW3-26-11	10/5/2000	--	**0.13**	--	**0.29**	--	**0.24**
MW-03-26	010328-MW3-26-113	3/28/2001	--	**0.1**	--	**0.44**	--	100 U
MW-03-56	951206-MW3-56-01	12/6/1995	--	**51**	--	**46**	--	**8.1**
MW-03-56	960319-MW3-56-01	3/19/1996	--	**56**	--	**70**	--	**5.6**
MW-03-56	960620-MW3-56-01	6/20/1996	--	**47**	--	**56**	--	**6.4**
MW-03-56	961002-MW3-56-01	10/2/1996	--	**42**	--	**62**	--	**6**
MW-03-56	970226-MW3-56-01	2/26/1997	--	**42**	--	**51**	--	100 U
MW-03-56	970828-MW3-56-01	8/28/1997	--	**21**	--	**15**	--	**7.3**
MW-03-56	980218-MW3-56-02	2/18/1998	--	**33**	--	**17**	--	**3.9**
MW-03-56	980218-MW3-56-01	2/18/1998	--	**25**	--	**14**	--	**3.7**
MW-03-56	980602-MW3-56-15	6/2/1998	--	**54**	--	**18**	--	**12**
MW-03-56	980602-MW3-56-14	6/2/1998	--	**57**	--	**19**	--	**12**
Tar Pond (Continued)								
MW-03-56	980826-MW3-56-12	8/26/1998	--	**37**	--	**8.5**	--	100 U
MW-03-56	981118-MW3-56-16	11/18/1998	--	**35**	--	**5.9**	--	**4.7**
MW-03-56	981118-MW3-56-17	11/18/1998	--	**35**	--	**6.2**	--	**4.5**
MW-03-56	990217-MW3-56-015	2/17/1999	--	**37.4**	--	**5.54**	--	**6.08**
MW-03-56	990514-MW3-56-24	5/14/1999	--	**50.2**	--	**4.02**	--	**8.8**
MW-03-56	990824-MW3-56-16	8/24/1999	--	**33**	--	**2.63**	--	**3.76**
MW-03-56	991028-MW3-56-17	10/28/1999	--	**35.4**	--	**2.49**	--	**4.59**
MW-03-56	000330-MW3-56-117	3/30/2000	--	**36.4**	--	**2.93**	--	**7.16**
MW-03-56	001005-MW3-56-13	10/5/2000	--	**36.5**	--	**1.65**	--	**7.83**
MW-03-56	010329-MW3-56-116	3/29/2001	--	**30.5**	--	**0.95**	--	**5.95**
MW-03-56	020404-MW3-56-111	4/4/2002	--	**37.9**	--	**0.41**	--	**5.32**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-03-26	960318-MW3-26-02	3/18/1996	--	**0.29**	--	**0.39**	--
MW-03-26	960618-MW3-26-01	6/18/1996	--	**0.49**	--	**0.56**	--
MW-03-26	961001-MW3-26-01	10/1/1996	--	**29**	--	**47**	--
MW-03-26	970225-MW3-26-01	2/25/1997	--	**0.78**	--	**1.3**	--
MW-03-26	970827-MW3-26-01	8/27/1997	--	**4.1**	--	**7.7**	--
MW-03-26	980217-MW3-26-01	2/17/1998	--	**0.68**	--	**1.8**	--
MW-03-26	980602-MW3-26-09	6/2/1998	--	**13**	--	**26**	--
MW-03-26	980826-MW3-26-08	8/26/1998	--	**62**	--	**160**	--
MW-03-26	981117-MW3-26-12	11/17/1998	--	**3.9**	--	**9.2**	--
MW-03-26	990216-MW3-26-010	2/16/1999	--	**0.24**	--	**0.22**	--
MW-03-26	990514-MW3-26-23	5/14/1999	--	**0.46**	--	**1.14**	--
MW-03-26	990824-MW3-26-12	8/24/1999	--	**0.12**	--	**0.38**	--
MW-03-26	991027-MW3-26-14	10/27/1999	--	**0.77**	--	**1.9**	--
MW-03-26	000330-MW3-26-113	3/30/2000	--	**0.27**	--	**0.63**	--
MW-03-26	001005-MW3-26-11	10/5/2000	--	**0.22**	--	**0.89**	--
MW-03-26	010328-MW3-26-113	3/28/2001	--	**0.78**	--	**1.72**	--
MW-03-56	951206-MW3-56-01	12/6/1995	--	**0.73**	--	**0.41**	--
MW-03-56	960319-MW3-56-01	3/19/1996	--	**0.59**	--	**0.38**	--
MW-03-56	960620-MW3-56-01	6/20/1996	--	**0.45**	--	**0.26**	--
MW-03-56	961002-MW3-56-01	10/2/1996	--	**0.27**	--	100 U	--
MW-03-56	970226-MW3-56-01	2/26/1997	--	**0.33**	--	100 U	--
MW-03-56	970828-MW3-56-01	8/28/1997	--	**0.28**	--	**0.13**	--
MW-03-56	980218-MW3-56-02	2/18/1998	--	**0.26**	--	100 U	--
MW-03-56	980218-MW3-56-01	2/18/1998	--	**0.28**	--	100 U	--
MW-03-56	980602-MW3-56-15	6/2/1998	--	**5.1**	--	**5.3**	--
MW-03-56	980602-MW3-56-14	6/2/1998	--	**5.3**	--	**5.1**	--
Tar Pond (Continued)							
MW-03-56	980826-MW3-56-12	8/26/1998	--	**0.72**	--	**0.66**	--
MW-03-56	981118-MW3-56-16	11/18/1998	--	**0.33**	--	**0.16**	--
MW-03-56	981118-MW3-56-17	11/18/1998	--	**0.29**	--	**0.1**	--
MW-03-56	990217-MW3-56-015	2/17/1999	--	**2.52**	--	**2.9**	--
MW-03-56	990514-MW3-56-24	5/14/1999	--	**0.66**	--	**0.51**	--
MW-03-56	990824-MW3-56-16	8/24/1999	--	**0.26**	--	1000 U	--
MW-03-56	991028-MW3-56-17	10/28/1999	--	**0.27**	--	100 U	--
MW-03-56	000330-MW3-56-117	3/30/2000	--	**0.87**	--	**0.73**	--
MW-03-56	001005-MW3-56-13	10/5/2000	--	**2.2**	--	**2.76**	--
MW-03-56	010329-MW3-56-116	3/29/2001	--	**1.93**	--	**1.88**	--
MW-03-56	020404-MW3-56-111	4/4/2002	--	**0.53**	--	**0.47**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-03-26	960318-MW3-26-02	3/18/1996	**0.35**	--	**0.34**	--
MW-03-26	960618-MW3-26-01	6/18/1996	**0.47**	--	**0.42**	--
MW-03-26	961001-MW3-26-01	10/1/1996	**41**	--	**34**	--
MW-03-26	970225-MW3-26-01	2/25/1997	**1.1**	--	**1.1**	--
MW-03-26	970827-MW3-26-01	8/27/1997	**5.7**	--	**5.6**	--
MW-03-26	980217-MW3-26-01	2/17/1998	**1.5**	--	**2.4**	--
MW-03-26	980602-MW3-26-09	6/2/1998	**24**	--	**25**	--
MW-03-26	980826-MW3-26-08	8/26/1998	**130**	--	**120**	--
MW-03-26	981117-MW3-26-12	11/17/1998	**7.1**	--	**7.5**	--
MW-03-26	990216-MW3-26-010	2/16/1999	**0.22**	--	**0.17**	--
MW-03-26	990514-MW3-26-23	5/14/1999	**1.04**	--	**1.36**	--
MW-03-26	990824-MW3-26-12	8/24/1999	**0.2**	--	**0.46**	--
MW-03-26	991027-MW3-26-14	10/27/1999	**1.14**	--	**1.57**	--
MW-03-26	000330-MW3-26-113	3/30/2000	**0.37**	--	**0.76**	--
MW-03-26	001005-MW3-26-11	10/5/2000	**0.69**	--	**0.71**	--
MW-03-26	010328-MW3-26-113	3/28/2001	**1.25**	--	**2.08**	--
MW-03-56	951206-MW3-56-01	12/6/1995	**0.33**	--	**0.36**	--
MW-03-56	960319-MW3-56-01	3/19/1996	**0.33**	--	**0.28**	--
MW-03-56	960620-MW3-56-01	6/20/1996	**0.22**	--	**0.21**	--
MW-03-56	961002-MW3-56-01	10/2/1996	100 U	--	100 U	--
MW-03-56	970226-MW3-56-01	2/26/1997	100 U	--	100 U	--
MW-03-56	970828-MW3-56-01	8/28/1997	**0.13**	--	100 U	--
MW-03-56	980218-MW3-56-02	2/18/1998	100 U	--	100 U	--
MW-03-56	980218-MW3-56-01	2/18/1998	**0.1**	--	100 U	--
MW-03-56	980602-MW3-56-15	6/2/1998	**4.7**	--	**4.3**	--
MW-03-56	980602-MW3-56-14	6/2/1998	**4.9**	--	**4.3**	--
Tar Pond (Continued)						
MW-03-56	980826-MW3-56-12	8/26/1998	**0.61**	--	**0.44**	--
MW-03-56	981118-MW3-56-16	11/18/1998	**0.16**	--	100 U	--
MW-03-56	981118-MW3-56-17	11/18/1998	**0.11**	--	100 U	--
MW-03-56	990217-MW3-56-015	2/17/1999	**2.95**	--	**2.3**	--
MW-03-56	990514-MW3-56-24	5/14/1999	**0.46**	--	**0.37**	--
MW-03-56	990824-MW3-56-16	8/24/1999	1000 U	--	1000 U	--
MW-03-56	991028-MW3-56-17	10/28/1999	100 U	--	100 U	--
MW-03-56	000330-MW3-56-117	3/30/2000	**0.43**	--	**0.58**	--
MW-03-56	001005-MW3-56-13	10/5/2000	**2.3**	--	**1.89**	--
MW-03-56	010329-MW3-56-116	3/29/2001	**1.27**	--	**2.03**	--
MW-03-56	020404-MW3-56-111	4/4/2002	**0.26**	--	**0.46**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name / Total/Dissolved / Unit / Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-03-26	960318-MW3-26-02	3/18/1996	**0.14**	--	**0.3**	--	100 U
MW-03-26	960618-MW3-26-01	6/18/1996	**0.17**	--	**0.55**	--	100 U
MW-03-26	961001-MW3-26-01	10/1/1996	**12**	--	**30**	--	100 U
MW-03-26	970225-MW3-26-01	2/25/1997	**0.36**	--	**0.59**	--	100 U
MW-03-26	970827-MW3-26-01	8/27/1997	**2**	--	**3.9**	--	1000 U
MW-03-26	980217-MW3-26-01	2/17/1998	**0.39**	--	**0.44**	--	**0.35**
MW-03-26	980602-MW3-26-09	6/2/1998	**5.7**	--	**11**	--	**3.1**
MW-03-26	980826-MW3-26-08	8/26/1998	**46**	--	**76**	--	**16**
MW-03-26	981117-MW3-26-12	11/17/1998	**2.1**	--	**3.7**	--	**0.93**
MW-03-26	990216-MW3-26-010	2/16/1999	100 U	--	**0.29**	--	100 U
MW-03-26	990514-MW3-26-23	5/14/1999	**0.26**	--	**0.42**	--	**0.15**
MW-03-26	990824-MW3-26-12	8/24/1999	**0.17**	--	**0.17**	--	**0.3**
MW-03-26	991027-MW3-26-14	10/27/1999	**0.94**	--	**1.08**	--	**0.23**
MW-03-26	000330-MW3-26-113	3/30/2000	**0.32**	--	**0.3**	--	100 U
MW-03-26	001005-MW3-26-11	10/5/2000	**0.24**	--	**0.26**	--	**0.11**
MW-03-26	010328-MW3-26-113	3/28/2001	**0.74**	--	**0.93**	--	100 U
MW-03-56	951206-MW3-56-01	12/6/1995	**0.14**	--	**0.85**	--	100 U
MW-03-56	960319-MW3-56-01	3/19/1996	**0.13**	--	**0.73**	--	100 U
MW-03-56	960620-MW3-56-01	6/20/1996	100 U	--	**0.51**	--	100 U
MW-03-56	961002-MW3-56-01	10/2/1996	100 U	--	**0.27**	--	100 U
MW-03-56	970226-MW3-56-01	2/26/1997	100 U	--	**0.29**	--	100 U
MW-03-56	970828-MW3-56-01	8/28/1997	100 U	--	**0.28**	--	100 U
MW-03-56	980218-MW3-56-02	2/18/1998	100 U	--	**0.2**	--	100 U
MW-03-56	980218-MW3-56-01	2/18/1998	100 U	--	**0.2**	--	100 U
MW-03-56	980602-MW3-56-15	6/2/1998	**1.9**	--	**4.5**	--	1000 U
MW-03-56	980602-MW3-56-14	6/2/1998	**1.7**	--	**4.6**	--	1000 U
Tar Pond (Continued)							
MW-03-56	980826-MW3-56-12	8/26/1998	**0.22**	--	**0.82**	--	100 U
MW-03-56	981118-MW3-56-16	11/18/1998	100 U	--	**0.32**	--	100 U
MW-03-56	981118-MW3-56-17	11/18/1998	100 U	--	**0.27**	--	100 U
MW-03-56	990217-MW3-56-015	2/17/1999	100 U	--	**2.32**	--	**0.36**
MW-03-56	990514-MW3-56-24	5/14/1999	**0.16**	--	**0.59**	--	**0.59**
MW-03-56	990824-MW3-56-16	8/24/1999	1000 U	--	**0.34**	--	1000 U
MW-03-56	991028-MW3-56-17	10/28/1999	100 U	--	**0.32**	--	100 U
MW-03-56	000330-MW3-56-117	3/30/2000	**0.38**	--	**1**	--	100 U
MW-03-56	001005-MW3-56-13	10/5/2000	**0.86**	--	**2.71**	--	**0.3**
MW-03-56	010329-MW3-56-116	3/29/2001	**0.96**	--	**2.12**	--	**0.47**
MW-03-56	020404-MW3-56-111	4/4/2002	**0.2**	--	**0.75**	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-03-26	960318-MW3-26-02	3/18/1996	--	**1.1**	--	**0.58**	--	**0.24**
MW-03-26	960618-MW3-26-01	6/18/1996	--	**1.3**	--	**1.3**	--	**0.31**
MW-03-26	961001-MW3-26-01	10/1/1996	--	**36**	--	100 U	--	**23**
MW-03-26	970225-MW3-26-01	2/25/1997	--	**1.2**	--	**0.18**	--	**0.81**
MW-03-26	970827-MW3-26-01	8/27/1997	--	**6.7**	--	1000 U	--	**4.2**
MW-03-26	980217-MW3-26-01	2/17/1998	--	**1**	--	**0.1**	--	**1.9**
MW-03-26	980602-MW3-26-09	6/2/1998	--	**27**	--	**0.47**	--	**17**
MW-03-26	980826-MW3-26-08	8/26/1998	--	**90**	--	10000 U	--	**86**
MW-03-26	981117-MW3-26-12	11/17/1998	--	**6.6**	--	1000 U	--	**5.3**
MW-03-26	990216-MW3-26-010	2/16/1999	--	**1.1**	--	100 U	--	100 U
MW-03-26	990514-MW3-26-23	5/14/1999	--	**1.04**	--	**0.93**	--	**0.95**
MW-03-26	990824-MW3-26-12	8/24/1999	--	**0.59**	--	**0.48**	--	**0.33**
MW-03-26	991027-MW3-26-14	10/27/1999	--	**1.14**	--	**0.33**	--	**1.17**
MW-03-26	000330-MW3-26-113	3/30/2000	--	**0.72**	--	**0.36**	--	**0.55**
MW-03-26	001005-MW3-26-11	10/5/2000	--	**0.65**	--	**0.16**	--	**0.55**
MW-03-26	010328-MW3-26-113	3/28/2001	--	**1.35**	--	**0.19**	--	100 U
MW-03-56	951206-MW3-56-01	12/6/1995	--	**7.8**	--	**19**	--	**0.23**
MW-03-56	960319-MW3-56-01	3/19/1996	--	**6.1**	--	**25**	--	**0.18**
MW-03-56	960620-MW3-56-01	6/20/1996	--	**5.8**	--	**27**	--	**0.15**
MW-03-56	961002-MW3-56-01	10/2/1996	--	**6.7**	--	**27**	--	100 U
MW-03-56	970226-MW3-56-01	2/26/1997	--	**3.2**	--	**21**	--	100 U
MW-03-56	970828-MW3-56-01	8/28/1997	--	**7**	--	**15**	--	100 U
MW-03-56	980218-MW3-56-02	2/18/1998	--	**4.9**	--	**17**	--	100 U
MW-03-56	980218-MW3-56-01	2/18/1998	--	**4.8**	--	**13**	--	100 U
MW-03-56	980602-MW3-56-15	6/2/1998	--	**19**	--	**28**	--	**2.8**
MW-03-56	980602-MW3-56-14	6/2/1998	--	**20**	--	**28**	--	**2.9**
Tar Pond (Continued)								
MW-03-56	980826-MW3-56-12	8/26/1998	--	**4.1**	--	**18**	--	**0.31**
MW-03-56	981118-MW3-56-16	11/18/1998	--	**5.5**	--	**12**	--	100 U
MW-03-56	981118-MW3-56-17	11/18/1998	--	**5.4**	--	**12**	--	100 U
MW-03-56	990217-MW3-56-015	2/17/1999	--	**13.3**	--	**12.2**	--	**1.48**
MW-03-56	990514-MW3-56-24	5/14/1999	--	**6.05**	--	**17.2**	--	**0.27**
MW-03-56	990824-MW3-56-16	8/24/1999	--	**5.17**	--	**9.99**	--	1000 U
MW-03-56	991028-MW3-56-17	10/28/1999	--	**5.32**	--	**11.4**	--	100 U
MW-03-56	000330-MW3-56-117	3/30/2000	--	**8.92**	--	**17.3**	--	**0.43**
MW-03-56	001005-MW3-56-13	10/5/2000	--	**12.4**	--	**15.5**	--	**1.5**
MW-03-56	010329-MW3-56-116	3/29/2001	--	**9.32**	--	**10.9**	--	**1.72**
MW-03-56	020404-MW3-56-111	4/4/2002	--	**7.53**	--	**13.5**	--	**0.41**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-03-26	960318-MW3-26-02	3/18/1996	--	**32**	--	**0.36**	--	**1.3**
MW-03-26	960618-MW3-26-01	6/18/1996	--	**30**	--	**0.79**	--	**1.9**
MW-03-26	961001-MW3-26-01	10/1/1996	--	**10**	--	**8.6**	--	**54**
MW-03-26	970225-MW3-26-01	2/25/1997	--	**0.97**	--	**0.39**	--	**1.9**
MW-03-26	970827-MW3-26-01	8/27/1997	--	1000 U	--	**1.4**	--	**7.8**
MW-03-26	980217-MW3-26-01	2/17/1998	--	**0.39**	--	**0.27**	--	**1.3**
MW-03-26	980602-MW3-26-09	6/2/1998	--	**1.8**	--	**3.8**	--	**43**
MW-03-26	980826-MW3-26-08	8/26/1998	--	**26**	--	**21**	--	**130**
MW-03-26	981117-MW3-26-12	11/17/1998	--	**1.8**	--	**0.9**	--	**8.1**
MW-03-26	990216-MW3-26-010	2/16/1999	--	100 U	--	100 U	--	**1.21**
MW-03-26	990514-MW3-26-23	5/14/1999	--	**1.25**	--	**0.5**	--	**1.44**
MW-03-26	990824-MW3-26-12	8/24/1999	--	100 U	--	100 U	--	**0.36**
MW-03-26	991027-MW3-26-14	10/27/1999	--	**0.19**	--	**0.17**	--	**1.45**
MW-03-26	000330-MW3-26-113	3/30/2000	--	100 U	--	**0.19**	--	**0.77**
MW-03-26	001005-MW3-26-11	10/5/2000	--	**0.2**	--	**0.11**	--	**0.7**
MW-03-26	010328-MW3-26-113	3/28/2001	--	**0.15**	--	**0.4**	--	**1.77**
MW-03-56	951206-MW3-56-01	12/6/1995	--	**1200**	--	**42**	--	**7.8**
MW-03-56	960319-MW3-56-01	3/19/1996	--	**1700**	--	**53**	--	**8.3**
MW-03-56	960620-MW3-56-01	6/20/1996	--	**1300**	--	**39**	--	**8.1**
MW-03-56	961002-MW3-56-01	10/2/1996	--	**730**	--	**58**	--	**5.6**
MW-03-56	970226-MW3-56-01	2/26/1997	--	**440**	--	**53**	--	**7.5**
MW-03-56	970828-MW3-56-01	8/28/1997	--	**85**	--	**39**	--	**5.4**
MW-03-56	980218-MW3-56-02	2/18/1998	--	**26**	--	**48**	--	**5.3**
MW-03-56	980218-MW3-56-01	2/18/1998	--	**22**	--	**41**	--	**5.5**
MW-03-56	980602-MW3-56-15	6/2/1998	--	**32**	--	**86**	--	**28**
MW-03-56	980602-MW3-56-14	6/2/1998	--	**37**	--	**86**	--	**28**
Tar Pond (Continued)								
MW-03-56	980826-MW3-56-12	8/26/1998	--	**16**	--	**6**	--	**8.2**
MW-03-56	981118-MW3-56-16	11/18/1998	--	**9.3**	--	**40**	--	**5.6**
MW-03-56	981118-MW3-56-17	11/18/1998	--	**12**	--	**40**	--	**5.6**
MW-03-56	990217-MW3-56-015	2/17/1999	--	**12.1**	--	**48.3**	--	**13.7**
MW-03-56	990514-MW3-56-24	5/14/1999	--	**16**	--	**44.8**	--	**6.53**
MW-03-56	990824-MW3-56-16	8/24/1999	--	**6.04**	--	**33**	--	**5.47**
MW-03-56	991028-MW3-56-17	10/28/1999	--	**4.35**	--	**29.5**	--	**5.34**
MW-03-56	000330-MW3-56-117	3/30/2000	--	**37.2**	--	**43.5**	--	**8.25**
MW-03-56	001005-MW3-56-13	10/5/2000	--	**1.58**	--	**29.1**	--	**16.5**
MW-03-56	010329-MW3-56-116	3/29/2001	--	**3.37**	--	**24.6**	--	**9.78**
MW-03-56	020404-MW3-56-111	4/4/2002	--	**2.08**	--	**22.7**	--	**5.61**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-03-56	030319-MW3-56-112	3/19/2003	--	**38**	--	**0.4**	--	**5.8**
MW-04-101	981117-MW4-101-09	11/17/1998	--	100 U	--	100 U	--	100 U
MW-04-101	990216-MW4-101-007	2/16/1999	--	100 U	--	100 U	--	100 U
MW-04-101	990514-MW4-101-20	5/14/1999	--	**0.2**	--	100 U	--	100 U
MW-04-101	990514-MW4-101-19	5/14/1999	--	**0.21**	--	100 U	--	100 U
MW-04-101	990824-MW4-101-09	8/24/1999	--	**0.64**	--	100 U	--	100 U
MW-04-101	991027-MW4-101-11	10/27/1999	--	**0.65**	--	100 U	--	100 U
MW-04-101	000329-MW4-101-111	3/29/2000	--	**0.97**	--	100 U	--	100 U
MW-04-101	001005-MW4-101-09	10/5/2000	--	**0.72**	--	100 U	--	100 U
MW-04-101	010328-MW4-101-110	3/28/2001	--	**0.56**	--	100 U	--	100 U
MW-04-101	011009-MW4-101-103	10/9/2001	--	**0.47**	--	100 U	--	100 U
MW-04-101	020404-MW4-101-110	4/4/2002	--	100 U	--	**0.51**	--	100 U
MW-04-101	020924-MW4-101-102	9/24/2002	--	**0.63**	--	100 U	--	100 U
MW-04-101	030318-MW4-101-109	3/18/2003	--	**0.63**	--	100 U	--	100 U
MW-04-35	951206-MW4-35-01	12/6/1995	--	**13**	--	**3**	--	**2.5**
MW-04-35	960318-MW4-35-01	3/18/1996	--	**35**	--	**2.7**	--	**2.7**
MW-04-35	960318-MW4-35-02	3/18/1996	--	**34**	--	**2.8**	--	**2.8**
MW-04-35	960618-MW4-35-01	6/18/1996	--	**25**	--	**3.5**	--	**2**
MW-04-35	961001-MW4-35-01	10/1/1996	--	**19**	--	**2**	--	**1.2**
MW-04-35	970225-MW4-35-01	2/25/1997	--	**24**	--	**2.6**	--	**0.78**
MW-04-35	970827-MW4-57-01	8/27/1997	--	**16**	--	**2.3**	--	**0.93**
MW-04-35	980217-MW4-35-01	2/17/1998	--	**16**	--	**2.1**	--	**0.47**
MW-04-35	980601-MW4-35-06	6/1/1998	--	**20**	--	**2.9**	--	**0.74**
MW-04-35	980826-MW4-35-06	8/26/1998	--	**28**	--	**2.6**	--	**1.6**
Tar Pond (Continued)								
MW-04-35	980826-MW4-35-07	8/26/1998	--	**29**	--	**2.3**	--	**1.6**
MW-04-35	981117-MW4-35-11	11/17/1998	--	**17**	--	**1.9**	--	**1.3**
MW-04-35	990216-MW4-35-009	2/16/1999	--	**9.33**	--	**1.12**	--	**0.69**
MW-04-35	990514-MW4-35-21	5/14/1999	--	**11.6**	--	**1.25**	--	**0.5**
MW-04-35	990824-MW4-35-11	8/24/1999	--	**14.9**	--	**2.28**	--	**0.81**
MW-04-35	991027-MW4-35-13	10/27/1999	--	**36.1**	--	**1.96**	--	**2.89**
MW-04-35	000330-MW4-35-114	3/30/2000	--	**19.7**	--	**2.54**	--	**1.15**
MW-04-35	001005-MW4-35-10	10/5/2000	--	**54.4**	--	**2.38**	--	**3.56**
MW-04-35	010328-MW4-35-112	3/28/2001	--	**9.92**	--	**0.82**	--	**0.49**
MW-04-57	951205-MW4-57-01	12/5/1995	--	**49**	--	**2.2**	--	**5.8**
MW-04-57	960321-MW4-57-01	3/21/1996	--	**35**	--	**1.9**	--	**4.9**
MW-04-57	960620-MW4-57-01	6/20/1996	--	**39**	--	**2.8**	--	**4.1**
MW-04-57	961002-MW4-57-01	10/2/1996	--	**48**	--	**5.6**	--	**4.7**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-03-56	030319-MW3-56-112	3/19/2003	--	**0.46**	--	**0.23**	--
MW-04-101	981117-MW4-101-09	11/17/1998	--	100 U	--	100 U	--
MW-04-101	990216-MW4-101-007	2/16/1999	--	100 U	--	100 U	--
MW-04-101	990514-MW4-101-20	5/14/1999	--	100 U	--	100 U	--
MW-04-101	990514-MW4-101-19	5/14/1999	--	100 U	--	100 U	--
MW-04-101	990824-MW4-101-09	8/24/1999	--	100 U	--	100 U	--
MW-04-101	991027-MW4-101-11	10/27/1999	--	100 U	--	100 U	--
MW-04-101	000329-MW4-101-111	3/29/2000	--	100 U	--	100 U	--
MW-04-101	001005-MW4-101-09	10/5/2000	--	100 U	--	100 U	--
MW-04-101	010328-MW4-101-110	3/28/2001	--	100 U	--	100 U	--
MW-04-101	011009-MW4-101-103	10/9/2001	--	100 U	--	100 U	--
MW-04-101	020404-MW4-101-110	4/4/2002	--	100 U	--	100 U	--
MW-04-101	020924-MW4-101-102	9/24/2002	--	100 U	--	100 U	--
MW-04-101	030318-MW4-101-109	3/18/2003	--	100 U	--	100 U	--
MW-04-35	951206-MW4-35-01	12/6/1995	--	**0.34**	--	100 U	--
MW-04-35	960318-MW4-35-01	3/18/1996	--	**0.74**	--	**0.54**	--
MW-04-35	960318-MW4-35-02	3/18/1996	--	**0.62**	--	**0.4**	--
MW-04-35	960618-MW4-35-01	6/18/1996	--	**0.66**	--	**0.43**	--
MW-04-35	961001-MW4-35-01	10/1/1996	--	**0.41**	--	**0.3**	--
MW-04-35	970225-MW4-35-01	2/25/1997	--	**0.22**	--	100 U	--
MW-04-35	970827-MW4-57-01	8/27/1997	--	**0.21**	--	100 U	--
MW-04-35	980217-MW4-35-01	2/17/1998	--	**0.15**	--	100 U	--
MW-04-35	980601-MW4-35-06	6/1/1998	--	**0.25**	--	100 U	--
MW-04-35	980826-MW4-35-06	8/26/1998	--	**0.58**	--	**0.64**	--
Tar Pond (Continued)							
MW-04-35	980826-MW4-35-07	8/26/1998	--	**0.78**	--	**0.95**	--
MW-04-35	981117-MW4-35-11	11/17/1998	--	**0.91**	--	**1.2**	--
MW-04-35	990216-MW4-35-009	2/16/1999	--	**0.21**	--	100 U	--
MW-04-35	990514-MW4-35-21	5/14/1999	--	**0.18**	--	100 U	--
MW-04-35	990824-MW4-35-11	8/24/1999	--	**0.24**	--	**0.19**	--
MW-04-35	991027-MW4-35-13	10/27/1999	--	**1.17**	--	**1.11**	--
MW-04-35	000330-MW4-35-114	3/30/2000	--	**0.21**	--	100 U	--
MW-04-35	001005-MW4-35-10	10/5/2000	--	**3.42**	--	**4.99**	--
MW-04-35	010328-MW4-35-112	3/28/2001	--	**0.2**	--	100 U	--
MW-04-57	951205-MW4-57-01	12/5/1995	--	**0.56**	--	**0.21**	--
MW-04-57	960321-MW4-57-01	3/21/1996	--	**0.59**	--	**0.35**	--
MW-04-57	960620-MW4-57-01	6/20/1996	--	**0.45**	--	**0.21**	--
MW-04-57	961002-MW4-57-01	10/2/1996	--	**0.35**	--	100 U	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-03-56	030319-MW3-56-112	3/19/2003	**0.2**	--	**0.16**	--
MW-04-101	981117-MW4-101-09	11/17/1998	100 U	--	100 U	--
MW-04-101	990216-MW4-101-007	2/16/1999	100 U	--	100 U	--
MW-04-101	990514-MW4-101-20	5/14/1999	100 U	--	100 U	--
MW-04-101	990514-MW4-101-19	5/14/1999	100 U	--	100 U	--
MW-04-101	990824-MW4-101-09	8/24/1999	100 U	--	100 U	--
MW-04-101	991027-MW4-101-11	10/27/1999	100 U	--	100 U	--
MW-04-101	000329-MW4-101-111	3/29/2000	100 U	--	100 U	--
MW-04-101	001005-MW4-101-09	10/5/2000	100 U	--	100 U	--
MW-04-101	010328-MW4-101-110	3/28/2001	100 U	--	100 U	--
MW-04-101	011009-MW4-101-103	10/9/2001	100 U	--	100 U	--
MW-04-101	020404-MW4-101-110	4/4/2002	100 U	--	100 U	--
MW-04-101	020924-MW4-101-102	9/24/2002	100 U	--	100 U	--
MW-04-101	030318-MW4-101-109	3/18/2003	100 U	--	100 U	--
MW-04-35	951206-MW4-35-01	12/6/1995	100 U	--	100 U	--
MW-04-35	960318-MW4-35-01	3/18/1996	**0.5**	--	**0.42**	--
MW-04-35	960318-MW4-35-02	3/18/1996	**0.36**	--	**0.29**	--
MW-04-35	960618-MW4-35-01	6/18/1996	**0.37**	--	**0.3**	--
MW-04-35	961001-MW4-35-01	10/1/1996	**0.3**	--	**0.18**	--
MW-04-35	970225-MW4-35-01	2/25/1997	100 U	--	100 U	--
MW-04-35	970827-MW4-57-01	8/27/1997	**0.1**	--	100 U	--
MW-04-35	980217-MW4-35-01	2/17/1998	100 U	--	100 U	--
MW-04-35	980601-MW4-35-06	6/1/1998	100 U	--	100 U	--
MW-04-35	980826-MW4-35-06	8/26/1998	**0.63**	--	**0.43**	--
Tar Pond (Continued)						
MW-04-35	980826-MW4-35-07	8/26/1998	**0.94**	--	**0.59**	--
MW-04-35	981117-MW4-35-11	11/17/1998	**1.1**	--	**0.97**	--
MW-04-35	990216-MW4-35-009	2/16/1999	100 U	--	100 U	--
MW-04-35	990514-MW4-35-21	5/14/1999	100 U	--	100 U	--
MW-04-35	990824-MW4-35-11	8/24/1999	**0.12**	--	**0.16**	--
MW-04-35	991027-MW4-35-13	10/27/1999	**0.74**	--	**0.87**	--
MW-04-35	000330-MW4-35-114	3/30/2000	100 U	--	100 U	--
MW-04-35	001005-MW4-35-10	10/5/2000	**4.25**	--	**3.27**	--
MW-04-35	010328-MW4-35-112	3/28/2001	100 U	--	100 U	--
MW-04-57	951205-MW4-57-01	12/5/1995	**0.22**	--	**0.14**	--
MW-04-57	960321-MW4-57-01	3/21/1996	**0.34**	--	**0.27**	--
MW-04-57	960620-MW4-57-01	6/20/1996	**0.19**	--	**0.15**	--
MW-04-57	961002-MW4-57-01	10/2/1996	100 U	--	100 U	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-03-56	030319-MW3-56-112	3/19/2003	100 U	--	**0.52**	--	100 U
MW-04-101	981117-MW4-101-09	11/17/1998	100 U	--	100 U	--	100 U
MW-04-101	990216-MW4-101-007	2/16/1999	100 U	--	100 U	--	100 U
MW-04-101	990514-MW4-101-20	5/14/1999	100 U	--	100 U	--	100 U
MW-04-101	990514-MW4-101-19	5/14/1999	100 U	--	100 U	--	100 U
MW-04-101	990824-MW4-101-09	8/24/1999	100 U	--	100 U	--	100 U
MW-04-101	991027-MW4-101-11	10/27/1999	100 U	--	100 U	--	100 U
MW-04-101	000329-MW4-101-111	3/29/2000	100 U	--	100 U	--	100 U
MW-04-101	001005-MW4-101-09	10/5/2000	100 U	--	100 U	--	100 U
MW-04-101	010328-MW4-101-110	3/28/2001	100 U	--	100 U	--	100 U
MW-04-101	011009-MW4-101-103	10/9/2001	100 U	--	100 U	--	100 U
MW-04-101	020404-MW4-101-110	4/4/2002	100 U	--	100 U	--	100 U
MW-04-101	020924-MW4-101-102	9/24/2002	100 U	--	100 U	--	100 U
MW-04-101	030318-MW4-101-109	3/18/2003	100 U	--	100 U	--	100 U
MW-04-35	951206-MW4-35-01	12/6/1995	100 U	--	**0.35**	--	100 U
MW-04-35	960318-MW4-35-01	3/18/1996	**0.18**	--	**0.94**	--	100 U
MW-04-35	960318-MW4-35-02	3/18/1996	**0.14**	--	**0.7**	--	100 U
MW-04-35	960618-MW4-35-01	6/18/1996	**0.12**	--	**0.71**	--	100 U
MW-04-35	961001-MW4-35-01	10/1/1996	**0.1**	--	**0.46**	--	100 U
MW-04-35	970225-MW4-35-01	2/25/1997	100 U	--	**0.19**	--	100 U
MW-04-35	970827-MW4-57-01	8/27/1997	100 U	--	**0.22**	--	100 U
MW-04-35	980217-MW4-35-01	2/17/1998	100 U	--	**0.1**	--	100 U
MW-04-35	980601-MW4-35-06	6/1/1998	100 U	--	**0.23**	--	100 U
MW-04-35	980826-MW4-35-06	8/26/1998	**0.21**	--	**0.64**	--	100 U
Tar Pond (Continued)							
MW-04-35	980826-MW4-35-07	8/26/1998	**0.35**	--	**0.91**	--	100 U
MW-04-35	981117-MW4-35-11	11/17/1998	**0.33**	--	**0.96**	--	**0.13**
MW-04-35	990216-MW4-35-009	2/16/1999	100 U	--	**0.19**	--	100 U
MW-04-35	990514-MW4-35-21	5/14/1999	100 U	--	**0.14**	--	100 U
MW-04-35	990824-MW4-35-11	8/24/1999	**0.121**	--	**0.31**	--	100 U
MW-04-35	991027-MW4-35-13	10/27/1999	**0.63**	--	**1.34**	--	**0.12**
MW-04-35	000330-MW4-35-114	3/30/2000	100 U	--	**0.21**	--	100 U
MW-04-35	001005-MW4-35-10	10/5/2000	**1.56**	--	**4.6**	--	**0.54**
MW-04-35	010328-MW4-35-112	3/28/2001	100 U	--	**0.2**	--	100 U
MW-04-57	951205-MW4-57-01	12/5/1995	100 U	--	**0.65**	--	100 U
MW-04-57	960321-MW4-57-01	3/21/1996	**0.12**	--	**0.71**	--	100 U
MW-04-57	960620-MW4-57-01	6/20/1996	100 U	--	**0.46**	--	100 U
MW-04-57	961002-MW4-57-01	10/2/1996	100 U	--	**0.29**	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-03-56	030319-MW3-56-112	3/19/2003	--	**8**	--	**12**	--	**0.11**
MW-04-101	981117-MW4-101-09	11/17/1998	--	100 U	--	100 U	--	100 U
MW-04-101	990216-MW4-101-007	2/16/1999	--	100 U	--	100 U	--	100 U
MW-04-101	990514-MW4-101-20	5/14/1999	--	100 U	--	100 U	--	100 U
MW-04-101	990514-MW4-101-19	5/14/1999	--	100 U	--	100 U	--	100 U
MW-04-101	990824-MW4-101-09	8/24/1999	--	100 U	--	100 U	--	100 U
MW-04-101	991027-MW4-101-11	10/27/1999	--	100 U	--	100 U	--	100 U
MW-04-101	000329-MW4-101-111	3/29/2000	--	100 U	--	100 U	--	100 U
MW-04-101	001005-MW4-101-09	10/5/2000	--	100 U	--	100 U	--	100 U
MW-04-101	010328-MW4-101-110	3/28/2001	--	100 U	--	100 U	--	100 U
MW-04-101	011009-MW4-101-103	10/9/2001	--	100 U	--	100 U	--	100 U
MW-04-101	020404-MW4-101-110	4/4/2002	--	100 U	--	100 U	--	100 U
MW-04-101	020924-MW4-101-102	9/24/2002	--	100 U	--	100 U	--	100 U
MW-04-101	030318-MW4-101-109	3/18/2003	--	100 U	--	**15**	--	100 U
MW-04-35	951206-MW4-35-01	12/6/1995	--	**9.7**	--	**6.1**	--	100 U
MW-04-35	960318-MW4-35-01	3/18/1996	--	**8.4**	--	**11**	--	**0.28**
MW-04-35	960318-MW4-35-02	3/18/1996	--	**8.1**	--	**9.2**	--	**0.19**
MW-04-35	960618-MW4-35-01	6/18/1996	--	**7.8**	--	**8.5**	--	**0.22**
MW-04-35	961001-MW4-35-01	10/1/1996	--	**6.1**	--	**4.9**	--	**0.13**
MW-04-35	970225-MW4-35-01	2/25/1997	--	**5**	--	**6**	--	100 U
MW-04-35	970827-MW4-57-01	8/27/1997	--	**5.3**	--	**5.3**	--	100 U
MW-04-35	980217-MW4-35-01	2/17/1998	--	**4.1**	--	**3.9**	--	100 U
MW-04-35	980601-MW4-35-06	6/1/1998	--	**6.6**	--	**6.2**	--	100 U
MW-04-35	980826-MW4-35-06	8/26/1998	--	**7.2**	--	**8**	--	**0.32**
Tar Pond (Continued)								
MW-04-35	980826-MW4-35-07	8/26/1998	--	**7.8**	--	**7.5**	--	**0.44**
MW-04-35	981117-MW4-35-11	11/17/1998	--	**6.1**	--	**5.8**	--	**0.69**
MW-04-35	990216-MW4-35-009	2/16/1999	--	**3.57**	--	**2.65**	--	100 U
MW-04-35	990514-MW4-35-21	5/14/1999	--	**3.74**	--	**2.77**	--	100 U
MW-04-35	990824-MW4-35-11	8/24/1999	--	**4.47**	--	**3.91**	--	**0.12**
MW-04-35	991027-MW4-35-13	10/27/1999	--	**11.8**	--	**12.2**	--	**0.64**
MW-04-35	000330-MW4-35-114	3/30/2000	--	**6.03**	--	**6.29**	--	100 U
MW-04-35	001005-MW4-35-10	10/5/2000	--	**17.5**	--	**17.8**	--	**2.36**
MW-04-35	010328-MW4-35-112	3/28/2001	--	**3.56**	--	**3.18**	--	100 U
MW-04-57	951205-MW4-57-01	12/5/1995	--	**7.8**	--	**11**	--	**0.09**
MW-04-57	960321-MW4-57-01	3/21/1996	--	**6.9**	--	**9.2**	--	**0.18**
MW-04-57	960620-MW4-57-01	6/20/1996	--	**6.5**	--	**10**	--	**0.11**
MW-04-57	961002-MW4-57-01	10/2/1996	--	**7.2**	--	**7.6**	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-03-56	030319-MW3-56-112	3/19/2003	--	**2.3**	--	**18**	--	**8.2**
MW-04-101	981117-MW4-101-09	11/17/1998	--	**20**	--	100 U	--	100 U
MW-04-101	990216-MW4-101-007	2/16/1999	--	**8.3**	--	100 U	--	100 U
MW-04-101	990514-MW4-101-20	5/14/1999	--	**62.3**	--	100 U	--	100 U
MW-04-101	990514-MW4-101-19	5/14/1999	--	**68.1**	--	100 U	--	100 U
MW-04-101	990824-MW4-101-09	8/24/1999	--	**190**	--	100 U	--	100 U
MW-04-101	991027-MW4-101-11	10/27/1999	--	**166**	--	100 U	--	100 U
MW-04-101	000329-MW4-101-111	3/29/2000	--	**20.6**	--	100 U	--	100 U
MW-04-101	001005-MW4-101-09	10/5/2000	--	**0.64**	--	100 U	--	100 U
MW-04-101	010328-MW4-101-110	3/28/2001	--	**0.58**	--	100 U	--	100 U
MW-04-101	011009-MW4-101-103	10/9/2001	--	**0.71**	--	100 U	--	100 U
MW-04-101	020404-MW4-101-110	4/4/2002	--	**5.46**	--	100 U	--	100 U
MW-04-101	020924-MW4-101-102	9/24/2002	--	**12**	--	100 U	--	100 U
MW-04-101	030318-MW4-101-109	3/18/2003	--	100 U	--	100 U	--	100 U
MW-04-35	951206-MW4-35-01	12/6/1995	--	**2**	--	**8.1**	--	**9.4**
MW-04-35	960318-MW4-35-01	3/18/1996	--	**3.2**	--	**7.9**	--	**9.9**
MW-04-35	960318-MW4-35-02	3/18/1996	--	**2.5**	--	**7.9**	--	**9.1**
MW-04-35	960618-MW4-35-01	6/18/1996	--	**0.59**	--	**1.9**	--	**9.3**
MW-04-35	961001-MW4-35-01	10/1/1996	--	**0.41**	--	**0.34**	--	**6.5**
MW-04-35	970225-MW4-35-01	2/25/1997	--	**1.2**	--	**0.36**	--	**5.3**
MW-04-35	970827-MW4-57-01	8/27/1997	--	**0.49**	--	**0.31**	--	**5.1**
MW-04-35	980217-MW4-35-01	2/17/1998	--	**1.1**	--	**0.13**	--	**3.8**
MW-04-35	980601-MW4-35-06	6/1/1998	--	**0.12**	--	**0.19**	--	**6.4**
MW-04-35	980826-MW4-35-06	8/26/1998	--	**2**	--	**0.6**	--	**7.4**
Tar Pond (Continued)								
MW-04-35	980826-MW4-35-07	8/26/1998	--	**2.4**	--	**0.69**	--	**8.4**
MW-04-35	981117-MW4-35-11	11/17/1998	--	**0.84**	--	**5.1**	--	**6.5**
MW-04-35	990216-MW4-35-009	2/16/1999	--	**1.87**	--	100 U	--	**3.78**
MW-04-35	990514-MW4-35-21	5/14/1999	--	**0.43**	--	**0.1**	--	**4.12**
MW-04-35	990824-MW4-35-11	8/24/1999	--	**0.86**	--	**0.18**	--	**4.59**
MW-04-35	991027-MW4-35-13	10/27/1999	--	**5.79**	--	**8.43**	--	**11.6**
MW-04-35	000330-MW4-35-114	3/30/2000	--	**2.46**	--	**1.33**	--	**5.34**
MW-04-35	001005-MW4-35-10	10/5/2000	--	**17.2**	--	**6.67**	--	**18**
MW-04-35	010328-MW4-35-112	3/28/2001	--	**2.76**	--	**1.08**	--	**3.34**
MW-04-57	951205-MW4-57-01	12/5/1995	--	**1200**	--	**42**	--	**8.6**
MW-04-57	960321-MW4-57-01	3/21/1996	--	**1000**	--	**31**	--	**6.3**
MW-04-57	960620-MW4-57-01	6/20/1996	--	**540**	--	**34**	--	**8.5**
MW-04-57	961002-MW4-57-01	10/2/1996	--	**1600**	--	**27**	--	**6.1**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-04-57	970226-MW4-57-01	2/26/1997	--	**39**	--	**3.3**	--	**3.4**
MW-04-57	970828-MW4-35-01	8/28/1997	--	**49**	--	**2.9**	--	**2.6**
MW-04-57	980218-MW4-57-01	2/18/1998	--	**45**	--	**2**	--	**1.6**
MW-04-57	980603-MW4-57-18	6/3/1998	--	**51**	--	**2.4**	--	**3.1**
MW-04-57	980826-MW4-57-13	8/26/1998	--	**43**	--	**2.2**	--	**1.7**
MW-04-57	981119-MW4-57-20	11/19/1998	--	**42**	--	**1.7**	--	**1.7**
MW-04-57	990217-MW4-57-016	2/17/1999	--	**26.2**	--	**1.15**	--	**1.4**
MW-04-57	990514-MW4-57-22	5/14/1999	--	--	--	**1.32**	--	**1.89**
MW-04-57	990825-MW4-57-17	8/25/1999	--	**34**	--	**1.11**	--	**1.48**
MW-04-57	991028-MW4-57-21	10/28/1999	--	**42**	--	20000 U	--	20000 U
MW-04-57	000403-MW4-57-121	4/3/2000	--	**38.8**	--	**1.42**	--	**2.34**
MW-04-57	001006-MW4-57-19	10/6/2000	--	**32**	--	**1.61**	--	**0.9**
MW-04-57	010329-MW4-57-120	3/29/2001	--	**32.6**	--	**1.35**	--	**1.43**
MW-04-57	020405-MW4-57-117	4/5/2002	--	**20**	--	**0.86**	--	**0.74**
MW-04-57	030320-MW4-57-117	3/20/2003	--	**28**	--	2000 U	--	2000 U
MW-05-100	981118-MW5-100-14	11/18/1998	--	**7.2**	--	**6.2**	--	**1.1**
MW-05-100	990217-MW5-100-018	2/17/1999	--	**6.34**	--	**3.52**	--	100 U
MW-05-100	990514-MW5-100-18	5/14/1999	--	**12.3**	--	**1.6**	--	**1.3**
MW-05-100	990825-MW5-100-18	8/25/1999	--	**18**	--	**1**	--	**1**
MW-05-100	991028-MW5-100-19	10/28/1999	--	**12.9**	--	**0.4**	--	**0.67**
MW-05-100	000330-MW5-100-119	3/30/2000	--	**15.7**	--	**0.32**	--	**0.77**
MW-05-100	001005-MW5-100-15	10/5/2000	--	100 U	--	**0.31**	--	**0.27**
Tar Pond (Continued)								
MW-05-100	001005-MW5-100-16	10/5/2000	--	**15**	--	**0.26**	--	**0.25**
MW-05-100	010329-MW5-100-118	3/29/2001	--	**19.8**	--	2000 U	--	2000 U
MW-05-100	020405-MW5-100-114	4/5/2002	--	**17.5**	--	1000 U	--	1000 U
MW-05-100	020405-MW5-100-115	4/5/2002	--	**8.9**	--	100 U	--	**0.14**
MW-05-100	030319-MW5-100-114	3/19/2003	--	**14**	--	2000 U	--	2000 U
MW-05-175	981116-MW5-175-07	11/16/1998	--	100 U	--	100 U	--	100 U
MW-05-175	990215-MW5-175-003	2/15/1999	--	100 U	--	100 U	--	100 U
MW-05-175	990512-MW5-175-07	5/12/1999	--	100 U	--	100 U	--	100 U
MW-05-175	990823-MW5-175-03	8/23/1999	--	100 U	--	100 U	--	100 U
MW-05-175	991026-MW5-175-06	10/26/1999	--	100 U	--	100 U	--	100 U
MW-05-175	000329-MW5-175-106	3/29/2000	--	100 U	--	100 U	--	100 U
MW-05-175	001004-MW5-175-05	10/4/2000	--	100 U	--	100 U	--	100 U
MW-05-175	010328-MW5-175-105	3/28/2001	--	100 U	--	100 U	--	100 U
MW-05-175	011009-MW5-175-102	10/9/2001	--	100 U	--	100 U	--	100 U
MW-05-175	020404-MW5-175-105	4/4/2002	--	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-04-57	970226-MW4-57-01	2/26/1997	--	**0.3**	--	100 U	--
MW-04-57	970828-MW4-35-01	8/28/1997	--	**0.24**	--	100 U	--
MW-04-57	980218-MW4-57-01	2/18/1998	--	**0.17**	--	100 U	--
MW-04-57	980603-MW4-57-18	6/3/1998	--	**0.35**	--	100 U	--
MW-04-57	980826-MW4-57-13	8/26/1998	--	**0.22**	--	100 U	--
MW-04-57	981119-MW4-57-20	11/19/1998	--	**0.18**	--	100 U	--
MW-04-57	990217-MW4-57-016	2/17/1999	--	**0.18**	--	100 U	--
MW-04-57	990514-MW4-57-22	5/14/1999	--	**0.22**	--	100 U	--
MW-04-57	990825-MW4-57-17	8/25/1999	--	**0.19**	--	1000 U	--
MW-04-57	991028-MW4-57-21	10/28/1999	--	20000 U	--	20000 U	--
MW-04-57	000403-MW4-57-121	4/3/2000	--	**0.24**	--	100 U	--
MW-04-57	001006-MW4-57-19	10/6/2000	--	**0.2**	--	100 U	--
MW-04-57	010329-MW4-57-120	3/29/2001	--	**0.23**	--	100 U	--
MW-04-57	020405-MW4-57-117	4/5/2002	--	**0.1**	--	100 U	--
MW-04-57	030320-MW4-57-117	3/20/2003	--	2000 U	--	2000 U	--
MW-05-100	981118-MW5-100-14	11/18/1998	--	100 U	--	100 U	--
MW-05-100	990217-MW5-100-018	2/17/1999	--	100 U	--	100 U	--
MW-05-100	990514-MW5-100-18	5/14/1999	--	1000 U	--	1000 U	--
MW-05-100	990825-MW5-100-18	8/25/1999	--	1000 U	--	1000 U	--
MW-05-100	991028-MW5-100-19	10/28/1999	--	100 U	--	100 U	--
MW-05-100	000330-MW5-100-119	3/30/2000	--	**0.1**	--	100 U	--
MW-05-100	001005-MW5-100-15	10/5/2000	--	100 U	--	100 U	--
Tar Pond (Continued)							
MW-05-100	001005-MW5-100-16	10/5/2000	--	100 U	--	100 U	--
MW-05-100	010329-MW5-100-118	3/29/2001	--	2000 U	--	2000 U	--
MW-05-100	020405-MW5-100-114	4/5/2002	--	1000 U	--	1000 U	--
MW-05-100	020405-MW5-100-115	4/5/2002	--	100 U	--	100 U	--
MW-05-100	030319-MW5-100-114	3/19/2003	--	2000 U	--	2000 U	--
MW-05-175	981116-MW5-175-07	11/16/1998	--	100 U	--	100 U	--
MW-05-175	990215-MW5-175-003	2/15/1999	--	100 U	--	100 U	--
MW-05-175	990512-MW5-175-07	5/12/1999	--	100 U	--	100 U	--
MW-05-175	990823-MW5-175-03	8/23/1999	--	100 U	--	100 U	--
MW-05-175	991026-MW5-175-06	10/26/1999	--	100 U	--	100 U	--
MW-05-175	000329-MW5-175-106	3/29/2000	--	100 U	--	100 U	--
MW-05-175	001004-MW5-175-05	10/4/2000	--	100 U	--	100 U	--
MW-05-175	010328-MW5-175-105	3/28/2001	--	100 U	--	100 U	--
MW-05-175	011009-MW5-175-102	10/9/2001	--	100 U	--	100 U	--
MW-05-175	020404-MW5-175-105	4/4/2002	--	100 U	--	100 U	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-04-57	970226-MW4-57-01	2/26/1997	100 U	--	100 U	--
MW-04-57	970828-MW4-35-01	8/28/1997	100 U	--	100 U	--
MW-04-57	980218-MW4-57-01	2/18/1998	100 U	--	100 U	--
MW-04-57	980603-MW4-57-18	6/3/1998	**0.1**	--	100 U	--
MW-04-57	980826-MW4-57-13	8/26/1998	**0.1**	--	100 U	--
MW-04-57	981119-MW4-57-20	11/19/1998	100 U	--	100 U	--
MW-04-57	990217-MW4-57-016	2/17/1999	100 U	--	100 U	--
MW-04-57	990514-MW4-57-22	5/14/1999	100 U	--	100 U	--
MW-04-57	990825-MW4-57-17	8/25/1999	1000 U	--	1000 U	--
MW-04-57	991028-MW4-57-21	10/28/1999	20000 U	--	20000 U	--
MW-04-57	000403-MW4-57-121	4/3/2000	100 U	--	100 U	--
MW-04-57	001006-MW4-57-19	10/6/2000	100 U	--	100 U	--
MW-04-57	010329-MW4-57-120	3/29/2001	100 U	--	100 U	--
MW-04-57	020405-MW4-57-117	4/5/2002	100 U	--	100 U	--
MW-04-57	030320-MW4-57-117	3/20/2003	2000 U	--	2000 U	--
MW-05-100	981118-MW5-100-14	11/18/1998	100 U	--	100 U	--
MW-05-100	990217-MW5-100-018	2/17/1999	100 U	--	100 U	--
MW-05-100	990514-MW5-100-18	5/14/1999	1000 U	--	1000 U	--
MW-05-100	990825-MW5-100-18	8/25/1999	1000 U	--	1000 U	--
MW-05-100	991028-MW5-100-19	10/28/1999	100 U	--	100 U	--
MW-05-100	000330-MW5-100-119	3/30/2000	100 U	--	100 U	--
MW-05-100	001005-MW5-100-15	10/5/2000	100 U	--	100 U	--
Tar Pond (Continued)						
MW-05-100	001005-MW5-100-16	10/5/2000	100 U	--	100 U	--
MW-05-100	010329-MW5-100-118	3/29/2001	2000 U	--	2000 U	--
MW-05-100	020405-MW5-100-114	4/5/2002	1000 U	--	**1**	--
MW-05-100	020405-MW5-100-115	4/5/2002	100 U	--	100 U	--
MW-05-100	030319-MW5-100-114	3/19/2003	2000 U	--	2000 U	--
MW-05-175	981116-MW5-175-07	11/16/1998	100 U	--	100 U	--
MW-05-175	990215-MW5-175-003	2/15/1999	100 U	--	100 U	--
MW-05-175	990512-MW5-175-07	5/12/1999	100 U	--	100 U	--
MW-05-175	990823-MW5-175-03	8/23/1999	100 U	--	100 U	--
MW-05-175	991026-MW5-175-06	10/26/1999	100 U	--	100 U	--
MW-05-175	000329-MW5-175-106	3/29/2000	100 U	--	100 U	--
MW-05-175	001004-MW5-175-05	10/4/2000	100 U	--	100 U	--
MW-05-175	010328-MW5-175-105	3/28/2001	100 U	--	100 U	--
MW-05-175	011009-MW5-175-102	10/9/2001	100 U	--	100 U	--
MW-05-175	020404-MW5-175-105	4/4/2002	100 U	--	100 U	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-04-57	970226-MW4-57-01	2/26/1997	100 U	--	**0.22**	--	100 U
MW-04-57	970828-MW4-35-01	8/28/1997	100 U	--	**0.2**	--	100 U
MW-04-57	980218-MW4-57-01	2/18/1998	100 U	--	**0.11**	--	100 U
MW-04-57	980603-MW4-57-18	6/3/1998	100 U	--	**0.32**	--	100 U
MW-04-57	980826-MW4-57-13	8/26/1998	100 U	--	**0.22**	--	100 U
MW-04-57	981119-MW4-57-20	11/19/1998	100 U	--	**0.16**	--	100 U
MW-04-57	990217-MW4-57-016	2/17/1999	100 U	--	**0.14**	--	100 U
MW-04-57	990514-MW4-57-22	5/14/1999	100 U	--	**0.17**	--	100 U
MW-04-57	990825-MW4-57-17	8/25/1999	1000 U	--	**0.21**	--	1000 U
MW-04-57	991028-MW4-57-21	10/28/1999	20000 U	--	20000 U	--	20000 U
MW-04-57	000403-MW4-57-121	4/3/2000	100 U	--	**0.23**	--	100 U
MW-04-57	001006-MW4-57-19	10/6/2000	100 U	--	**0.18**	--	100 U
MW-04-57	010329-MW4-57-120	3/29/2001	100 U	--	**0.2**	--	100 U
MW-04-57	020405-MW4-57-117	4/5/2002	100 U	--	**0.11**	--	100 U
MW-04-57	030320-MW4-57-117	3/20/2003	2000 U	--	2000 U	--	2000 U
MW-05-100	981118-MW5-100-14	11/18/1998	100 U	--	100 U	--	100 U
MW-05-100	990217-MW5-100-018	2/17/1999	100 U	--	100 U	--	100 U
MW-05-100	990514-MW5-100-18	5/14/1999	1000 U	--	1000 U	--	1000 U
MW-05-100	990825-MW5-100-18	8/25/1999	1000 U	--	1000 U	--	1000 U
MW-05-100	991028-MW5-100-19	10/28/1999	100 U	--	100 U	--	100 U
MW-05-100	000330-MW5-100-119	3/30/2000	100 U	--	100 U	--	100 U
MW-05-100	001005-MW5-100-15	10/5/2000	100 U	--	100 U	--	100 U
Tar Pond (Continued)							
MW-05-100	001005-MW5-100-16	10/5/2000	100 U	--	100 U	--	100 U
MW-05-100	010329-MW5-100-118	3/29/2001	2000 U	--	2000 U	--	2000 U
MW-05-100	020405-MW5-100-114	4/5/2002	1000 U	--	1000 U	--	1000 U
MW-05-100	020405-MW5-100-115	4/5/2002	100 U	--	100 U	--	**0.14**
MW-05-100	030319-MW5-100-114	3/19/2003	2000 U	--	2000 U	--	2000 U
MW-05-175	981116-MW5-175-07	11/16/1998	100 U	--	100 U	--	100 U
MW-05-175	990215-MW5-175-003	2/15/1999	100 U	--	100 U	--	100 U
MW-05-175	990512-MW5-175-07	5/12/1999	100 U	--	100 U	--	100 U
MW-05-175	990823-MW5-175-03	8/23/1999	100 U	--	100 U	--	100 U
MW-05-175	991026-MW5-175-06	10/26/1999	100 U	--	100 U	--	100 U
MW-05-175	000329-MW5-175-106	3/29/2000	100 U	--	100 U	--	100 U
MW-05-175	001004-MW5-175-05	10/4/2000	100 U	--	100 U	--	100 U
MW-05-175	010328-MW5-175-105	3/28/2001	100 U	--	100 U	--	100 U
MW-05-175	011009-MW5-175-102	10/9/2001	100 U	--	100 U	--	100 U
MW-05-175	020404-MW5-175-105	4/4/2002	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-04-57	970226-MW4-57-01	2/26/1997	--	**6.2**	--	**6**	--	100 U
MW-04-57	970828-MW4-35-01	8/28/1997	--	**4.3**	--	**4.3**	--	100 U
MW-04-57	980218-MW4-57-01	2/18/1998	--	**3.6**	--	**3.4**	--	100 U
MW-04-57	980603-MW4-57-18	6/3/1998	--	**6.1**	--	**5.9**	--	100 U
MW-04-57	980826-MW4-57-13	8/26/1998	--	**3.5**	--	**3.7**	--	100 U
MW-04-57	981119-MW4-57-20	11/19/1998	--	**3**	--	**3.3**	--	100 U
MW-04-57	990217-MW4-57-016	2/17/1999	--	**2.57**	--	**2.36**	--	100 U
MW-04-57	990514-MW4-57-22	5/14/1999	--	**3.44**	--	**3.13**	--	100 U
MW-04-57	990825-MW4-57-17	8/25/1999	--	**3.17**	--	**2.7**	--	1000 U
MW-04-57	991028-MW4-57-21	10/28/1999	--	20000 U	--	20000 U	--	20000 U
MW-04-57	000403-MW4-57-121	4/3/2000	--	**3.95**	--	**3.21**	--	100 U
MW-04-57	001006-MW4-57-19	10/6/2000	--	**1.88**	--	**2.2**	--	100 U
MW-04-57	010329-MW4-57-120	3/29/2001	--	**2.52**	--	**3.08**	--	100 U
MW-04-57	020405-MW4-57-117	4/5/2002	--	**1.22**	--	**1.78**	--	100 U
MW-04-57	030320-MW4-57-117	3/20/2003	--	2000 U	--	2000 U	--	2000 U
MW-05-100	981118-MW5-100-14	11/18/1998	--	**1.1**	--	**2.7**	--	100 U
MW-05-100	990217-MW5-100-018	2/17/1999	--	**1.47**	--	**2.14**	--	100 U
MW-05-100	990514-MW5-100-18	5/14/1999	--	**16.3**	--	**1.73**	--	1000 U
MW-05-100	990825-MW5-100-18	8/25/1999	--	**1.9**	--	**1.7**	--	1000 U
MW-05-100	991028-MW5-100-19	10/28/1999	--	**1.29**	--	**0.96**	--	100 U
MW-05-100	000330-MW5-100-119	3/30/2000	--	**1.43**	--	**1.01**	--	100 U
MW-05-100	001005-MW5-100-15	10/5/2000	--	**0.64**	--	**0.68**	--	100 U
Tar Pond (Continued)								
MW-05-100	001005-MW5-100-16	10/5/2000	--	**0.52**	--	**0.58**	--	100 U
MW-05-100	010329-MW5-100-118	3/29/2001	--	2000 U	--	2000 U	--	2000 U
MW-05-100	020405-MW5-100-114	4/5/2002	--	1000 U	--	1000 U	--	**1.1**
MW-05-100	020405-MW5-100-115	4/5/2002	--	**0.36**	--	**0.49**	--	**0.11**
MW-05-100	030319-MW5-100-114	3/19/2003	--	2000 U	--	2000 U	--	2000 U
MW-05-175	981116-MW5-175-07	11/16/1998	--	100 U	--	100 U	--	100 U
MW-05-175	990215-MW5-175-003	2/15/1999	--	100 U	--	100 U	--	100 U
MW-05-175	990512-MW5-175-07	5/12/1999	--	100 U	--	100 U	--	100 U
MW-05-175	990823-MW5-175-03	8/23/1999	--	100 U	--	100 U	--	100 U
MW-05-175	991026-MW5-175-06	10/26/1999	--	100 U	--	100 U	--	100 U
MW-05-175	000329-MW5-175-106	3/29/2000	--	100 U	--	100 U	--	100 U
MW-05-175	001004-MW5-175-05	10/4/2000	--	100 U	--	100 U	--	100 U
MW-05-175	010328-MW5-175-105	3/28/2001	--	100 U	--	100 U	--	100 U
MW-05-175	011009-MW5-175-102	10/9/2001	--	100 U	--	100 U	--	100 U
MW-05-175	020404-MW5-175-105	4/4/2002	--	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-04-57	970226-MW4-57-01	2/26/1997	--	**1600**	--	**24**	--	**6**
MW-04-57	970828-MW4-35-01	8/28/1997	--	**1600**	--	**24**	--	**4.2**
MW-04-57	980218-MW4-57-01	2/18/1998	--	**2280**	--	**19**	--	**3**
MW-04-57	980603-MW4-57-18	6/3/1998	--	**2200**	--	**23**	--	**6.7**
MW-04-57	980826-MW4-57-13	8/26/1998	--	**2400**	--	**13**	--	**3.7**
MW-04-57	981119-MW4-57-20	11/19/1998	--	**1900**	--	**13**	--	**2.9**
MW-04-57	990217-MW4-57-016	2/17/1999	--	**1530**	--	**8.69**	--	**2.59**
MW-04-57	990514-MW4-57-22	5/14/1999	--	**1660**	--	**10.7**	--	**3.45**
MW-04-57	990825-MW4-57-17	8/25/1999	--	**2250**	--	**9.46**	--	**3.08**
MW-04-57	991028-MW4-57-21	10/28/1999	--	**1650**	--	20000 U	--	20000 U
MW-04-57	000403-MW4-57-121	4/3/2000	--	**2700**	--	**12**	--	**3.55**
MW-04-57	001006-MW4-57-19	10/6/2000	--	**2450**	--	**6.31**	--	**2.83**
MW-04-57	010329-MW4-57-120	3/29/2001	--	**3010**	--	**9.47**	--	**2.47**
MW-04-57	020405-MW4-57-117	4/5/2002	--	**2220**	--	**4.14**	--	**1.01**
MW-04-57	030320-MW4-57-117	3/20/2003	--	**2200**	--	**5.4**	--	2000 U
MW-05-100	981118-MW5-100-14	11/18/1998	--	**7100**	--	**7.2**	--	**1.2**
MW-05-100	990217-MW5-100-018	2/17/1999	--	**5010**	--	**7.87**	--	**1.39**
MW-05-100	990514-MW5-100-18	5/14/1999	--	**7440**	--	**6.9**	--	**2**
MW-05-100	990825-MW5-100-18	8/25/1999	--	**13300**	--	**6.7**	--	1000 U
MW-05-100	991028-MW5-100-19	10/28/1999	--	**7450**	--	**4.28**	--	**1.29**
MW-05-100	000330-MW5-100-119	3/30/2000	--	**9800**	--	**4.42**	--	**1.31**
MW-05-100	001005-MW5-100-15	10/5/2000	--	**10100**	--	**1.49**	--	**0.64**
Tar Pond (Continued)								
MW-05-100	001005-MW5-100-16	10/5/2000	--	**9200**	--	**1.27**	--	**0.53**
MW-05-100	010329-MW5-100-118	3/29/2001	--	**9600**	--	2000 U	--	2000 U
MW-05-100	020405-MW5-100-114	4/5/2002	--	**82300**	--	1000 U	--	1000 U
MW-05-100	020405-MW5-100-115	4/5/2002	--	**4310**	--	**0.81**	--	**0.33**
MW-05-100	030319-MW5-100-114	3/19/2003	--	**5600**	--	2000 U	--	2000 U
MW-05-175	981116-MW5-175-07	11/16/1998	--	100 U	--	100 U	--	100 U
MW-05-175	990215-MW5-175-003	2/15/1999	--	100 U	--	100 U	--	100 U
MW-05-175	990512-MW5-175-07	5/12/1999	--	100 U	--	100 U	--	100 U
MW-05-175	990823-MW5-175-03	8/23/1999	--	**0.2**	--	100 U	--	100 U
MW-05-175	991026-MW5-175-06	10/26/1999	--	100 U	--	100 U	--	100 U
MW-05-175	000329-MW5-175-106	3/29/2000	--	100 U	--	100 U	--	100 U
MW-05-175	001004-MW5-175-05	10/4/2000	--	100 U	--	100 U	--	100 U
MW-05-175	010328-MW5-175-105	3/28/2001	--	100 U	--	100 U	--	100 U
MW-05-175	011009-MW5-175-102	10/9/2001	--	100 U	--	100 U	--	100 U
MW-05-175	020404-MW5-175-105	4/4/2002	--	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-05-175	020924-MW5-175-101	9/24/2002	--	100 U	--	100 U	--	100 U
MW-05-175	030318-MW5-175-105	3/18/2003	--	100 U	--	100 U	--	100 U
MW-05-32	951205-MW5-32-01	12/5/1995	--	**12**	--	**9.2**	--	**18**
MW-05-32	960319-MW5-32-01	3/19/1996	**2.5**	**4.2**	**1.1**	**2.1**	**4.4**	**20**
MW-05-32	960620-MW5-32-01	6/20/1996	--	**2**	--	**1.1**	--	**9.2**
MW-05-32	961001-MW5-32-01	10/1/1996	--	10000 U	--	10000 U	--	**47**
MW-05-32	970225-MW5-32-01	2/25/1997	--	**0.16**	--	100 U	--	**0.95**
MW-05-32	970827-MW5-32-01	8/27/1997	--	1000 U	--	1000 U	--	1000 U
MW-05-32	980217-MW5-32-01	2/17/1998	--	100 U	--	**0.1**	--	**0.19**
MW-05-32	980602-MW5-32-10	6/2/1998	--	**1.2**	--	**0.47**	--	**1.6**
MW-05-32	980826-MW5-32-09	8/26/1998	--	1000 U	--	**4.5**	--	**8.5**
MW-05-32	981118-MW5-32-13	11/18/1998	--	100 U	--	100 U	--	100 U
MW-05-32	990216-MW5-32-011	2/16/1999	--	100 U	--	100 U	--	**0.18**
MW-05-32	990514-MW5-32-17	5/14/1999	--	100 U	--	100 U	--	100 U
MW-05-32	990824-MW5-32-13	8/24/1999	--	100 U	--	**0.19**	--	**0.33**
MW-05-32	991027-MW5-32-15	10/27/1999	--	100 U	--	**0.12**	--	**0.2**
MW-05-32	000330-MW5-32-115	3/30/2000	--	100 U	--	**0.12**	--	**0.18**
MW-05-32	001005-MW5-32-12	10/5/2000	--	100 U	--	100 U	--	**0.12**
MW-05-32	010329-MW5-32-114	3/29/2001	--	100 U	--	**0.2**	--	**0.4**
MW-08-29	951207-MW8-29-01	12/7/1995	--	**94**	--	**200**	--	**110**
Tar Pond (Continued)								
MW-08-29	960321-MW8-29-01	3/21/1996	--	**140**	--	**260**	--	**56**
MW-08-29	960619-MW8-29-01	6/20/1996	--	**100**	--	**310**	--	**15**
MW-08-29	960619-MW8-29-02	6/20/1996	--	**26**	--	**49**	--	**5.1**
MW-08-29	961002-MW8-29-01	10/2/1996	--	**120**	--	**240**	--	**29**
MW-08-29	970226-MW8-29-01	2/26/1997	--	**120**	--	**250**	--	**17**
MW-08-29	970828-MW8-29-01	8/28/1997	--	**370**	--	**230**	--	**56**
MW-08-29	980218-MW8-29-01	2/18/1998	--	**340**	--	**110**	--	**13**
MW-08-29	980603-MW8-29-19	6/3/1998	--	**420**	--	**130**	--	**51**
MW-08-29	981119-MW8-29-22	11/19/1998	--	**190**	--	**85**	--	**15**
MW-08-29	990513-MW8-29-14	5/13/1999	--	**311**	--	**31.2**	--	**262**
MW-08-29	991029-MW8-29-23	10/29/1999	--	**210**	--	**42**	--	**28**
MW-08-29	000403-MW8-29-123	4/3/2000	--	**320**	--	**6.46**	--	**20.1**
MW-08-29	010330-MW8-29-123	3/30/2001	--	**173**	--	**4.84**	--	**22.6**
MW-08-56	951207-MW8-56-01	12/7/1995	--	**130**	--	**250**	--	**53**
MW-08-56	960321-MW8-56-01	3/21/1996	--	**220**	--	**300**	--	**110**
MW-08-56	960620-MW8-56-01	6/20/1996	--	**28 J**	--	**66 J**	--	**9.8 J**
MW-08-56	961002-MW8-56-01	10/2/1996	--	**120**	--	**230**	--	**42**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-05-175	020924-MW5-175-101	9/24/2002	--	100 U	--	100 U	--
MW-05-175	030318-MW5-175-105	3/18/2003	--	100 U	--	100 U	--
MW-05-32	951205-MW5-32-01	12/5/1995	--	**1.8**	--	**1.1**	--
MW-05-32	960319-MW5-32-01	3/19/1996	100 U	**5.7**	100 U	**5.5**	100 U
MW-05-32	960620-MW5-32-01	6/20/1996	--	**2.6**	--	**2.7**	--
MW-05-32	961001-MW5-32-01	10/1/1996	--	**50**	--	**63**	--
MW-05-32	970225-MW5-32-01	2/25/1997	--	**0.32**	--	**0.16**	--
MW-05-32	970827-MW5-32-01	8/27/1997	--	**2**	--	**2.4**	--
MW-05-32	980217-MW5-32-01	2/17/1998	--	**0.57**	--	**0.67**	--
MW-05-32	980602-MW5-32-10	6/2/1998	--	**7**	--	**7.6**	--
MW-05-32	980826-MW5-32-09	8/26/1998	--	**42**	--	**56**	--
MW-05-32	981118-MW5-32-13	11/18/1998	--	**0.27**	--	**0.27**	--
MW-05-32	990216-MW5-32-011	2/16/1999	--	**0.51**	--	**0.57**	--
MW-05-32	990514-MW5-32-17	5/14/1999	--	**0.1**	--	100 U	--
MW-05-32	990824-MW5-32-13	8/24/1999	--	**1.43**	--	**1.69**	--
MW-05-32	991027-MW5-32-15	10/27/1999	--	**1.19**	--	**1.33**	--
MW-05-32	000330-MW5-32-115	3/30/2000	--	**0.72**	--	**0.93**	--
MW-05-32	001005-MW5-32-12	10/5/2000	--	**0.28**	--	**0.37**	--
MW-05-32	010329-MW5-32-114	3/29/2001	--	**1.61**	--	**1.94**	--
MW-08-29	951207-MW8-29-01	12/7/1995	--	**65**	--	**44**	--
Tar Pond (Continued)							
MW-08-29	960321-MW8-29-01	3/21/1996	--	**28**	--	**31**	--
MW-08-29	960619-MW8-29-01	6/20/1996	--	**1.2**	--	**1.1**	--
MW-08-29	960619-MW8-29-02	6/20/1996	--	**2.5**	--	**3**	--
MW-08-29	961002-MW8-29-01	10/2/1996	--	**5.4**	--	**6.2**	--
MW-08-29	970226-MW8-29-01	2/26/1997	--	**3.1**	--	**2**	--
MW-08-29	970828-MW8-29-01	8/28/1997	--	**32**	--	**39**	--
MW-08-29	980218-MW8-29-01	2/18/1998	--	**4.3**	--	**4.9**	--
MW-08-29	980603-MW8-29-19	6/3/1998	--	**37**	--	**45**	--
MW-08-29	981119-MW8-29-22	11/19/1998	--	**2.2**	--	**2.6**	--
MW-08-29	990513-MW8-29-14	5/13/1999	--	**2.57**	--	**2.13**	--
MW-08-29	991029-MW8-29-23	10/29/1999	--	20000 U	--	20000 U	--
MW-08-29	000403-MW8-29-123	4/3/2000	--	**1.78**	--	**1.47**	--
MW-08-29	010330-MW8-29-123	3/30/2001	--	**8.97**	--	**10**	--
MW-08-56	951207-MW8-56-01	12/7/1995	--	**25**	--	**17**	--
MW-08-56	960321-MW8-56-01	3/21/1996	--	**68**	--	**74**	--
MW-08-56	960620-MW8-56-01	6/20/1996	--	**6.6 J**	--	**7.9 J**	--
MW-08-56	961002-MW8-56-01	10/2/1996	--	**26**	--	**27**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name / Total/Dissolved / Unit / Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-05-175	020924-MW5-175-101	9/24/2002	100 U	--	100 U	--
MW-05-175	030318-MW5-175-105	3/18/2003	100 U	--	100 U	--
MW-05-32	951205-MW5-32-01	12/5/1995	**1**	--	**0.9**	--
MW-05-32	960319-MW5-32-01	3/19/1996	**4.7**	100 U	**4.8**	100 U
MW-05-32	960620-MW5-32-01	6/20/1996	**2.2**	--	**2.3**	--
MW-05-32	961001-MW5-32-01	10/1/1996	**55**	--	**56**	--
MW-05-32	970225-MW5-32-01	2/25/1997	**0.19**	--	**0.12**	--
MW-05-32	970827-MW5-32-01	8/27/1997	**1.9**	--	**1.8**	--
MW-05-32	980217-MW5-32-01	2/17/1998	**0.55**	--	**0.62**	--
MW-05-32	980602-MW5-32-10	6/2/1998	**7**	--	**6.3**	--
MW-05-32	980826-MW5-32-09	8/26/1998	**53**	--	**36**	--
MW-05-32	981118-MW5-32-13	11/18/1998	**0.26**	--	**0.21**	--
MW-05-32	990216-MW5-32-011	2/16/1999	**0.51**	--	**0.41**	--
MW-05-32	990514-MW5-32-17	5/14/1999	100 U	--	100 U	--
MW-05-32	990824-MW5-32-13	8/24/1999	**0.93**	--	**1.79**	--
MW-05-32	991027-MW5-32-15	10/27/1999	**0.79**	--	**1.07**	--
MW-05-32	000330-MW5-32-115	3/30/2000	**0.58**	--	**0.83**	--
MW-05-32	001005-MW5-32-12	10/5/2000	**0.34**	--	**0.25**	--
MW-05-32	010329-MW5-32-114	3/29/2001	**1.33**	--	**1.75**	--
MW-08-29	951207-MW8-29-01	12/7/1995	**34**	--	**36**	--
Tar Pond (Continued)						
MW-08-29	960321-MW8-29-01	3/21/1996	**23**	--	**23**	--
MW-08-29	960619-MW8-29-01	6/20/1996	**0.88**	--	**0.88**	--
MW-08-29	960619-MW8-29-02	6/20/1996	**2.4**	--	**2.3**	--
MW-08-29	961002-MW8-29-01	10/2/1996	**4.4**	--	**4.5**	--
MW-08-29	970226-MW8-29-01	2/26/1997	**2.1**	--	1000 U	--
MW-08-29	970828-MW8-29-01	8/28/1997	**29**	--	**25**	--
MW-08-29	980218-MW8-29-01	2/18/1998	**3.7**	--	**4**	--
MW-08-29	980603-MW8-29-19	6/3/1998	**37**	--	**30**	--
MW-08-29	981119-MW8-29-22	11/19/1998	**1.9**	--	**1.8**	--
MW-08-29	990513-MW8-29-14	5/13/1999	**1.98**	--	**1.39**	--
MW-08-29	991029-MW8-29-23	10/29/1999	20000 U	--	20000 U	--
MW-08-29	000403-MW8-29-123	4/3/2000	**0.93**	--	**0.75**	--
MW-08-29	010330-MW8-29-123	3/30/2001	**6.4**	--	**6.48**	--
MW-08-56	951207-MW8-56-01	12/7/1995	**14**	--	**15**	--
MW-08-56	960321-MW8-56-01	3/21/1996	**66**	--	**60**	--
MW-08-56	960620-MW8-56-01	6/20/1996	**5.7 J**	--	**6 J**	--
MW-08-56	961002-MW8-56-01	10/2/1996	**24**	--	**20**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-05-175	020924-MW5-175-101	9/24/2002	100 U	--	100 U	--	100 U
MW-05-175	030318-MW5-175-105	3/18/2003	100 U	--	100 U	--	100 U
MW-05-32	951205-MW5-32-01	12/5/1995	**0.41**	--	**2.6**	--	**0.12**
MW-05-32	960319-MW5-32-01	3/19/1996	**1.7**	100 U	**8.5**	100 U	**0.61**
MW-05-32	960620-MW5-32-01	6/20/1996	**0.93**	--	**3.4**	--	**0.34**
MW-05-32	961001-MW5-32-01	10/1/1996	**18**	--	**51**	--	10000 U
MW-05-32	970225-MW5-32-01	2/25/1997	100 U	--	**0.33**	--	100 U
MW-05-32	970827-MW5-32-01	8/27/1997	1000 U	--	**2.7**	--	1000 U
MW-05-32	980217-MW5-32-01	2/17/1998	**0.19**	--	**0.65**	--	**0.11**
MW-05-32	980602-MW5-32-10	6/2/1998	**1.9**	--	**7**	--	**0.91**
MW-05-32	980826-MW5-32-09	8/26/1998	**17**	--	**58**	--	**5.8**
MW-05-32	981118-MW5-32-13	11/18/1998	**0.1**	--	**0.37**	--	100 U
MW-05-32	990216-MW5-32-011	2/16/1999	100 U	--	**0.61**	--	**0.14**
MW-05-32	990514-MW5-32-17	5/14/1999	100 U	--	**0.11**	--	**0.59**
MW-05-32	990824-MW5-32-13	8/24/1999	**0.93**	--	**2.08**	--	**0.47**
MW-05-32	991027-MW5-32-15	10/27/1999	**0.73**	--	**1.68**	--	**0.16**
MW-05-32	000330-MW5-32-115	3/30/2000	**0.49**	--	**1**	--	**0.12**
MW-05-32	001005-MW5-32-12	10/5/2000	**0.11**	--	**0.37**	--	100 U
MW-05-32	010329-MW5-32-114	3/29/2001	**1.12**	--	**2.12**	--	**0.52**
MW-08-29	951207-MW8-29-01	12/7/1995	**16**	--	**81**	--	**50**
Tar Pond (Continued)							
MW-08-29	960321-MW8-29-01	3/21/1996	**9.8**	--	**33**	--	**2.9**
MW-08-29	960619-MW8-29-01	6/20/1996	**0.3**	--	**1.2**	--	**0.12**
MW-08-29	960619-MW8-29-02	6/20/1996	**0.82**	--	**2.7**	--	**0.3**
MW-08-29	961002-MW8-29-01	10/2/1996	**1.6**	--	**4.8**	--	1000 U
MW-08-29	970226-MW8-29-01	2/26/1997	1000 U	--	**2.7**	--	1000 U
MW-08-29	970828-MW8-29-01	8/28/1997	**11**	--	**38**	--	**4.7**
MW-08-29	980218-MW8-29-01	2/18/1998	**1.2**	--	**4.1**	--	**0.69**
MW-08-29	980603-MW8-29-19	6/3/1998	**13**	--	**39**	--	**3.8**
MW-08-29	981119-MW8-29-22	11/19/1998	**0.69**	--	**2.3**	--	**0.22**
MW-08-29	990513-MW8-29-14	5/13/1999	**0.64**	--	**2.21**	--	**0.19**
MW-08-29	991029-MW8-29-23	10/29/1999	20000 U	--	20000 U	--	20000 U
MW-08-29	000403-MW8-29-123	4/3/2000	**0.79**	--	**1.66**	--	**0.14**
MW-08-29	010330-MW8-29-123	3/30/2001	**5.16**	--	**10.9**	--	**1.93**
MW-08-56	951207-MW8-56-01	12/7/1995	**60**	--	**30**	--	2000 U
MW-08-56	960321-MW8-56-01	3/21/1996	**23**	--	**83**	--	**7.1**
MW-08-56	960620-MW8-56-01	6/20/1996	**2.2 J**	--	**7.3 J**	--	**0.81 J**
MW-08-56	961002-MW8-56-01	10/2/1996	10000 U	--	**22**	--	10000 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name / Total/Dissolved / Unit / Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-05-175	020924-MW5-175-101	9/24/2002	--	100 U	--	100 U	--	100 U
MW-05-175	030318-MW5-175-105	3/18/2003	--	100 U	--	100 U	--	100 U
MW-05-32	951205-MW5-32-01	12/5/1995	--	**15**	--	**28**	--	**0.56**
MW-05-32	960319-MW5-32-01	3/19/1996	**0.96**	**44**	**5.3**	**10**	100 U	**3.1**
MW-05-32	960620-MW5-32-01	6/20/1996	--	**12**	--	**2.1**	--	**1.5**
MW-05-32	961001-MW5-32-01	10/1/1996	--	**160**	--	10000 U	--	**40**
MW-05-32	970225-MW5-32-01	2/25/1997	--	**3**	--	**0.23**	--	100 U
MW-05-32	970827-MW5-32-01	8/27/1997	--	**5.8**	--	1000 U	--	**1.4**
MW-05-32	980217-MW5-32-01	2/17/1998	--	**1.5**	--	100 U	--	**0.49**
MW-05-32	980602-MW5-32-10	6/2/1998	--	**20**	--	**0.57**	--	**4.3**
MW-05-32	980826-MW5-32-09	8/26/1998	--	**91**	--	**1.2**	--	**27**
MW-05-32	981118-MW5-32-13	11/18/1998	--	**1.4**	--	100 U	--	**0.15**
MW-05-32	990216-MW5-32-011	2/16/1999	--	**1.66**	--	100 U	--	**0.23**
MW-05-32	990514-MW5-32-17	5/14/1999	--	100 U	--	100 U	--	100 U
MW-05-32	990824-MW5-32-13	8/24/1999	--	**4.03**	--	100 U	--	**1.29**
MW-05-32	991027-MW5-32-15	10/27/1999	--	**3.2**	--	100 U	--	**0.8**
MW-05-32	000330-MW5-32-115	3/30/2000	--	**1.41**	--	100 U	--	**0.61**
MW-05-32	001005-MW5-32-12	10/5/2000	--	**0.54**	--	100 U	--	**0.19**
MW-05-32	010329-MW5-32-114	3/29/2001	--	**2.63**	--	100 U	--	**1.48**
MW-08-29	951207-MW8-29-01	12/7/1995	--	**230**	--	**83**	--	**25**
Tar Pond (Continued)								
MW-08-29	960321-MW8-29-01	3/21/1996	--	**98**	--	**89**	--	**16**
MW-08-29	960619-MW8-29-01	6/20/1996	--	**15**	--	**70**	--	**0.61**
MW-08-29	960619-MW8-29-02	6/20/1996	--	**9.4**	--	**14**	--	**1.6**
MW-08-29	961002-MW8-29-01	10/2/1996	--	**30**	--	**71**	--	**3.5**
MW-08-29	970226-MW8-29-01	2/26/1997	--	**22**	--	**52**	--	1000 U
MW-08-29	970828-MW8-29-01	8/28/1997	--	**150**	--	**120**	--	**18**
MW-08-29	980218-MW8-29-01	2/18/1998	--	**24**	--	**65**	--	**3.3**
MW-08-29	980603-MW8-29-19	6/3/1998	--	**140**	--	**120**	--	**21**
MW-08-29	981119-MW8-29-22	11/19/1998	--	**17**	--	**47**	--	**1.2**
MW-08-29	990513-MW8-29-14	5/13/1999	--	**21**	--	**64.5**	--	**1.01**
MW-08-29	991029-MW8-29-23	10/29/1999	--	**20**	--	**54**	--	20000 U
MW-08-29	000403-MW8-29-123	4/3/2000	--	**18.3**	--	**68.7**	--	**0.65**
MW-08-29	010330-MW8-29-123	3/30/2001	--	**31.2**	--	**47**	--	**5.76**
MW-08-56	951207-MW8-56-01	12/7/1995	--	**110**	--	**86**	--	**10**
MW-08-56	960321-MW8-56-01	3/21/1996	--	**200**	--	**130**	--	**40**
MW-08-56	960620-MW8-56-01	6/20/1996	--	**21 J**	--	**17 J**	--	**4.3 J**
MW-08-56	961002-MW8-56-01	10/2/1996	--	**92**	--	**74**	--	**15**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-05-175	020924-MW5-175-101	9/24/2002	--	100 U	--	100 U	--	100 U
MW-05-175	030318-MW5-175-105	3/18/2003	--	100 U	--	100 U	--	100 U
MW-05-32	951205-MW5-32-01	12/5/1995	--	**11**	--	**88**	--	**18**
MW-05-32	960319-MW5-32-01	3/19/1996	**0.61**	**1**	**29**	**100**	**1.1**	**53**
MW-05-32	960620-MW5-32-01	6/20/1996	--	**0.42**	--	**20**	--	**20**
MW-05-32	961001-MW5-32-01	10/1/1996	--	10000 U	--	**83**	--	**150**
MW-05-32	970225-MW5-32-01	2/25/1997	--	**0.16**	--	**0.29**	--	**3.8**
MW-05-32	970827-MW5-32-01	8/27/1997	--	1000 U	--	1000 U	--	**6.3**
MW-05-32	980217-MW5-32-01	2/17/1998	--	100 U	--	**0.23**	--	**1.7**
MW-05-32	980602-MW5-32-10	6/2/1998	--	**0.67**	--	**4.2**	--	**24**
MW-05-32	980826-MW5-32-09	8/26/1998	--	**3.4**	--	**17**	--	**120**
MW-05-32	981118-MW5-32-13	11/18/1998	--	100 U	--	100 U	--	**1.7**
MW-05-32	990216-MW5-32-011	2/16/1999	--	100 U	--	**0.17**	--	**1.9**
MW-05-32	990514-MW5-32-17	5/14/1999	--	**0.95**	--	100 U	--	**0.63**
MW-05-32	990824-MW5-32-13	8/24/1999	--	**0.12**	--	**0.51**	--	**5.36**
MW-05-32	991027-MW5-32-15	10/27/1999	--	100 U	--	**0.32**	--	**4.57**
MW-05-32	000330-MW5-32-115	3/30/2000	--	100 U	--	**0.27**	--	**1.71**
MW-05-32	001005-MW5-32-12	10/5/2000	--	100 U	--	100 U	--	**0.73**
MW-05-32	010329-MW5-32-114	3/29/2001	--	**0.13**	--	**0.61**	--	**3.81**
MW-08-29	951207-MW8-29-01	12/7/1995	--	**6000**	--	**400**	--	**220**
Tar Pond (Continued)								
MW-08-29	960321-MW8-29-01	3/21/1996	--	**6700**	--	**270**	--	**100**
MW-08-29	960619-MW8-29-01	6/20/1996	--	**1400**	--	**150**	--	**21**
MW-08-29	960619-MW8-29-02	6/20/1996	--	**2000**	--	**32**	--	**15**
MW-08-29	961002-MW8-29-01	10/2/1996	--	**5400**	--	**140**	--	**26**
MW-08-29	970226-MW8-29-01	2/26/1997	--	**5600**	--	**110**	--	**23**
MW-08-29	970828-MW8-29-01	8/28/1997	--	**10000**	--	**380**	--	**210**
MW-08-29	980218-MW8-29-01	2/18/1998	--	**11000**	--	**150**	--	**32**
MW-08-29	980603-MW8-29-19	6/3/1998	--	**10700**	--	**440**	--	**180**
MW-08-29	981119-MW8-29-22	11/19/1998	--	**4900**	--	**91**	--	**19**
MW-08-29	990513-MW8-29-14	5/13/1999	--	**5580**	--	**133**	--	**30**
MW-08-29	991029-MW8-29-23	10/29/1999	--	**2790**	--	**138**	--	**20**
MW-08-29	000403-MW8-29-123	4/3/2000	--	**6550**	--	**143**	--	**23.5**
MW-08-29	010330-MW8-29-123	3/30/2001	--	**1770**	--	**151**	--	**36**
MW-08-56	951207-MW8-56-01	12/7/1995	--	**20000**	--	**290**	--	**110**
MW-08-56	960321-MW8-56-01	3/21/1996	--	**13300**	--	**580**	--	**240**
MW-08-56	960620-MW8-56-01	6/20/1996	--	**1500 J**	--	**56 J**	--	**30 J**
MW-08-56	961002-MW8-56-01	10/2/1996	--	**10700**	--	**250**	--	**100**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-08-56	970226-MW8-56-01	2/26/1997	--	**120**	--	**240**	--	**34**
MW-08-56	970828-MW8-56-01	8/28/1997	--	**160**	--	**240**	--	**16**
MW-08-56	980218-MW8-56-01	2/18/1998	--	**130**	--	**220**	--	**18**
MW-08-56	980603-MW8-56-21	6/3/1998	--	**190**	--	**310**	--	**31**
MW-08-56	981119-MW8-56-23	11/19/1998	--	**130**	--	**180**	--	**15**
MW-08-56	990513-MW8-56-15	5/13/1999	--	**128**	--	**168**	--	**10.2**
MW-08-56	991029-MW8-56-24	10/29/1999	--	**148**	--	**179**	--	**19.1**
MW-08-56	000403-MW8-56-124	4/3/2000	--	**188**	--	**207**	--	**50**
MW-08-56	010330-MW8-56-122	3/30/2001	--	**169**	--	**165**	--	**29.8**
MW-08-56	020405-MW8-56-118	4/5/2002	--	**91.6**	--	**77.6**	--	**9.61**
MW-08-56	030320-MW8-56-120	3/20/2003	--	**99**	--	**61**	--	**11**
MW-11-32	951207-MW11-32-01	12/7/1995	--	**340**	--	**340**	--	**32**
MW-11-32	960320-MW11-32-01	3/20/1996	--	**200**	--	**180**	--	**20**
MW-11-32	960617-MW11-32-01	6/17/1996	--	**160**	--	**160**	--	**19**
MW-11-32	960930-MW11-32-01	9/30/1996	--	**270**	--	**220**	--	**62**
MW-11-32	960930-MW11-32-02	9/30/1996	--	**270**	--	**250**	--	**74**
MW-11-32	970224-MW11-32-01	2/25/1997	--	**150**	--	**140**	--	**1.4**
MW-11-32	970826-MW11-32-01	8/26/1997	--	**260**	--	**190**	--	**21**
Tar Pond (Continued)								
MW-11-32	980216-MW11-32-01	2/16/1998	--	**150**	--	**120**	--	**16**
MW-11-32	980601-MW11-32-03	6/1/1998	--	**510**	--	**360**	--	**56**
MW-14-110	981116-MW14-110-06	11/16/1998	--	100 U	--	100 U	--	100 U
MW-14-110	990216-MW14-110-005	2/16/1999	--	**0.11**	--	100 U	--	100 U
MW-14-110	990512-MW14-110-09	5/12/1999	--	**0.14**	--	100 U	--	100 U
MW-14-110	990823-MW14-110-06	8/23/1999	--	**0.29**	--	100 U	--	100 U
MW-14-110	991027-MW14-110-10	10/27/1999	--	**0.26**	--	100 U	--	100 U
MW-14-110	991027-MW14-110-09	10/27/1999	--	**0.26**	--	100 U	--	100 U
MW-14-110	000329-MW14-110-109	3/29/2000	--	**0.42**	--	100 U	--	100 U
MW-14-110	000329-MW14-110-110	3/29/2000	--	**0.42**	--	100 U	--	100 U
MW-14-110	000615-MW14-110-102	6/15/2000	--	**0.18**	--	100 U	--	100 U
MW-14-110	001005-MW14-110-06	10/5/2000	--	100 U	--	100 U	--	100 U
MW-14-110	001220-MW14-110-102	12/20/2000	--	**0.14**	--	100 U	--	100 U
MW-14-110	010328-MW14-110-108	3/28/2001	--	**0.23**	--	100 U	--	100 U
MW-14-110	011009-MW14-110-105	10/9/2001	--	100 U	--	100 U	--	100 U
MW-14-110	011213-MW14-110-101	12/13/2001	--	100 U	--	100 U	--	100 U
MW-14-110	020404-MW14-110-108	4/4/2002	--	100 U	--	**0.1**	--	100 U
MW-14-110	020711-MW14-110-101	7/11/2002	--	100 U	--	100 U	--	100 U
MW-14-110	020924-MW14-110-105	9/24/2002	--	**0.1**	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-08-56	970226-MW8-56-01	2/26/1997	--	20000 U	--	20000 U	--
MW-08-56	970828-MW8-56-01	8/28/1997	--	**4.1**	--	**4.4**	--
MW-08-56	980218-MW8-56-01	2/18/1998	--	**2.6**	--	**2.4**	--
MW-08-56	980603-MW8-56-21	6/3/1998	--	**13**	--	**15**	--
MW-08-56	981119-MW8-56-23	11/19/1998	--	10000 U	--	10000 U	--
MW-08-56	990513-MW8-56-15	5/13/1999	--	1000 U	--	1000 U	--
MW-08-56	991029-MW8-56-24	10/29/1999	--	**0.97**	--	**0.81**	--
MW-08-56	000403-MW8-56-124	4/3/2000	--	**12.2**	--	11100 U	--
MW-08-56	010330-MW8-56-122	3/30/2001	--	**8.28**	--	**7.84**	--
MW-08-56	020405-MW8-56-118	4/5/2002	--	**0.45**	--	**0.35**	--
MW-08-56	030320-MW8-56-120	3/20/2003	--	**2.2**	--	2000 U	--
MW-11-32	951207-MW11-32-01	12/7/1995	--	**5.5**	--	**2.8**	--
MW-11-32	960320-MW11-32-01	3/20/1996	--	**1.6**	--	**1.2**	--
MW-11-32	960617-MW11-32-01	6/17/1996	--	**2.9**	--	**2.8**	--
MW-11-32	960930-MW11-32-01	9/30/1996	--	**31**	--	**27**	--
MW-11-32	960930-MW11-32-02	9/30/1996	--	**41**	--	**40**	--
MW-11-32	970224-MW11-32-01	2/25/1997	--	**4.2**	--	1000 U	--
MW-11-32	970826-MW11-32-01	8/26/1997	--	**4.6**	--	**4.3**	--
Tar Pond (Continued)							
MW-11-32	980216-MW11-32-01	2/16/1998	--	**4.1**	--	**3.2**	--
MW-11-32	980601-MW11-32-03	6/1/1998	--	**26**	--	**24**	--
MW-14-110	981116-MW14-110-06	11/16/1998	--	100 U	--	100 U	--
MW-14-110	990216-MW14-110-005	2/16/1999	--	100 U	--	100 U	--
MW-14-110	990512-MW14-110-09	5/12/1999	--	100 U	--	100 U	--
MW-14-110	990823-MW14-110-06	8/23/1999	--	100 U	--	100 U	--
MW-14-110	991027-MW14-110-10	10/27/1999	--	100 U	--	100 U	--
MW-14-110	991027-MW14-110-09	10/27/1999	--	100 U	--	100 U	--
MW-14-110	000329-MW14-110-109	3/29/2000	--	100 U	--	100 U	--
MW-14-110	000329-MW14-110-110	3/29/2000	--	100 U	--	100 U	--
MW-14-110	000615-MW14-110-102	6/15/2000	--	100 U	--	100 U	--
MW-14-110	001005-MW14-110-06	10/5/2000	--	100 U	--	100 U	--
MW-14-110	001220-MW14-110-102	12/20/2000	--	100 U	--	100 U	--
MW-14-110	010328-MW14-110-108	3/28/2001	--	100 U	--	100 U	--
MW-14-110	011009-MW14-110-105	10/9/2001	--	100 U	--	100 U	--
MW-14-110	011213-MW14-110-101	12/13/2001	--	100 U	--	100 U	--
MW-14-110	020404-MW14-110-108	4/4/2002	--	100 U	--	100 U	--
MW-14-110	020711-MW14-110-101	7/11/2002	--	100 U	--	100 U	--
MW-14-110	020924-MW14-110-105	9/24/2002	--	100 U	--	100 U	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-08-56	970226-MW8-56-01	2/26/1997	20000 U	--	20000 U	--
MW-08-56	970828-MW8-56-01	8/28/1997	**3.7**	--	**3**	--
MW-08-56	980218-MW8-56-01	2/18/1998	**2**	--	**1.7**	--
MW-08-56	980603-MW8-56-21	6/3/1998	**13**	--	**11**	--
MW-08-56	981119-MW8-56-23	11/19/1998	10000 U	--	10000 U	--
MW-08-56	990513-MW8-56-15	5/13/1999	1000 U	--	1000 U	--
MW-08-56	991029-MW8-56-24	10/29/1999	**0.52**	--	**0.56**	--
MW-08-56	000403-MW8-56-124	4/3/2000	11100 U	--	11100 U	--
MW-08-56	010330-MW8-56-122	3/30/2001	**5.07**	--	**5.62**	--
MW-08-56	020405-MW8-56-118	4/5/2002	**0.19**	--	**0.27**	--
MW-08-56	030320-MW8-56-120	3/20/2003	2000 U	--	2000 U	--
MW-11-32	951207-MW11-32-01	12/7/1995	**2.6**	--	**2.2**	--
MW-11-32	960320-MW11-32-01	3/20/1996	**1.2**	--	**0.75**	--
MW-11-32	960617-MW11-32-01	6/17/1996	**2.3**	--	**1.8**	--
MW-11-32	960930-MW11-32-01	9/30/1996	**22**	--	**20**	--
MW-11-32	960930-MW11-32-02	9/30/1996	**36**	--	**31**	--
MW-11-32	970224-MW11-32-01	2/25/1997	**3.2**	--	1000 U	--
MW-11-32	970826-MW11-32-01	8/26/1997	**3.7**	--	**2.3**	--
Tar Pond (Continued)						
MW-11-32	980216-MW11-32-01	2/16/1998	**3.1**	--	**2.3**	--
MW-11-32	980601-MW11-32-03	6/1/1998	**25**	--	**18**	--
MW-14-110	981116-MW14-110-06	11/16/1998	100 U	--	100 U	--
MW-14-110	990216-MW14-110-005	2/16/1999	100 U	--	100 U	--
MW-14-110	990512-MW14-110-09	5/12/1999	100 U	--	100 U	--
MW-14-110	990823-MW14-110-06	8/23/1999	100 U	--	100 U	--
MW-14-110	991027-MW14-110-10	10/27/1999	100 U	--	100 U	--
MW-14-110	991027-MW14-110-09	10/27/1999	100 U	--	100 U	--
MW-14-110	000329-MW14-110-109	3/29/2000	100 U	--	100 U	--
MW-14-110	000329-MW14-110-110	3/29/2000	100 U	--	100 U	--
MW-14-110	000615-MW14-110-102	6/15/2000	100 U	--	100 U	--
MW-14-110	001005-MW14-110-06	10/5/2000	100 U	--	100 U	--
MW-14-110	001220-MW14-110-102	12/20/2000	100 U	--	100 U	--
MW-14-110	010328-MW14-110-108	3/28/2001	100 U	--	100 U	--
MW-14-110	011009-MW14-110-105	10/9/2001	100 U	--	100 U	--
MW-14-110	011213-MW14-110-101	12/13/2001	100 U	--	100 U	--
MW-14-110	020404-MW14-110-108	4/4/2002	100 U	--	100 U	--
MW-14-110	020711-MW14-110-101	7/11/2002	100 U	--	100 U	--
MW-14-110	020924-MW14-110-105	9/24/2002	100 U	--	100 U	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-08-56	970226-MW8-56-01	2/26/1997	20000 U	--	20000 U	--	20000 U
MW-08-56	970828-MW8-56-01	8/28/1997	**1.4**	--	**4.1**	--	1000 U
MW-08-56	980218-MW8-56-01	2/18/1998	**0.58**	--	**1.8**	--	**0.3**
MW-08-56	980603-MW8-56-21	6/3/1998	**5**	--	**13**	--	**1.3**
MW-08-56	981119-MW8-56-23	11/19/1998	10000 U	--	10000 U	--	10000 U
MW-08-56	990513-MW8-56-15	5/13/1999	1000 U	--	1000 U	--	1000 U
MW-08-56	991029-MW8-56-24	10/29/1999	**0.45**	--	**1.04**	--	--
MW-08-56	000403-MW8-56-124	4/3/2000	11100 U	--	**18.9**	--	11100 U
MW-08-56	010330-MW8-56-122	3/30/2001	**4.23**	--	**8.57**	--	**1.5**
MW-08-56	020405-MW8-56-118	4/5/2002	**0.21**	--	**0.53**	--	100 U
MW-08-56	030320-MW8-56-120	3/20/2003	2000 U	--	**2**	--	2000 U
MW-11-32	951207-MW11-32-01	12/7/1995	**1.3**	--	**6.3**	--	1000 U
MW-11-32	960320-MW11-32-01	3/20/1996	**0.49**	--	**1.3**	--	500 U
MW-11-32	960617-MW11-32-01	6/17/1996	**1**	--	**2.8**	--	**0.31**
MW-11-32	960930-MW11-32-01	9/30/1996	**9.9**	--	**27**	--	**2**
MW-11-32	960930-MW11-32-02	9/30/1996	**14**	--	**33**	--	**3**
MW-11-32	970224-MW11-32-01	2/25/1997	1000 U	--	**3.3**	--	1000 U
MW-11-32	970826-MW11-32-01	8/26/1997	**1.3**	--	**4.1**	--	**0.5**
Tar Pond (Continued)							
MW-11-32	980216-MW11-32-01	2/16/1998	**1**	--	**2.9**	--	1000 U
MW-11-32	980601-MW11-32-03	6/1/1998	10000 U	--	**24**	--	10000 U
MW-14-110	981116-MW14-110-06	11/16/1998	100 U	--	100 U	--	100 U
MW-14-110	990216-MW14-110-005	2/16/1999	100 U	--	100 U	--	100 U
MW-14-110	990512-MW14-110-09	5/12/1999	100 U	--	100 U	--	100 U
MW-14-110	990823-MW14-110-06	8/23/1999	100 U	--	100 U	--	100 U
MW-14-110	991027-MW14-110-10	10/27/1999	100 U	--	100 U	--	100 U
MW-14-110	991027-MW14-110-09	10/27/1999	100 U	--	100 U	--	100 U
MW-14-110	000329-MW14-110-109	3/29/2000	100 U	--	100 U	--	100 U
MW-14-110	000329-MW14-110-110	3/29/2000	100 U	--	100 U	--	100 U
MW-14-110	000615-MW14-110-102	6/15/2000	100 U	--	100 U	--	100 U
MW-14-110	001005-MW14-110-06	10/5/2000	100 U	--	100 U	--	100 U
MW-14-110	001220-MW14-110-102	12/20/2000	100 U	--	100 U	--	100 U
MW-14-110	010328-MW14-110-108	3/28/2001	100 U	--	100 U	--	100 U
MW-14-110	011009-MW14-110-105	10/9/2001	100 U	--	100 U	--	100 U
MW-14-110	011213-MW14-110-101	12/13/2001	100 U	--	100 U	--	100 U
MW-14-110	020404-MW14-110-108	4/4/2002	100 U	--	100 U	--	100 U
MW-14-110	020711-MW14-110-101	7/11/2002	100 U	--	100 U	--	100 U
MW-14-110	020924-MW14-110-105	9/24/2002	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-08-56	970226-MW8-56-01	2/26/1997	--	**34**	--	**60**	--	20000 U
MW-08-56	970828-MW8-56-01	8/28/1997	--	**24**	--	**80**	--	**2.3**
MW-08-56	980218-MW8-56-01	2/18/1998	--	**20**	--	**67**	--	**1.5**
MW-08-56	980603-MW8-56-21	6/3/1998	--	**61**	--	**100**	--	**7.5**
MW-08-56	981119-MW8-56-23	11/19/1998	--	**12**	--	**64**	--	10000 U
MW-08-56	990513-MW8-56-15	5/13/1999	--	**9.2**	--	**52.3**	--	1000 U
MW-08-56	991029-MW8-56-24	10/29/1999	--	**8.94**	--	**58.8**	--	**0.44**
MW-08-56	000403-MW8-56-124	4/3/2000	--	**66.7**	--	**82.2**	--	11100 U
MW-08-56	010330-MW8-56-122	3/30/2001	--	**32.9**	--	**71.7**	--	**4.93**
MW-08-56	020405-MW8-56-118	4/5/2002	--	**7.61**	--	**48.6**	--	**0.21**
MW-08-56	030320-MW8-56-120	3/20/2003	--	**9.2**	--	**42**	--	2000 U
MW-11-32	951207-MW11-32-01	12/7/1995	--	**48**	--	**190**	--	**1.5**
MW-11-32	960320-MW11-32-01	3/20/1996	--	**16**	--	**90**	--	**0.54**
MW-11-32	960617-MW11-32-01	6/17/1996	--	**19**	--	**90**	--	**1.4**
MW-11-32	960930-MW11-32-01	9/30/1996	--	**150**	--	**150**	--	**13**
MW-11-32	960930-MW11-32-02	9/30/1996	--	**200**	--	**180**	--	**22**
MW-11-32	970224-MW11-32-01	2/25/1997	--	1000 U	--	**68**	--	1000 U
MW-11-32	970826-MW11-32-01	8/26/1997	--	**37**	--	**120**	--	**2**
Tar Pond (Continued)								
MW-11-32	980216-MW11-32-01	2/16/1998	--	**25**	--	**65**	--	**1.6**
MW-11-32	980601-MW11-32-03	6/1/1998	--	**130**	--	**250**	--	**13**
MW-14-110	981116-MW14-110-06	11/16/1998	--	100 U	--	100 U	--	100 U
MW-14-110	990216-MW14-110-005	2/16/1999	--	100 U	--	100 U	--	100 U
MW-14-110	990512-MW14-110-09	5/12/1999	--	100 U	--	100 U	--	100 U
MW-14-110	990823-MW14-110-06	8/23/1999	--	100 U	--	100 U	--	100 U
MW-14-110	991027-MW14-110-10	10/27/1999	--	100 U	--	100 U	--	100 U
MW-14-110	991027-MW14-110-09	10/27/1999	--	100 U	--	100 U	--	100 U
MW-14-110	000329-MW14-110-109	3/29/2000	--	100 U	--	100 U	--	100 U
MW-14-110	000329-MW14-110-110	3/29/2000	--	100 U	--	100 U	--	100 U
MW-14-110	000615-MW14-110-102	6/15/2000	--	100 U	--	100 U	--	100 U
MW-14-110	001005-MW14-110-06	10/5/2000	--	100 U	--	100 U	--	100 U
MW-14-110	001220-MW14-110-102	12/20/2000	--	100 U	--	100 U	--	100 U
MW-14-110	010328-MW14-110-108	3/28/2001	--	100 U	--	100 U	--	100 U
MW-14-110	011009-MW14-110-105	10/9/2001	--	100 U	--	100 U	--	100 U
MW-14-110	011213-MW14-110-101	12/13/2001	--	100 U	--	100 U	--	100 U
MW-14-110	020404-MW14-110-108	4/4/2002	--	100 U	--	100 U	--	100 U
MW-14-110	020711-MW14-110-101	7/11/2002	--	100 U	--	100 U	--	100 U
MW-14-110	020924-MW14-110-105	9/24/2002	--	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-08-56	970226-MW8-56-01	2/26/1997	--	**13000**	--	**160**	--	**44**
MW-08-56	970828-MW8-56-01	8/28/1997	--	**17400**	--	**170**	--	**28**
MW-08-56	980218-MW8-56-01	2/18/1998	--	**12300**	--	**150**	--	**27**
MW-08-56	980603-MW8-56-21	6/3/1998	--	**16600**	--	**280**	--	**69**
MW-08-56	981119-MW8-56-23	11/19/1998	--	**10500**	--	**110**	--	**13**
MW-08-56	990513-MW8-56-15	5/13/1999	--	**11500**	--	**88.2**	--	**9.9**
MW-08-56	991029-MW8-56-24	10/29/1999	--	**12000**	--	**110**	--	**8.54**
MW-08-56	000403-MW8-56-124	4/3/2000	--	**13000**	--	**294**	--	**97.8**
MW-08-56	010330-MW8-56-122	3/30/2001	--	**14200**	--	**202**	--	**37.1**
MW-08-56	020405-MW8-56-118	4/5/2002	--	**6830**	--	**69.6**	--	**6.17**
MW-08-56	030320-MW8-56-120	3/20/2003	--	**7400**	--	**77**	--	**8.8**
MW-11-32	951207-MW11-32-01	12/7/1995	--	**21000**	--	**360**	--	**33**
MW-11-32	960320-MW11-32-01	3/20/1996	--	**14000**	--	**150**	--	**13**
MW-11-32	960617-MW11-32-01	6/17/1996	--	**11000**	--	**120**	--	**25**
MW-11-32	960930-MW11-32-01	9/30/1996	--	**16000**	--	**430**	--	**170**
MW-11-32	960930-MW11-32-02	9/30/1996	--	**17000**	--	**510**	--	**190**
MW-11-32	970224-MW11-32-01	2/25/1997	--	**11000**	--	**140**	--	**26**
MW-11-32	970826-MW11-32-01	8/26/1997	--	**16200**	--	**200**	--	**25**
Tar Pond (Continued)								
MW-11-32	980216-MW11-32-01	2/16/1998	--	**9200**	--	**140**	--	**25**
MW-11-32	980601-MW11-32-03	6/1/1998	--	**30200**	--	**580**	--	**160**
MW-14-110	981116-MW14-110-06	11/16/1998	--	100 U	--	100 U	--	100 U
MW-14-110	990216-MW14-110-005	2/16/1999	--	100 U	--	100 U	--	100 U
MW-14-110	990512-MW14-110-09	5/12/1999	--	**0.14**	--	100 U	--	100 U
MW-14-110	990823-MW14-110-06	8/23/1999	--	**0.12**	--	100 U	--	100 U
MW-14-110	991027-MW14-110-10	10/27/1999	--	100 U	--	100 U	--	100 U
MW-14-110	991027-MW14-110-09	10/27/1999	--	100 U	--	100 U	--	100 U
MW-14-110	000329-MW14-110-109	3/29/2000	--	100 U	--	100 U	--	100 U
MW-14-110	000329-MW14-110-110	3/29/2000	--	100 U	--	100 U	--	100 U
MW-14-110	000615-MW14-110-102	6/15/2000	--	100 U	--	100 U	--	100 U
MW-14-110	001005-MW14-110-06	10/5/2000	--	100 U	--	100 U	--	100 U
MW-14-110	001220-MW14-110-102	12/20/2000	--	100 U	--	100 U	--	100 U
MW-14-110	010328-MW14-110-108	3/28/2001	--	100 U	--	100 U	--	100 U
MW-14-110	011009-MW14-110-105	10/9/2001	--	100 U	--	100 U	--	100 U
MW-14-110	011213-MW14-110-101	12/13/2001	--	100 U	--	100 U	--	100 U
MW-14-110	020404-MW14-110-108	4/4/2002	--	100 U	--	100 U	--	100 U
MW-14-110	020711-MW14-110-101	7/11/2002	--	100 U	--	100 U	--	100 U
MW-14-110	020924-MW14-110-105	9/24/2002	--	100 U	--	100 U	--	100 U

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Acenaphthene D µg/l	Acenaphthene T µg/l	Acenaphthylene D µg/l	Acenaphthylene T µg/l	Anthracene D µg/l	Anthracene T µg/l
MW-14-110	021217-MW14-110-102	12/17/2002	--	100 U	--	100 U	--	100 U
MW-14-110	030318-MW14-110-108	3/18/2003	--	100 U	--	100 U	--	100 U
MW-14-110	030602-MW14-110-101	6/2/2003	--	100 U	--	100 U	--	100 U
Summary								
Number of Samples			--	**369**	**2**	**370**	**2**	**370**
Number of Detects			--	**263**	**2**	**228**	**2**	**234**
Percent Detects			--	**71%**	**100%**	**62%**	**100%**	**63%**
Mean (µg/L)			--	**975.26**	**1.55**	**324.78**	**4.75**	**377.45**
90 Percentile UCL (µg/L)			--	**1664.56**	**2.29**	**475.83**	**5.33**	**551.86**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(a)anthracene D µg/l	Benzo(a)anthracene T µg/l	Benzo(a)pyrene D µg/l	Benzo(a)pyrene T µg/l	Benzo(b)fluoranthene D µg/l
MW-14-110	021217-MW14-110-102	12/17/2002	--	100 U	--	100 U	--
MW-14-110	030318-MW14-110-108	3/18/2003	--	100 U	--	100 U	--
MW-14-110	030602-MW14-110-101	6/2/2003	--	100 U	--	100 U	--
Summary							
Number of Samples			**2**	**370**	**2**	**370**	**2**
Number of Detects			**0**	**218**	**0**	**165**	**0**
Percent Detects			**0%**	**59%**	**0%**	**45%**	**0%**
Mean (µg/L)			**100.00**	**464.52**	**100.00**	**504.67**	**100.00**
90 Percentile UCL (µg/L)			--	**677.33**	--	**721.49**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(b)fluoranthene T µg/l	Benzo(g,h,i)perylene D µg/l	Benzo(g,h,i)perylene T µg/l	Benzo(k)fluoranthene D µg/l
MW-14-110	021217-MW14-110-102	12/17/2002	100 U	--	100 U	--
MW-14-110	030318-MW14-110-108	3/18/2003	100 U	--	100 U	--
MW-14-110	030602-MW14-110-101	6/2/2003	100 U	--	100 U	--
Summary						
Number of Samples			**370**	**2**	**370**	**2**
Number of Detects			**170**	**0**	**157**	**0**
Percent Detects			**46%**	**0%**	**42%**	**0%**
Mean (µg/L)			**514.33**	**100.00**	**502.66**	**100.00**
90 Percentile UCL (µg/L)			**732.02**	--	**719.34**	--

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Benzo(k)fluoranthene T µg/l	Chrysene D µg/l	Chrysene T µg/l	Dibenzo(a,h)anthracene D µg/l	Dibenzo(a,h)anthracene T µg/l
MW-14-110	021217-MW14-110-102	12/17/2002	100 U	--	100 U	--	100 U
MW-14-110	030318-MW14-110-108	3/18/2003	100 U	--	100 U	--	100 U
MW-14-110	030602-MW14-110-101	6/2/2003	100 U	--	100 U	--	100 U
Summary							
Number of Samples			**370**	**2**	**370**	**2**	**369**
Number of Detects			**140**	**0**	**216**	**0**	**77**
Percent Detects			**38%**	**0%**	**58%**	**0%**	**21%**
Mean (µg/L)			**578.06**	**100.00**	**472.26**	**100.00**	**668.57**
90 Percentile UCL (µg/L)			**803.54**	--	**685.58**	--	**898.23**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name / Total/Dissolved / Unit / Sample Date	Fluoranthene D µg/l	Fluoranthene T µg/l	Fluorene D µg/l	Fluorene T µg/l	Indeno(1,2,3-cd)pyrene D µg/l	Indeno(1,2,3-cd)pyrene T µg/l
MW-14-110	021217-MW14-110-102	12/17/2002	--	100 U	--	100 U	--	100 U
MW-14-110	030318-MW14-110-108	3/18/2003	--	100 U	--	100 U	--	100 U
MW-14-110	030602-MW14-110-101	6/2/2003	--	100 U	--	100 U	--	100 U
Summary								
Number of Samples			**2**	**370**	**2**	**370**	**2**	**370**
Number of Detects			**2**	**252**	**2**	**232**	**0**	**150**
Percent Detects			**100%**	**68%**	**100%**	**63%**	**0%**	**41%**
Mean (µg/L)			**1.13**	**425.39**	**23.65**	**484.88**	**100.00**	**504.94**
90 Percentile UCL (µg/L)			**1.41**	**631.74**	**53.83**	**718.33**	--	**721.59**

Table A-6
Groundwater PAH Results

Location ID	Sample ID	Chemical Name Total/Dissolved Unit Sample Date	Naphthalene D µg/l	Naphthalene T µg/l	Phenanthrene D µg/l	Phenanthrene T µg/l	Pyrene D µg/l	Pyrene T µg/l
MW-14-110	021217-MW14-110-102	12/17/2002	--	100 U	--	100 U	--	100 U
MW-14-110	030318-MW14-110-108	3/18/2003	--	100 U	--	100 U	--	100 U
MW-14-110	030602-MW14-110-101	6/2/2003	--	100 U	--	100 U	--	100 U
Summary								
Number of Samples			**2**	**370**	**2**	**370**	**2**	**370**
Number of Detects			**2**	**264**	**2**	**245**	**2**	**262**
Percent Detects			**100%**	**71%**	**100%**	**66%**	**100%**	**71%**
Mean (µg/L)			**800.31**	**23160.77**	**48.50**	**719.38**	**1.40**	**454.72**
90 Percentile UCL (µg/L)			**2115.69**	**52209.20**	**80.57**	**1191.76**	**1.89**	**684.13**

Bold = Detected Values
U = Undetected Values
J = Estimated Values

Table A-7
Surfacewater PAH Results

Location		Sample ID	Sample Date	Acenaphthene µg/l	Acenaphthylene µg/l	Anthracene µg/l	Benzo(a)anthracene µg/l	Benzo(a)pyrene µg/l	Benzo(b)fluoranthene µg/l
			Chemical Name / Unit						
East Pond	SW1	SW1-01	1/29/1992	0.3 U	**0.6**	**0.87**	**0.75**	**1.1**	**1.8**
Middle Pond	SW2	SW2-01	1/29/1992	**2.9**	**0.3**	**0.4**	0.1 U	0.1 U	**0.13**
West Pond	SW3	SW3-01	1/29/1992	**2.8**	**0.48**	**0.56**	**0.11**	**0.13**	**0.19**
Ditch, West	SW4	SW4-01	1/29/1992	**0.31**	0.1 U	0.1 U	0.1 U	**0.12**	**0.17**
Ditch, East	SW5	SW5-01	1/29/1992	**1.1**	**0.31**	0.1 U	**0.1**	**0.11**	**0.16**
Ditch, East	SW5	SW1-02	1/29/1992	**1.2**	**0.35**	**0.16**	**0.11**	**0.12**	**0.18**
Summary									
	Number of Samples			**6**	**6**	**6**	**6**	**6**	**6**
	Number of Detects			**5**	**5**	**4**	**4**	**5**	**6**
	Percent Detects			**83%**	**83%**	**67%**	**67%**	**83%**	**100%**
	Mean (µg/L)			**1.44**	**0.36**	**0.37**	**0.21**	**0.28**	**0.44**
	90 Percentile UCL (µg/L)			**2.21**	**0.47**	**0.57**	**0.39**	**0.55**	**0.89**

Bold = Detected Values
U = Undetected Values
J = Estimated Values

Table A-7
Surfacewater PAH Results

Location		Sample ID	Sample Date	Benzo(g,h,i)perylene µg/l	Benzo(k)fluoranthene µg/l	Chrysene µg/l	Dibenzo(a,h)anthracene µg/l	Fluoranthene µg/l	Fluorene µg/l
			Chemical Name / Unit						
East Pond	SW1	SW1-01	1/29/1992	**1.8**	**0.64**	**1.1**	0.3 U	**0.9**	0.3 U
Middle Pond	SW2	SW2-01	1/29/1992	**0.1**	0.1 U	**0.11**	0.1 U	**0.85**	**1.2**
West Pond	SW3	SW3-01	1/29/1992	**0.17**	0.1 U	**0.21**	0.1 U	**1.1**	**1.3**
Ditch, West	SW4	SW4-01	1/29/1992	**0.18**	0.1 U	**0.15**	0.1 U	**0.28**	**0.22**
Ditch, East	SW5	SW5-01	1/29/1992	**0.14**	0.1 U	**0.15**	0.1 U	**0.32**	**0.41**
Ditch, East	SW5	SW1-02	1/29/1992	**0.17**	0.1 U	**0.16**	0.1 U	**0.3**	**0.44**
Summary									
	Number of Samples			**6**	**6**	**6**	**6**	**6**	**6**
	Number of Detects			**6**	**1**	**6**	**0**	**6**	**5**
	Percent Detects			**100%**	**17%**	**100%**	**0%**	**100%**	**83%**
	Mean (µg/L)			**0.43**	**0.19**	**0.31**	**0.13**	**0.63**	**0.65**
	90 Percentile UCL (µg/L)			**0.88**	**0.34**	**0.57**	**0.19**	**0.87**	**0.96**

Table A-7
Surfacewater PAH Results

Location		Sample ID	Sample Date	Indeno(1,2,3-cd)pyrene µg/l	Naphthalene µg/l	Phenanthrene µg/l	Pyrene µg/l	Total Carcinogenic PAHs µg/l	Total PAHs (MTCA) µg/l
			Chemical Name / Unit						
East Pond	SW1	SW1-01	1/29/1992	**1.2**	0.3 U	0.3 U	**1.3**	**6.59**	**12.06**
Middle Pond	SW2	SW2-01	1/29/1992	0.1 U	**16**	**0.96**	**0.71**	**0.24**	**23.66**
West Pond	SW3	SW3-01	1/29/1992	**0.12**	**7.2**	**1.1**	**0.86**	**0.76**	**16.33**
Ditch, West	SW4	SW4-01	1/29/1992	**0.11**	**2.5**	**0.4**	**0.28**	**0.55**	**4.72**
Ditch, East	SW5	SW5-01	1/29/1992	**0.1**	**16**	**0.88**	**0.32**	**0.62**	**20.1**
Ditch, East	SW5	SW1-02	1/29/1992	**0.12**	**18**	**1**	**0.28**	**0.69**	**22.59**
Summary									
	Number of Samples			**6**	**6**	**6**	**6**	**6**	**6**
	Number of Detects			**5**	**5**	**5**	**6**	**6**	**6**
	Percent Detects			**83%**	**83%**	**83%**	**100%**	**100%**	**100%**
	Mean (µg/L)			**0.29**	**10.00**	**0.77**	**0.63**	**1.58**	**16.58**
	90 Percentile UCL (µg/L)			**0.59**	**15.15**	**1.00**	**0.90**	**3.23**	**21.42**

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*												
	MW-1-22	MW-2-32	MW-2-61	MW-3-26	MW-3-56	MW-4-35	MW-4-57	MW-4-101	MW-5-32	MW-5-100	MW-5-175	MW-6-32	MW-6-61
6-Dec-91	34.75	34.46	34.41	34.11	34.07	34.54	34.53	34.36	27.83	27.31	27.19	35.51	34.5
	Elevation of Ground Surface (feet msl)*												
	32	35.8	34.7	31.2	31.2	31.7	31.7	31.8	25.1	25.4	25.2	35.8	35.8
Date Measured	Measured Water Level (feet btc)												
	MW-1-22	MW-2-32	MW-2-61	MW-3-26	MW-3-56	MW-4-35	MW-4-57	MW-4-101	MW-5-32	MW-5-100	MW-5-175	MW-6-32	MW-6-61
4-Dec-91	14.15	15.23	-	15.58	15.79	16.12	16.39	-	9.46	-	-	16.71	15.77
4-Jan-92	14.47	20.04	-	19.47	21.85	22.47	22.38	-	15.57	-	-	14.84	21.58
11-Feb-92	7.74	8.61	-	8.52	8.63	9.09	9.1	-	2.41	-	-	9.55	8.97
17-Mar-92	12.44	18.03	-	17.87	19.66	20.24	20.21	-	13.37	-	-	12.1	19.39
15-Apr-92	13.65	18.83	-	18.13	19.47	20.26	20.07	-	13.36	-	-	13.42	19.51
9-May-92	13.75	19.47	-	18.98	22.01	22.58	22.6	-	15.78	-	-	13.3	21.55
16-Jun-92	13.88	17.4	-	17.4	18.21	18.61	18.73	-	11.96	-	-	13.4	18.13
15-Jul-92	15.51	20.71	-	20.07	24.41	24.3	24.93	-	17.91	-	-	14.6	23.55
20-Aug-92	16.51	21.8	-	22.24	26.99	26.77	27.51	-	20.46	-	-	16.17	26.27
16-Sep-92	17.06	22.06	-	20.61	28.02	27.15	28.53	-	21.27	-	-	16.94	26.81
29-Sep-92	17.17	22.24	-	23.32	27.04	27.46	27.61	-	20.68	-	-	17.08	27.01
14-Nov-92	16.38	22.02	-	20.76	26.48	26.85	27	-	19.84	-	-	17	25.71
23-Feb-93	12.41	18.71	-	18.61	20.48	20.82	21.02	-	14.17	-	-	12.83	19.79
9-Jun-93	12.89	14.23	-	13.8	14.2	14.7	14.56	-	7.97	-	-	13.81	14.61
25-Aug-93	15.38	21.7	-	22.61	26.1	26.56	25.84	-	19.63	-	-	18.53	25.58
24-Nov-93	14.42	21.5	-	19.25	24.64	25.14	24.8	-	18.23	-	-	16.29	24.33
18-Dec-93	-	-	-	-	22.75	-	23.28	-	-	-	-	-	22.62
15-Feb-94	12.6	20.13	-	18.65	23.55	23.25	24.1	-	17.09	-	-	14.29	-
31-May-94	14.49	16.97	-	16.61	16.51	16.9	17	-	10.33	-	-	15.75	-
24-Aug-94	17.62	22.74	-	23.68	27.79	27.32	28.36	-	21.14	-	-	17.73	-
15-Nov-94	18.42	24.59	28.36	22.2	27.57	27.32	28.1	28.29	20.99	21.19	21.05	18.23	-
14-Feb-95	11.97	19.02	23.94	18.27	23.2	23.94	23.71	23.75	16.75	16.72	16.54	12.35	-
10-May-95	14.32	20.19	22.99	18.76	22.44	22.92	22.99	22.94	16.06	15.87	15.68	13.41	-
19-Aug-95	17.37	22.16	26.95	21.92	26.31	25.98	26.81	26.87	19.73	19.8	19.62	19.8	-

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
6-Dec-91	39.09	39.13	37.65	39.22	39.33	38.39	38.69	34.86	34.78	37.41	35.97[1]	36.06[1]
	Elevation of Ground Surface (feet msl)*											
	36.5	36.5	37.9	36.5	36.5	35.4	35.9	35.2	35.2	35.3	36.27	36.27
Date Measured	Measured Water Level (feet btc)											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
4-Dec-91	19.75	20.61	6.2	14.98	13.42	12.69	9.37	-	-	-	-	-
4-Jan-92	19.01	26.74	7.33	15.2	16.32	12.19	10.82	-	-	-	-	-
11-Feb-92	16.99	13.56	3.32	11.11	8.92	8.95	5.27	-	-	-	-	-
17-Mar-92	15.22	24.54	6.13	11.95	14.47	9.42	9.01	-	-	-	-	-
15-Apr-92	15.58	24.44	6.93	12.63	15.07	10.12	9.69	-	-	-	-	-
9-May-92	15.77	26.93	6.94	12.98	15.9	10.4	10.24	-	-	-	-	-
16-Jun-92	16	23.15	5.03	13.51	13.96	10.9	9.98	-	-	-	-	-
15-Jul-92	17.26	29.05	6.65	15.9	17.21	11.93	12.43	-	-	-	-	-
20-Aug-92	19.18	31.93	8.47	16.58	19.43	13.4	14.53	-	-	-	-	-
16-Sep-92	20.13	32.63	7.52	16.8	19.3	14.02	14.86	-	-	-	-	-
29-Sep-92	20.19	32.45	8.7	16.89	19.84	14.26	14.97	-	-	-	-	-
14-Nov-92	20.63	31.37	6.61	16.42	18.38	14.2	13.85	-	-	-	-	-
23-Feb-93	18.43	25.33	4.35	14.85	14.33	11.18	9.71	-	-	-	-	-
9-Jun-93	18.56	19.25	4.84	16.01	12.2	12.5	8.49	-	-	-	-	-
25-Aug-93	20.31	31.13	11.71	17.1	20.16	14.3	14.13	-	-	-	-	-
24-Nov-93	20.85	29.85	7.85	16.36	17.89	13.88	11.79	-	-	-	-	-
18-Dec-93	-	27.9	-	-	16.9	-	-	-	23.71	-	-	-
15-Feb-94	20.05	28.5	5.33	15.6	15.89	12.02	9.72	14.73	23.98	-	-	-
31-May-94	20.05	21.63	7.25	14.63	14.36	12.85	9.83	15.69	17.11	-	-	-
24-Aug-94	20.89	32.46	12.67	14.32	21.19	14.29	14.97	17.56	28.22	-	-	-
15-Nov-94	21.19	32.13	12.1	14.3	20.81	14.45	14.92	17.78	28.11	24.84	-	-
14-Feb-95	17.66	27.97	5.11	12.41	15.34	10.03	9.51	13.04	23.62	20.35	-	-
10-May-95	16.56	27.31	8.5	15.82	16.94	10.82	11.11	14.03	22.91	20.62	-	-
19-Aug-95	19.65	31.04	12.04	15	20.46	14.25	14.4	17.18	26.81	23.93	15.05	15.37

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*												
	MW-1-22	MW-2-32	MW-2-61	MW-3-26	MW-3-56	MW-4-35	MW-4-57	MW-4-101	MW-5-32	MW-5-100	MW-5-175	MW-6-32	MW-6-61
6-Dec-91	34.75	34.46	34.41	34.11	34.07	34.54	34.53	34.36	27.83	27.31	27.19	35.51	34.5
	Elevation of Ground Surface (feet msl)*												
	32	35.8	34.7	31.2	31.2	31.7	31.7	31.8	25.1	25.4	25.2	35.8	35.8
Date Measured	Measured Water Level (feet btc)												
	MW-1-22	MW-2-32	MW-2-61	MW-3-26	MW-3-56	MW-4-35	MW-4-57	MW-4-101	MW-5-32	MW-5-100	MW-5-175	MW-6-32	MW-6-61
24-Oct-95	18.48	24.73	28.77	24.4	28.05	28.02	28.49	28.44	21.56	21.36	21.11	19	-
26-Mar-96	12.88	20.09	26.94	19.24	26.27	25.69	26.8	26.91	19.36	19.83	19.64	14.05	-
14-Jun-96	16.26	21.18	24.08	20.01	23.56	24.42	24.14	24.1	17.4	17.07	16.86	16.05	-
3-Oct-96	18.15	23.24	28.92	22.12	28.42	28.02	28.95	28.92	21.93	21.88	21.69	-	-
19-Dec-96	17.98	22.73	27.13	19.5	26.89	26.13	27.27	26.76	20.33	19.63	19.31	-	-
26-Mar-97	16.91	21.94	28.05	20.86	27.35	27.01	27.91	28.1	20.66	21.05	20.88	-	-
27-Jun-97	18.02	23.49	28.58	24.14	28.11	27.51	28.52	28.25	21.59	21.23	20.97	-	-
7-Oct-97	19.24	26.16	29.85	25.45	29.1	29.05	29.68	28.72	22.67	22.6	22.45	-	-
11-Dec-97	16.73	22.68	26.54	20.49	25.81	24.12	26.33	26.46	19.01	19.41	19.21	-	-
1-Apr-98	14.98	20.47	25.78	20.61	25.33	26.38	25.84	25.59	18.71	18.56	18.34	-	-
9-Jul-98	17.18	21.78	25.31	21.42	24.69	25.12	25.22	25.13	18.28	18.1	17.92	-	-
28-Sep-98	18.44	24.95	29.44	24.73	28.65	28.25	29.27	29.44	22.14	22.41	22.23	-	-
16-Dec-98	19.34	24.41	24.61	20.25	25.05	23.61	25.42	25.06	18.92	18.02	17.99	-	-
16-Mar-99	14.9	20.71	24.92	19.79	24.35	24.38	24.91	24.91	17.82	17.87	17.67	-	-
4-Dec-91	11.4	16.57	-	12.67	12.92	13.28	13.56	-	6.73	-	-	17	17.07
4-Jan-92	11.72	21.38	-	16.56	18.98	19.63	19.55	-	12.84	-	-	15.13	22.88
11-Feb-92	4.99	9.95	-	5.61	5.76	6.25	6.27	-	-0.32	-	-	9.84	10.27
17-Mar-92	9.69	19.37	-	14.96	16.79	17.4	17.38	-	10.64	-	-	12.39	20.69
15-Apr-92	10.9	20.17	-	15.22	16.6	17.42	17.24	-	10.63	-	-	13.71	20.81
9-May-92	11	20.81	-	16.07	19.14	19.74	19.77	-	13.05	-	-	13.59	22.85
16-Jun-92	11.13	18.74	-	14.49	15.34	15.77	15.9	-	9.23	-	-	13.69	19.43
15-Jul-92	12.76	22.05	-	17.16	21.54	21.46	22.1	-	15.18	-	-	14.89	24.85
20-Aug-92	13.76	23.14	-	19.33	24.12	23.93	24.68	-	17.73	-	-	16.46	27.57
16-Sep-92	14.31	23.4	-	17.7	25.15	24.31	25.7	-	18.54	-	-	17.23	28.11

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
6-Dec-91	39.09	39.13	37.65	39.22	39.33	38.39	38.69	34.86	34.78	37.41	35.97[1]	36.06[1]
	Elevation of Ground Surface (feet msl)*											
	36.5	36.5	37.9	36.5	36.5	35.4	35.9	35.2	35.2	35.3	36.27	36.27
Date Measured	Measured Water Level (feet btc)											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
24-Oct-95	20.83	32.78	13.86	16.4	22.15	15.6	16.51	18.52	28.63	25.68	16.92	17.28
26-Mar-96	19.43	31.08	6.25	17.7	17.32	12.9	11.65	14.45	26.71	23.11	14.05	14.68
14-Jun-96	19.53	28.42	10.15	14.74	18.55	13.36	13.11	15.82	24.1	22.02	14.14	14.96
3-Oct-96	20.31	33.46	13.67	14.09	22.31	14.15	16.85	17.32	28.98	26.31	17.81	18.66
19-Dec-96	19.24	32.12	12.22	13.02	20.2	13.09	15.17	16.7	27.7	26.05	16.25	17.08
26-Mar-97	19.19	32.07	11.91	13.74	20.85	13.63	14.96	16.81	27.86	25.24	16.4	17.23
27-Jun-97	21.14	33.04	13.31	17.27	22.92	15.25	16.06	18.06	28.72	25.88	17.32	18.11
7-Oct-97	21.99	34.11	15.5	18.28	23.89	17.1	18.45	19.41	29.78	27.51	19.41	20.19
11-Dec-97	21.58	30.43	9.71	16.5	19	16	13.67	17.89	26.34	23.66	15.05	15.86
1-Apr-98	20.24	30.61	7.99	16.77	18.46	13.16	12.48	15.35	25.85	23.59	14.56	15.42
9-Jul-98	20.43	29.73	11.61	16.2	19.92	14	13.98	17.09	25.31	23.29	15.91	15.22
28-Sep-98	21.41	33.35	14.27	-	22.83	-	17.42	18.63	29.15	26.55	18.34	19.11
16-Dec-98	21.79	31.16	12.93	16.2	20.8	17.3	16.05	19.02	25.75	24.11	16.2	16.86
16-Mar-99	20.69	29.51	6.87	16.4	17.05	13.5	17.47	15.92	24.92	22.22	13.5	14.31
4-Dec-91	17.16	17.98	6.45	12.26	10.59	9.7	6.58	-	-	-	-	-
4-Jan-92	16.42	24.11	7.58	12.48	13.49	9.2	8.03	-	-	-	-	-
11-Feb-92	14.4	10.93	3.57	8.39	6.09	5.96	2.48	-	-	-	-	-
17-Mar-92	12.63	21.91	6.38	9.23	11.64	6.43	6.22	-	-	-	-	-
15-Apr-92	12.99	21.81	7.18	9.91	12.24	7.13	6.9	-	-	-	-	-
9-May-92	13.18	24.3	7.19	10.26	13.07	7.41	7.45	-	-	-	-	-
16-Jun-92	13.41	20.52	5.28	10.79	11.13	7.91	7.19	-	-	-	-	-
15-Jul-92	14.67	26.42	6.9	13.18	14.38	8.94	9.64	-	-	-	-	-
20-Aug-92	16.59	29.3	8.72	13.86	16.6	10.41	11.74	-	-	-	-	-
16-Sep-92	17.54	30	7.77	14.08	16.47	11.03	12.07	-	-	-	-	-

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*												
	MW-1-22	MW-2-32	MW-2-61	MW-3-26	MW-3-56	MW-4-35	MW-4-57	MW-4-101	MW-5-32	MW-5-100	MW-5-175	MW-6-32	MW-6-61
6-Dec-91	34.75	34.46	34.41	34.11	34.07	34.54	34.53	34.36	27.83	27.31	27.19	35.51	34.5
	Elevation of Ground Surface (feet msl)*												
	32	35.8	34.7	31.2	31.2	31.7	31.7	31.8	25.1	25.4	25.2	35.8	35.8
Date Measured	Measured Water Level (feet btc)												
	MW-1-22	MW-2-32	MW-2-61	MW-3-26	MW-3-56	MW-4-35	MW-4-57	MW-4-101	MW-5-32	MW-5-100	MW-5-175	MW-6-32	MW-6-61
29-Sep-92	14.42	23.58	-	20.41	24.17	24.62	24.78	-	17.95	-	-	17.37	28.31
14-Nov-92	13.63	23.36	-	17.85	23.61	24.01	24.17	-	17.11	-	-	17.29	27.01
23-Feb-93	9.66	20.05	-	15.7	17.61	17.98	18.19	-	11.44	-	-	13.12	21.09
9-Jun-93	10.14	15.57	-	10.89	11.33	11.86	11.73	-	5.24	-	-	14.1	15.91
25-Aug-93	12.63	23.04	-	19.7	23.23	23.72	23.01	-	16.9	-	-	18.82	26.88
24-Nov-93	11.67	22.84	-	16.34	21.77	22.3	21.97	-	15.5	-	-	16.58	25.63
18-Dec-93	-	-	-	-	19.88	-	20.45	-	-	-	-	-	23.92
15-Feb-94	9.85	21.47	-	15.74	20.68	20.41	21.27	-	14.36	-	-	14.58	-
31-May-94	11.74	18.31	-	13.7	13.64	14.06	14.17	-	7.6	-	-	16.04	-
24-Aug-94	14.87	24.08	-	20.77	24.92	24.48	25.53	-	18.41	-	-	18.02	-
15-Nov-94	15.67	25.93	28.65	19.29	24.7	24.48	25.27	25.73	18.26	19.28	19.06	18.52	-
14-Feb-95	9.22	20.36	24.23	15.36	20.33	21.1	20.88	21.19	14.02	14.81	14.55	12.64	-
10-May-95	11.57	21.53	23.28	15.85	19.57	20.08	20.16	20.38	13.33	13.96	13.69	13.7	-
19-Aug-95	14.62	23.5	27.24	19.01	23.44	23.14	23.98	24.31	17	17.89	17.63	20.09	-
24-Oct-95	15.73	26.07	29.06	21.49	25.18	25.18	25.66	25.88	18.83	19.45	19.12	19.29	-
26-Mar-96	10.13	21.43	27.23	16.33	23.4	22.85	23.97	24.35	16.63	17.92	17.65	14.34	-
14-Jun-96	13.51	22.52	24.37	17.1	20.69	21.58	21.31	21.54	14.67	15.16	14.87	16.34	-
3-Oct-96	15.4	24.58	29.21	19.21	25.55	25.18	26.12	26.36	19.2	19.97	19.7	-	-
19-Dec-96	15.23	24.07	27.42	16.59	24.02	23.29	24.44	24.2	17.6	17.72	17.32	-	-
26-Mar-97	14.16	23.28	28.34	17.95	24.48	24.17	25.08	25.54	17.93	19.14	18.89	-	-
27-Jun-97	15.27	24.83	28.87	21.23	25.24	24.67	25.69	25.69	18.86	19.32	18.98	-	-
7-Oct-97	16.49	27.5	30.14	22.54	26.23	26.21	26.85	26.16	19.94	20.69	20.46	-	-
11-Dec-97	13.98	24.02	26.83	17.58	22.94	21.28	23.5	23.9	16.28	17.5	17.22	-	-
1-Apr-98	12.23	21.81	26.07	17.7	22.46	23.54	23.01	23.03	15.98	16.65	16.35	-	-

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
6-Dec-91	39.09	39.13	37.65	39.22	39.33	38.39	38.69	34.86	34.78	37.41	35.97[1]	36.06[1]
	Elevation of Ground Surface (feet msl)*											
	36.5	36.5	37.9	36.5	36.5	35.4	35.9	35.2	35.2	35.3	36.27	36.27
Date Measured	Measured Water Level (feet btc)											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
29-Sep-92	17.6	29.82	8.95	14.17	17.01	11.27	12.18	-	-	-	-	-
14-Nov-92	18.04	28.74	6.86	13.7	15.55	11.21	11.06	-	-	-	-	-
23-Feb-93	15.84	22.7	4.6	12.13	11.5	8.19	6.92	-	-	-	-	-
9-Jun-93	15.97	16.62	5.09	13.29	9.37	9.51	5.7	-	-	-	-	-
25-Aug-93	17.72	28.5	11.96	14.38	17.33	11.31	11.34	-	-	-	-	-
24-Nov-93	18.26	27.22	8.1	13.64	15.06	10.89	9	-	-	-	-	-
18-Dec-93	-	25.27	-	-	14.07	-	-	-	24.13	-	-	-
15-Feb-94	19.04	10.63	5.58	12.88	13.06	9.03	6.93	15.07	24.4	-	-	-
31-May-94	19.04	17.5	7.5	11.91	11.53	9.86	7.04	16.03	17.53	-	-	-
24-Aug-94	18.2	6.67	12.92	11.6	18.36	11.3	12.18	17.9	28.64	-	-	-
15-Nov-94	17.9	7	12.35	11.58	17.98	11.46	12.13	18.12	28.53	22.73	-	-
14-Feb-95	21.43	11.16	5.36	9.69	12.51	7.04	6.72	13.38	24.04	18.24	-	-
10-May-95	22.53	11.82	8.75	13.1	14.11	7.83	8.32	14.37	23.33	18.51	-	-
19-Aug-95	19.44	8.09	12.29	12.28	17.63	11.26	11.61	17.52	27.23	21.82	-	-
24-Oct-95	18.26	6.35	14.11	13.68	19.32	12.61	13.72	18.86	29.05	23.57	-	-
26-Mar-96	19.66	8.05	6.5	14.98	14.49	9.91	8.86	14.79	27.13	21	14.349	14.889
14-Jun-96	19.56	10.71	10.4	12.02	15.72	10.37	10.32	16.16	24.52	19.91	14.439	15.169
3-Oct-96	18.78	5.67	13.92	11.37	19.48	11.16	14.06	17.66	29.4	24.2	18.109	18.869
19-Dec-96	19.85	7.01	12.47	10.3	17.37	10.1	12.38	17.04	28.12	23.94	16.549	17.289
26-Mar-97	19.9	7.06	12.16	11.02	18.02	10.64	12.17	17.15	28.28	23.13	16.699	17.439
27-Jun-97	17.95	6.09	13.56	14.55	20.09	12.26	13.27	18.4	29.14	23.77	17.619	18.319
7-Oct-97	17.1	5.02	15.75	15.56	21.06	14.11	15.66	19.75	30.2	25.4	19.709	20.399
11-Dec-97	17.51	8.7	9.96	13.78	16.17	13.01	10.88	18.23	26.76	21.55	15.349	16.069
1-Apr-98	18.85	8.52	8.24	14.05	15.63	10.17	9.69	15.69	26.27	21.48	14.859	15.629

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*												
	MW-1-22	**MW-2-32**	**MW-2-61**	**MW-3-26**	**MW-3-56**	**MW-4-35**	**MW-4-57**	**MW-4-101**	**MW-5-32**	**MW-5-100**	**MW-5-175**	**MW-6-32**	**MW-6-61**
6-Dec-91	34.75	34.46	34.41	34.11	34.07	34.54	34.53	34.36	27.83	27.31	27.19	35.51	34.5
	Elevation of Ground Surface (feet msl)*												
	32	35.8	34.7	31.2	31.2	31.7	31.7	31.8	25.1	25.4	25.2	35.8	35.8
Date Measured	**Measured Water Level (feet btc)**												
	MW-1-22	**MW-2-32**	**MW-2-61**	**MW-3-26**	**MW-3-56**	**MW-4-35**	**MW-4-57**	**MW-4-101**	**MW-5-32**	**MW-5-100**	**MW-5-175**	**MW-6-32**	**MW-6-61**
9-Jul-98	14.43	23.12	25.6	18.51	21.82	22.28	22.39	22.57	15.55	16.19	15.93	-	-
22-Sep-98	15.69	26.29	29.73	21.82	25.78	25.41	26.44	26.88	19.41	20.5	20.24	-	-
16-Dec-98	16.59	25.75	24.9	17.34	22.18	20.77	22.59	22.5	16.19	16.11	16	-	-
16-Mar-99	12.15	22.05	25.21	16.88	21.48	21.54	22.08	22.35	15.09	15.96	15.68	-	-
Average	**14.1**	**21.4**	**26.9**	**18.6**	**22.4**	**22.5**	**22.9**	**25.3**	**16.1**	**18.6**	**18.4**	**15.4**	**21.9**
Lower 95th Percentile	**9.7**	**15.5**	**23.8**	**13.3**	**13.5**	**13.8**	**14.0**	**21.5**	**7.3**	**15.1**	**14.8**	**12.2**	**13.1**

Table A-8
Summary of Water Level Measurements and Groundwater Elevations

Date of Elevation Survey	Elevation of Top of Casing (feet msl)*											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
6-Dec-91	39.09	39.13	37.65	39.22	39.33	38.39	38.69	34.86	34.78	37.41	35.97[1]	36.06[1]
	Elevation of Ground Surface (feet msl)*											
	36.5	36.5	37.9	36.5	36.5	35.4	35.9	35.2	35.2	35.3	36.27	36.27
Date Measured	Measured Water Level (feet btc)											
	MW-8-29	MW-8-56	MW-9-29	MW-10-25	MW-10-61	MW-11-32	MW-12-36	MW-13-30	MW-13-61	MW-14-110	MW-15-50	MW-15-66
9-Jul-98	18.66	9.4	11.86	13.48	17.09	11.01	11.19	17.43	25.73	21.18	16.209	15.429
22-Sep-98	17.68	5.78	14.52	-	20	-	14.63	18.97	29.57	24.44	18.639	19.319
16-Dec-98	17.3	7.97	13.18	13.48	17.97	14.31	13.26	19.36	26.17	22	16.499	17.069
16-Mar-99	18.4	9.62	7.12	13.68	14.22	10.51	14.68	16.26	25.34	20.11	13.799	14.519
Average	**18.5**	**22.1**	**9.1**	**13.9**	**16.6**	**11.6**	**11.5**	**16.9**	**26.3**	**23.1**	**16.2**	**16.8**
Lower 95th Percentile	**14.1**	**6.3**	**4.8**	**10.1**	**11.0**	**7.3**	**6.5**	**14.0**	**23.0**	**19.6**	**13.9**	**14.6**

NOTE: * = City of Portland Datum btc = below top of casing
bbm = below bench mark msl = mean sea level

**Willamette River, Portland Harbor Stage, obtained from National Weather Service and adjusted to feet msl - City of Portland datum: December 1995 to December 1997. Post December 1997 River Stage data measured directly from surveyed bench mark located on north end of FAMM Dock

1 = Well casing raised in January 2000. Pre-2000 top of casing elevations are: MW-15-50 (35.15 feet); MW-15-66 (35.36 feet)

APPENDIX B

EXPOSURE PARAMETER VALUES, ACCUMULATION FACTORS, ETC.

Table B-1
Human Health Exposure Assumptions for Occupational Soils Exposures

Parameter	Name	CTE Value	RME Value	Units	References	Comments
Occupational Skin Surface Area Soil	SA_soil	3300	4100	cm2	DEQ 2000b	Used Occupational Adult Values from DEQ 2003
Soil to Skin Adherence Factor	AF	0.02	0.02	mg/cm2/event	DEQ 2000b	Used Occupational Adult Values from DEQ 2003
Events Frequency Soil	EF_soil	1	1	events/day	DEQ 2000b	Used Residential Values for Soil Contact from Table B-1 because no occupational value given
Days Per Year Exposure Frequency Soil	DEF_soil	250	250	day/yr	DEQ 2000b	Used Occupational Soil Contact from Table B-1
Exposure Duration	ED	6	25	years	DEQ 2000b	Used General Occupational Values from Table B-1
Ingestion Rate Soil	IR_soil	50	100	mg/day	DEQ 2000b	Used Occupational Soil Rate from Table B-1
Averaging Time	AT	2190	9125	days	DEQ 2000b	Used General Values from Table B-1
Lifespan	Lifespan	25550	25550	yr	DEQ 2000b	Used General Values from Table B-1
Body Weight, Adult	BW	70	70	kg	DEQ 2000b	Used General Values from Table B-1

Table B-2
Human Health Exposure Assumptions for Occupational Inhalation Exposures

Parameter	Name	Single Value or CTE Value	RME Value	Units	References	Comments
Exposure Interval	Ie	9.50E+08	NA	sec	DEQ 2000b	Default value shown in Table B-2 and p. A-14. Value applies to all situations.
Height of Indoor Air Space	Ceiling	230	NA	cm	Estimated for site	7.5 ft ceiling height indoors
Enclosed Space Air Exchange Rate	Nair	48.0	NA	exchanges/day	DEQ 2003	Commercial/Industrial Value
Fraction of Floor Area w/ Cracks	fcrack	1.00E-03	NA	unitless	DEQ 2003	Commercial/Industrial Value
Erosion Threshold Windspeed	Ut	11.3	NA	m/sec	DEQ 2000b	Default value shown in Table B-2 and p. A-16. Value applies to all situations.
Mean Annual Windspeed	Um	4.7	NA	m/sec	DEQ 2000b	Default value shown in Table B-2 and p. A-16. Value applies to all situations.
Respirable Fraction of Particulates	Rf	0.036	NA	g/m2-hr	DEQ 2000b	Default value shown in Table B-2. Value applies to all situations.
Hours Per Day Exposure Frequency Air	EF	8	8	hr/day	DEQ 2000b	Typical work hours. Default not found in Table B-1.
Days per Year Exposure Frequency Air	DEF	250	250	day/yr	DEQ 2000b	Used General Occupational values from Table B-1.
Exposure Duration	ED	6	25	years	DEQ 2000b	Used General Occupational values from Table B-1.
Inhalation Rate of Air	IRA	15.2	15.2	m3/day	DEQ 2000b	Used General Occupational values from Table B-1.
Averaging Time	AT	2190	9125	days	DEQ 2000b	Used General Values from Table B-1
Lifespan	Lifespan	25550	25550	yr	DEQ 2000b	Used General Values from Table B-1
Body Weight, Adult	BW	70	70	kg	DEQ 2000b	Used General Values from Table B-1

Table B-3
Human Health Exposure Assumptions for Excavation Worker Soils and Groundwater Exposures

Parameter	Name	CTE Value	RME Value	Units	References	Comments
Skin Surface Area Soil	SA_soil	3300	4100	cm2	DEQ 2000b	Used excavation adult values from DEQ 2003
Soil to Skin Adherence Factor	AF	0.1	0.1	mg/cm2/event	DEQ 2000b	Used excavation adult values from DEQ 2003
Events Frequency Soil	EF_soil	2	2	events/day	DEQ 2000b	Used excavation values from Table B-1.
Days Per Year Exposure Frequency Soil	DEF_soil	9	9	day/yr	DEQ 2000b	Used excavation worker soil contact from Table B-1.
Ingestion Rate Soil	IR_soil	100	480	mg/day	DEQ 2000b	Used excavation soil rate from Table B-1
Skin Surface Area Groundwater	SA_water	5700	5700	cm2	DEQ 2000b	Used excavation adult values from DEQ 2003
Time Per Event Groundwater	tevent_w	2	2	hr/event	DEQ 2000b	Used excavation worker values for groundwater from Table B-1.
Event Frequency Groundwater	EF_w	2	2	events/day	DEQ 2000b	Used excavation worker values for groundwater from Table B-1.
Days Per Year Exposure Frequency Groundwater	DEF_w	9	9	day/yr	DEQ 2000b	Used excavation worker values for groundwater from Table B-1.
Incidental Ingestion Rate Groundwater	IR_w	0.2	0.2	L/day	USEPA 1989	Used swimming ingestion rate of 0.05 L/hr from RAGS 1989 document. Multiplied by tevent_w and EF_w to obtain L/day. DEQ provides no incidental water ingestion rates.
Exposure Duration	ED	0.5	1	years	DEQ 2000b	Used excavation values from Table B-1.
Averaging Time	AT	182.5	365	days	DEQ 2000b	Used General Values from Table B-1.
Lifespan	Lifespan	25550	25550	yr	DEQ 2000b	Used General Values from Table B-1.
Body weight, adult	BW	70	70	kg	DEQ 2000b	Used General Values from Table B-1.

Table B-4
Human Health Exposure Assumptions for Excavation Worker Inhalation Exposures

Parameter	Name	Single Value or CTE Value	RME Value	Units	References	Comments
Exposure Interval	Ie	9.50E+08	NA	sec	DEQ 2000b	Default value shown in Table B-2 and p. A-14. Value applies to all situations.
Height of Indoor Air Space	Ceiling	NA	NA	cm	Estimated for site	7.5 ft ceiling height indoors
Enclosed Space Air Exchange Rate	Nair	NA	NA	L/day	NA	Commercial/Industrial Value
Fraction of Floor Area w/ Cracks	fcrack	NA	NA	unitless	NA	Commercial/Industrial Value
Erosion Threshold Windspeed	Ut	11.3	NA	m/sec	DEQ 2000b	Default value shown in Table B-2 and p. A-16. Value applies to all situations.
Mean Annual Windspeed	Um	4.7	NA	m/sec	DEQ 2000b	Default value shown in Table B-2 and p. A-16. Value applies to all situations.
Respirable Fraction of Particulates	Rf	0.036	NA	g/m2-hr	DEQ 2000b	Default value shown in Table B-2. Value applies to all situations.
Hours Per Day Exposure Frequency Air	EF	4	4	hr/day	DEQ 2000b	Used time per event of 2 hrs and 2 events per day for excavation worker in Table B-1.
Days per Year Exposure Frequency Air	DEF	9	9	day/yr	DEQ 2000b	Used excavation values from Table B-1.
Exposure Duration	ED	0.5	1	years	DEQ 2000b	Used excavation values from Table B-1.
Inhalation Rate of Air	IRA	20	20	m3/day	DEQ 2000b	Used excavation values from Table B-1.
Averaging Time	AT	182.5	365	days	DEQ 2000b	Used General Values from Table B-1.
Lifespan	Lifespan	25550	25550	yr	DEQ 2000b	Used General Values from Table B-1.
Body Weight, Adult	BW	70	70	kg	DEQ 2000b	Used General Values from Table B-1.

Table B-5
Human Health Chemical Specific Values Soil Exposures

References:	From EPA 1992 or calculated from Eq. A39 DEQ 2000b	From EPA 1992 or noted databases	Std. Refs	Values from EPA 2001 & DEQ 1998	Values from EPA 1992 or calculated per EPA 1992	Values from EPA 1992 or calculated per EPA 1992	Values from EPA 1992 or calculated per EPA 1992	Calc. Per EPA 1992	Calc. Per EPA 1992
	(cm/hr) Dermal Permeability Coeffc. (Kp)	**(unitless) O/W Partition. Log Coeffc. (logOW)**	**(g/mol) Molecular Weight (MW)**	**(unitless) Dermal Adsorp. Fac. (DAF)**	**(hr/event) Lag Time (T)**	**(hr) Time to Steady State (Tss)**	**(unitless) Relative Contribution of Kp (B)**	**Constant (bc)**	**Constant (cc)**
Metals									
Chromium	2.00E-03	NA	NA	1.00E-02	NA	NA	NA	NA	NA
Monocyclic Aromatic Compounds									
Benzene	1.10E-01	2.13E+00	7.81E+01	1.00E-01	2.60E-01	6.24E-01	1.30E-02	3.07E-01	3.46E-01
Xylenes	8.00E-02	3.12E+00	1.06E+02	1.00E-01	3.90E-01	1.40E+00	1.60E-01	3.63E-01	4.93E-01
Polyaromatic Compounds									
Acenaphthylene	1.74E-01	4.07E+00	1.52E+02	1.30E-01	7.42E-01	1.78E+00	4.07E-03	3.04E-01	3.37E-01
Benzo(a)anthracene	8.10E-01	5.66E+00	2.28E+02	1.30E-01	2.20E+00	1.04E+01	4.60E+01	1.36E+03	4.63E+01
Benzo(a)pyrene	1.20E+00	6.10E+00	2.50E+02	1.30E-01	2.90E+00	1.37E+01	1.30E+02	1.08E+04	1.30E+02
Benzo(b)fluoranthene	1.20E+00	6.12E+00	2.52E+02	1.30E-01	3.00E+00	1.42E+01	1.30E+02	1.08E+04	1.30E+02
Benzo(g,h,i)perylene	7.47E-01	5.82E+00	2.52E+02	1.30E-01	3.03E+00	7.26E+00	5.82E-03	3.05E-01	3.39E-01
Benzo(k)fluoranthene	3.96E+00	6.84E+00	2.52E+02	1.30E-01	3.03E+00	7.26E+00	6.84E-03	3.05E-01	3.40E-01
Chrysene	8.10E-01	5.66E+00	2.28E+02	1.30E-01	2.20E+00	1.04E+01	4.60E+01	1.36E+03	4.63E+01
Dibenzo(a,h)anthracene	2.70E+00	6.84E+00	2.78E+02	1.30E-01	4.40E+00	2.07E+01	6.90E+02	3.03E+05	6.90E+02
Indeno(1,2,3-cd)pyrene	1.90E+00	6.58E+00	2.76E+02	1.30E-01	4.20E+00	1.01E+01	3.80E-02	3.15E-01	3.71E-01
Naphthalene	6.90E-02	3.30E+00	1.28E+02	1.30E-01	5.30E-01	2.23E+00	2.00E-01	3.83E-01	5.33E-01
Phenanthrene	2.30E-01	4.57E+00	1.78E+02	1.30E-01	1.10E+00	5.74E+00	2.90E+00	6.45E+00	3.23E+00

Table B-6
Human Health Chemical Specific Values Inhalation Exposures

References:	EPA 1996 or HSDB 2002	General	EPA 1996	EPA 1996	EPA 1996 or HSDB 2002	EPA 1996 or HSDB 2002	EPA 1996 or HSDB 2002	
	(cm3/g) Soil Organic Carbon Part. (Koc)	**(g/mol) Molecular Weight (MW)**	**(cm2/sec) Diffusivity in Air (Di)**	**(cm2/sec) Diffusivity in Water (Dw)**	**(Pa-m3/mol) Henry's Law Constant (H)**	**dimensionless Henry's Law Constant (H)**	**(atm-m3/mol) Henry's Law Constant (H)**	**Is this Chemical a Volatile? (Vol?)**
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	No
Monocyclic Aromatic Compounds								
Benzene	5.89E+01	7.81E+01	8.80E-02	9.80E-06	5.34E+02	2.28E-01	5.47E-03	Yes
Xylenes	3.63E+02	1.06E+02	8.70E-02	1.00E-05	4.98E+02	2.13E-01	5.11E-03	Yes
Polyaromatic Compounds								
Acenaphthylene	2.13E+03	1.52E+02	N/AV	N/AV	1.10E-01	4.71E-05	5.11E-03	Yes
Benzo(a)anthracene	3.98E+05	2.28E+02	5.10E-02	9.00E-06	3.21E-01	1.37E-04	3.29E-06	No
Benzo(a)pyrene	1.02E+06	2.50E+02	4.30E-02	9.00E-06	1.08E-01	4.63E-05	1.11E-06	No
Benzo(b)fluoranthene	1.23E+06	2.52E+02	2.26E-02	5.56E-06	1.06E+01	4.55E-03	1.09E-04	No
Benzo(g,h,i)perylene	9.60E+05	2.52E+02	N/AV	N/AV	2.59E-03	1.11E-06	5.11E-03	No
Benzo(k)fluoranthene	1.23E+06	2.52E+02	2.26E-02	5.56E-06	7.96E-02	3.40E-05	8.16E-07	No
Chrysene	3.98E+05	2.28E+02	2.48E-02	6.21E-06	9.08E+00	3.88E-03	9.32E-05	No
Dibenzo(a,h)anthracene	3.80E+06	2.78E+02	2.02E-02	5.18E-06	1.41E-03	6.03E-07	1.45E-08	No
Indeno(1,2,3-cd)pyrene	3.47E+06	2.76E+02	1.90E-02	5.66E-06	1.54E-01	6.56E-05	1.58E-06	No
Naphthalene	2.00E+03	1.28E+02	5.90E-02	7.50E-06	4.63E+01	1.98E-02	4.75E-04	Yes
Phenanthrene	2.29E+04	1.78E+02	N/AV	N/AV	1.21E+00	5.16E-04	5.11E-03	Yes

APPENDIX C

DETAILED TOXICITY PROFILES AND ALL TRVS

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1 ECOLOGICAL RISK CHEMICALS

The chemicals considered are xylenes, ethylbenzene, zinc, and a collection of PAHs, including acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

The profiles below with the exception of fluorene and PAHs as a group are from the online version of the Risk Assessment Information System (RAIS), sponsored by the U.S. Department of Energy (DOE), Office of Environmental Management, Oak Ridge Operations Office and the DOE Center for Risk Excellence. Information on fluorene is from the Hazardous Substances Database (HSDB undated). The information on PAHs as a group is from RTI 1995. All chemical-specific toxicity value references are from the IRIS database (EPA 2003) and are not reproduced here.

1.1 PAHs as a Group

PAHs are a group of chemicals formed during incomplete burning of organic substances such as coal, oil, wood, garbage, tobacco, or meat. There are more than 100 different PAHs and they generally occur as complex mixtures rather than single compounds. As pure substances, PAHS are generally colorless, white, or pale yellow solids. They are found in crude oil, coal, creosote, and roofing tar. PAHs are typically released to the air from volcanoes, forest fires, residential wood burning, and exhaust from automobiles and trucks. They are found throughout the environment in the air (attached to dust particles), water and soil.

The primary human exposure to PAHs in the U.S. is inhalation of tobacco, wood smoke and ambient air, and consumption of PAHs in food. Employees in production of coal tar, coke, bitumen, asphalt, gasified coal, smoked meat, and aluminum, as well as employees of incineration facilities may be exposed to PAHs in the workplace. PAHs can be absorbed by the oral, inhalation, and dermal routes of exposure. PAHs are stored in the kidneys, liver, and fat; smaller amounts are stored in the spleen, adrenal glands, and ovaries. Results from animal studies shoe that most PAHs are excreted within a few days. Health effects vary by individual chemical, but “studies of people saw that individuals exposed by breathing or

skin contact for long periods to mixtures that contain PAHs and other compounds can also develop cancer."

1.2 Xylene

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. Xylene is a volatile organic solvent widely used in chemical synthesis, consumer products, and agricultural chemicals. Xylene occurs naturally in petroleum and coal tar and is formed during forest fires; it is found in small amounts in airplane fuel and gasoline. Xylene, which is produced from petroleum, is one of the top 30 chemicals produced in the United States in terms of volume. Xylene is used as a solvent, a cleaning agent, a thinner for paint, in paints and varnishes, and in the printing, rubber, and leather industries.

Human exposure to xylene by either oral or inhalation routes can cause death due to respiratory failure accompanied by pulmonary congestion. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in balance. Exposure of humans to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. It is not known whether xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are lacking in information and are therefore not conclusive. EPA has placed xylene in weight-of-evidence group D, not classifiable as to human carcinogenicity. No significant increase in tumor incidence was observed in rats or mice of both sexes following oral administration of technical grade xylene.

The following is a presentation of the toxicity information associated with xylene.

Xylene, Mixture

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 2.00E-01 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 1000.
- The Oral Chronic Reference Dose is based on the NTP study from 1986.
- The Oral Chronic Reference Dose study critical effects are hyperactivity, decreased body weight, and increased mortality.
- The overall confidence in the Oral Chronic Reference Dose is medium.

1.3 Ethylbenzene

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and in manufactured products such as inks, insecticides, and paints. Ethylbenzene is used primarily to make another chemical, styrene. Additionally, it may be used as a solvent, in aviation fuels, and to make other chemicals. The general public can be exposed to ethylbenzene in ambient air as a result of releases from vehicle exhaust and cigarette smoke.

Ethylbenzene can be absorbed through the lungs, digestive tract, and skin. Limited information is available on the health effects of ethylbenzene on humans. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of humans exposed to high levels of ethylbenzene in air. Animal studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air. Ingestion of sublethal amounts of ethylbenzene is likely to cause central nervous system (CNS) depression, oro-pharyngeal and gastric discomfort, and vomiting. Animal studies indicate that the primary target organs following chronic oral exposures are likely to be the liver and kidney.

No human studies of oral or inhalation exposure to ethylbenzene have resulted in cancer. Two available animal studies suggest that ethylbenzene may cause tumors. Ethylbenzene is placed by EPA in Group D, not classifiable as to human carcinogenicity, based on a lack of data in humans and animals.

The following is a presentation of the toxicity information associated with ethylbenzene.

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 1.00E-01 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 1000.
- The Oral Chronic Reference Dose is based on the Wolf et al. study from 1956.
- The Oral Chronic Reference Dose study target organs are liver and kidney.
- The Oral Chronic Reference Dose study critical effect is toxicity.
- The overall confidence in the Oral Chronic Reference Dose is low.
- The Inhalation Chronic Reference Concentration is 1.00E+00 (mg/m3).
- The Inhalation Chronic Reference Concentration has a modifying factor of 1.
- The Inhalation Chronic Reference Concentration has an uncertainty factor of 300.
- The Inhalation Chronic Reference Concentration is based on the Andrew et al. study from 1981.
- The Inhalation Chronic Reference Concentration study critical effect is developmental toxicity.
- The overall confidence in the Inhalation Chronic Reference Concentration is low.

1.4 Zinc

Pure zinc is a bluish-white shiny metal. Zinc is one of the most common elements in the earth's crust and is found in air, soil, and water, and is present in all foods. Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass and bronze. A zinc and copper alloy is used to make pennies in the United States. Zinc combines with other elements to form zinc compounds; common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, zinc phosphide, zinc cyanide, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dye, wood preservatives, and ointments.

Zinc is an essential element with recommended daily allowances (RDS) ranging from 5 mg for infants to 15 mg for adult males. Too little zinc can cause health problems, but too much zinc is also harmful.

The digestive tract absorbs 20 percent to 80 percent of ingested zinc based on the chemical compound ingested. Harmful health effects generally begin at levels in the 100 to 250 mg/day range. Eating large amounts of zinc, even for a short time, can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia, pancreas damage, and lower levels of high-density lipoprotein cholesterol (the good form of cholesterol). Breathing large amounts of zinc (as dust or fumes) can cause a specific short-term disease called metal fume fever. This is believed to be an immune response affecting the lungs and body temperature. The long-term effects of breathing high levels of zinc or the effects on human reproduction are not known. Rats that were fed large amounts of zinc became infertile or had smaller babies. Irritation was also observed on the skin of rabbits, guinea pigs, and mice when exposed to some zinc compounds. Skin irritation will probably occur in humans.

No case studies or epidemiologic evidence has been presented to suggest that zinc is carcinogenic in humans by the oral or inhalation route. In animal studies, zinc sulfate in drinking water or zinc oleate in the diet of mice for a period of one year did not result in a statistically significant increase in tumors; however, in a 3-year, five-generation study on tumor-resistant and tumor-susceptible strains of mice, exposure to zinc in drinking water resulted in increased frequencies of tumors. Zinc is placed in weight-of-evidence Group D, not classifiable as to human carcinogenicity due to inadequate evidence in humans and animals.

The following is a presentation of the toxicity information associated with zinc.

Zinc, Metallic

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 3.00E-01 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3.
- The Oral Chronic Reference Dose is based on the Yadrick et al study from 1989.
- The Oral Chronic Reference Dose study critical effect is 47 percent decrease in ESOD concentration in adult females after 10 weeks.
- The overall confidence in the Oral Chronic Reference Dose is medium.

1.5 Acenaphthene

Acenaphthene is a tricyclic aromatic hydrocarbon, crystalline solid at ambient temperature. Acenaphthene does not dissolve in water but is soluble in many organic solvents. Acenaphthene occurs in coal tar produced during the high temperature carbonization or coking of coal. It is used as a dye intermediate in the manufacture of some plastics and as an insecticide and fungicide. Acenaphthene is an environmental pollutant and has been detected in cigarette smoke, automobile exhausts, and urban air; in effluents from petrochemical, pesticide, and wood preservative industries; and in soils, groundwater, and surface waters at hazardous waste sites. This compound is one of a number of PAHs on EPA's priority pollutant list.

The toxic effects to humans of PAH exposure is well studied, however, the human studies of acenaphthene are limited. Acenaphthene is irritating to the skin and mucous membranes of humans and animals. Oral exposure of rats to acenaphthene for 32 days produced peripheral blood changes, mild liver and kidney damage, and pulmonary effects. Subchronic oral exposure to acenaphthene for 90 days produced increased liver weights, hepatocellular hypertrophy, and increased cholesterol levels in mice. Reproductive effects included decreased ovary weights and decreased ovarian and uterine activity as well as smaller and fewer corpora lutea. Adverse effects on the blood, lungs, and glandular tissues were reported in rats exposed daily for 5 months.

The EPA has not assigned a weight-of-evidence classification for carcinogenicity to acenaphthene.

The following is a presentation of the toxicity information associated with acenaphthene:

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 6.00E-02 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3000.
- The Oral Chronic Reference Dose is based on the U.S. EPA study from 1989.
- The Oral Chronic Reference Dose study target organ is liver.
- The Oral Chronic Reference Dose study critical effect is hepatotoxicity.

- The overall confidence in the Oral Chronic Reference Dose is low.

1.6 Anthracene

Anthracene, also referred to as paranaphthalene or green oil, is a PAH derived from coal tar and is primarily used as an intermediate in the production of dyes. It has also been used in the production of smoke screens, scintillation counter crystals, and organic semiconductor research. Anthracene is ubiquitous in the environment as a product of incomplete combustion of fossil fuels. Anthracene is the simplest tricyclic aromatic hydrocarbon. Anthracene is a colorless crystalline compound. It is soluble in a variety of organic solvents, including ethanol, methanol, benzene, toluene, and carbon disulfide, but is almost insoluble in water. It has been identified in surface and drinking water, ambient air, exhaust emissions from internal combustion engines, smoke of cigarettes and cigars, and in smoked foods and edible aquatic organisms. Anthracene is one of a number of PAHs on EPA's priority pollutant list. Although a large body of literature exists on the toxicity and carcinogenicity of other PAHs, toxicity data for anthracene are limited.

Information on the toxicity of anthracene exposure in humans is very limited. Evidence indicates that anthracene is absorbed following oral and dermal exposure. Targets for anthracene toxicity are the skin, hematopoietic system, lymphoid system, and gastrointestinal tract. Adverse dermatologic effects have been observed in humans and animals in conjunction with acute and subchronic exposure to anthracene. In humans, anthracene may cause acute dermatitis with symptoms of burning, itching, and edema. Prolonged dermal exposure produces pigmentation, cornification of skin surface layers, and telangiectasis. Anthracene is photosensitizing, potentiating skin damage elicited by exposure to ultraviolet radiation. Hematologic toxicity was observed in patients receiving intraperitoneal injections of anthracene-containing chemotherapeutic agents and in rats exposed to anthracene by oral gavage and by inhalation. Mice receiving subcutaneous injections of anthracene exhibited adverse lymphoid effects. Long-term use of anthracene-containing laxatives produced melanosis of the colon and rectum. Human exposure to anthracene has also been associated with headache, nausea, loss of appetite, inflammation of the gastrointestinal tract, slow reactions, and weakness.

Based on no human data and inadequate data from animal bioassays, U.S. EPA has placed anthracene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

The following is a presentation of the toxicity information associated with anthracene:

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 3.00E-01 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3000.
- The Oral Chronic Reference Dose is based on the U.S. EPA study from 1989.
- The overall confidence in the Oral Chronic Reference Dose is low.

1.7 Benz[a]anthracene

Benz[a]anthracene is a PAH containing four aromatic rings two of which share carbons with only one other ring. It is soluble in alcohol, ether and benzene but practically insoluble in water. There is no commercial application for benz[a]anthracene, however, it is a ubiquitous contaminant formed during the incomplete combustion of organic material. Benz[a]anthracene is found in various kinds of smoke and flue gases, tobacco smoke, automobile exhaust, roasted coffee and in charcoal broiled, barbecued or smoked meats. It is also found in creosote, coal tar, petroleum asphalt, and a variety of foods, including vegetable oils and baker's yeast. It is an atmospheric contaminant near power plants and busy highways, and tends to bind to particulate matter in the atmosphere. In general, there is a region in the structure of PAHs that is known to react with DNA, which may account for both their toxicity and carcinogenicity.

The toxic effects of benz[a]anthracene and similar PAHs are primarily directed toward tissues that contain proliferating cells. Animal studies indicate that exposure to PAH's with distinct chemical structure can damage the hematopoietic system leading to progressive anemia as well as agranulocytosis. The lymphoid system can also be affected resulting in lymphopenia. Toxic effects have been observed in the rapidly dividing cells of the intestinal epithelium, spermatogonia and resting spermatocytes in the testis and primary oocytes of the ovary. Most of these effects have occurred following both oral and parenteral exposure.

Epithelial proliferation and cell hyperplasia in the respiratory tract have been reported following subchronic inhalation exposure.

The primary concern with benz[a]anthracene exposure is its potential carcinogenicity. There is no unequivocal, direct evidence of the carcinogenicity of the compound to humans, however, benz[a]anthracene and other known carcinogenic PAHs are components of coal tar, soot, coke oven emissions and tobacco smoke. There is adequate evidence of its carcinogenic properties in animals. Oral exposures of mice to benz[a]anthracene have resulted in hepatomas, pulmonary adenomas and forestomach papillomas. The EPA weight-of-evidence classification is: B2, probable human carcinogen, for both oral and inhalation exposure based on adequate animal evidence and no human evidence.

The following is a presentation of the toxicity information associated with benz[a]anthracene:

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E-01 (mg/kg-day)-1.
- The slope factor is based on toxicity equivalency estimate from benzo(a)pyrene

1.8 Benzo[a]pyrene

Benzo[a]pyrene is a PAH, which exists as yellowish plates and needles. Benzo[a]pyrene is practically insoluble in water but is soluble in benzene, toluene, xylene and sparingly soluble in alcohol and methanol. No current commercial production or use of benzo[a]pyrene is known. It occurs ubiquitously in products of incomplete combustion and in fossil fuels. It has been identified in surface water, tap water, rain water, groundwater, waste water, and sewage sludge. Benzo[a]pyrene is primarily released to the air and removed from the atmosphere by photochemical oxidation and dry deposition to land or water. Biodegradation is the most important transformation process in soil or sediment.

No data are available on the systemic (non-carcinogenic) effects of benzo[a]pyrene in humans. Benzo[a]pyrene is readily absorbed following inhalation, oral, and dermal routes of administration. Following inhalation exposure, benzo[a]pyrene is rapidly distributed to several tissues in rats. The metabolism of benzo[a]pyrene is complex and includes the

formation of a proposed ultimate carcinogen, benzo[a]pyrene 7,8 diol-9,10-epoxide. Dietary administration of doses as low as 10 mg/kg during gestation caused reduced fertility and reproductive capacity in mice offspring, and treatment by gavage with 120 mg/kg/day during gestation caused stillbirths, resorptions, and malformations.

Numerous epidemiologic studies have shown a clear association between exposure to various mixtures of PAHs containing benzo[a]pyrene (e.g., coke oven emissions, roofing tar emissions, and cigarette smoke) and increased risk of lung cancer and other tumors. However, each of the mixtures also contained other potentially carcinogenic PAHs; therefore, it is not possible to evaluate the contribution of benzo[a]pyrene to the carcinogenicity of these mixtures. Based on United States EPA guidelines, benzo[a]pyrene was assigned to weight-of-evidence group B2, probable human carcinogen.

The following is a presentation of the toxicity information associated with benzo[a]pyrene:

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E+00 (mg/kg-day)-1.
- The Oral Slope Factor study target organ is forestomach.
- The Oral Slope Factor study cancer type is squamous cell papillomas and carcinomas.
- The Oral Slope Factor is based on the Neal and Rigdon study from 1967.

1.9 Benzo[b]fluoranthene

Benzo[b]fluoranthene is a PAH with one five-membered carbon ring and four six-membered carbon rings. It is a crystalline solid with. Benzo[b]fluoranthene is virtually insoluble in water and is slightly soluble in benzene and acetone. There is no commercial production or known use of this compound. Benzo[b]fluoranthene is found in fossil fuels and occurs ubiquitously in products of incomplete combustion. It has been detected in mainstream cigarette smoke; urban air; gasoline engine exhaust; emissions from burning coal and from oil-fired heating; broiled and smoked food; oils and margarine; and in soils, groundwater, and surface waters at hazardous waste sites.

No absorption data were available for benzo[b]fluoranthene; however, by analogy to structurally-related PAHs, primarily benzo[a]pyrene, it would be expected to be absorbed from the gastrointestinal tract, lungs, and skin. No data were found concerning the acute, subchronic, chronic, developmental, or reproductive toxicity of benzo[b]fluoranthene in humans.

No long-term oral or inhalation bioassays were available to assess the carcinogenicity of benzo[b]fluoranthene in humans. Benzo[b]fluoranthene was tested for carcinogenicity in animals in dermal application, lung implantation, subcutaneous (s.c.) injection, and intraperitoneal (i.p.) injection studies. Dermal applications of 0.01-0.5 percent solutions of benzo[b]fluoranthene for life produced a high incidence of skin papillomas and carcinomas in mice. Sarcomas and carcinomas of the lungs and thorax were seen in rats receiving single lung implants of 0.1-1 mg benzo[b]fluoranthene. Newborn mice receiving 0.5 umol benzo[b]fluoranthene via i.p. injection developed liver and lung tumors and mice administered three s.c. injections of 0.6 mg benzo[b]fluoranthene developed injection site sarcomas.

Based on no human data and sufficient evidence for carcinogenicity in animals, EPA has assigned a weight-of-evidence classification of B2, probable human carcinogen, to benzo[b]fluoranthene.

The following is a presentation of the toxicity information associated with benzo[b]fluoranthene:

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E-01 (mg/kg-day)-1.
- The slope factor is based on toxicity equivalency estimate from benzo(a)pyrene.

1.10 Benzo[k]fluoranthene

Benzo[k]fluoranthene is a PAH with one five-membered and four six-membered carbon rings. It is a crystalline solid. Benzo[k]fluoranthene is insoluble in water but is soluble in acetic acid, benzene, and ethanol. No commercial production or commercial use of benzo[k]fluoranthene is known at this time, however, small amounts of this compound are

used for research. Benzo[k]fluoranthene is found in fossil fuels and occurs ubiquitously in products of incomplete combustion. It has been detected in mainstream cigarette smoke, gasoline engine exhaust, emissions from burning coal and from oil-fired heating, lubricating oils, used motor oils, crude oils, and in soils, surface waters, and groundwater at hazardous waste sites.

No absorption or excretion data were available for benzo[k]fluoranthene; however, by analogy to structurally-related PAHs, primarily benzo[a]pyrene, it would be expected to be absorbed from the gastrointestinal tract, lungs, and skin. No data were found concerning the acute, subchronic, chronic, developmental, or reproductive toxicity of benzo[k]fluoranthene in humans.

No long-term oral or inhalation bioassays were available to assess the carcinogenicity of benzo[k]fluoranthene in humans. Benzo[k]fluoranthene was tested for carcinogenicity in animals in dermal application, subcutaneous (s.c.) injection, lung implantation, and intraperitoneal (i.p.) injection studies. Dermal applications of 0.5% solutions of benzo[k]fluoranthene for life produced only a few skin papillomas in mice, but in initiation-promotion assays, benzo[k]fluoranthene was active as an initiator of skin carcinogenesis. Injection site sarcomas developed in mice given three s.c. injections of 0.6 mg benzo[k]fluoranthene and dose-related increases of epidermoid carcinomas of the lungs were reported in rats receiving single lung implants of 0.16-4.15 mg benzo[k]fluoranthene. In a short-term assay, hepatic and lung tumors occurred in newborn mice receiving 2.1 umol benzo[k]fluoranthene via i.p. injection.

Based on no human data and sufficient evidence for carcinogenicity in animals, EPA has assigned a weight-of-evidence classification of B2, probable human carcinogen, to benzo[k]fluoranthene.

The following is a presentation of the toxicity information associated with benzo[k]fluoranthene:

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E-02 (mg/kg-day)-1.

- The slope factor is based on toxicity equivalency estimate from benzo(a)pyrene.

1.11 Benzo[g,h,i]perylene

Benzo[g,h,i]perylene is a PAH with six carbon rings. It is a crystalline solid. Benzo[g,h,i]perylene is practically insoluble in water but is soluble in 1,4-dioxane, dichloromethane, benzene, and acetone. There is no known commercial production or use of benzo[g,h,i]perylene. It occurs naturally in crude oils and is present ubiquitously in products of incomplete combustion and in coal tar. It has been identified in cigarette smoke, charcoal-broiled steaks, and edible oils and in soils, groundwater, and surface waters at hazardous waste sites.

No absorption data were available for benzo[g,h,i]perylene; however, by analogy to other PAHs, primarily benzo[a]pyrene, it would be expected to be absorbed from the gastrointestinal tract, lungs, and skin. No human or animal data were available to evaluate the toxicity of benzo[g,h,i]perylene.

No oral or inhalation bioassays were available to assess the carcinogenicity of benzo[g,h,i]perylene in humans. Negative results were reported in dermal application studies and in initiation-promotion assays for skin tumorigenesis in mice. Although a few pulmonary tumors were observed in Osborne-Mendel rats when benzo[g,h,i]perylene was administered as single lung implants of >=83 mg, the tumors may have been caused by impurities in the test compound. In subcutaneous injection studies, benzo[g,h,i]perylene did not produce injection site tumors in mice.

Based on no human data and inadequate data with experimental animals, the EPA has classified benzo[g,h,i]perylene in weight-of-evidence Group D, not classifiable as to human carcinogenicity.

1.12 Chrysene

Chrysene is a PAH. Pure chrysene is a colorless crystalline solid that is virtually insoluble in water; only slightly soluble in alcohol, ether, carbon bisulfide or glacial acetic acid; and moderately soluble in benzene. Chrysene is not used or produced commercially; it is used primarily in research applications. Chrysene is a ubiquitous environmental contaminant

that occurs as a product of the incomplete combustion of organic compounds. Environmental manmade sources of chrysene include gasoline, diesel, and aircraft turbine exhausts; coal combustion and gasification; emissions from coke ovens, wood burning stoves, and waste incineration; and various industrial applications such as iron, aluminum, and steel production. Chrysene is also a constituent of coal, oil, and their distillates, such as coal tar, and creosote. Non-manmade sources of chrysene include forest and grass fires, as well as volcanoes; however, these latter sources do not contribute significantly to the total environmental concentration of chrysene.

Little information on the absorption, distribution, metabolism and excretion of chrysene in humans is available. Animal studies have shown that approximately 75 percent of the administered chrysene may be absorbed by oral, dermal, or inhalation routes. Humans are exposed to chrysene by oral, inhalation, and dermal routes. Meats, particularly those with high fat contents, contribute significant quantities of chrysene to the diet from cooking the fat. Foods smoked or cooked over open coals contain even greater concentrations. Significant exposure to chrysene also occurs through the inhalation of mainstream and sidestream cigarette smoke. Occupational exposure to chrysene occurs during tar production or from coking plants, coal gasification, smoke houses and smoked meat production, road and roof-tarring, incinerators, and aluminum production. Human or animal systemic, developmental, and reproductive health effects following exposure to chrysene were not identified.

Oral and inhalation carcinogenic bioassays were not identified for humans. In mouse skin painting studies, chrysene was an initiator of papillomas and carcinomas. In addition, intraperitoneal injections of chrysene have induced liver adenomas and carcinomas in male CD-1 and BLU/Ha Swiss mice. EPA has classified chrysene in weight-of-evidence Group B2, probable human carcinogen, based on the induction of liver tumors and skin papillomas and carcinomas following treatment and the mutagenicity and chromosomal abnormalities induced in in-vitro tests.

The following is a presentation of the toxicity information associated with chrysene.

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E-03 (mg/kg-day)-1.
- The slope factor is based on toxicity equivalency estimate from benzo(a)pyrene.

1.13 Dibenz[a,h]anthracene

Dibenz[a,h]anthracene is a PAH with five aromatic carbon rings. Dibenz[a,h]anthracene exists as crystalline plates or leaflets and is insoluble in water; slightly soluble in alcohol and ether; and soluble in petroleum ether, benzene, toluene, xylene, oils, and other organic solvents. No commercial production or use of dibenz[a,h]anthracene is known. It occurs as a component of coal tars, shale oils, and soots and has been detected in gasoline engine exhaust, coke oven emissions, cigarette smoke, charcoal broiled meats, vegetation near heavily traveled roads, and surface water and soils near hazardous waste sites.

Dibenz[a,h]anthracene is poorly absorbed from the digestive tract. No human studies were available to evaluate the toxicity of dibenz[a,h]anthracene. In animals, depressed immune responses were observed in mice following single or multiple subcutaneous injections of dibenz[a,h]anthracene. Weekly subcutaneous injections of 0.05% dibenz[a,h]anthracene for 40 weeks produced lymphoid tissue changes, decreased spleen weights, and liver and kidney lesions in mice. Weekly intramuscular injections of 20 mg/kg promoted the development of arteriosclerotic plaques in chickens.

No epidemiologic studies or case reports addressing the carcinogenicity of dibenz[a,h]anthracene in humans were available. In animals, dibenz[a,h]anthracene has produced tumors by different routes of administration (oral and dermal), having both local and systemic carcinogenic effects. After administration, dibenz[a,h]anthracene produced pulmonary adenomatosis, alveologenic carcinomas of the lung, hemangio-endotheliomas of the pancreas and mesentery/abdominal lymph nodes, mammary carcinomas (females), forestomach papillomas, and skin papillomas. Based on no human data and sufficient evidence for carcinogenicity in animals, EPA has assigned dibenz[a,h]anthracene a weight-of-evidence classification of B2, probable human carcinogen.

The following is a presentation of the toxicity information associated with dibenz[a,h]anthracene.

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E+00 (mg/kg-day)-1.
- The slope factor is based on toxicity equivalency estimate from benzo(a)pyrene.

1.14 Fluoranthene

Fluoranthene is a PAH, which exists as pale yellow needles or plates. Fluoranthene is almost insoluble in water, but is soluble in alcohol, ether, benzene, and acetic acid. Fluoranthene can be produced by the pyrolysis of organic raw materials such as coal and petroleum at high temperatures; it is also known to occur naturally as a product of plant biosynthesis. Fluoranthene is a constituent of coal tar and petroleum-derived asphalt. Currently, there is no known production or use of this compound.

Fluoranthene can be absorbed through dermal exposure and, based on similar PAHs, would be expected to be absorbed from the digestive tract and lungs. Although a large body of literature exists on the toxicity and carcinogenicity of PAHs, toxicity data for fluoranthene are very limited. No human data were available that addressed the toxicity of fluoranthene. Toxicity studies in animals have shown that fluoranthene exposure can cause eye irritation, nephropathy, increased liver weights, and increased liver enzyme levels.

No oral or inhalation bioassays were available to assess the carcinogenicity of fluoranthene to humans; bioassays by other exposure routes generally gave negative results. Studies involving topical application to the skin of mice and subcutaneous injection in mice provided no evidence of carcinogenicity. Fluoranthene was also inactive in mouse skin initiation and promotion assays. Based on no human data and inadequate data from animal bioassays, EPA has placed fluoranthene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

The following is a presentation of the toxicity information associated with fluoranthene.

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 4.00E-02 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3000.

- The Oral Chronic Reference Dose is based on the U.S. EPA study from 1988.
- The Oral Chronic Reference Dose study target organ is liver.
- The Oral Chronic Reference Dose study critical effects are nephropathy, increased weight, alterations and clinical effects.
- The overall confidence in the Oral Chronic Reference Dose is low.

1.15 Fluorene

Human exposure to fluorene occurs primarily through the smoking of tobacco, inhalation of polluted air and by ingestion of food and water contaminated by combustion effluents. The average exposure of workers to fluorene in the paving, roofing and steel industries is reported to be about 0.5 μg/cu m; avg exposure to workers in the aluminum refinery, silicon carbide and refractory brick industries is reported to be about 20 μg/cu m. Based upon 1981-1982 air monitoring in Osaka, Japan (avg fluorene concn of 0.12 ng/cu m), the avg daily respiratory intake of fluorene from ambient air has been reported as 0.5 ng/day/man.

Evidence for Carcinogenicity: No data are available in humans. Inadequate evidence of carcinogenicity in animals. Overall Evaluation: Group 3: The agent is not classifiable as to its carcinogenicity to humans.

The following is a presentation of the toxicity information associated with fluorene.

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 4.00E-02 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3000.
- The Oral Chronic Reference Dose is based on the EPA study from 1989.

1.16 Indeno[1,2,3-cd]pyrene

Indeno[1,2,3-cd]pyrene is a PAH with one five-membered carbon ring and five six-membered carbon rings. It is a crystalline solid that is insoluble in water but is soluble in organic solvents. There is no commercial production or known use of indeno[1,2,3-cd]pyrene. The compound is found in fossil fuels and occurs ubiquitously in products of incomplete combustion. It has been detected in mainstream cigarette smoke; gasoline engine

exhaust; emissions from burning coal; lubricating oils; used motor oils; and soils, surface waters, and groundwater at hazardous waste sites.

No absorption data were available for indeno[1,2,3-cd]pyrene; however, by analogy to structurally-related PAHs, it would be expected to be absorbed from the digestive tract, lungs, and skin. No data were found concerning the acute, subchronic, chronic, developmental, or reproductive toxicity of indeno[1,2,3-cd]pyrene.

No long-term oral or inhalation human bioassays were available to assess the carcinogenicity of indeno[1,2,3-cd]pyrene. The compound was tested for carcinogenicity in dermal application, lung implant, subcutaneous injection, and intraperitoneal injection studies in animals. Dermal application produced skin papillomas and carcinomas in mice. Lung implants produced epidermoid carcinomas in rats. Injection site sarcomas developed in mice given injections of indeno[1,2,3-cd]pyrene. Based on no human data and sufficient evidence for carcinogenicity in animals, the United Stated Environmental Protection Agency (EPA) has assigned a weight-of-evidence classification of B2, probable human carcinogen to indeno[1,2,3-cd]pyrene.

The following is a presentation of the toxicity information associated with indeno[1,2,3-cd]pyrene.

Carcinogenic Health Effects

- The Oral Slope Factor is 7.30E-01 (mg/kg-day)-1.
- The slope factor is based on toxicity equivalency estimate from benzo(a)pyrene.

1.17 Naphthalene

Naphthalene is a white solid that is found naturally in fossil fuels and that exhibits a typical mothball odor. Naphthalene is a PAH composed of two fused benzene rings. Burning tobacco or wood produces naphthalene. It occurs in crude oil, from which it may be recovered directly as white flakes; it can also be isolated from cracked petroleum, coke-oven emissions, or from high-temperature carbonization of bituminous coal. The major products made from naphthalene are moth repellents. It is also used for making dyes, resins, leather, tanning agents, and the insecticide carbaryl.

Naphthalene can be absorbed by the oral, inhalation, and dermal routes of exposure and can cross the placenta in amounts sufficient to cause fetal toxicity. Exposure to large amounts of naphthalene may damage or destroy some red blood cells, causing a low level until the body replaces the destroyed cells. People, particularly children, have developed this problem after eating naphthalene-containing mothballs or deodorant blocks. Some of the symptoms of this problem are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause neurotoxic effects (confusion, lethargy, listlessness, vertigo), gastrointestinal distress, hepatic effects (jaundice, hepatomegaly, elevated serum enzyme levels), renal effects, and ocular effects (cataracts, optical atrophy). The estimated lethal dose of naphthalene is 5-15 g for adults and 2-3 g for children. Animals sometimes develop cloudiness in their eyes after swallowing naphthalene. It is not clear if this also develops in people. When mice were repeatedly exposed to naphthalene vapors for 2 years, their noses and lungs became inflamed and irritated.

Available cancer bioassays were insufficient to assess the carcinogenicity of naphthalene. Using the EPA's 1996 Proposed Guidelines for Carcinogen Risk Assessment, the human carcinogenic potential of naphthalene via the oral or inhalation routes "cannot be determined" at this time based on human and animal data. However, there is suggestive evidence (observations of benign respiratory tumors and one carcinoma in female mice only exposed to naphthalene by inhalation) that naphthalene may cause cancer. Additional support includes increase in respiratory tumors associated with exposure to 1-methylnaphthalene.

The following is a presentation of the toxicity information associated with naphthalene.

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 2.00E-02 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3000.
- The Oral Chronic Reference Dose is based on the BCL study from 1980.
- The Oral Chronic Reference Dose study critical effect is decreased mean terminal body weights in males.
- The overall confidence in the Oral Chronic Reference Dose is low.

- The Inhalation Chronic Reference Concentration is 3.00E-03 (mg/m3).
- The Inhalation Chronic Reference Concentration has a modifying factor of 1.
- The Inhalation Chronic Reference Concentration has an uncertainty factor of 3000.
- The Inhalation Chronic Reference Concentration is based on the NTP study from 1992.
- The Inhalation Chronic Reference Concentration study target organ is nasal.
- The Inhalation Chronic Reference Concentration study critical effect is hyperplasia and metaplasia in respiratory & olfactory epithelium.
- The overall confidence in the Inhalation Chronic Reference Concentration is medium.

1.18 Phenanthrene

Phenanthrene, also known as phenanthrin, is a PAH with three aromatic carbon rings. It exists as a colorless crystalline solid that occurs in fossil fuels and is present in products of incomplete combustion. Some of the known sources of phenanthrene in the atmosphere are vehicular emissions, coal and oil burning, wood combustion, coke plants, aluminum plants, iron and steel works, foundries, municipal incinerators, synfuel plants, and oil shale plants. According to EPA, there is no current commercial production of phenanthrene in the United States. Phenanthrene can be used in the manufacture of dyestuffs, explosives, drugs, in the synthesis of other chemicals, and in biochemical research. A derivative of phenanthrene has been used as a starting material for synthesizing bile acids, cholesterol, and other steroids.

Phenanthrene is absorbed following oral and dermal exposure. Data from structurally related PAHs suggest that phenanthrene would be absorbed from the lungs. Although a large body of literature exists on the toxicity and carcinogenicity of other PAHs, toxicity data for phenanthrene are very limited. No human data were available that addressed the toxicity of phenanthrene. Phenanthrene produced slight liver toxicity in rats.

No inhalation bioassays were available to assess the carcinogenicity of phenanthrene in humans. Many animal studies failed to increase tumor incidence. However, phenanthrene was found to be an active tumor initiator in one mouse study. Based on no human data and inadequate data from animal bioassays, EPA has placed phenanthrene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

1.19 Pyrene

Pyrene, also known as benzo(def)phenanthrene, is a PAH with four aromatic carbon rings. Pure pyrene is a colorless crystalline solid at ambient temperature; the presence of tetracene, a common contaminant, gives it a yellow color. Pyrene can be derived from coal tar, but there is no commercial production or known commercial use of this compound. Pyrene from coal tar has been used as the starting material for the synthesis of benzo[a]pyrene.

Human exposure to pyrene occurs primarily through inhalation of tobacco smoke and polluted air and by ingestion of water polluted by combustion effluents. Pyrene is common in the environment as a product of incomplete combustion and has been identified in water, food, and in the air. Although a large body of literature exists on the toxicity and carcinogenicity of other PAHs, toxicity data for pyrene are limited. No human data were available that addressed the toxicity of pyrene. Subchronic oral exposure to pyrene produced nephropathy, decreased kidney weights, increased liver weights, and slight hematological changes in mice and produced fatty livers in rats. A single intraperitoneal injection of pyrene produced swelling and congestion of the liver and increased serum aspartate amino transferase (AST) and bilirubin levels in rats. No data were available concerning the toxic effects of inhalation exposure to pyrene.

No oral or inhalation bioassays were available to assess the carcinogenicity of pyrene in humans. Many studies involving different routes of pyrene exposure were done on animals. None of these studies saw an increase in tumor rates, but there is evidence that pyrene enhances the tumor causing ability of benzo[a]pyrene. Based on no human data and inadequate data from animal bioassays, EPA has placed pyrene in weight-of-evidence group D, not classifiable as to human carcinogenicity.

The following is a presentation of the toxicity information associated with pyrene.

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 3.00E-02 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 3000.
- The Oral Chronic Reference Dose is based on the U.S. EPA study from 1989.

- The Oral Chronic Reference Dose study target organ is kidney.
- The Oral Chronic Reference Dose study critical effect is effects.
- The overall confidence in the Oral Chronic Reference Dose is low.

2 HUMAN HEALTH CHEMICALS

The chemicals in the human health risk assessment that are not covered in the Ecological Risk list are chromium, benzene, and acenaphthylene. The chromium and benzene profiles are from the RAIS. The acenaphthylene information is from the HSDB.

2.1 Acenaphthylene

Probable Routes of Human Exposure:

The most probable human exposure would be occupational exposure, which may occur through dermal contact or inhalation at places where acenaphthylene is produced or used. Workers at a creosote impregnation plant for lumber were exposed to an average atmospheric concentration of acenaphthylene of less than 0.1 mg/m^3 for 18 samples. The concentration of acenaphthylene in the personal air at the coal preparation area of a solvent refined coal pilot plant was 13.7 and 3.1 μg/m^3 for a welder and an operator, respectively. Acenaphthylene was found to be completely in the gaseous phase in the workplace air of an aluminum plant at Soderberg, Norway at an average concentration of 14.74 μg/ m^3. Acenaphthylene was also detected in the workplace air of Danish smokehouses. Non-occupational exposures would most likely occur via urban atmospheres, contaminated drinking water supplies and recreational activities at contaminated waterways.

Human Toxicity Excerpts:

Acute toxicity is rarely reported. Exposure to high-risk PAHs by skin and lung absorption results in increased incidences of skin and lung cancer. Certain polycyclic aromatic hydrocarbons are considered carcinogenic, whereas others are not. Coke oven emissions are complex mixtures of coal and coke material that include polycyclic aromatic hydrocarbons; epidemiological study of exposed workers indicated increased incidences of lung and urinary tract cancer. Soots, tars, and creosote contain a variety of by-products and contaminants that include polycyclic aromatic hydrocarbons and epidemiological study demonstrates increased incidences of skin, lung, bladder and gastrointestinal cancer.

2.2 Chromium

Elemental chromium does not occur in nature, but it is present in ores, primarily chromite. Chromium can be found in rocks, animals, plants, soil, and in volcanic dust and gases. Chromium is present in the environment in several different forms (oxidation states). The

most common forms are chromium(0), chromium(III), and chromium(VI). No taste or odor is associated with chromium compounds. Chromium(III) occurs naturally in the environment and is an essential nutrient that helps the body use sugar, protein, and fat.. Chromium(VI) and chromium(0) are generally produced by industrial processes. The metal chromium, chromium(0), is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving.

Chromium enters the body through the lungs, digestive tract and, to a lesser extent, the skin. Inhalation is the most important route for occupational exposure. Non-occupational exposure occurs via ingestion of chromium-containing food and water. Breathing high levels of chromium(VI) can cause irritation to the nose, such as runny nose, nosebleeds, and ulcers and holes in the nasal septum. Ingesting large amounts of chromium(VI) can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death. Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

Several studies have shown that chromium(VI) compounds can increase the risk of lung cancer when inhaled. Animal studies have also shown an increased risk of cancer. There is also evidence for an increased risk of developing nasal, pharyngeal, and gastrointestinal carcinomas. Based on sufficient evidence for humans and animals, Chromium(VI) has been placed in the EPA weight-of-evidence classification A, human carcinogen. Chromium(III) is most appropriately designated a Group D – Not classified as to its human carcinogenicity; however, the classification of chromium(VI) as a known human carcinogen raises a concern for the carcinogenic potential of trivalent chromium.

The following is a presentation of the toxicity information associated with chromium.

Chromium III (Insoluble Salts)

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 1.50E+00 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 10.
- The Oral Chronic Reference Dose has an uncertainty factor of 100.

- The Oral Chronic Reference Dose is based on the Ivankovic and Preussman study from 1975.
- The overall confidence in the Oral Chronic Reference Dose is low.

Chromium VI (Chromic Acid Mists)

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 3.00E-03 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 3.
- The Oral Chronic Reference Dose has an uncertainty factor of 300.
- The Oral Chronic Reference Dose is based on the MacKenzie et al. study from 1958.
- The overall confidence in the Oral Chronic Reference Dose is low.
- The Inhalation Chronic Reference Concentration is 8.00E-06 (mg/m3).
- The Inhalation Chronic Reference Concentration has a modifying factor of 1.
- The Inhalation Chronic Reference Concentration has an uncertainty factor of 90.
- The Inhalation Chronic Reference Concentration is based on the Lindberg and Hedenstierna study from 1983.
- The Inhalation Chronic Reference Concentration study target organ is nasal.
- The Inhalation Chronic Reference Concentration study critical effect is septum atrophy.
- The overall confidence in the Inhalation Chronic Reference Concentration is low.

Carcinogenic Health Effects

- The Inhalation Unit Risk is 1.2E+01 (mg/m3)-1.
- The Inhalation Unit Risk study target organ is lung.
- The Inhalation Unit Risk study cancer type is Tumors.
- The Inhalation Unit Risk is based on the Mancuso study from 1975.

Chromium VI (Particulates)

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 3.00E-03 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 3.
- The Oral Chronic Reference Dose has an uncertainty factor of 300.
- The Oral Chronic Reference Dose is based on the MacKenzie et al. study from 1958.

- The Oral Chronic Reference Dose study critical effect is none observed.
- The overall confidence in the Oral Chronic Reference Dose is low.
- The Inhalation Chronic Reference Concentration is 1.00E-04 (mg/m3).
- The Inhalation Chronic Reference Concentration has a modifying factor of 1.
- The Inhalation Chronic Reference Concentration has an uncertainty factor of 90.
- The Inhalation Chronic Reference Concentration is based on the Malsch et al. study from 1994.
- The Inhalation Chronic Reference Concentration study target organ is nasal.
- The Inhalation Chronic Reference Concentration study critical effect is septum atrophy.
- The overall confidence in the Inhalation Chronic Reference Concentration is low.

Carcinogenic Health Effects

- The Inhalation Unit Risk is 1.2E+01 (mg/m3)-1.
- The Inhalation Unit Risk study target organ is lung.
- The Inhalation Unit Risk study cancer type is Tumors.
- The Inhalation Unit Risk is based on the Mancuso study from 1975.

2.3 Benzene

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Benzene is a colorless organic liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities. Benzene is used primarily in the production of other chemicals such as ethylbenzene, cumene, and cyclohexane. Benzene has also been used as a solvent, but this use is declining, coincidental with the replacement of benzene with other organic solvents. Benzene is emitted into the workplace and the environment from industrial and other manmade sources, including gasoline from filling stations, smoking tobacco products, and auto exhaust.

Because of benzene's high vapor pressure, inhalation is the most likely route of exposure to the chemical, particularly in the workplace. Benzene is absorbed via ingestion, inhalation, and skin application. Experimental data indicate that humans can absorb up to 80% of inhaled benzene (after 5 minutes of exposure). Lethal oral doses of benzene are estimated to

be 10 mL in humans. Nonlethal oral doses of benzene can impact the nervous, hematological, and immunological systems. Ingested and inhaled benzene produces symptoms of neurotoxicity at acute doses of 2 mL for humans. Inhalation of benzene vapor concentrations of 20,000 ppm for 5-10 minutes can be fatal to humans; death results from central nervous system depression.

Benzene is carcinogenic in humans by inhalation and in animals by the oral route of exposure. Occupational exposure to benzene has been associated mainly with increased incidences of acute myeloblastic or erythroblastic leukemias and chronic myeloid and lymphoid leukemias among workers. Studies in animals have demonstrated an association between oral and inhalation exposure to benzene and the development of a variety of tumors, including lymphoma and carcinomas of the Zymbal gland, oral cavity, mammary gland, ovaries, lung, and skin. Benzene has been placed in the EPA weight-of-evidence classification A, human carcinogen.

The following is a presentation of the toxicity information associated with benzene:

Noncarcinogenic Health Effects

- The Oral Chronic Reference Dose is 4.00E-03 (mg/kg-day).
- The Oral Chronic Reference Dose has a modifying factor of 1.
- The Oral Chronic Reference Dose has an uncertainty factor of 300.
- The Oral Chronic Reference Dose is based on the Rothman et. al. study from 1996.
- The Oral Chronic Reference Dose study critical effect is decreased lymphocyte count.
- The Oral Chronic Reference Dose is based on human study.
- The overall confidence in the Oral Chronic Reference Dose is medium.
- The Inhalation Chronic Reference Concentration is 3.00E-02 (mg/m3).
- The Inhalation Chronic Reference Concentration has a modifying factor of 1.
- The Inhalation Chronic Reference Concentration has an uncertainty factor of 300.
- The Inhalation Chronic Reference Concentration is based on the Rothman et. al. study from 1996.
- The Inhalation Chronic Reference Concentration study critical effects is decreased lymphocyte count.
- The Inhalation Chronic Reference Concentration is based on human study.

- The overall confidence in the Inhalation Chronic Reference Concentration is medium.

Carcinogenic Health Effects

- The Oral Slope Factor is 5.50E-02 (mg/kg-day)-1.
- The Oral Slope Factor study target organ is blood.
- The Oral Slope Factor study cancer type is leukemia.
- The Oral Slope Factor is based on the U.S. EPA study from 1999.
- The Inhalation Unit Risk is 7.8E-03 (mg/m3)-1.
- The Inhalation Unit Risk study target organ is blood.
- The Inhalation Unit Risk study cancer type is Leukemia.
- The Inhalation Unit Risk is based on the U.S. EPA study from 1998.

3 REFERENCES

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Table C-1
Human Health Reference Doses (RfD) and Carcinogenic Slope Factors for Injestion and Dermal Contact Exposures

References:	Values from EPA 2003 and EPA 1997	Values from EPA 2003 except PAHs based on EPA 1993a	Values Calculated Per EPA 2001	Values Calculated Per EPA 2001	
	(mg/kg-d) **Oral TDI or RfD**	***(kg-d/mg)*** **Oral Slope Factor**	***(mg/kg-d)*** **Dermal TDI or RfD**	***(kg-d/mg)*** **Dermal Slope Factor**	**Comments**
Metals					
Chromium (as Cr VI)	3.00E-03	N/AV	3.90E-05	N/AV	
Monocyclic Aromatic Compounds					
Benzene	4.00E-03	5.50E-02	4.00E-03	5.50E-02	
Xylenes	2.00E-01	N/AV	2.00E-01	N/AV	
Polyaromatic Compounds					
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	
Benzo(a)anthracene	N/AV	7.30E-01	N/AV	7.30E-01	Extrapolated from BaP
Benzo(a)pyrene	N/AV	7.30E+00	N/AV	7.30E+00	
Benzo(b)fluoranthene	N/AV	7.30E-01	N/AV	7.30E-01	Extrapolated from BaP
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	
Benzo(k)fluoranthene	N/AV	7.30E-02	N/AV	7.30E-02	Extrapolated from BaP
Chrysene	N/AV	7.30E-03	N/AV	7.30E-03	Extrapolated from BaP
Dibenzo(a,h)anthracene	N/AV	7.30E-02	N/AV	7.30E-02	Extrapolated from BaP
Indeno(1,2,3-cd)pyrene	N/AV	7.30E-01	N/AV	7.30E-01	Extrapolated from BaP
Naphthalene	2.00E-02	N/AV	2.00E-02	N/AV	
Phenanthrene	N/AV	N/AV	N/AV	N/AV	

Table C-2
Human Health Reference Doses (RfD) and Carcinogenic Slope Factors for Inhalation Exposures

References:	If no inhalation dose, based on oral EPA 2003	If no inhalation dose, based on oral EPA 2003 or EPA 1997	EPA 2003 Unit Risk Value	EPA 2003 Unit Risk Value	
	***Value Used* (mg/kg-d) TDI or RfD**	***Value Used* (kg-d/mg) Slope Factor**	**(mg/m3) TDI or RfD**	**(m3/mg) AUR**	**Comments**
Metals					
Chromium (as Cr VI)	2.86E-05	4.20E+00	1.00E-04	1.20E+00	
Monocyclic Aromatic Compounds					
Benzene	8.57E-03	2.73E-02	3.00E-02	7.80E-03	
Ethylbenzene	2.86E-01	N/AV	1.00E+00	N/AV	
Toluene	1.14E-01	N/AV	4.00E-01	N/AV	
Xylenes	2.86E-02	N/AV	1.00E-01	N/AV	
Polyaromatic Compounds					
Acenaphthene	6.00E-02	N/AV	N/AV	N/AV	
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	
Anthracene	3.00E-01	N/AV	N/AV	N/AV	
Benzo(a)anthracene	N/AV	7.30E-01	N/AV	N/AV	Extrapolated from Bap
Benzo(a)pyrene	N/AV	7.30E+00	N/AV	N/AV	
Benzo(b)fluoranthene	N/AV	7.30E-01	N/AV	N/AV	Extrapolated from Bap
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	
Benzo(k)fluoranthene	N/AV	7.30E-02	N/AV	N/AV	Extrapolated from Bap
Chrysene	N/AV	7.30E-03	N/AV	N/AV	Extrapolated from Bap
Dibenzo(a,h)anthracene	N/AV	7.30E+00	N/AV	N/AV	Extrapolated from Bap
Fluoranthene	4.00E-02	N/AV	N/AV	N/AV	
Fluorene	4.00E-02	N/AV	N/AV	N/AV	
Indeno(1,2,3-cd)pyrene	N/AV	7.30E-01	N/AV	N/AV	Extrapolated from Bap
Naphthalene	8.57E-04	N/AV	3.00E-03	N/AV	
Phenanthrene	N/AV	N/AV	N/AV	N/AV	
Pyrene	3.00E-02	N/AV	N/AV	N/AV	

APPENDIX D

RISK CHARACTERIZATION TABLES

Table D-1
Summary of Occupational Total Combined Risks for Reasonable Maximum Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	9.89E-03	1.93E-07	6.68E-03	1.15E-07	6.94E-03	1.91E-07	1.56E-02	3.58E-07	3.53E-03	5.07E-08
Monocyclic Aromatic Compounds										
Benzene	1.16E-02	9.65E-07	1.88E-05	1.57E-09	**8.93E+01**	**7.46E-03**	**5.60E+00**	**4.68E-04**	**7.13E+00**	**5.96E-04**
Xylenes	1.34E-02	0.00E+00	1.64E-05	0.00E+00	**1.25E+00**	0.00E+00	5.72E-02	0.00E+00	3.44E-01	0.00E+00
Polyaromatic Compounds										
Acenaphthene	7.24E-05	0.00E+00	3.14E-05	0.00E+00	2.29E-03	0.00E+00	4.60E-05	0.00E+00	2.16E-03	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	7.87E-06	0.00E+00	2.33E-06	0.00E+00	3.27E-04	0.00E+00	4.76E-06	0.00E+00	6.06E-05	0.00E+00
Benzo(a)anthracene	0.00E+00	**2.83E-06**	0.00E+00	**1.35E-06**	0.00E+00	**9.90E-05**	0.00E+00	**3.53E-06**	0.00E+00	**2.90E-05**
Benzo(a)pyrene	0.00E+00	**4.49E-05**	0.00E+00	**1.82E-05**	0.00E+00	**1.34E-03**	0.00E+00	**1.04E-04**	0.00E+00	**4.34E-04**
Benzo(b)fluoranthene	0.00E+00	**4.77E-06**	0.00E+00	**1.56E-06**	0.00E+00	**1.17E-04**	0.00E+00	**9.43E-06**	0.00E+00	**4.31E-05**
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	**1.41E-06**	0.00E+00	**1.10E-06**	0.00E+00	**9.62E-05**	0.00E+00	**3.20E-06**	0.00E+00	**1.34E-05**
Chrysene	0.00E+00	3.15E-08	0.00E+00	1.46E-08	0.00E+00	**1.10E-06**	0.00E+00	4.73E-08	0.00E+00	*3.15E-07*
Dibenzo(a,h)anthracene	0.00E+00	**5.53E-06**	0.00E+00	**4.00E-06**	0.00E+00	**3.25E-04**	0.00E+00	**1.43E-05**	0.00E+00	**4.37E-05**
Fluoranthene	2.16E-05	0.00E+00	1.08E-05	0.00E+00	7.44E-04	0.00E+00	1.74E-05	0.00E+00	4.88E-04	0.00E+00
Fluorene	2.57E-05	0.00E+00	1.62E-05	0.00E+00	8.19E-04	0.00E+00	1.81E-05	0.00E+00	1.14E-03	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	**3.88E-06**	0.00E+00	**1.28E-06**	0.00E+00	**9.56E-05**	0.00E+00	**7.23E-06**	0.00E+00	**2.08E-05**
Naphthalene	6.33E-02	0.00E+00	6.12E-03	0.00E+00	**2.59E+00**	0.00E+00	1.29E-01	0.00E+00	7.91E-01	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	3.84E-05	0.00E+00	1.56E-05	0.00E+00	9.28E-04	0.00E+00	4.13E-05	0.00E+00	1.02E-03	0.00E+00
Total Occupational Risks										
	5.41E-03	**6.31E-05**	1.29E-02	**2.77E-05**	**9.47E+01**	**9.54E-03**	**5.83E+00**	**6.10E-04**	**8.50E+00**	**1.18E-03**

Bold = value above Oregon Risk levels

Table D-2
Summary of Occupational Total Combined Risks for Central Tendency Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	6.43E-03	3.38E-08	5.20E-03	2.44E-08	***5.12E-03***	3.63E-08	6.81E-03	4.13E-08	2.54E-03	1.01E-08
Monocyclic Aromatic Compounds										
Benzene	8.21E-03	1.65E-07	1.82E-05	3.65E-10	**6.74E+01**	*1.35E-03*	**3.48E+00**	6.98E-05	**4.65E+00**	*9.33E-05*
Xylenes	9.44E-03	0.00E+00	1.59E-05	0.00E+00	***9.16E-01***	0.00E+00	4.43E-02	0.00E+00	2.22E-01	0.00E+00
Polyaromatic Compounds										
Acenaphthene	4.71E-05	0.00E+00	2.07E-05	0.00E+00	***9.60E-04***	0.00E+00	3.16E-05	0.00E+00	1.12E-03	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	4.98E-06	0.00E+00	1.42E-06	0.00E+00	***1.63E-04***	0.00E+00	2.33E-06	0.00E+00	3.01E-05	0.00E+00
Benzo(a)anthracene	0.00E+00	3.41E-07	0.00E+00	1.68E-07	0.00E+00	7.92E-06	0.00E+00	3.13E-07	0.00E+00	*3.01E-06*
Benzo(a)pyrene	0.00E+00	*5.18E-06*	0.00E+00	*2.22E-06*	0.00E+00	*1.06E-04*	0.00E+00	*8.21E-06*	0.00E+00	*5.21E-05*
Benzo(b)fluoranthene	0.00E+00	5.55E-07	0.00E+00	1.95E-07	0.00E+00	9.45E-06	0.00E+00	7.85E-07	0.00E+00	*5.05E-06*
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	1.64E-07	0.00E+00	1.30E-07	0.00E+00	7.59E-06	0.00E+00	3.13E-07	0.00E+00	*1.72E-06*
Chrysene	0.00E+00	3.90E-09	0.00E+00	1.80E-09	0.00E+00	8.91E-08	0.00E+00	4.12E-09	0.00E+00	3.56E-08
Dibenzo(a,h)anthracene	0.00E+00	*6.99E-07*	0.00E+00	*4.97E-07*	0.00E+00	*2.52E-05*	0.00E+00	1.16E-06	0.00E+00	*5.51E-06*
Fluoranthene	1.13E-05	0.00E+00	5.61E-06	0.00E+00	***2.64E-04***	0.00E+00	7.90E-06	0.00E+00	1.78E-04	0.00E+00
Fluorene	1.80E-05	0.00E+00	9.38E-06	0.00E+00	***3.92E-04***	0.00E+00	1.02E-05	0.00E+00	6.07E-04	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	4.16E-07	0.00E+00	1.53E-07	0.00E+00	7.48E-06	0.00E+00	5.91E-07	0.00E+00	*2.64E-06*
Naphthalene	4.07E-02	0.00E+00	3.60E-03	0.00E+00	**1.83E+00**	0.00E+00	8.37E-02	0.00E+00	5.23E-01	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	1.97E-05	0.00E+00	8.30E-06	0.00E+00	***3.29E-04***	0.00E+00	1.69E-05	0.00E+00	3.76E-04	0.00E+00
Total Occupational Risks										
	3.17E-03	*7.33E-06*	8.89E-03	3.39E-06	**7.12E+01**	*1.52E-03*	**3.63E+00**	8.12E-05	**5.55E+00**	*1.63E-04*

Bold = value above Oregon Risk levels

Table D-3
Summary of Excavation Worker Total Combined Risks for Reasonable Maximum Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	1.21E-02	1.26E-10	1.72E-03	8.05E-11	6.12E-02	1.37E-10	3.18E-03	2.58E-10	4.85E-02	3.57E-11
Monocyclic Aromatic Compounds										
Benzene	2.45E-03	7.78E-09	3.98E-07	1.32E-12	**2.02E+01**	*6.39E-05*	3.53E-06	1.17E-11	**6.37E+00**	*2.02E-05*
Xylenes	7.88E-04	0.00E+00	3.10E-07	0.00E+00	7.90E-02	0.00E+00	2.76E-06	0.00E+00	1.03E-02	0.00E+00
Polyaromatic Compounds										
Acenaphthene	2.44E-02	0.00E+00	4.07E-06	0.00E+00	***8.31E-02***	0.00E+00	3.64E-06	0.00E+00	1.20E-01	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	4.70E-03	0.00E+00	9.48E-07	0.00E+00	3.38E-03	0.00E+00	1.72E-06	0.00E+00	6.38E-03	0.00E+00
Benzo(a)anthracene	0.00E+00	*1.40E-06*	0.00E+00	1.94E-09	0.00E+00	*1.27E-06*	0.00E+00	5.06E-09	0.00E+00	*2.85E-06*
Benzo(a)pyrene	0.00E+00	*2.98E-05*	0.00E+00	*2.62E-08*	0.00E+00	*2.30E-05*	0.00E+00	*1.49E-07*	0.00E+00	*5.43E-05*
Benzo(b)fluoranthene	0.00E+00	*3.31E-06*	0.00E+00	2.24E-09	0.00E+00	*2.47E-06*	0.00E+00	1.35E-08	0.00E+00	*4.85E-06*
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	*4.47E-07*	0.00E+00	8.68E-10	0.00E+00	*3.01E-07*	0.00E+00	2.53E-09	0.00E+00	*7.68E-07*
Chrysene	0.00E+00	2.34E-08	0.00E+00	2.10E-11	0.00E+00	*1.13E-08*	0.00E+00	6.79E-11	0.00E+00	3.00E-08
Dibenzo(a,h)anthracene	0.00E+00	*2.05E-07*	0.00E+00	2.91E-09	0.00E+00	*3.24E-07*	0.00E+00	*1.04E-08*	0.00E+00	*3.69E-07*
Fluoranthene	7.49E-02	0.00E+00	7.59E-05	0.00E+00	***9.59E-02***	0.00E+00	1.20E-04	0.00E+00	1.97E-01	0.00E+00
Fluorene	5.17E-02	0.00E+00	4.47E-06	0.00E+00	***7.88E-02***	0.00E+00	4.36E-06	0.00E+00	1.33E-01	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	*3.47E-06*	0.00E+00	1.84E-09	0.00E+00	*2.40E-06*	0.00E+00	1.04E-08	0.00E+00	*5.59E-06*
Naphthalene	1.28E-01	0.00E+00	8.32E-05	0.00E+00	**3.59E+00**	0.00E+00	7.82E-04	0.00E+00	**6.38E+00**	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	8.17E-02	0.00E+00	1.09E-04	0.00E+00	***9.46E-02***	0.00E+00	2.83E-04	0.00E+00	2.44E-01	0.00E+00
Total Excavation Risks										
	3.82E-01	**3.87E-05**	1.99E-03	3.61E-08	**2.53E+01**	**9.37E-05**	4.38E-03	*1.91E-07*	**1.39E+01**	**8.90E-05**

Bold = value above Oregon Risk levels

Table D-4
Summary of Excavation Worker Total Combined Risks for Central Tendency Estimate

	Spent Oxide Area		Former Office Area		Koppers Area		FAMM Area		Tar Pond Area	
	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk	Non-Cancer HQ	Cancer Risk
Metals										
Chromium	8.31E-03	4.51E-11	1.10E-03	3.57E-11	4.64E-02	5.44E-11	1.12E-03	6.19E-11	2.90E-02	1.53E-11
Monocyclic Aromatic Compounds										
Benzene	1.87E-03	2.96E-09	3.59E-07	5.98E-13	**1.25E+01**	*1.98E-05*	3.31E-06	5.51E-12	**4.66E+00**	*7.40E-06*
Xylenes	5.72E-04	0.00E+00	2.97E-07	0.00E+00	5.43E-02	0.00E+00	2.75E-06	0.00E+00	7.49E-03	0.00E+00
Polyaromatic Compounds										
Acenaphthene	1.71E-02	0.00E+00	2.15E-06	0.00E+00	6.25E-02	0.00E+00	1.78E-06	0.00E+00	7.75E-02	0.00E+00
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	3.16E-03	0.00E+00	4.57E-07	0.00E+00	2.42E-03	0.00E+00	6.71E-07	0.00E+00	4.30E-03	0.00E+00
Benzo(a)anthracene	0.00E+00	*4.30E-07*	0.00E+00	3.16E-10	0.00E+00	*3.69E-07*	0.00E+00	5.89E-10	0.00E+00	*9.21E-07*
Benzo(a)pyrene	0.00E+00	*9.10E-06*	0.00E+00	4.18E-09	0.00E+00	*6.75E-06*	0.00E+00	1.55E-08	0.00E+00	*1.69E-05*
Benzo(b)fluoranthene	0.00E+00	*9.84E-07*	0.00E+00	3.68E-10	0.00E+00	*7.60E-07*	0.00E+00	1.48E-09	0.00E+00	*1.52E-06*
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	*1.41E-07*	0.00E+00	7.02E-11	0.00E+00	*8.27E-08*	0.00E+00	1.70E-10	0.00E+00	*2.42E-07*
Chrysene	0.00E+00	7.28E-09	0.00E+00	3.39E-12	0.00E+00	*3.20E-09*	0.00E+00	7.76E-12	0.00E+00	9.56E-09
Dibenzo(a,h)anthracene	0.00E+00	*6.74E-08*	0.00E+00	2.01E-10	0.00E+00	*4.54E-08*	0.00E+00	4.71E-10	0.00E+00	*9.90E-08*
Fluoranthene	4.79E-02	0.00E+00	3.82E-05	0.00E+00	***6.71E-02***	0.00E+00	5.22E-05	0.00E+00	1.31E-01	0.00E+00
Fluorene	3.62E-02	0.00E+00	2.06E-06	0.00E+00	6.15E-02	0.00E+00	1.92E-06	0.00E+00	8.94E-02	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	*1.10E-06*	0.00E+00	2.89E-10	0.00E+00	*7.73E-07*	0.00E+00	1.11E-09	0.00E+00	*1.69E-06*
Naphthalene	8.66E-02	0.00E+00	5.15E-05	0.00E+00	**2.24E+00**	0.00E+00	3.42E-04	0.00E+00	**4.15E+00**	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.24E-02	0.00E+00	5.66E-05	0.00E+00	***6.16E-02***	0.00E+00	1.11E-04	0.00E+00	1.61E-01	0.00E+00
Total Excavation Risks										
	2.55E-01	**1.18E-05**	1.25E-03	5.47E-09	**1.58E+01**	**2.86E-05**	1.63E-03	1.94E-08	**9.59E+00**	**2.88E-05**

Bold = value above Oregon Risk levels

Table D-5
Spent Oxide Area (1) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.51E-03	1.93E-07
Monocyclic Aromatic Compounds								
Benzene	9.60E-03	8.02E-07	1.95E-03	1.63E-07	1.16E-02	9.65E-07	1.54E-07	1.29E-11
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	3.44E-04	N/AV	4.62E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	9.99E-04	N/AV	1.16E-08	N/AV
Xylenes	1.28E-02	N/AV	5.85E-04	N/AV	1.34E-02	N/AV	4.73E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	6.88E-05	N/AP	7.14E-05	N/AV	4.15E-08	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	7.49E-06	N/AP	7.50E-06	N/AV	1.60E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.69E-09
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.06E-07
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.13E-08
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.33E-09
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.44E-11
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.31E-08
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	9.44E-07	N/AV
Fluorene	3.17E-07	N/AP	2.46E-05	N/AP	2.49E-05	N/AV	3.43E-08	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	9.18E-09
Naphthalene	4.46E-02	N/AP	1.88E-02	N/AP	6.33E-02	N/AV	3.36E-06	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.68E-06	N/AV
Total Occupational Risks								
	6.70E-02	8.02E-07	2.14E-02	1.63E-07	8.98E-02	9.65E-07	4.51E-03	3.43E-07

Bold = value above Oregon Risk levels

Table D-5
Spent Oxide Area (1) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals						
Chromium	5.35E-03	N/AV	3.39E-05	N/AV	9.89E-03	1.93E-07
Monocyclic Aromatic Compounds						
Benzene	2.67E-08	4.20E-11	2.61E-07	2.05E-11	1.16E-02	9.65E-07
Ethylbenzene	6.41E-08	N/AV	1.04E-08	N/AV	3.45E-04	0.00E+00
Toluene	3.21E-08	N/AV	5.22E-09	N/AV	9.99E-04	0.00E+00
Xylenes	3.28E-08	N/AV	5.34E-09	N/AV	1.34E-02	0.00E+00
Polyaromatic Compounds						
Acenaphthene	8.74E-07	N/AV	3.28E-08	N/AV	7.24E-05	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	3.36E-07	N/AV	1.26E-08	N/AV	7.87E-06	0.00E+00
Benzo(a)anthracene	N/AV	**2.82E-06**	N/AV	5.29E-09	0.00E+00	**2.83E-06**
Benzo(a)pyrene	N/AV	**4.47E-05**	N/AV	8.40E-08	0.00E+00	**4.49E-05**
Benzo(b)fluoranthene	N/AV	**4.75E-06**	N/AV	8.92E-09	0.00E+00	**4.77E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**1.40E-06**	N/AV	2.63E-09	0.00E+00	**1.41E-06**
Chrysene	N/AV	3.13E-08	N/AV	5.88E-11	0.00E+00	3.15E-08
Dibenzo(a,h)anthracene	N/AV	**5.51E-06**	N/AV	1.03E-08	0.00E+00	**5.53E-06**
Fluoranthene	1.99E-05	N/AV	7.46E-07	N/AV	2.16E-05	0.00E+00
Fluorene	7.22E-07	N/AV	2.71E-08	N/AV	2.57E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**3.86E-06**	N/AV	7.25E-09	0.00E+00	**3.88E-06**
Naphthalene	3.03E-06	N/AV	1.14E-07	N/AV	6.33E-02	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	3.54E-05	N/AV	1.33E-06	N/AV	3.84E-05	0.00E+00
Total Occupational Risks						
	5.41E-03	**6.31E-05**	3.65E-05	1.18E-07	9.97E-02	**6.46E-05**

Bold = value above Oregon Risk levels

Table D-6
Spent Oxide Area (1) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.28E-03	3.38E-08
Monocyclic Aromatic Compounds								
Benzene	7.41E-03	1.49E-07	7.99E-04	1.60E-08	8.21E-03	1.65E-07	6.32E-08	1.27E-12
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	2.44E-04	N/AV	1.90E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	6.97E-04	N/AV	4.74E-09	N/AV
Xylenes	9.17E-03	N/AV	2.74E-04	N/AV	9.44E-03	N/AV	2.22E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	4.48E-05	N/AP	4.66E-05	N/AV	2.70E-08	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	4.79E-06	N/AP	4.80E-06	N/AV	1.02E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.00E-09
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.52E-08
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.63E-09
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.83E-10
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.14E-11
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.05E-09
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	6.14E-07	N/AV
Fluorene	2.15E-07	N/AP	1.73E-05	N/AP	1.76E-05	N/AV	2.42E-08	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.22E-09
Naphthalene	2.97E-02	N/AP	1.11E-02	N/AP	4.07E-02	N/AV	1.98E-06	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.07E-06	N/AV
Total Occupational Risks								
	4.62E-02	1.49E-07	1.22E-02	1.60E-08	5.94E-02	1.65E-07	3.29E-03	5.54E-08

Bold = value above Oregon Risk levels

Table D-6
Spent Oxide Area (1) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals						
Chromium	3.13E-03	N/AV	1.23E-05	N/AV	6.43E-03	3.38E-08
Monocyclic Aromatic Compounds						
Benzene	8.82E-09	3.33E-12	5.35E-08	1.01E-12	8.21E-03	1.65E-07
Ethylbenzene	2.12E-08	N/AV	2.14E-09	N/AV	2.44E-04	0.00E+00
Toluene	1.06E-08	N/AV	1.07E-09	N/AV	6.97E-04	0.00E+00
Xylenes	1.24E-08	N/AV	1.25E-09	N/AV	9.44E-03	0.00E+00
Polyaromatic Compounds						
Acenaphthene	4.58E-07	N/AV	1.07E-08	N/AV	4.71E-05	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	1.73E-07	N/AV	4.03E-09	N/AV	4.98E-06	0.00E+00
Benzo(a)anthracene	N/AV	3.39E-07	N/AV	3.95E-10	0.00E+00	3.41E-07
Benzo(a)pyrene	N/AV	**5.16E-06**	N/AV	6.01E-09	0.00E+00	**5.18E-06**
Benzo(b)fluoranthene	N/AV	5.53E-07	N/AV	6.44E-10	0.00E+00	5.55E-07
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	1.64E-07	N/AV	1.91E-10	0.00E+00	1.64E-07
Chrysene	N/AV	3.88E-09	N/AV	4.52E-12	0.00E+00	3.90E-09
Dibenzo(a,h)anthracene	N/AV	*6.96E-07*	N/AV	8.12E-10	0.00E+00	*6.99E-07*
Fluoranthene	1.04E-05	N/AV	2.42E-07	N/AV	1.13E-05	0.00E+00
Fluorene	4.10E-07	N/AV	9.56E-09	N/AV	1.80E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	4.14E-07	N/AV	4.83E-10	0.00E+00	4.16E-07
Naphthalene	1.44E-06	N/AV	3.36E-08	N/AV	4.07E-02	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	1.82E-05	N/AV	4.24E-07	N/AV	1.97E-05	0.00E+00
Total Occupational Risks						
	3.17E-03	7.33E-06	*1.31E-05*	8.54E-09	6.59E-02	*7.55E-06*

Bold = value above Oregon Risk levels

Table D-7
Former Office Area (2) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.69E-03	1.15E-07
Monocyclic Aromatic Compounds								
Benzene	0.00E+00	0.00E+00	1.88E-05	1.57E-09	1.88E-05	1.57E-09	1.35E-09	1.13E-13
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	5.13E-07	N/AV	4.05E-11	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	1.39E-06	N/AV	1.01E-10	N/AV
Xylenes	0.00E+00	N/AV	1.64E-05	N/AV	1.64E-05	N/AV	1.21E-09	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	3.09E-05	N/AP	3.09E-05	N/AV	1.85E-08	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	2.20E-06	N/AP	2.20E-06	N/AV	4.65E-09	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.58E-09
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.47E-08
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.97E-09
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.09E-09
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.79E-11
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.62E-09
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.84E-07	N/AV
Fluorene	0.00E+00	N/AP	1.56E-05	N/AP	1.56E-05	N/AV	2.15E-08	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.44E-09
Naphthalene	0.00E+00	N/AP	6.12E-03	N/AP	6.12E-03	N/AV	1.06E-06	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	5.53E-07	N/AV
Total Occupational Risks								
	0.00E+00	0.00E+00	6.20E-03	1.57E-09	6.21E-03	1.57E-09	2.69E-03	1.68E-07

Bold = value above Oregon Risk levels

Table D-7
Former Office Area (2) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Total Non-cancer HQ	Total Cancer Risk
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk		
Metals						
Chromium	3.97E-03	N/AV	2.51E-05	N/AV	6.68E-03	1.15E-07
Monocyclic Aromatic Compounds						
Benzene	2.91E-10	4.57E-13	2.84E-09	2.23E-13	1.88E-05	1.57E-09
Ethylbenzene	6.98E-10	N/AV	1.13E-10	N/AV	5.14E-07	0.00E+00
Toluene	3.49E-10	N/AV	5.67E-11	N/AV	1.39E-06	0.00E+00
Xylenes	1.05E-09	N/AV	1.70E-10	N/AV	1.64E-05	0.00E+00
Polyaromatic Compounds						
Acenaphthene	4.83E-07	N/AV	1.81E-08	N/AV	3.14E-05	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	1.22E-07	N/AV	4.56E-09	N/AV	2.33E-06	0.00E+00
Benzo(a)anthracene	N/AV	**1.35E-06**	N/AV	2.53E-09	0.00E+00	**1.35E-06**
Benzo(a)pyrene	N/AV	**1.82E-05**	N/AV	3.41E-08	0.00E+00	**1.82E-05**
Benzo(b)fluoranthene	N/AV	**1.55E-06**	N/AV	2.91E-09	0.00E+00	**1.56E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**1.09E-06**	N/AV	2.05E-09	0.00E+00	**1.10E-06**
Chrysene	N/AV	1.46E-08	N/AV	2.74E-11	0.00E+00	1.46E-08
Dibenzo(a,h)anthracene	N/AV	**3.99E-06**	N/AV	7.48E-09	0.00E+00	**4.00E-06**
Fluoranthene	1.00E-05	N/AV	3.77E-07	N/AV	1.08E-05	0.00E+00
Fluorene	5.63E-07	N/AV	2.11E-08	N/AV	1.62E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**1.28E-06**	N/AV	2.40E-09	0.00E+00	**1.28E-06**
Naphthalene	1.19E-06	N/AV	4.47E-08	N/AV	6.12E-03	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	1.45E-05	N/AV	5.43E-07	N/AV	1.56E-05	0.00E+00
Total Occupational Risks						
	3.98E-03	**2.74E-05**	2.56E-05	5.15E-08	1.29E-02	**2.77E-05**

Bold = value above Oregon Risk levels

Table D-8
Former Office Area (2) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.37E-03	2.44E-08
Monocyclic Aromatic Compounds								
Benzene	0.00E+00	0.00E+00	1.82E-05	3.65E-10	1.82E-05	3.65E-10	1.31E-09	2.62E-14
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	4.98E-07	N/AV	3.93E-11	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	1.35E-06	N/AV	9.81E-11	N/AV
Xylenes	0.00E+00	N/AV	1.59E-05	N/AV	1.59E-05	N/AV	1.18E-09	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	2.05E-05	N/AP	2.05E-05	N/AV	1.22E-08	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	1.35E-06	N/AP	1.35E-06	N/AV	2.86E-09	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.97E-10
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.26E-09
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.63E-10
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.08E-10
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.26E-12
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.18E-09
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.49E-07	N/AV
Fluorene	0.00E+00	N/AP	9.09E-06	N/AP	9.09E-06	N/AV	1.26E-08	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.62E-10
Naphthalene	0.00E+00	N/AP	3.60E-03	N/AP	3.60E-03	N/AV	6.25E-07	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.68E-07	N/AV
Total Occupational Risks								
	0.00E+00	0.00E+00	3.67E-03	3.65E-10	3.67E-03	3.65E-10	2.38E-03	3.24E-08

Bold = value above Oregon Risk levels

Table D-8
Former Office Area (2) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals						
Chromium	2.82E-03	N/AV	1.11E-05	N/AV	5.20E-03	2.44E-08
Monocyclic Aromatic Compounds						
Benzene	2.27E-10	8.56E-14	1.38E-09	2.59E-14	1.82E-05	3.65E-10
Ethylbenzene	5.45E-10	N/AV	5.50E-11	N/AV	4.99E-07	0.00E+00
Toluene	2.72E-10	N/AV	2.75E-11	N/AV	1.35E-06	0.00E+00
Xylenes	8.17E-10	N/AV	8.25E-11	N/AV	1.59E-05	0.00E+00
Polyaromatic Compounds						
Acenaphthene	2.57E-07	N/AV	5.99E-09	N/AV	2.07E-05	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	6.02E-08	N/AV	1.40E-09	N/AV	1.42E-06	0.00E+00
Benzo(a)anthracene	N/AV	1.67E-07	N/AV	1.95E-10	0.00E+00	1.68E-07
Benzo(a)pyrene	N/AV	**2.21E-06**	N/AV	2.58E-09	0.00E+00	**2.22E-06**
Benzo(b)fluoranthene	N/AV	1.95E-07	N/AV	2.27E-10	0.00E+00	1.95E-07
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	1.30E-07	N/AV	1.51E-10	0.00E+00	1.30E-07
Chrysene	N/AV	1.79E-09	N/AV	2.09E-12	0.00E+00	1.80E-09
Dibenzo(a,h)anthracene	N/AV	*4.95E-07*	N/AV	5.77E-10	0.00E+00	*4.97E-07*
Fluoranthene	5.24E-06	N/AV	1.22E-07	N/AV	5.61E-06	0.00E+00
Fluorene	2.65E-07	N/AV	6.18E-09	N/AV	9.38E-06	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	1.53E-07	N/AV	1.78E-10	0.00E+00	1.53E-07
Naphthalene	5.64E-07	N/AV	1.31E-08	N/AV	3.60E-03	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	7.76E-06	N/AV	1.81E-07	N/AV	8.30E-06	0.00E+00
Total Occupational Risks						
	2.83E-03	3.35E-06	1.14E-05	3.91E-09	8.89E-03	3.39E-06

Bold = value above Oregon Risk levels

Table D-9
Koppers Area (3) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.45E-03	1.91E-07
Monocyclic Aromatic Compounds								
Benzene	**8.93E+01**	**7.46E-03**	9.87E-04	8.25E-08	**8.93E+01**	**7.46E-03**	1.42E-07	1.19E-11
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	4.15E-02	N/AV	4.26E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	**1.53E+00**	N/AV	1.06E-08	N/AV
Xylenes	**1.25E+00**	N/AV	2.98E-04	N/AV	**1.25E+00**	N/AV	4.39E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	2.09E-03	N/AP	2.26E-03	N/AV	2.37E-06	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	3.12E-04	N/AP	3.13E-04	N/AV	1.25E-06	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.98E-07
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	**6.73E-06**
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.90E-07
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.84E-07
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.55E-09
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	**1.64E-06**
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	6.61E-05	N/AV
Fluorene	4.08E-06	N/AP	7.92E-04	N/AP	7.96E-04	N/AV	2.08E-06	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.81E-07
Naphthalene	**2.53E+00**	N/AP	5.91E-02	N/AP	**2.59E+00**	N/AV	1.97E-05	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	8.25E-05	N/AV
Total Occupational Risks								
	9.31E+01	**7.46E-03**	6.35E-02	8.25E-08	**9.47E+01**	**7.46E-03**	4.54E-03	**1.06E-05**

Bold = value above Oregon Risk levels

Table D-9
Koppers Area (3) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals						
Chromium	2.48E-03	N/AV	1.57E-05	N/AV	6.94E-03	1.91E-07
Monocyclic Aromatic Compounds						
Benzene	1.15E-08	1.81E-11	1.13E-07	8.85E-12	**8.93E+01**	**7.46E-03**
Ethylbenzene	2.77E-08	N/AV	4.51E-09	N/AV	4.15E-02	0.00E+00
Toluene	1.39E-08	N/AV	2.25E-09	N/AV	**1.53E+00**	0.00E+00
Xylenes	1.43E-08	N/AV	2.32E-09	N/AV	**1.25E+00**	0.00E+00
Polyaromatic Compounds						
Acenaphthene	2.34E-05	N/AV	8.79E-07	N/AV	2.29E-03	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	1.23E-05	N/AV	4.63E-07	N/AV	3.27E-04	0.00E+00
Benzo(a)anthracene	N/AV	**9.83E-05**	N/AV	1.84E-07	0.00E+00	**9.90E-05**
Benzo(a)pyrene	N/AV	**1.33E-03**	N/AV	**2.49E-06**	0.00E+00	**1.34E-03**
Benzo(b)fluoranthene	N/AV	**1.17E-04**	N/AV	2.19E-07	0.00E+00	**1.17E-04**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**9.55E-05**	N/AV	1.79E-07	0.00E+00	**9.62E-05**
Chrysene	N/AV	**1.10E-06**	N/AV	2.06E-09	0.00E+00	**1.10E-06**
Dibenzo(a,h)anthracene	N/AV	**3.23E-04**	N/AV	6.06E-07	0.00E+00	**3.25E-04**
Fluoranthene	6.53E-04	N/AV	2.45E-05	N/AV	7.44E-04	0.00E+00
Fluorene	2.05E-05	N/AV	7.70E-07	N/AV	8.19E-04	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**9.50E-05**	N/AV	1.78E-07	0.00E+00	**9.56E-05**
Naphthalene	8.34E-06	N/AV	3.13E-07	N/AV	**2.59E+00**	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	8.15E-04	N/AV	3.06E-05	N/AV	9.28E-04	0.00E+00
Total Occupational Risks						
	3.19E-03	**2.06E-03**	4.28E-05	3.86E-06	**9.47E+01**	**9.54E-03**

Bold = value above Oregon Risk levels

Table D-10
Koppers Area (3) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.53E-03	3.63E-08
Monocyclic Aromatic Compounds								
Benzene	**6.74E+01**	**1.35E-03**	3.89E-04	7.79E-09	**6.74E+01**	**1.35E-03**	5.59E-08	1.12E-12
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	3.07E-02	N/AV	1.68E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	9.52E-01	N/AV	4.19E-09	N/AV
Xylenes	9.16E-01	N/AV	1.26E-04	N/AV	9.16E-01	N/AV	1.86E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	8.79E-04	N/AP	9.51E-04	N/AV	9.97E-07	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	1.57E-04	N/AP	1.57E-04	N/AV	6.28E-07	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.94E-08
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.64E-07
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.90E-08
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.74E-08
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.56E-10
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.57E-07
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.90E-05	N/AV
Fluorene	2.02E-06	N/AP	3.81E-04	N/AP	3.83E-04	N/AV	9.99E-07	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.67E-08
Naphthalene	**1.80E+00**	N/AP	2.98E-02	N/AP	**1.83E+00**	N/AV	9.95E-06	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.60E-05	N/AV
Total Occupational Risks								
	7.01E+01	**1.35E-03**	3.18E-02	7.79E-09	**7.11E+01**	**1.35E-03**	3.61E-03	1.06E-06

Bold = value above Oregon Risk levels

Table D-10
Koppers Area (3) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals						
Chromium	1.58E-03	N/AV	6.23E-06	N/AV	5.12E-03	3.63E-08
Monocyclic Aromatic Compounds						
Benzene	3.66E-09	1.38E-12	2.22E-08	4.18E-13	**6.74E+01**	**1.35E-03**
Ethylbenzene	8.78E-09	N/AV	8.87E-10	N/AV	3.07E-02	0.00E+00
Toluene	4.39E-09	N/AV	4.44E-10	N/AV	9.52E-01	0.00E+00
Xylenes	4.87E-09	N/AV	4.92E-10	N/AV	9.16E-01	0.00E+00
Polyaromatic Compounds						
Acenaphthene	7.92E-06	N/AV	1.85E-07	N/AV	9.60E-04	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	4.99E-06	N/AV	1.16E-07	N/AV	1.63E-04	0.00E+00
Benzo(a)anthracene	N/AV	**7.86E-06**	N/AV	9.16E-09	0.00E+00	**7.92E-06**
Benzo(a)pyrene	N/AV	**1.06E-04**	N/AV	1.23E-07	0.00E+00	**1.06E-04**
Benzo(b)fluoranthene	N/AV	**9.38E-06**	N/AV	1.09E-08	0.00E+00	**9.45E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**7.53E-06**	N/AV	8.78E-09	0.00E+00	**7.59E-06**
Chrysene	N/AV	8.84E-08	N/AV	1.03E-10	0.00E+00	8.91E-08
Dibenzo(a,h)anthracene	N/AV	**2.50E-05**	N/AV	2.92E-08	0.00E+00	**2.52E-05**
Fluoranthene	2.30E-04	N/AV	5.36E-06	N/AV	2.64E-04	0.00E+00
Fluorene	7.94E-06	N/AV	1.85E-07	N/AV	3.92E-04	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**7.42E-06**	N/AV	8.65E-09	0.00E+00	**7.48E-06**
Naphthalene	3.39E-06	N/AV	7.90E-08	N/AV	**1.83E+00**	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	2.86E-04	N/AV	6.67E-06	N/AV	3.29E-04	0.00E+00
Total Occupational Risks						
	2.12E-03	**1.63E-04**	1.88E-05	1.90E-07	**7.12E+01**	**1.52E-03**

Bold = value above Oregon Risk levels

Table D-11
FAMM Area (4) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	8.35E-03	3.58E-07
Monocyclic Aromatic Compounds								
Benzene	**5.60E+00**	**4.68E-04**	1.73E-04	1.45E-08	**5.60E+00**	**4.68E-04**	1.99E-08	1.66E-12
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.35E-02	N/AV	2.05E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	8.88E-03	N/AV	1.49E-09	N/AV
Xylenes	5.70E-02	N/AV	1.52E-04	N/AV	5.72E-02	N/AV	1.79E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	3.01E-05	N/AP	4.55E-05	N/AV	2.68E-08	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	4.50E-06	N/AP	4.52E-06	N/AV	1.42E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.15E-08
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.38E-07
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.07E-08
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.04E-08
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.54E-10
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.65E-08
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.03E-06	N/AV
Fluorene	4.94E-07	N/AP	1.70E-05	N/AP	1.75E-05	N/AV	3.51E-08	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.35E-08
Naphthalene	8.58E-02	N/AP	4.32E-02	N/AP	1.29E-01	N/AV	1.14E-05	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.45E-06	N/AV
Total Occupational Risks								
	5.75E+00	**4.68E-04**	4.35E-02	1.45E-08	**5.81E+00**	**4.68E-04**	8.36E-03	8.18E-07

Bold = value above Oregon Risk levels

Table D-11
FAMM Area (4) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals						
Chromium	7.19E-03	N/AV	4.56E-05	N/AV	1.56E-02	3.58E-07
Monocyclic Aromatic Compounds						
Benzene	2.51E-09	3.94E-12	2.45E-08	1.92E-12	**5.60E+00**	**4.68E-04**
Ethylbenzene	2.06E-08	N/AV	3.36E-09	N/AV	1.35E-02	0.00E+00
Toluene	3.01E-09	N/AV	4.89E-10	N/AV	8.88E-03	0.00E+00
Xylenes	9.03E-09	N/AV	1.47E-09	N/AV	5.72E-02	0.00E+00
Polyaromatic Compounds						
Acenaphthene	4.10E-07	N/AV	1.54E-08	N/AV	4.60E-05	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	2.17E-07	N/AV	8.14E-09	N/AV	4.76E-06	0.00E+00
Benzo(a)anthracene	N/AV	**3.51E-06**	N/AV	6.58E-09	0.00E+00	**3.53E-06**
Benzo(a)pyrene	N/AV	**1.03E-04**	N/AV	1.94E-07	0.00E+00	**1.04E-04**
Benzo(b)fluoranthene	N/AV	**9.38E-06**	N/AV	1.76E-08	0.00E+00	**9.43E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**3.18E-06**	N/AV	5.97E-09	0.00E+00	**3.20E-06**
Chrysene	N/AV	4.70E-08	N/AV	8.82E-11	0.00E+00	4.73E-08
Dibenzo(a,h)anthracene	N/AV	**1.42E-05**	N/AV	2.67E-08	0.00E+00	**1.43E-05**
Fluoranthene	1.58E-05	N/AV	5.94E-07	N/AV	1.74E-05	0.00E+00
Fluorene	5.37E-07	N/AV	2.01E-08	N/AV	1.81E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**7.20E-06**	N/AV	1.35E-08	0.00E+00	**7.23E-06**
Naphthalene	7.45E-06	N/AV	2.80E-07	N/AV	1.29E-01	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	3.74E-05	N/AV	1.40E-06	N/AV	4.13E-05	0.00E+00
Total Occupational Risks						
	7.21E-03	**1.41E-04**	4.65E-05	2.64E-07	**5.83E+00**	**6.10E-04**

Bold = value above Oregon Risk levels

Table D-12
FAMM Area (4) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.02E-03	4.13E-08
Monocyclic Aromatic Compounds								
Benzene	**3.48E+00**	**6.98E-05**	1.73E-04	3.47E-09	**3.48E+00**	**6.98E-05**	1.99E-08	3.99E-13
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.10E-02	N/AV	1.39E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	4.22E-03	N/AV	1.49E-09	N/AV
Xylenes	4.41E-02	N/AV	1.52E-04	N/AV	4.43E-02	N/AV	1.79E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	1.81E-05	N/AP	3.14E-05	N/AV	1.62E-08	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	2.23E-06	N/AP	2.24E-06	N/AV	7.03E-09	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.26E-09
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.32E-08
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.18E-09
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.27E-09
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.66E-11
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.68E-09
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	5.81E-07	N/AV
Fluorene	4.36E-07	N/AP	9.46E-06	N/AP	9.90E-06	N/AV	1.95E-08	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.39E-09
Naphthalene	6.48E-02	N/AP	1.89E-02	N/AP	8.37E-02	N/AV	5.00E-06	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.24E-06	N/AV
Total Occupational Risks								
	3.59E+00	**6.98E-05**	1.93E-02	3.47E-09	**3.62E+00**	**6.98E-05**	4.02E-03	8.73E-08

Bold = value above Oregon Risk levels

Table D-12
FAMM Area (4) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact				Total Non-cancer HQ	Total Cancer Risk
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk		
Metals						
Chromium	2.78E-03	N/AV	1.10E-05	N/AV	6.81E-03	4.13E-08
Monocyclic Aromatic Compounds						
Benzene	2.02E-09	7.61E-13	1.22E-08	2.31E-13	**3.48E+00**	**6.98E-05**
Ethylbenzene	1.13E-08	N/AV	1.14E-09	N/AV	1.10E-02	0.00E+00
Toluene	2.42E-09	N/AV	2.45E-10	N/AV	4.22E-03	0.00E+00
Xylenes	7.27E-09	N/AV	7.34E-10	N/AV	4.43E-02	0.00E+00
Polyaromatic Compounds						
Acenaphthene	1.99E-07	N/AV	4.63E-09	N/AV	3.16E-05	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	8.65E-08	N/AV	2.02E-09	N/AV	2.33E-06	0.00E+00
Benzo(a)anthracene	N/AV	3.11E-07	N/AV	3.62E-10	0.00E+00	3.13E-07
Benzo(a)pyrene	N/AV	**8.16E-06**	N/AV	9.51E-09	0.00E+00	**8.21E-06**
Benzo(b)fluoranthene	N/AV	7.81E-07	N/AV	9.11E-10	0.00E+00	7.85E-07
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	3.12E-07	N/AV	3.63E-10	0.00E+00	3.13E-07
Chrysene	N/AV	4.09E-09	N/AV	4.77E-12	0.00E+00	4.12E-09
Dibenzo(a,h)anthracene	N/AV	**1.15E-06**	N/AV	1.34E-09	0.00E+00	**1.16E-06**
Fluoranthene	7.15E-06	N/AV	1.67E-07	N/AV	7.90E-06	0.00E+00
Fluorene	2.40E-07	N/AV	5.60E-09	N/AV	1.02E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	5.88E-07	N/AV	6.85E-10	0.00E+00	5.91E-07
Naphthalene	2.63E-06	N/AV	6.14E-08	N/AV	8.37E-02	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	1.53E-05	N/AV	3.56E-07	N/AV	1.69E-05	0.00E+00
Total Occupational Risks						
	2.81E-03	**1.13E-05**	1.16E-05	1.32E-08	**3.63E+00**	**8.12E-05**

Bold = value above Oregon Risk levels

Table D-13
Tar Pond Area (5) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.18E-03	5.07E-08
Monocyclic Aromatic Compounds								
Benzene	**7.08E+00**	**5.92E-04**	5.40E-02	**4.51E-06**	**7.13E+00**	**5.96E-04**	2.35E-06	1.96E-10
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	2.17E-02	N/AV	1.01E-07	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.03E-01	N/AV	6.53E-08	N/AV
Xylenes	2.99E-01	N/AV	4.44E-02	N/AV	3.44E-01	N/AV	2.05E-06	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	2.11E-03	N/AP	2.11E-03	N/AV	1.24E-06	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	5.62E-05	N/AP	5.62E-05	N/AV	1.18E-07	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.12E-08
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	*6.18E-07*
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.13E-08
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.91E-08
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.49E-10
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.23E-08
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.31E-05	N/AV
Fluorene	1.99E-07	N/AP	1.08E-03	N/AP	1.08E-03	N/AV	1.48E-06	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.96E-08
Naphthalene	5.23E-01	N/AP	2.68E-01	N/AP	7.91E-01	N/AV	4.22E-05	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.74E-05	N/AV
Total Occupational Risks								
	7.90E+00	**5.92E-04**	3.70E-01	4.51E-06	**8.50E+00**	**5.96E-04**	1.24E-03	8.83E-07

Bold = value above Oregon Risk levels

Table D-13
Tar Pond Area (5) - Occupational Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals						
Chromium	2.33E-03	N/AV	1.48E-05	N/AV	3.53E-03	5.07E-08
Monocyclic Aromatic Compounds						
Benzene	6.76E-07	1.06E-09	6.60E-06	5.18E-10	**7.13E+00**	**5.96E-04**
Ethylbenzene	2.33E-06	N/AV	3.79E-07	N/AV	2.17E-02	0.00E+00
Toluene	3.01E-07	N/AV	4.90E-08	N/AV	2.03E-01	0.00E+00
Xylenes	2.36E-06	N/AV	3.84E-07	N/AV	3.44E-01	0.00E+00
Polyaromatic Compounds						
Acenaphthene	4.32E-05	N/AV	1.62E-06	N/AV	2.16E-03	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	4.11E-06	N/AV	1.54E-07	N/AV	6.06E-05	0.00E+00
Benzo(a)anthracene	N/AV	**2.89E-05**	N/AV	5.41E-08	0.00E+00	**2.90E-05**
Benzo(a)pyrene	N/AV	**4.32E-04**	N/AV	*8.11E-07*	0.00E+00	**4.34E-04**
Benzo(b)fluoranthene	N/AV	**4.29E-05**	N/AV	8.05E-08	0.00E+00	**4.31E-05**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**1.34E-05**	N/AV	2.51E-08	0.00E+00	**1.34E-05**
Chrysene	N/AV	*3.14E-07*	N/AV	5.90E-10	0.00E+00	*3.15E-07*
Dibenzo(a,h)anthracene	N/AV	**4.36E-05**	N/AV	8.17E-08	0.00E+00	**4.37E-05**
Fluoranthene	4.57E-04	N/AV	1.72E-05	N/AV	4.88E-04	0.00E+00
Fluorene	5.19E-05	N/AV	1.95E-06	N/AV	1.14E-03	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**2.07E-05**	N/AV	3.89E-08	0.00E+00	**2.08E-05**
Naphthalene	6.32E-05	N/AV	2.37E-06	N/AV	7.91E-01	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	9.59E-04	N/AV	3.60E-05	N/AV	1.02E-03	0.00E+00
Total Occupational Risks						
	2.96E-03	**5.82E-04**	4.54E-05	1.09E-06	**8.50E+00**	**1.18E-03**

Bold = value above Oregon Risk levels

Table D-14
Tar Pond Area (5) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	9.80E-04	1.01E-08
Monocyclic Aromatic Compounds								
Benzene	**4.63E+00**	**9.28E-05**	2.61E-02	5.24E-07	**4.65E+00**	**9.33E-05**	1.13E-06	2.28E-11
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.47E-02	N/AV	4.79E-08	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	1.35E-01	N/AV	3.17E-08	N/AV
Xylenes	2.02E-01	N/AV	2.07E-02	N/AV	2.22E-01	N/AV	9.52E-07	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	1.10E-03	N/AP	1.10E-03	N/AV	6.45E-07	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	2.83E-05	N/AP	2.83E-05	N/AV	5.93E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.33E-09
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	9.22E-08
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	8.95E-09
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.04E-09
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.30E-11
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	9.75E-09
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	5.99E-06	N/AV
Fluorene	1.49E-07	N/AP	5.83E-04	N/AP	5.83E-04	N/AV	7.98E-07	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.68E-09
Naphthalene	3.78E-01	N/AP	1.44E-01	N/AP	5.23E-01	N/AV	2.27E-05	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.26E-05	N/AV
Total Occupational Risks								
	5.21E+00	**9.28E-05**	1.93E-01	5.24E-07	**5.55E+00**	**9.33E-05**	1.03E-03	1.34E-07

Bold = value above Oregon Risk levels

Table D-14
Tar Pond Area (5) - Occupational Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals						
Chromium	1.56E-03	N/AV	6.13E-06	N/AV	2.54E-03	1.01E-08
Monocyclic Aromatic Compounds						
Benzene	2.63E-07	9.93E-11	1.60E-06	3.01E-11	**4.65E+00**	**9.33E-05**
Ethylbenzene	8.89E-07	N/AV	8.98E-08	N/AV	1.47E-02	0.00E+00
Toluene	1.18E-07	N/AV	1.19E-08	N/AV	1.35E-01	0.00E+00
Xylenes	8.84E-07	N/AV	8.93E-08	N/AV	2.22E-01	0.00E+00
Polyaromatic Compounds						
Acenaphthene	1.82E-05	N/AV	4.23E-07	N/AV	1.12E-03	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	1.67E-06	N/AV	3.90E-08	N/AV	3.01E-05	0.00E+00
Benzo(a)anthracene	N/AV	**3.00E-06**	N/AV	3.50E-09	0.00E+00	**3.01E-06**
Benzo(a)pyrene	N/AV	**5.19E-05**	N/AV	6.05E-08	0.00E+00	**5.21E-05**
Benzo(b)fluoranthene	N/AV	**5.04E-06**	N/AV	5.87E-09	0.00E+00	**5.05E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	**1.71E-06**	N/AV	1.99E-09	0.00E+00	**1.72E-06**
Chrysene	N/AV	3.55E-08	N/AV	4.13E-11	0.00E+00	3.56E-08
Dibenzo(a,h)anthracene	N/AV	**5.49E-06**	N/AV	6.40E-09	0.00E+00	**5.51E-06**
Fluoranthene	1.69E-04	N/AV	3.93E-06	N/AV	1.78E-04	0.00E+00
Fluorene	2.25E-05	N/AV	5.24E-07	N/AV	6.07E-04	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	**2.63E-06**	N/AV	3.07E-09	0.00E+00	**2.64E-06**
Naphthalene	2.74E-05	N/AV	6.40E-07	N/AV	5.23E-01	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	3.55E-04	N/AV	8.28E-06	N/AV	3.76E-04	0.00E+00
Total Occupational Risks						
	2.15E-03	**6.98E-05**	2.18E-05	8.14E-08	**5.55E+00**	**1.63E-04**

Bold = value above Oregon Risk levels

Table D-15
Spent Oxide Area (1) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	7.35E-05	1.26E-10
Monocyclic Aromatic Compounds								
Benzene	3.63E-04	1.21E-09	2.66E-05	8.89E-11	3.89E-04	1.30E-09	2.10E-09	7.03E-15
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.02E-05	N/AV	6.31E-11	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.96E-05	N/AV	1.58E-10	N/AV
Xylenes	5.94E-04	N/AV	8.17E-06	N/AV	6.02E-04	N/AV	6.61E-10	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	1.16E-06	N/AP	2.86E-04	N/AV	7.00E-10	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	1.26E-07	N/AP	2.86E-05	N/AV	2.68E-10	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.49E-12
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.11E-11
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.56E-12
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.23E-12
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.99E-14
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	8.81E-12
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.59E-08	N/AV
Fluorene	4.46E-04	N/AP	4.17E-07	N/AP	4.47E-04	N/AV	5.83E-10	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.13E-12
Naphthalene	1.18E-01	N/AP	3.16E-04	N/AP	1.18E-01	N/AV	5.65E-08	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.82E-08	N/AV
Total Excavation Risks								
	1.19E-01	1.21E-09	3.52E-04	8.89E-11	1.20E-01	1.30E-09	7.36E-05	2.26E-10

Bold = value above Oregon Risk levels

Table D-15
Spent Oxide Area (1) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals										
Chromium	1.74E-03	N/AV	2.95E-04	N/AV	9.44E-03	N/AV	5.38E-04	N/AV	1.21E-02	1.26E-10
Monocyclic Aromatic Compounds										
Benzene	1.46E-06	4.59E-12	1.90E-06	5.97E-12	1.94E-03	6.08E-09	1.23E-04	3.86E-10	2.45E-03	7.78E-09
Ethylbenzene	3.50E-07	N/AV	7.60E-08	N/AV	1.02E-03	N/AV	4.27E-06	N/AV	1.03E-03	0.00E+00
Toluene	1.75E-07	N/AV	3.80E-08	N/AV	3.37E-04	N/AV	2.49E-06	N/AV	3.69E-04	0.00E+00
Xylenes	3.06E-08	N/AV	3.98E-08	N/AV	1.73E-04	N/AV	1.34E-05	N/AV	7.88E-04	0.00E+00
Polyaromatic Compounds										
Acenaphthene	5.90E-06	N/AV	2.95E-07	N/AV	2.41E-02	N/AV	4.50E-05	N/AV	2.44E-02	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	2.26E-06	N/AV	1.13E-07	N/AV	4.66E-03	N/AV	4.50E-06	N/AV	4.70E-03	0.00E+00
Benzo(a)anthracene	N/AV	*1.89E-09*	N/AV	1.89E-09	N/AV	**1.39E-06**	N/AV	5.21E-09	0.00E+00	**1.40E-06**
Benzo(a)pyrene	N/AV	*3.00E-08*	N/AV	3.00E-08	N/AV	**2.97E-05**	N/AV	6.52E-08	0.00E+00	**2.98E-05**
Benzo(b)fluoranthene	N/AV	*3.18E-09*	N/AV	3.19E-09	N/AV	**3.30E-06**	N/AV	7.12E-09	0.00E+00	**3.31E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	*9.40E-11*	N/AV	9.40E-10	N/AV	*4.43E-07*	N/AV	2.89E-09	0.00E+00	*4.47E-07*
Chrysene	N/AV	2.10E-11	N/AV	2.10E-11	N/AV	2.33E-08	N/AV	8.69E-11	0.00E+00	2.34E-08
Dibenzo(a,h)anthracene	N/AV	*3.71E-11*	N/AV	3.71E-09	N/AV	*1.87E-07*	N/AV	1.48E-08	0.00E+00	*2.05E-07*
Fluoranthene	1.34E-04	N/AV	6.68E-06	N/AV	7.47E-02	N/AV	3.80E-05	N/AV	7.49E-02	0.00E+00
Fluorene	4.91E-06	N/AV	2.45E-07	N/AV	5.11E-02	N/AV	7.05E-05	N/AV	5.17E-02	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	*2.58E-09*	N/AV	2.58E-09	N/AV	**3.46E-06**	N/AV	3.99E-09	0.00E+00	**3.47E-06**
Naphthalene	1.02E-06	N/AV	1.02E-06	N/AV	8.94E-03	N/AV	7.99E-04	N/AV	1.28E-01	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	2.37E-04	N/AV	1.19E-05	N/AV	8.14E-02	N/AV	5.37E-05	N/AV	8.17E-02	0.00E+00
Total Excavation Risks										
	2.13E-03	3.78E-08	3.17E-04	4.23E-08	2.58E-01	**3.85E-05**	1.69E-03	9.97E-08	*3.82E-01*	**3.87E-05**

Bold = value above Oregon Risk levels

Table D-16
Spent Oxide Area (1) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	5.26E-05	4.51E-11
Monocyclic Aromatic Compounds								
Benzene	2.78E-04	4.65E-10	1.09E-05	1.82E-11	2.89E-04	4.83E-10	8.61E-10	1.44E-15
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	7.49E-06	N/AV	2.58E-11	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.16E-05	N/AV	6.46E-11	N/AV
Xylenes	4.32E-04	N/AV	3.79E-06	N/AV	4.36E-04	N/AV	3.07E-10	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	7.54E-07	N/AP	2.01E-04	N/AV	4.55E-10	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	8.01E-08	N/AP	1.92E-05	N/AV	1.71E-10	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.39E-12
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.11E-11
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.26E-12
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.70E-13
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.59E-14
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.86E-12
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.02E-08	N/AV
Fluorene	3.13E-04	N/AP	2.94E-07	N/AP	3.13E-04	N/AV	4.11E-10	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.69E-12
Naphthalene	7.98E-02	N/AP	1.86E-04	N/AP	8.00E-02	N/AV	3.33E-08	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.79E-08	N/AV
Total Excavation Risks								
	8.08E-02	4.65E-10	2.02E-04	1.82E-11	8.13E-02	4.83E-10	5.27E-05	7.51E-11

Bold = value above Oregon Risk levels

Table D-16
Spent Oxide Area (1) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals										
Chromium	1.01E-03	N/AV	4.40E-05	N/AV	6.81E-03	N/AV	3.89E-04	N/AV	8.31E-03	4.51E-11
Monocyclic Aromatic Compounds										
Benzene	4.81E-07	7.56E-13	1.62E-07	2.54E-13	1.48E-03	2.33E-09	9.41E-05	1.48E-10	1.87E-03	2.96E-09
Ethylbenzene	1.15E-07	N/AV	6.48E-09	N/AV	7.72E-04	N/AV	3.24E-06	N/AV	7.83E-04	0.00E+00
Toluene	5.77E-08	N/AV	3.24E-09	N/AV	2.54E-04	N/AV	1.88E-06	N/AV	2.77E-04	0.00E+00
Xylenes	1.14E-08	N/AV	3.85E-09	N/AV	1.26E-04	N/AV	9.75E-06	N/AV	5.72E-04	0.00E+00
Polyaromatic Compounds										
Acenaphthene	3.08E-06	N/AV	3.99E-08	N/AV	1.69E-02	N/AV	3.16E-05	N/AV	1.71E-02	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	1.16E-06	N/AV	1.50E-08	N/AV	3.13E-03	N/AV	3.02E-06	N/AV	3.16E-03	0.00E+00
Benzo(a)anthracene	N/AV	4.71E-10	N/AV	1.22E-10	N/AV	*4.27E-07*	N/AV	1.60E-09	0.00E+00	*4.30E-07*
Benzo(a)pyrene	N/AV	*7.14E-09*	N/AV	1.85E-09	N/AV	**9.08E-06**	N/AV	1.99E-08	0.00E+00	**9.10E-06**
Benzo(b)fluoranthene	N/AV	7.67E-10	N/AV	1.99E-10	N/AV	*9.81E-07*	N/AV	2.12E-09	0.00E+00	*9.84E-07*
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	2.27E-11	N/AV	5.88E-11	N/AV	*1.40E-07*	N/AV	9.13E-10	0.00E+00	*1.41E-07*
Chrysene	N/AV	5.38E-12	N/AV	1.39E-12	N/AV	7.25E-09	N/AV	2.71E-11	0.00E+00	7.28E-09
Dibenzo(a,h)anthracene	N/AV	*9.70E-12*	N/AV	2.51E-10	N/AV	*6.22E-08*	N/AV	4.93E-09	0.00E+00	*6.74E-08*
Fluoranthene	6.92E-05	N/AV	8.97E-07	N/AV	4.78E-02	N/AV	2.43E-05	N/AV	4.79E-02	0.00E+00
Fluorene	2.78E-06	N/AV	3.61E-08	N/AV	3.59E-02	N/AV	4.94E-05	N/AV	3.62E-02	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	5.74E-10	N/AV	1.49E-10	N/AV	**1.09E-06**	N/AV	1.26E-09	0.00E+00	**1.10E-06**
Naphthalene	4.84E-07	N/AV	1.25E-07	N/AV	6.04E-03	N/AV	5.40E-04	N/AV	8.66E-02	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	1.21E-04	N/AV	1.57E-06	N/AV	5.22E-02	N/AV	3.45E-05	N/AV	5.24E-02	0.00E+00
Total Excavation Risks										
	1.20E-03	9.00E-09	4.69E-05	2.63E-09	1.71E-01	**1.18E-05**	1.18E-03	3.09E-08	2.55E-01	**1.18E-05**

Bold = value above Oregon Risk levels

Table D-17
Former Office Area (2) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.70E-05	8.05E-11
Monocyclic Aromatic Compounds								
Benzene	0.00E+00	0.00E+00	3.50E-07	1.17E-12	3.50E-07	1.17E-12	2.52E-11	8.42E-17
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	9.58E-09	N/AV	7.56E-13	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.60E-08	N/AV	1.89E-12	N/AV
Xylenes	0.00E+00	N/AV	3.07E-07	N/AV	3.07E-07	N/AV	2.27E-11	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	4.17E-07	N/AP	4.17E-07	N/AV	2.49E-10	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	2.89E-08	N/AP	2.89E-08	N/AV	6.12E-11	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.32E-12
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.76E-11
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.52E-12
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.06E-12
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.42E-14
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.96E-12
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.91E-09	N/AV
Fluorene	0.00E+00	N/AP	2.10E-07	N/AP	2.10E-07	N/AV	2.91E-10	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.24E-12
Naphthalene	0.00E+00	N/AP	8.23E-05	N/AP	8.23E-05	N/AV	1.43E-08	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	7.11E-09	N/AV
Total Excavation Risks								
	0.00E+00	0.00E+00	8.36E-05	1.17E-12	8.36E-05	1.17E-12	4.70E-05	1.07E-10

Bold = value above Oregon Risk levels

Table D-17
Former Office Area (2) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total Non-cancer HQ	Total Cancer Risk
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk		
Metals										
Chromium	1.43E-03	N/AV	2.41E-04	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.72E-03	8.05E-11
Monocyclic Aromatic Compounds										
Benzene	2.09E-08	6.58E-14	2.72E-08	8.56E-14	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.98E-07	1.32E-12
Ethylbenzene	5.02E-09	N/AV	1.09E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.57E-08	0.00E+00
Toluene	2.51E-09	N/AV	5.45E-10	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.90E-08	0.00E+00
Xylenes	1.26E-09	N/AV	1.63E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.10E-07	0.00E+00
Polyaromatic Compounds										
Acenaphthene	3.48E-06	N/AV	1.74E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	4.07E-06	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Anthracene	8.75E-07	N/AV	4.38E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	9.48E-07	0.00E+00
Benzo(a)anthracene	N/AV	9.71E-10	N/AV	9.72E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.94E-09
Benzo(a)pyrene	N/AV	*1.31E-08*	N/AV	1.31E-08	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	*2.62E-08*
Benzo(b)fluoranthene	N/AV	1.12E-09	N/AV	1.12E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	2.24E-09
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	7.88E-11	N/AV	7.88E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	8.68E-10
Chrysene	N/AV	1.05E-11	N/AV	1.05E-11	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	2.10E-11
Dibenzo(a,h)anthracene	N/AV	2.87E-11	N/AV	2.87E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	2.91E-09
Fluoranthene	7.23E-05	N/AV	3.62E-06	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	7.59E-05	0.00E+00
Fluorene	4.06E-06	N/AV	2.03E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	4.47E-06	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	9.20E-10	N/AV	9.20E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.84E-09
Naphthalene	4.29E-07	N/AV	4.29E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	8.32E-05	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Pyrene	1.04E-04	N/AV	5.21E-06	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.09E-04	0.00E+00
Total Excavation Risks										
	1.61E-03	1.62E-08	2.51E-04	1.98E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-03	3.61E-08

Bold = value above Oregon Risk levels

Table D-18
Former Office Area (2) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.16E-05	3.57E-11
Monocyclic Aromatic Compounds								
Benzene	0.00E+00	0.00E+00	3.37E-07	5.63E-13	3.37E-07	5.63E-13	2.42E-11	4.05E-17
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	9.22E-09	N/AV	7.27E-13	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.50E-08	N/AV	1.82E-12	N/AV
Xylenes	0.00E+00	N/AV	2.95E-07	N/AV	2.95E-07	N/AV	2.18E-11	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	2.79E-07	N/AP	2.79E-07	N/AV	1.67E-10	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	1.81E-08	N/AP	1.81E-08	N/AV	3.83E-11	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.04E-13
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.32E-12
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.71E-13
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.15E-13
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.33E-15
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.25E-12
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.02E-09	N/AV
Fluorene	0.00E+00	N/AP	1.31E-07	N/AP	1.31E-07	N/AV	1.81E-10	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.69E-13
Naphthalene	0.00E+00	N/AP	5.13E-05	N/AP	5.13E-05	N/AV	8.90E-09	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.47E-09	N/AV
Total Excavation Risks								
	0.00E+00	0.00E+00	5.23E-05	5.63E-13	5.24E-05	5.63E-13	4.16E-05	4.38E-11

Bold = value above Oregon Risk levels

Table D-18
Former Office Area (2) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals										
Chromium	1.01E-03	N/AV	4.44E-05	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.10E-03	3.57E-11
Monocyclic Aromatic Compounds										
Benzene	1.63E-08	2.57E-14	5.50E-09	8.65E-15	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.59E-07	5.98E-13
Ethylbenzene	3.92E-09	N/AV	2.20E-10	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.34E-08	0.00E+00
Toluene	1.96E-09	N/AV	1.10E-10	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.71E-08	0.00E+00
Xylenes	9.80E-10	N/AV	3.30E-10	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.97E-07	0.00E+00
Polyaromatic Compounds										
Acenaphthene	1.85E-06	N/AV	2.40E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.15E-06	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Anthracene	4.33E-07	N/AV	5.61E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	4.57E-07	0.00E+00
Benzo(a)anthracene	N/AV	2.51E-10	N/AV	6.49E-11	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	3.16E-10
Benzo(a)pyrene	N/AV	3.32E-09	N/AV	8.60E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	4.18E-09
Benzo(b)fluoranthene	N/AV	2.92E-10	N/AV	7.57E-11	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	3.68E-10
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	1.95E-11	N/AV	5.04E-11	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	7.02E-11
Chrysene	N/AV	2.69E-12	N/AV	6.96E-13	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	3.39E-12
Dibenzo(a,h)anthracene	N/AV	7.43E-12	N/AV	1.92E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	2.01E-10
Fluoranthene	3.77E-05	N/AV	4.89E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.82E-05	0.00E+00
Fluorene	1.91E-06	N/AV	2.47E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.06E-06	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	2.29E-10	N/AV	5.93E-11	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	2.89E-10
Naphthalene	2.03E-07	N/AV	5.26E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	5.15E-05	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Pyrene	5.58E-05	N/AV	7.23E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	5.66E-05	0.00E+00
Total Excavation Risks										
	1.11E-03	4.12E-09	4.57E-05	1.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-03	5.47E-09

Bold = value above Oregon Risk levels

Table D-19
Koppers Area (3) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	8.01E-05	1.37E-10
Monocyclic Aromatic Compounds								
Benzene	**3.02E+00**	**1.01E-05**	1.27E-03	4.26E-09	**3.02E+00**	**1.01E-05**	1.83E-07	6.12E-13
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.58E-03	N/AV	2.15E-08	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	7.22E-02	N/AV	9.83E-09	N/AV
Xylenes	5.99E-02	N/AV	2.94E-04	N/AV	6.02E-02	N/AV	4.32E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	4.77E-04	N/AP	1.42E-03	N/AV	5.41E-07	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	1.22E-05	N/AP	3.13E-05	N/AV	4.87E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.70E-10
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.22E-09
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.49E-10
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.27E-10
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.35E-12
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.12E-09
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.79E-06	N/AV
Fluorene	6.71E-04	N/AP	9.47E-05	N/AP	7.66E-04	N/AV	2.49E-07	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.55E-10
Naphthalene	**2.50E+00**	N/AP	8.80E-01	N/AP	**3.38E+00**	N/AV	2.94E-04	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.03E-06	N/AV
Total Excavation Risks								
	5.58E+00	**1.01E-05**	8.82E-01	4.26E-09	**6.53E+00**	**1.01E-05**	3.80E-04	7.98E-09

Bold = value above Oregon Risk levels

Table D-19
Koppers Area (3) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact					
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Total Non-cancer HQ	Total Cancer Risk
Metals										
Chromium	8.92E-04	N/AV	1.51E-04	N/AV	5.68E-02	N/AV	3.24E-03	N/AV	6.12E-02	1.37E-10
Monocyclic Aromatic Compounds										
Benzene	5.96E-05	1.87E-10	7.76E-05	2.44E-10	**1.61E+01**	**5.06E-05**	**1.02E+00**	**3.21E-06**	**2.02E+01**	**6.39E-05**
Ethylbenzene	5.61E-05	N/AV	1.22E-05	N/AV	1.55E-01	N/AV	6.52E-04	N/AV	1.57E-01	0.00E+00
Toluene	5.12E-06	N/AV	1.11E-06	N/AV	8.80E-01	N/AV	6.51E-03	N/AV	9.59E-01	0.00E+00
Xylenes	9.38E-07	N/AV	1.22E-06	N/AV	1.74E-02	N/AV	1.35E-03	N/AV	7.90E-02	0.00E+00
Polyaromatic Compounds										
Acenaphthene	2.14E-03	N/AV	1.07E-04	N/AV	*7.93E-02*	N/AV	1.48E-04	N/AV	*8.31E-02*	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	1.92E-04	N/AV	9.62E-06	N/AV	3.14E-03	N/AV	3.03E-06	N/AV	3.38E-03	0.00E+00
Benzo(a)anthracene	N/AV	*7.31E-08*	N/AV	7.31E-08	N/AV	**1.12E-06**	N/AV	4.19E-09	0.00E+00	**1.27E-06**
Benzo(a)pyrene	N/AV	**1.03E-06**	N/AV	**1.03E-06**	N/AV	**2.09E-05**	N/AV	4.59E-08	0.00E+00	**2.30E-05**
Benzo(b)fluoranthene	N/AV	*8.86E-08*	N/AV	8.87E-08	N/AV	**2.28E-06**	N/AV	4.93E-09	0.00E+00	**2.47E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	*6.47E-09*	N/AV	6.47E-08	N/AV	*2.28E-07*	N/AV	1.48E-09	0.00E+00	*3.01E-07*
Chrysene	N/AV	8.59E-10	N/AV	8.59E-10	N/AV	*9.54E-09*	N/AV	3.57E-11	0.00E+00	*1.13E-08*
Dibenzo(a,h)anthracene	N/AV	*2.21E-09*	N/AV	2.21E-07	N/AV	*9.24E-08*	N/AV	7.32E-09	0.00E+00	*3.24E-07*
Fluoranthene	7.07E-03	N/AV	3.54E-04	N/AV	*8.84E-02*	N/AV	4.50E-05	N/AV	*9.59E-02*	0.00E+00
Fluorene	9.82E-04	N/AV	4.91E-05	N/AV	*7.69E-02*	N/AV	1.06E-04	N/AV	*7.88E-02*	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	*7.00E-08*	N/AV	7.01E-08	N/AV	**2.26E-06**	N/AV	2.60E-09	0.00E+00	**2.40E-06**
Naphthalene	2.48E-03	N/AV	2.49E-03	N/AV	*1.89E-01*	N/AV	1.69E-02	N/AV	**3.59E+00**	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	1.20E-02	N/AV	5.98E-04	N/AV	*8.20E-02*	N/AV	5.41E-05	N/AV	*9.46E-02*	0.00E+00
Total Excavation Risks										
	2.58E-02	*1.27E-06*	3.85E-03	*1.55E-06*	**1.77E+01**	**7.75E-05**	**1.05E+00**	3.28E-06	**2.53E+01**	**9.37E-05**

Bold = value above Oregon Risk levels

Table D-20
Koppers Area (3) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	6.35E-05	5.44E-11
Monocyclic Aromatic Compounds								
Benzene	**1.87E+00**	**3.13E-06**	4.86E-04	8.12E-10	**1.87E+00**	**3.13E-06**	6.98E-08	1.17E-13
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.03E-03	N/AV	8.16E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	4.60E-02	N/AV	3.76E-09	N/AV
Xylenes	4.12E-02	N/AV	1.12E-04	N/AV	4.13E-02	N/AV	1.65E-08	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	1.89E-04	N/AP	9.09E-04	N/AV	2.15E-07	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	6.01E-06	N/AP	2.02E-05	N/AV	2.41E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	8.71E-11
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.24E-09
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.07E-10
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.20E-11
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.05E-12
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.43E-10
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	8.91E-07	N/AV
Fluorene	5.28E-04	N/AP	3.96E-05	N/AP	5.67E-04	N/AV	1.04E-07	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	8.18E-11
Naphthalene	**1.76E+00**	N/AP	3.33E-01	N/AP	**2.09E+00**	N/AV	1.11E-04	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.45E-06	N/AV
Total Excavation Risks								
	3.67E+00	3.13E-06	3.34E-01	8.12E-10	**4.06E+00**	3.13E-06	1.77E-04	1.89E-09

Bold = value above Oregon Risk levels

Table D-20
Koppers Area (3) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals										
Chromium	5.69E-04	N/AV	2.49E-05	N/AV	4.33E-02	N/AV	2.47E-03	N/AV	4.64E-02	5.44E-11
Monocyclic Aromatic Compounds										
Benzene	1.83E-05	2.87E-11	6.16E-06	9.68E-12	**9.99E+00**	**1.57E-05**	6.34E-01	9.96E-07	**1.25E+01**	**1.98E-05**
Ethylbenzene	1.71E-05	N/AV	9.60E-07	N/AV	1.05E-01	N/AV	4.40E-04	N/AV	1.06E-01	0.00E+00
Toluene	1.57E-06	N/AV	8.84E-08	N/AV	5.61E-01	N/AV	4.15E-03	N/AV	6.11E-01	0.00E+00
Xylenes	2.89E-07	N/AV	9.72E-08	N/AV	1.20E-02	N/AV	9.30E-04	N/AV	5.43E-02	0.00E+00
Polyaromatic Compounds										
Acenaphthene	6.82E-04	N/AV	8.83E-06	N/AV	6.07E-02	N/AV	1.14E-04	N/AV	6.25E-02	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	7.66E-05	N/AV	9.92E-07	N/AV	2.32E-03	N/AV	2.24E-06	N/AV	2.42E-03	0.00E+00
Benzo(a)anthracene	N/AV	1.38E-08	N/AV	3.59E-09	N/AV	*3.50E-07*	N/AV	1.31E-09	0.00E+00	*3.69E-07*
Benzo(a)pyrene	N/AV	*1.97E-07*	N/AV	5.11E-08	N/AV	**6.49E-06**	N/AV	1.42E-08	0.00E+00	**6.75E-06**
Benzo(b)fluoranthene	N/AV	1.70E-08	N/AV	4.40E-09	N/AV	*7.37E-07*	N/AV	1.59E-09	0.00E+00	*7.60E-07*
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	1.14E-09	N/AV	2.96E-09	N/AV	*7.80E-08*	N/AV	5.09E-10	0.00E+00	*8.27E-08*
Chrysene	N/AV	1.66E-10	N/AV	4.31E-11	N/AV	*2.98E-09*	N/AV	1.11E-11	0.00E+00	*3.20E-09*
Dibenzo(a,h)anthracene	N/AV	*3.87E-10*	N/AV	1.00E-08	N/AV	*3.22E-08*	N/AV	2.55E-09	0.00E+00	*4.54E-08*
Fluoranthene	2.83E-03	N/AV	3.67E-05	N/AV	*6.42E-02*	N/AV	3.27E-05	N/AV	*6.71E-02*	0.00E+00
Fluorene	3.30E-04	N/AV	4.28E-06	N/AV	6.05E-02	N/AV	8.33E-05	N/AV	6.15E-02	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	1.30E-08	N/AV	3.37E-09	N/AV	*7.56E-07*	N/AV	8.71E-10	0.00E+00	*7.73E-07*
Naphthalene	7.57E-04	N/AV	1.96E-04	N/AV	*1.33E-01*	N/AV	1.19E-02	N/AV	**2.24E+00**	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	4.60E-03	N/AV	5.95E-05	N/AV	*5.69E-02*	N/AV	3.76E-05	N/AV	*6.16E-02*	0.00E+00
Total Excavation Risks										
	9.88E-03	2.43E-07	3.38E-04	7.55E-08	**1.11E+01**	**2.41E-05**	6.54E-01	1.02E-06	**1.58E+01**	**2.86E-05**

Bold = value above Oregon Risk levels

Table D-21
FAMM Area (4) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.50E-04	2.58E-10
Monocyclic Aromatic Compounds								
Benzene	0.00E+00	0.00E+00	3.12E-06	1.04E-11	3.12E-06	1.04E-11	3.58E-10	1.20E-15
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	2.93E-07	N/AV	3.69E-11	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.31E-07	N/AV	2.69E-11	N/AV
Xylenes	0.00E+00	N/AV	2.74E-06	N/AV	2.74E-06	N/AV	3.22E-10	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	5.41E-07	N/AP	5.41E-07	N/AV	4.83E-10	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	8.10E-08	N/AP	8.10E-08	N/AV	2.56E-10	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	8.27E-12
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.43E-10
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.21E-11
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.49E-12
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.11E-13
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.35E-11
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.86E-08	N/AV
Fluorene	0.00E+00	N/AP	3.06E-07	N/AP	3.06E-07	N/AV	6.32E-10	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.70E-11
Naphthalene	0.00E+00	N/AP	7.77E-04	N/AP	7.77E-04	N/AV	2.05E-07	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	4.40E-08	N/AV
Total Excavation Risks								
	0.00E+00	0.00E+00	7.84E-04	1.04E-11	7.84E-04	1.04E-11	1.51E-04	5.89E-10

Bold = value above Oregon Risk levels

Table D-21
FAMM Area (4) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total Non-cancer HQ	Total Cancer Risk
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk		
Metals										
Chromium	2.59E-03	N/AV	4.38E-04	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.18E-03	2.58E-10
Monocyclic Aromatic Compounds										
Benzene	1.81E-07	5.67E-13	2.35E-07	7.38E-13	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.53E-06	1.17E-11
Ethylbenzene	1.49E-07	N/AV	3.22E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	4.74E-07	0.00E+00
Toluene	2.17E-08	N/AV	4.70E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.58E-07	0.00E+00
Xylenes	1.08E-08	N/AV	1.41E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.76E-06	0.00E+00
Polyaromatic Compounds										
Acenaphthene	2.95E-06	N/AV	1.48E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.64E-06	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Anthracene	1.56E-06	N/AV	7.82E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.72E-06	0.00E+00
Benzo(a)anthracene	N/AV	2.53E-09	N/AV	2.53E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	5.06E-09
Benzo(a)pyrene	N/AV	7.44E-08	N/AV	7.44E-08	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.49E-07
Benzo(b)fluoranthene	N/AV	6.76E-09	N/AV	6.76E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.35E-08
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	2.29E-10	N/AV	2.29E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	2.53E-09
Chrysene	N/AV	3.39E-11	N/AV	3.39E-11	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	6.79E-11
Dibenzo(a,h)anthracene	N/AV	1.02E-10	N/AV	1.02E-08	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.04E-08
Fluoranthene	1.14E-04	N/AV	5.70E-06	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.20E-04	0.00E+00
Fluorene	3.86E-06	N/AV	1.93E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	4.36E-06	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	5.18E-09	N/AV	5.19E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.04E-08
Naphthalene	2.68E-06	N/AV	2.69E-06	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	7.82E-04	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Pyrene	2.69E-04	N/AV	1.35E-05	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.83E-04	0.00E+00
Total Excavation Risks										
	2.98E-03	8.92E-08	4.60E-04	1.01E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-03	1.91E-07

Bold = value above Oregon Risk levels

Table D-22
FAMM Area (4) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	7.23E-05	6.19E-11
Monocyclic Aromatic Compounds								
Benzene	0.00E+00	0.00E+00	3.12E-06	5.21E-12	3.12E-06	5.21E-12	3.58E-10	5.99E-16
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.99E-07	N/AV	2.51E-11	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	2.31E-07	N/AV	2.69E-11	N/AV
Xylenes	0.00E+00	N/AV	2.74E-06	N/AV	2.74E-06	N/AV	3.22E-10	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	3.26E-07	N/AP	3.26E-07	N/AV	2.91E-10	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	4.01E-08	N/AP	4.01E-08	N/AV	1.27E-10	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.90E-12
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.98E-11
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.76E-12
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.90E-12
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.50E-14
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.01E-12
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.05E-08	N/AV
Fluorene	0.00E+00	N/AP	1.70E-07	N/AP	1.70E-07	N/AV	3.52E-10	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.58E-12
Naphthalene	0.00E+00	N/AP	3.41E-04	N/AP	3.41E-04	N/AV	8.99E-08	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.23E-08	N/AV
Total Excavation Risks								
	0.00E+00	0.00E+00	3.47E-04	5.21E-12	3.48E-04	5.21E-12	7.24E-05	1.31E-10

Bold = value above Oregon Risk levels

Table D-22
FAMM Area (4) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals										
Chromium	1.00E-03	N/AV	4.39E-05	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.12E-03	6.19E-11
Monocyclic Aromatic Compounds										
Benzene	1.45E-07	2.28E-13	4.89E-08	7.69E-14	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.31E-06	5.51E-12
Ethylbenzene	8.14E-08	N/AV	4.57E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.85E-07	0.00E+00
Toluene	1.74E-08	N/AV	9.78E-10	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.50E-07	0.00E+00
Xylenes	8.72E-09	N/AV	2.94E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	2.75E-06	0.00E+00
Polyaromatic Compounds										
Acenaphthene	1.43E-06	N/AV	1.85E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.78E-06	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Anthracene	6.23E-07	N/AV	8.06E-09	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	6.71E-07	0.00E+00
Benzo(a)anthracene	N/AV	4.66E-10	N/AV	1.21E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	5.89E-10
Benzo(a)pyrene	N/AV	1.22E-08	N/AV	3.17E-09	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.55E-08
Benzo(b)fluoranthene	N/AV	1.17E-09	N/AV	3.04E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.48E-09
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	4.68E-11	N/AV	1.21E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.70E-10
Chrysene	N/AV	6.14E-12	N/AV	1.59E-12	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	7.76E-12
Dibenzo(a,h)anthracene	N/AV	1.73E-11	N/AV	4.47E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	4.71E-10
Fluoranthene	5.15E-05	N/AV	6.67E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	5.22E-05	0.00E+00
Fluorene	1.73E-06	N/AV	2.24E-08	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.92E-06	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	8.82E-10	N/AV	2.28E-10	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	1.11E-09
Naphthalene	9.48E-07	N/AV	2.46E-07	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	3.42E-04	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	0.00E+00	0.00E+00
Pyrene	1.10E-04	N/AV	1.42E-06	N/AV	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	**>12ft bgs**	1.11E-04	0.00E+00
Total Excavation Risks										
	1.17E-03	1.48E-08	4.63E-05	4.39E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-03	1.94E-08

Bold = value above Oregon Risk levels

Table D-23
Tar Pond Area (5) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates	
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk
Metals								
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	2.08E-05	3.57E-11
Monocyclic Aromatic Compounds								
Benzene	9.54E-01	**3.19E-06**	2.29E-03	7.67E-09	9.57E-01	**3.20E-06**	9.96E-08	3.33E-13
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.48E-03	N/AV	3.18E-09	N/AV
Toluene	N/AP	N/AP	N/AP	N/AP	1.61E-02	N/AV	3.28E-09	N/AV
Xylenes	N/AP	N/AV	N/AP	N/AV	N/AV	N/AV	N/AV	N/AV
Polyaromatic Compounds								
Acenaphthene	N/AP	N/AP	2.25E-04	N/AP	1.60E-03	N/AV	1.32E-07	N/AV
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	1.83E-05	N/AP	5.34E-05	N/AV	3.82E-08	N/AV
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	5.84E-11
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	7.77E-10
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	6.63E-11
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.27E-11
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	8.26E-13
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	9.47E-11
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	5.02E-07	N/AV
Fluorene	1.13E-03	N/AP	1.26E-04	N/AP	1.25E-03	N/AV	1.72E-07	N/AV
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	4.43E-11
Naphthalene	**5.29E+00**	N/AP	6.41E-01	N/AP	**5.93E+00**	N/AV	1.01E-04	N/AV
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.06E-06	N/AV
Total Excavation Risks								
	6.25E+00	3.19E-06	6.44E-01	7.67E-09	**6.91E+00**	*3.20E-06*	1.24E-04	1.11E-09

Bold = value above Oregon Risk levels

Table D-23
Tar Pond Area (5) - Excavation Worker Human Health HQs and Cancer Risks (Reasonable Maximum Estimate)

	Soil Ingestion/Contact				Groundwater Ingestion/Contact				Total	Total
	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals										
Chromium	8.21E-04	N/AV	1.39E-04	N/AV	4.50E-02	N/AV	2.57E-03	N/AV	4.85E-02	3.57E-11
Monocyclic Aromatic Compounds										
Benzene	1.15E-04	3.61E-10	1.49E-04	4.70E-10	**5.09E+00**	**1.60E-05**	3.23E-01	**1.01E-06**	**6.37E+00**	**2.02E-05**
Ethylbenzene	2.94E-05	N/AV	6.37E-06	N/AV	1.51E-01	N/AV	6.36E-04	N/AV	1.54E-01	0.00E+00
Toluene	6.06E-06	N/AV	1.31E-06	N/AV	1.95E-01	N/AV	1.44E-03	N/AV	2.13E-01	0.00E+00
Xylenes	3.38E-06	N/AV	4.40E-06	N/AV	9.55E-03	N/AV	7.41E-04	N/AV	1.03E-02	0.00E+00
Polyaromatic Compounds										
Acenaphthene	1.84E-03	N/AV	9.22E-05	N/AV	1.16E-01	N/AV	2.17E-04	N/AV	1.20E-01	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	5.35E-04	N/AV	2.68E-05	N/AV	5.76E-03	N/AV	5.55E-06	N/AV	6.38E-03	0.00E+00
Benzo(a)anthracene	N/AV	4.08E-08	N/AV	4.09E-08	N/AV	**2.76E-06**	N/AV	1.03E-08	0.00E+00	**2.85E-06**
Benzo(a)pyrene	N/AV	5.44E-07	N/AV	5.44E-07	N/AV	**5.31E-05**	N/AV	1.17E-07	0.00E+00	**5.43E-05**
Benzo(b)fluoranthene	N/AV	4.64E-08	N/AV	4.64E-08	N/AV	**4.75E-06**	N/AV	1.03E-08	0.00E+00	**4.85E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	N/AV	2.28E-09	N/AV	2.29E-08	N/AV	*7.38E-07*	N/AV	4.81E-09	0.00E+00	*7.68E-07*
Chrysene	N/AV	5.78E-10	N/AV	5.78E-10	N/AV	2.87E-08	N/AV	1.07E-10	0.00E+00	3.00E-08
Dibenzo(a,h)anthracene	N/AV	6.63E-10	N/AV	6.63E-08	N/AV	*2.80E-07*	N/AV	2.22E-08	0.00E+00	*3.69E-07*
Fluoranthene	7.03E-03	N/AV	3.52E-04	N/AV	1.90E-01	N/AV	9.66E-05	N/AV	1.97E-01	0.00E+00
Fluorene	2.41E-03	N/AV	1.21E-04	N/AV	1.29E-01	N/AV	1.78E-04	N/AV	1.33E-01	0.00E+00
Indeno(1,2,3-cd)pyrene	N/AV	3.10E-08	N/AV	3.10E-08	N/AV	**5.52E-06**	N/AV	6.37E-09	0.00E+00	**5.59E-06**
Naphthalene	3.03E-03	N/AV	3.03E-03	N/AV	*4.01E-01*	N/AV	3.58E-02	N/AV	**6.38E+00**	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	1.48E-02	N/AV	7.41E-04	N/AV	2.28E-01	N/AV	1.50E-04	N/AV	2.44E-01	0.00E+00
Total Excavation Risks										
	3.06E-02	6.66E-07	4.66E-03	7.53E-07	**6.56E+00**	**8.32E-05**	3.65E-01	1.19E-06	**1.39E+01**	**8.90E-05**

Bold = value above Oregon Risk levels

Table D-24
Tar Pond Area (5) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Only Groundwater Vapors		Only Soil Vapors		Inhalation Vapors Soil/GW		Inhalation Soil Particulates		
	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Inhalation Non-cancer HQ	Inhalation Cancer Risk	Dermal Non-cancer HQ
Metals									
Chromium	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	1.78E-05	1.53E-11	5.66E-04
Monocyclic Aromatic Compounds									
Benzene	6.99E-01	**1.17E-06**	1.20E-03	2.01E-09	7.00E-01	**1.17E-06**	5.21E-08	8.71E-14	4.84E-05
Ethylbenzene	N/AP	N/AP	N/AP	N/AP	1.13E-03	N/AV	2.00E-09	N/AV	1.48E-05
Toluene	N/AP	N/AP	N/AP	N/AP	1.23E-02	N/AV	1.63E-09	N/AV	2.42E-06
Xylenes	N/AP	N/AV	N/AP	N/AV	N/AV	N/AV	N/AV	N/AV	1.72E-06
Polyaromatic Compounds									
Acenaphthene	N/AP	N/AP	1.30E-04	N/AP	1.02E-03	N/AV	7.61E-08	N/AV	8.57E-04
Acenaphthylene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV	N/AV
Anthracene	N/AP	N/AP	9.86E-06	N/AP	3.45E-05	N/AV	2.07E-08	N/AV	2.33E-04
Benzo(a)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.88E-11	N/AV
Benzo(a)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.65E-10	N/AV
Benzo(b)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.24E-11	N/AV
Benzo(g,h,i)perylene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV
Benzo(k)fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.08E-11	N/AV
Chrysene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	2.61E-13	N/AV
Dibenzo(a,h)anthracene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	3.14E-11	N/AV
Fluoranthene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	3.04E-07	N/AV	3.42E-03
Fluorene	7.62E-04	N/AP	7.34E-05	N/AP	8.36E-04	N/AV	1.01E-07	N/AV	1.13E-03
Indeno(1,2,3-cd)pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	N/AV	1.49E-11	N/AV
Naphthalene	**3.50E+00**	N/AP	3.50E-01	N/AP	**3.85E+00**	N/AV	5.51E-05	N/AV	1.33E-03
Phenanthrene	N/AP	N/AP	N/AP	N/AP	N/AV	N/AV	N/AV	N/AV	N/AV
Pyrene	N/AP	N/AP	N/AP	N/AP	N/AP	N/AP	6.24E-07	N/AV	7.03E-03
Total Excavation Risks									
	4.20E+00	1.17E-06	3.52E-01	2.01E-09	**4.57E+00**	1.17E-06	7.41E-05	3.79E-10	1.46E-02

Bold = value above Oregon Risk levels

Table D-24
Tar Pond Area (5) - Excavation Worker Human Health HQs and Cancer Risks (Central Tendency Estimate)

	Soil Ingestion/Contact			Groundwater Ingestion/Contact				Total	Total
	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Dermal Non-cancer HQ	Dermal Cancer Risk	Ingestion Non-cancer HQ	Ingestion Cancer Risk	Non-cancer HQ	Cancer Risk
Metals									
Chromium	N/AV	2.48E-05	N/AV	2.69E-02	N/AV	1.53E-03	N/AV	2.90E-02	1.53E-11
Monocyclic Aromatic Compounds									
Benzene	7.60E-11	1.63E-05	2.56E-11	**3.73E+00**	**5.86E-06**	2.36E-01	3.71E-07	**4.66E+00**	**7.40E-06**
Ethylbenzene	N/AV	8.32E-07	N/AV	1.16E-01	N/AV	4.89E-04	N/AV	1.18E-01	0.00E+00
Toluene	N/AV	1.36E-07	N/AV	1.49E-01	N/AV	1.10E-03	N/AV	1.62E-01	0.00E+00
Xylenes	N/AV	5.79E-07	N/AV	6.95E-03	N/AV	5.39E-04	N/AV	7.49E-03	0.00E+00
Polyaromatic Compounds									
Acenaphthene	N/AV	1.11E-05	N/AV	7.54E-02	N/AV	1.41E-04	N/AV	7.75E-02	0.00E+00
Acenaphthylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Anthracene	N/AV	3.01E-06	N/AV	4.03E-03	N/AV	3.88E-06	N/AV	4.30E-03	0.00E+00
Benzo(a)anthracene	1.06E-08	N/AV	2.74E-09	N/AV	*9.04E-07*	N/AV	3.38E-09	0.00E+00	*9.21E-07*
Benzo(a)pyrene	*1.49E-07*	N/AV	3.86E-08	N/AV	**1.67E-05**	N/AV	3.67E-08	0.00E+00	**1.69E-05**
Benzo(b)fluoranthene	*1.26E-08*	N/AV	3.26E-09	N/AV	**1.50E-06**	N/AV	3.24E-09	0.00E+00	**1.52E-06**
Benzo(g,h,i)perylene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Benzo(k)fluoranthene	6.09E-10	N/AV	1.58E-09	N/AV	*2.38E-07*	N/AV	1.55E-09	0.00E+00	*2.42E-07*
Chrysene	1.47E-10	N/AV	3.80E-11	N/AV	9.34E-09	N/AV	3.49E-11	0.00E+00	9.56E-09
Dibenzo(a,h)anthracene	*1.77E-10*	N/AV	4.58E-09	N/AV	*8.73E-08*	N/AV	6.92E-09	0.00E+00	*9.90E-08*
Fluoranthene	N/AV	4.43E-05	N/AV	1.27E-01	N/AV	6.49E-05	N/AV	1.31E-01	0.00E+00
Fluorene	N/AV	1.47E-05	N/AV	8.73E-02	N/AV	1.20E-04	N/AV	8.94E-02	0.00E+00
Indeno(1,2,3-cd)pyrene	8.40E-09	N/AV	2.18E-09	N/AV	**1.68E-06**	N/AV	1.93E-09	0.00E+00	**1.69E-06**
Naphthalene	N/AV	3.45E-04	N/AV	*2.65E-01*	N/AV	2.37E-02	N/AV	**4.15E+00**	0.00E+00
Phenanthrene	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	N/AV	0.00E+00	0.00E+00
Pyrene	N/AV	9.11E-05	N/AV	1.53E-01	N/AV	1.01E-04	N/AV	1.61E-01	0.00E+00
Total Excavation Risks									
	1.82E-07	5.51E-04	5.30E-08	**4.74E+00**	**2.70E-05**	2.64E-01	4.25E-07	**9.59E+00**	**2.88E-05**

Bold = value above Oregon Risk levels

APPENDIX E

PREVIOUS LETTERS, COMMENTS, AND RESPONSES