REPORT ON SUPPLEMENTAL UPLAND REMEDIAL INVESTIGATION ACTIVITIES

VOLUME 1

NW Natural – Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

March 11, 2005

Project No. 2708

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APPENDICES

1.0 INTRODUCTION

The investigation activities described herein have been conducted to provide supplemental information related to the nature, extent, and potential migration pathways of chemical impacts present in groundwater along the uplands portion of the Willamette River shoreline at the NW Natural Gasco facility, 7900 NW St. Helens Road, in Portland, Oregon (Figure 1). The need and scope for these additional upland-area investigatory activities was initially discussed during a January 27, 2004 meeting with representatives of NW Natural, the Oregon Department of Environmental Quality (DEQ), and the U.S. Environmental Protection Agency (EPA), and were outlined in a DEQ Memorandum prepared by Mr. Matt McClincy and Mr. Rod Struck, dated January 26, 2004. The investigation activities described herein were completed in accordance with an HAI Work Plan dated April 28, 2004 (HAI 2004), as conditionally approved in DEQ correspondence dated May 11, 2004 (Mr. Matt McClincy to Mr. Bob Wyatt).

1.1 Purpose and Project Objectives

The purpose of this report is to summarize results of the supplemental soil and groundwater quality investigation activities that were conducted at the site during the timeframe June through August 2004, to satisfy the objectives identified below.

- Describe the presence and distribution of tar and/or oil in the Surficial Fill Unit and Alluvial Unit in the vicinity of the buried historical drainage near boring B-29.

- Evaluate the potential that oil identified in the subsurface in the vicinity of the historical drainage adjacent to the Willamette River is a present oil migration threat to Willamette River sediments.

- Collect representative groundwater quality data to supplement the current interpretation of contaminant nature and extent, with emphasis on identifying unique plume characteristics in the area of the historical discharge feature (e.g., boring B-29 area) that would be of significance to the upland source control evaluation.

- Collect representative groundwater quality data to supplement the current interpretation of contaminant nature and extent down-gradient of the former tar pond area, at a location mid-way between existing groundwater monitoring points MW-4 and MW-5.

1.2 Scope of Work

The overall scope of work for investigatory activities completed at the Gasco property during the timeframe June through December 2004 is summarized below, with sampling locations depicted on Figures 2 and 3.

- Installation of 10 push probe borings for identification of subsurface lithological and contaminant distribution conditions at a location between the former tar pond area and the Willamette River embankment, and in the area of the historic effluent discharge / filled area located upland of the surficial tar body previously identified in the Willamette River.

- Collection of depth discrete exploratory groundwater quality samples from push probe borings installed at two locations (borings B-56 and B-59) to further evaluate horizontal and vertical distribution of groundwater impacts adjacent to the Willamette River embankment.

- Collection of soil samples from select boring locations primarily across depths of interest with regard to potential human and/or ecological exposure (upper 3 to 12 feet below ground surface) for laboratory physical testing of polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylene (BTEX), and total cyanide.

- Collection, preservation, and shipment of undisturbed soil core across the oil-bearing zone identified in the area of historic effluent discharge for photographic evaluation and completion of analyses related to potential dense non-aqueous phase liquid (DNAPL) mobility.

- Installation of three new wells (MW-16-45, MW-16-65, and MW-16-125) in the area of historic effluent discharge to evaluate groundwater contaminant plume conditions in this area, as well as the potential to yield DNAPL from a well screened across the oily zone identified within soils at this location (e.g., MW-16-45).

- Sampling and analytical testing of groundwater samples from the MW-16 well cluster and all other wells at the site.

- Sampling of DNAPL from well MW-16-45, with physical and chemical testing of the oil.

1.3 Report Organization

This report is organized as follows:

- Section 1 provides a summary of the purpose, objectives, and scope of work for the investigation activities, as well as a description of the report's organization.

- Section 2 describes the supplemental RI activities completed at the site.

- Section 3 provides the results of the supplemental activities completed at the site.

- Section 4 provides a summary of the results and conclusions of the investigation

2.0 SUPPLEMENTAL INVESTIGATION ACTIVITIES

2.1 Push Probe Boring Installation

Push probe borings were installed in the vicinity of the former effluent discharge feature / low area located east of the Fuel and Marine Marketing (FAMM) tank farm in the boring B-29 vicinity; as well as in the vicinity of boring B-31, located mid-way between the MW-4 and MW-5 monitoring well clusters, between the former tar pond area and the Willamette River (Figures 2 and 3).

As previously stated, the objective of the push probe work in the former effluent discharge / low area (boring B-29 vicinity) was to support evaluation of the extent and thickness of tarry and oily zones previously identified in the subsurface at this portion of the site, as well as to collect a vertical profile of groundwater quality to support the selection of screened intervals for a new monitoring well cluster to be installed in a subsequent phase of investigation.

The objective of the push probe work completed in the former B-31 vicinity, a location situated between the river and the former tar pond area, was to obtain a vertical profile of groundwater quality to supplement data currently available in this area at the adjacent MW-4 and MW-5 well cluster locations.

All push probe boring installation and abandonment activities were conducted in accordance with the April 28, 2004 Work Plan (HAI 2004), with drilling activities conducted by Geo-Tech Explorations, Inc. / Boart Longyear, Inc. of Tualatin, Oregon (Oregon Monitoring Well Constructor License No. 1011). A truck-mounted push probe unit using a 1.5-inch outside-diameter (OD) hydraulically-driven steel rod was used to advance all push probe soil borings.

Soil samples were collected from push probe borings using a 2-inch OD, 5-foot long, stainless-steel Macro-Core sampler, fitted with a PVC sleeve, that was advanced in 5 foot intervals into the undisturbed soils. All soil samples were screened in the field for the presence of contaminants by visual (color), olfactory, sheen, headspace vapor, and ultraviolet fluorescence methods.

The results of the field screening observations are noted on the field boring logs. Soil sampling and screening activities were conducted in accordance with a DEQ-approved April 28, 2004 Work Plan (HAI 2004).

Where groundwater samples were collected for vertical contaminant profiling, a temporary 3.25-inch diameter steel casing was set through visually impacted zones in order to isolate upper zones of impact prior to advancing to the lower portions of each borehole. Further, all groundwater samples were collected from a new boring advanced directly to the targeted screen intervals without collection of soil samples, thereby reducing the potential for groundwater mixing within an open borehole prior to sample collection. Groundwater sampling activities were conducted in accordance with the approved April 28, 2004 Work Plan (HAI 2004).

2.1.1 Former Effluent Discharge / Low Area

Seven push probe borings (B-53, B-54, B-55, B-57, B-58, B-59, and B-59A) were installed in the area of the buried historical drainage / low area near boring B-29 (Figures 2 and 3) between the dates of June 7 and June 14, 2004. With the exception of borings B-53 and B-54, where sampler refusal was encountered on apparent concrete or rock within the fill at depths of 29 feet and 20 feet, respectively, all push probe borings were advanced and continuously cored to a minimum depth of 50 feet below ground surface (bgs). With the exception of those locations where sampling device refusal was encountered, all borings were advanced to a sufficient depth such that the base of oily zones within subsurface soils could be observed and documented.

Based on the depth and thickness of oily soil zones within borings B-55, B-57, and B-58, as well as within previous boring B-29, the location for a deep push probe boring was selected for soil description and vertical groundwater quality profiling purposes. As reviewed with Mr. Matt McClincy and Mr. Rod Struck of the DEQ during a site meeting conducted on June 8, 2004, and as approved during a June 9, 2004 telephone conversation (Mr. Rob Ede to Mr. Matt McClincy), it was agreed that a deep boring (i.e., boring B-59) would be installed at a location approximately midway between borings B-57 and B-58, and as close to the river embankment as possible. The preceding location was selected since it was deemed likely to adequately represent the oily zone identified in adjacent borings, and would suitably represent contaminant conditions immediately upland relative to the "surficial tar body" previously identified within the Willamette River (Figure 2). The surficial tar body was the subject of a separate and synchronous investigation conducted for NW Natural under oversight of the EPA by Anchor Environmental, LLC (Anchor), with results of that investigation included within a September 2004 Anchor report (Anchor 2004), and summarized in Section 2.9 herein.

Deep boring B-59 was advanced to a total depth of 175 feet bgs in an attempt to identify the top of gravels typical of the base of the Alluvial WBZ, or the top of the basalt bedrock. Boring B-59 was continuously logged to a depth of 50 feet bgs, below which soil cores were collected and logged at intervals ranging from 20 to 30 feet. The boring was terminated at a depth of 175 feet bgs prior to encountering the base of the Alluvial WBZ due to concerns of losing the tooling if the sampler should become stuck within hard substrate at this depth.

Lithological descriptions and field screening for potential soil contamination were obtained during the advancement of boring B-59. To prevent mixing of groundwater within the open borehole resulting from soil sample collection, groundwater samples were collected in a new boring installed adjacent to the first boring. Specifically, depth discrete groundwater samples were collected from adjacent boring B-59A from a temporary well point screened across depth intervals of 46 to 50 feet bgs; 76-80 feet bgs; 96-100 feet bgs; 116-120 feet bgs; 144-148 feet bgs; and 171-175 feet bgs.

The properties of each soil sample were noted in the field by the HAI scientist. Boring logs prepared by HAI for the push probe borings, including a description of field screening results and groundwater sample depth intervals, are included in Appendix A.

2.1.2 Former Tar Pond and River Embankment Area

Three deep push probe borings (B-56, B-56A, and B-56B) were advanced in the immediate vicinity of former boring B-31 (Figure 2), located between the former effluent tar pond and the Willamette River embankment, for screening of soils and collection of groundwater samples. Lithological descriptions and field screening for potential contamination were obtained during the advancement of boring B-56. Boring B-56 was continuously logged to a depth of 50 feet bgs, with subsequent soil cores collected every 10 feet through a depth of 110 feet bgs, and every 25 feet below 110 feet bgs. This boring was advanced to a total depth of 179 feet bgs, where sampling equipment refusal occurred in dense gravels / basalt bedrock.

To prevent mixing of groundwater within the open borehole, groundwater samples were collected in new borings installed adjacent to B-56. Specifically, after collection of a groundwater sample within the Surficial Fill WBZ, a 3.25-inch OD protective outer steel casing was advanced to a depth of 30 feet bgs, through which a temporary well point was advanced directly to targeted groundwater sampling depths. Depth discrete groundwater samples were collected from adjacent boring B-56A from a temporary well point screened across depth intervals of 18 to 22 feet bgs; 40-44 feet bgs; 60-64 feet bgs; 80-84 feet bgs; and 100-104 feet bgs. As depicted on the boring log for B-56A (Appendix A), the well point became stuck after being advanced to a depth of 140 feet bgs, at which time the probe rod became separated at a depth of 30 feet bgs. Attempts to retrieve the probe rod and well point (extending across a depth interval of 30 to 140 feet bgs) using a hollow-stem auger drill rig and a stinger were unsuccessful. Therefore, the well point and probe rod were pressure grouted and chipped in-place with bentonite from 40 feet bgs to ground surface. Below 40 feet bgs, the formation had heaved around the probe rod, preventing lowering of the grout tremie tube to a greater depth.

Push probe boring B-56B was subsequently installed adjacent to the sealed B-56A location, with depth discrete groundwater samples collected across depth intervals of 136-140 feet bgs and 174-178 feet bgs.

The properties of each soil sample were noted in the field by the HAI scientist. Boring logs prepared by HAI for the push probe borings, including a description of field screening results and groundwater sample depth intervals, are included in Appendix A.

2.2 Monitoring Well Installation

With the completion of groundwater and soil sampling activities associated with the push probe boring component of work (Section 2.1), and the receipt of analytical results from the groundwater investigation, NW Natural and DEQ met on July 7, 2004 and agreed upon the location and depth of monitoring wells. Approval of the proposed MW-16 series monitoring well cluster location was provided during this meeting in order to facilitate completion of well installation activities during the week of July 12, 2004. Proposed screen intervals for the MW-16 series wells were approved in an e-mail dated July 12, 2004 (Mr. Matt McClincy to Mr. Rob Ede). As agreed during the meeting, three monitoring wells were constructed near the shoreline riverward of boring B-59. Based on groundwater quality data obtained at the boring B-56 location, it was agreed that installation of permanent monitoring wells in the vicinity of this boring would not be necessary.

Of the wells proposed for installation as part of the MW-16 series cluster, the deepest well, designed to monitor chemical concentrations within the basal portion of the contaminant plume, was constructed with a screen interval of 115 to 125 feet bgs, with a stainless steel sump from 125 to 127.5 feet bgs. It was agreed that temporary well point data collected from below 144 feet bgs at boring B-59 was sufficient to provide vertical plume delineation in this area.

The intermediate-depth well, designed to target the dissolved phase contaminant plume within the upper Alluvial WBZ across an elevation similar to adjacent wells at the existing MW-3 and MW-4 well clusters, was constructed with a screened interval of 55 to 65 feet bgs, with a stainless steel sump from 65 to 67.5 feet bgs.

The shallow-depth well, designed to target the oil-bearing zone found within the upper Alluvial WBZ (across a depth interval of approximately 28 to 44 feet bgs), was constructed with a screened interval of 30 to 45 feet bgs, with a stainless steel sump from 45 to 47.5 feet bgs.

All well construction activities were conducted in accordance with the April 28, 2004 Work Plan (HAI 2004), with drilling activities conducted by Geo-Tech Explorations, Inc. / Boart Longyear, Inc. of Tualatin, Oregon (Oregon Monitoring Well Constructor License No. 1011). A sonic drill rig using 8-inch and/or 6-inch OD steel drive casing was used for all drilling activities, which occurred from July 14 through July 20, 2004.

During the drilling of monitoring well boreholes, continuous soil core was extruded from 4-inch to 6-inch diameter core barrels that were advanced 2 to 10 feet into undisturbed soils. With exception of select depth intervals at the MW-16-65 well location, soil cores were extruded into labeled plastic bags of approximately 2 to 3 foot lengths prior to being sliced open for field screening and description. At MW-16-65 , soil cores across a depth interval of 26 to 46 feet bgs and 60 to 63 feet bgs were collected with the use of 4-inch OD polycarbonate resin (Lexan®) tubes to facilitate recovery of relatively undisturbed soil. Upon being brought to the surface, the Lexan® tubes were immediately cut, capped, and labeled for placement within sample coolers containing dry ice. These core samples were maintained in a horizontal and frozen state prior to, and during, overnight shipment to the testing laboratory, where photographic logs, as well as physical and non-aqueous phase liquid (NAPL) mobility screening occurred (Section 2.8).

Details of the field methods employed to install the monitoring wells, and soil and groundwater sampling protocols, are included in the approved Work Plan (HAI 2004). Boring logs that describe the soils encountered and well construction details are included in Appendix B.

2.3 Monitoring Well Development

Wells MW-16-45, MW-16-65, and MW-16-125 underwent development with an electric submersible pump from July 28, 2004 through August 3, 2004 in an attempt to remove the fine sediment from around the well bore.

Development continued until indicator parameters (pH, temperature, specific conductivity, and dissolved oxygen) stabilized, and until turbidity levels within the purged water consistently dropped to acceptable levels, using a turbidity goal of 5 NTU.

Well development field logs are included within Appendix C. As summarized on the field logs, development involved removal of 82 gallons of groundwater (25 well casing volumes) from well MW-16-45; 96 gallons of groundwater (13 well casing volumes) from well MW-16-65; and 382 gallons (22 well casing volumes) from well MW-16-125. All indicator parameters stabilized prior to completing development, while final turbidity measurements (2.24 to 9.21 NTU) were at or near the 5 NTU goal.

2.4 Monitoring Well Sampling

Site-wide groundwater monitoring activities, including sample collection from all non-product containing wells at the site (including the new MW-16 well cluster) were conducted by HAI between the dates of August 12 and August 26, 2004 in accordance with a DEQ-approved monitoring plan and schedule, dated July 22, 2004. Field sampling records documenting purging and sampling activities related to the August 2004 groundwater monitoring event are included within Appendix D.

2.5 Investigation-Derived Waste Management

Push probe and monitoring well installation activities, including Anchor's synchronous barge-based investigation activities related to the off-shore tar body (Section 2.9), generated 20 full and 9 partially filled 55-gallon drums of soil sample wastes, and 18 55-gallon drums filled with equipment decontamination and monitoring well development water. The 9 partially filled drums of soil were consolidated into 2 full drums prior to off-site shipment, resulting in 22 drums of soil sample wastes requiring management.

All equipment decontamination water was treated within the on-site wastewater treatment system, and discharged through NW Natural's National Discharge Elimination System (NPDES) permitted outfall in batches on June 23, 2004 and on August 4, 2004.

Soil sampling wastes were characterized as non-hazardous under the Resource Conservation and Recovery Act (RCRA), as summarized in a non-hazardous waste determination memorandum included within Appendix E.

Based on the waste determination referenced above, and approval of the waste profile from Pollution Control Industries, Inc. (PCI), of Millington, Tennessee, the target treatment/disposal facility, all soils were removed from the site under a non-hazardous waste manifest by WasteWatch, Inc., of Troutdale, Oregon on August 26, 2004. The soils were transported to PCI's Millington, Tennessee facility for incineration as non-hazardous waste. The non-hazardous waste manifest, documenting removal from the site and receipt by the treatment facility, is included within Appendix E, as is a certificate of thermal destruction documenting completion of treatment.

2.6 Elevation Survey

Monitoring wells and push probe boring locations were surveyed for location and elevation (mean seal level, City of Portland datum) by Mr. Robert Taylor, an Oregon Registered Professional Land Surveyor employed by NW Natural. For monitoring wells, both the ground surface and the top of the casing elevations were surveyed. All top of casing survey elevation data were collected within an accuracy of 0.01 feet vertically, while ground surface data was collected with an accuracy of 0.1 feet vertically. All elevation information has been included on the boring and well construction logs (Appendices A and B).

2.7 Non-Aqueous Phase Liquid Measurements

The evaluation for the presence of NAPL at wells MW-16-45, MW-16-65, and MW-16-125 has been conducted numerous times subsequent to completion of installation activities, as follows:

- Immediately after well installation activities were completed on July 21, 2004;
- Before and after conducting development activities on August 3 and 4, 2004;
- Prior to conducting a round of water levels at the site on August 12, 2004;

- Prior to collecting groundwater samples from the wells within the MW-16 well cluster on August 26, 2004;
- During a NAPL check conducted on September 29, 2004 (in which NAPL was first identified in the sump of well MW-16-45);
- After identification of NAPL at the base of well MW-16-45, subsequent checks were conducted at this well location in tandem with NAPL removal activities occurring between October and December 2004.

All measurements were conducted by lowering an interface probe across the entire water column of the three MW-16 cluster wells and checking for identification of NAPL by a "sounding" of the probe alarm, and by conducting a visual evaluation of the probe tip and measuring tape upon removal from each well.

Prior to the September 29, 2004 NAPL check, measurements with an interface probe across the entire water column of the three MW-16 cluster wells did not result in the identification of NAPL, either by "sounding" the probe alarm, or as indicated by visual evaluation of the probe tip upon removal from the wells.

During the NAPL check conducted on September 29, 2004, although the NAPL sounding feature did not signal, approximately 1.5 feet of NAPL was observed adhering to the probe tip and base of the measuring tape upon withdrawal from well MW-16-45. Removal of the NAPL from the base of the well was subsequently conducted on numerous occasions with a clear bottom-filling weighted bailer between the dates of October 5 and December 2, 2004. NAPL removal was conducted primarily for the collection of sufficient sample volume for physical and chemical testing, as well as to support initial evaluation of the feasibility of possible longer term NAPL recovery at this location.

2.8 Laboratory Analyses

With the exception of undisturbed soil core collected during the installation of well MW-16-45, all soil and groundwater samples collected as part of the supplemental RI or routine groundwater monitoring activities described herein were shipped in sealed coolers with chain-of-custody documentation to North Creek Analytical Laboratory in Beaverton, Oregon.

Soil core collected from the boring for well MW-16-65 as part of the supplemental RI activities were shipped to PTS Laboratories in Santa Fe Springs, California for physical testing and NAPL mobility-related screening analyses.

Additionally, samples of NAPL collected from well MW-16-45 were shipped to both North Creek Analytical, Inc. and to PTS Laboratories for both chemical and physical testing.

2.8.1 Groundwater

Groundwater samples collected for screening purposes from the deep push probe boring installed in the former effluent discharge/low area (boring B-59) were analyzed for those indicator constituents useful in ascertaining the overall presence and magnitude of site-related impacts. Specifically, samples from this push probe location were analyzed for volatile organic compounds (VOCs) by EPA Method 8260B.

Groundwater samples collected from the deep push probe boring installed between the former tar pond and the river (boring B-56), as well as from new monitoring wells within the MW-16 cluster and from immediately adjacent plume monitoring wells MW-3-56, MW-4-57, and MW-5-100, were analyzed for VOCs by EPA Method 8260B; semi-volatile organic compounds (SVOCs) by EPA Method 8270C; polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270 SIM; total and amenable cyanide by EPA Method 9010; and total and/or dissolved metals arsenic, chromium, copper, nickel, lead, and zinc by EPA Method 6010.

Groundwater samples collected from the on-site groundwater monitoring well network in August 2004 were analyzed for SVOCs, PAHs, VOCs, BTEX, total and amenable cyanide, and select metals, as per methodologies indicated above, in accordance with a DEQ-approved monitoring plan and schedule dated July 22, 2004.

Results of the June 2004 push probe / temporary well point groundwater sampling analyses are summarized on Tables 1 through 4, with chain-of-custody documentation and laboratory analytical reports included within Appendix F. Results of the August 2004 site-wide groundwater monitoring event are summarized on Tables 5 through 8, with chain-of-custody documentation and laboratory analytical reports included within Appendix G.

2.8.2 Soil

2.8.2.1 Chemical Testing

Seven select soil samples obtained during the June 2004 push probe investigation, primarily collected across depths of interest with regard to potential human and/or ecological exposure (upper 3 to 12 feet bgs), were selected to undergo laboratory analyses for PAHs by EPA Method 8270 SIM and BTEX by EPA Method 8021, two of the samples were selected for analysis of total cyanide content by EPA Method 9010, and one sample received follow-up analysis for leachable benzene by EPA Method 1311 (Toxicity Characteristic Leaching Procedure)/8021. Results of these soil analyses are set out in Tables 9 through 13 (see borings B-53 through B-56; Tar Pond Area), which also include a summary of all other available soil data for the site as a whole. Chain-of-custody documentation and laboratory analytical reports documenting analytical results of the June 2004 samples are included within Appendix H.

2.8.2.2 Physical Soil Core Testing

The soil core collected from the boring for well MW-16-65 within Lexan® liners, frozen, and shipped to PTS Laboratories, Inc. (PTS) in Santa Fe Springs, California has undergone various types of physical testing, as described below.

Specifically, the soil core depth intervals from 26 to 46 feet bgs and from 60 to 61 feet bgs, were cut open and photographed under both white light and ultraviolet light. The photographs, which depict the soil type, structure, and presence and distribution of NAPL within the soils, are within the PTS Laboratory Report (PTS 2005), included as Appendix I.

Based on evaluation of the MW-16-65 core photo log, as well as boring logs for the MW-16 well cluster, 11 depth intervals for particle size testing using American Society of Testing and Materials (ASTM) Method D422/D4464M, and pore fluid saturation testing using ASTM D2216 / American Petroleum Institute (API) RP40 methodology (includes % water saturation and % NAPL saturation; total porosity, air filled porosity, grain density, dry bulk density, and initial moisture content) were selected. Specifically, these tests were conducted on undisturbed, frozen core submitted to PTS for the following depths: 27.5 feet, 29.2 feet, 31.5 feet, 33.5 feet, 35.7 feet, 38.5 feet, 40.4 feet, 42.5 feet, 44.8 feet, 45.3, and 60.7 feet bgs.

Results of the particle size and the physical properties testing of the above-referenced samples are summarized within the PTS Report included within Appendix I.

Based on results of the pore fluid saturation testing summarized in the PTS report, soil from three depth intervals (35.7, 40.4, and 42.5 feet bgs) were selected to undergo "Free Product Mobility/Residual Saturation" testing using centrifuge methodology as specified within ASTM Method D425M. These samples were selected since they contained a range of pore fluid saturations with regard to NAPL content (i.e., ranging from 1.4% at 42.5 feet bgs, to 50.3% at 35.7 feet bgs). This testing uses a large amount of force (1,000-times the force of gravity) such that minimum residual NAPL levels may be estimated. Results of these tests are included within the PTS Report included within Appendix I.

Finally a sample of core from a depth of approximately 35.6 feet bgs was selected for wettability index analysis by Amott Wettability methodology using site-specific NAPL and groundwater that was recovered from well MW-16-45 as part of the NAPL recovery evaluation described in Section 2.7. Wettability is a measure of a liquid's relative affinity for a solid. For example, a "wetting" fluid will preferentially spread over a solid surface (e.g., soil particle) at the expense of a "non-wetting" fluid. Thus, a strongly "water-wet" system would tend to result in lower residual NAPL saturation levels (e.g., greater mobility potential) than a strongly "NAPL-wet" system. Results of these tests are included within the PTS Report included within Appendix I.

2.8.3 NAPL

Samples of NAPL collected from the sump of well MW-16-45 were analyzed by North Creek Analytical (NCA) for chemistry and by PTS for physical parameters. Analyses conducted by NCA include the following:

- Flashpoint by EPA Method 1010
- pH by EPA Method 9040A
- SVOCs by EPA Method 8270C
- PAHs by EPA Method 8270 SIM
- VOCs by EPA Method 8260C
- Fuel Fingerprinting by NW-TPH Methodology

Laboratory reports documenting results of NCA's NAPL analyses are included within Appendix J, while these results, in addition to results from the previous testing of other wells at the site where NAPL has been identified (i.e., wells MW-6-36, MW-10-32, and MW-11-32), are summarized in Tables 14 through 16.

A second sample of NAPL and water collected from the sump of well MW-16-45 was analyzed by PTS as per their "Fluid Properties Package-NAPL and Water". This suite of analyses includes dynamic viscosity and fluid density at three temperatures, surface tension for each fluid, and interfacial tension for three phase pairs (oil/water; oil/air; and water/air) as per ASTM D445 and D1481.

Laboratory reports documenting results of PTS's NAPL analyses are also included within Appendix I, and are summarized, in part, on Table 14.

2.9 Sediment Characterization

NW Natural entered into an Administrative Order on Consent (Order) with EPA on April 28, 2004 to perform a sediment removal action at the Gasco site. In accordance with the Statement of Work (SOW) attached to the Order, sediment characterization was performed by Anchor adjacent to the Gasco site in July 2004 to facilitate design of the removal action. The characterization protocols were discussed in detail in the Field Sampling Plan which was an Appendix to the Remedial Action Work Plan (Anchor 2004). The design characterization included the collection of subsurface cores within the removal action area in order to:

- Establish the lateral and vertical extents and the physical characteristics of the tar body
- Estimate elutriate concentrations in the nearby water column that may occur during the removal action
- Profile the contaminated materials to be removed to determine a suitable disposal location
- Determine the chemical/physical characteristics of the sediments residing within and beneath the visibly contaminated strata
- Provide observational data to support evaluation of the potential that NAPL identified in proximity of the historical drainage area upland of the off-shore tar body is a present oil migration threat to Willamette River sediments.

2.9.1 Sediment Collection and Processing

Twenty sediment samples (RAA-01 to RAA-20) were collected by Anchor in July 2004 from the locations depicted in Figure 3 and 11. The AN-X series of samples was collected during a previous sediment investigation in 2002. For all samples with sufficient water depths, the sampling was conducted from a shallow draft barge equipped with a hydraulic coring device (i.e., Geoprobe). The Geoprobe was deployed through a "moonhole" in the middle of the barge deck space. Horizontal positioning at each sampling location was determined using a differential global positioning system (DGPS) in latitude and longitude to the nearest 0.01 second in the North American Datum (NAD) 1983. Where water depths precluded collection from the waterside, the cores were taken using a portable track-mounted Geoprobe rig from the landside. Coring began at the mudline/ground surface elevation using a 4-foot long, 2.5-inch inside diameter (ID) core sampler. Following penetration of the full length of the core tube (5 feet), the sampler was withdrawn to retrieve the liner containing the sediment sample. This process was repeated to a maximum depth of approximately 20 to 40 feet below mudline for all sampling stations.

Following retrieval, sediment cores were immediately opened and logged on the sampling vessel and the desired samples from the appropriate intervals were collected. Based on the heterogeneity of the strata encountered, a spatially representative subset of 17 samples from the total of 40 collected samples was selected for chemical and physical analyses.

2.9.2 Visual Characterization

To establish the lateral and vertical extents of the tar body and assess whether offshore migration of contamination from the uplands is potentially occurring, the cores were visually logged by Anchor personnel as to their color, structure, texture, mineral composition, moisture, and percent recovery, according to ASTM Method D 2487. In addition, particular emphasis was placed on identification of the tar body, visibly contaminated, and visibly uncontaminated zones. During evaluation of the cores, Anchor and EPA's oversight contractor, Parametrix, Inc., reached consensus on the depth(s) of the zones present at each station for the purposes of sampling. To maintain a consistent definition of each zone throughout the characterization, each zone was identified through the presence of particular physical characteristics. Observations of the tar body included:

- Thin tar laminations bounded by sediments
- Lenses of tar
- Somewhat soft, sticky masses of tar
- Dense brittle fragments of tar containing little or no sediments.

Observations of the visibly contaminated zone included sediments:

- Saturated (i.e., visibly detectable) oil (but composed primarily of sediments)
- Saturated with tar and tarry like substances (but composed primarily of sediments)
- With a heavy sheen
- With blebs of oil and/or tar
- With a slight sheen.

Sediments with no sheen, oil, tar, or petroleum odor noted were identified as the visibly uncontaminated zone.

2.9.3 Chemical Testing

The 17 selected samples were subjected to the following suite of analyses: total organic carbon (TOC; PSEP protocols), BTEX (EPA method 8260), PAHs (EPA Method 8270), total cyanide (EPA Method 335.2), total solids (TS; EPA Method 160.3) and grain size (ASTM D 422). In addition, a representative subset of 9 samples with sufficient silt content was analyzed for Atterberg limits (ASTM D 4318). A TCLP (EPA Method 6010) and Dredge Elutriate Test (DRET) was also conducted on 2 representative tar body zone samples and visibly contaminated zone samples. These chemical analyses were conducted to facilitate a removal and disposal alternatives evaluation in accordance with the Order. The chemical laboratory analytical results will be included in the Remedial Action Project Plan (RAPP), to be prepared by Anchor, which is currently in draft form (Anchor 2004).

3.0 RESULTS

3.1 Former Tar Pond / River Embankment Vicinity

Push probe boring B-56 was installed with the primary objective of obtaining depth discrete groundwater quality data near the former boring B-31 area, located between the former tar effluent pond and the Willamette River embankment (Figure 2 and 3). A hydrogeologic cross-section parallel to the river (Figure 4), including the B-56 boring location, is included as Figure 5. Results of these investigatory activities are summarized below:

3.1.1 Subsurface Conditions

- Soils encountered at the B-56 boring location (Appendix A and Figure 5) consisted of gravelly sands and silts, including patches or flecks of solid black carbon pitch (fill) to a depth of approximately 22.5 feet bgs, where an approximate 0.5-foot thick layer of solid, ductile tar was identified. Below the tar were interbedded sands, silty sands, and silts characteristic of the Alluvial WBZ extending to a depth of 174 feet bgs. Sandy gravel including angular basalt fragments were identified at this location from 174 to 179 feet bgs, where soil sampler refusal, potentially on basalt bedrock, was encountered.

- The silt layer that typically defines the top of the Alluvial WBZ in the more upland reaches of the site, and typically becomes thin to absent in the vicinity of the Willamette River shoreline, was not observed at the B-56 boring location (Figure 5).

- The thin layer of tar identified at the apparent base of the fill unit across a depth of 22 to 22.5 feet bgs at the B-56 location is consistent with the previous identification of this material at the immediately adjacent former B-31 boring location. Tar has not been identified within soils either immediately west (MW-4 well cluster) or immediately east (MW-5 well cluster) of the B-31/B-56 boring location (Figure 5). No evidence of oil was identified within either the fill or the underlying alluvial materials at these locations. The tar identified at this location was likely the result of historical discharge to the pre-fill ground surface.

3.1.2 Groundwater Analytical Results

Results of the testing of groundwater samples collected from the boring B-56 location are summarized in Tables 1 through 4. Hydrogeologic cross-sections through the B-56 boring location (oriented parallel to the river), are included as Figures 5A (depicting benzene concentrations) and 5B (depicting naphthalene concentrations). Additionally, plume iso-concentration maps depicting benzene and naphthalene concentrations within the Surficial Fill WBZ and the Alluvial WBZ across the site and the western portion of the adjacent Siltronic property, are provided as Figures 7 through 10.

Groundwater quality data from the adjacent Siltronic property that are posted on the referenced figures were obtained from results of investigatory activities conducted by HAI for NW Natural, as well as Limno-Tech, Inc. (LTI), Maul Foster Alongi, Inc. (MFA), and others for Siltronic. Primary sources for the Siltronic property data include a 2003 HAI report (HAI 2003), as well as 2003 and 2004 reports prepared by MFA (MFA 2003, 2004a through h), and a 1990 report prepared by CH2M HILL, Inc. (CH2M HILL 1990).

Key findings from evaluation of the preceding groundwater quality results are summarized below:

- The greatest benzene concentration in groundwater at the B-56 boring location was 8 parts per billion (ppb), as identified within the Surficial Fill WBZ across the 18-22 foot interval. Within the Alluvial WBZ, detectable concentrations of benzene were found to range from 3.1 ppb (80 to 84 feet bgs) to 3.62 ppb (60 to 64 feet bgs).

- The greatest concentrations of PAHs in groundwater (with the exception of naphthalene) at the B-56 location were identified in the Surficial Fill WBZ, where individual PAHs were identified at concentrations ranging from 4 ppb to 54.1 ppb. In contrast, individual PAH concentrations (except naphthalene) from discrete zones within the Alluvial WBZ were typically identified at concentrations less than 0.2 ppb. With regard to naphthalene, the greatest concentration was identified across the 80 to 84 foot depth interval at this location, where a concentration of up to 405 ppb was identified.

  The concentrations of PAHs identified within the Surficial Fill WBZ at the B-56 boring location (317 ppb) were slightly elevated above PAH concentrations identified within the Surficial Fill WBZ at adjacent monitoring well locations to the west (MW-4-35 with 65 ppb) and east (MW-5-32 with 0.27 ppb). This occurrence, however, is likely a function of the presence of soil impacts across the temporary well point screen interval, in conjunction with the typically turbid nature of temporary well point samples. Specifically, because PAHs have a strong affinity to bind to soil particles, PAH results from turbid samples may be skewed high because results would be a function of both the dissolved phase (water) and the solid phase (soil) components. Such an effect is common and is exemplified at the MW-5-32 well location, where initial sampling in 1995 (when drilling-induced turbidity was greatest) identified 288 ppb total PAHs, while in 2004 only 0.27 ppb total PAHs were identified at this location.

- With regard to the Alluvial WBZ, as depicted on Figures 5, 8 and 10, concentrations of benzene (3.6 ppb maximum) and naphthalene (441 ppb maximum) as identified at the B-56 boring location were found to be significantly lower than concentrations of the same contaminants as identified at locations either immediately west (15,000 ppb benzene; 3,780 ppb naphthalene at MW-4-57) or immediately east (11,500 ppb benzene; 11,900 naphthalene at MW-5-100).

  Such a contaminant distribution as described above suggests the presence of two somewhat discrete contaminant plumes within the Alluvial WBZ at this portion of the site (Figures 8 and 10), with data from boring B-56 defining the eastern limit of the relatively shallow (approximately 45 to 120 feet bgs) plume identified at shoreline well cluster locations MW-4 and MW-16; while also providing definition of the western limit of the somewhat deeper (approximately 70 to 140 feet bgs) plume identified at shoreline well location MW-5-100 and extending east (to the adjacent Siltronic property) to wells WS-14 and WS-11. The eastern limit of this plume is defined by the WS-12 well location.

Based on the plume morphology (Figures 8 and 10), as well as observations of soil core, it appears that there are two different sources for the impacts observed within the Alluvial WBZ, with both sources appearing to correspond to locations where effluent, including NAPL, were formerly discharged directly onto the historic ground surface (i.e., the surface of the alluvial unit).

The western benzene and naphthalene plume appears to originate within the southern portion of the former tar ponds/former Koppers waste discharge area, generally between the MW-11 / MW-14 well locations and the MW-8 well cluster, with contaminant contribution to the Alluvial WBZ occurring to the north within the former tar pond area and adjacent low area/former discharge. NAPL source within the Alluvial WBZ has been observed within the former tar pond area (e.g., borings B-32, B-33, B-35 and MW-8), and within the upper portion of the Alluvial WBZ in the former effluent discharge area (e.g., borings B-55 through B-59, B-29 and MW-16).

The eastern benzene and naphthalene plume (e.g., MW-5, WS-11, and WS-14 down-gradient monitoring points), appears to be the result of deep NAPL migration near the eastern limit of the former tar ponds in vicinity of the Gasco/Siltronic property boundary (proximate to the former pond overflow point as depicted on Figure 3). Specifically, the deepest NAPL directly observed on either property has been identified in this area (B-33, B-35, B-1-8, and WS-16 boring locations), where NAPL has been logged at depths ranging from 67 feet bgs (B-33) to 74 feet bgs (WS-16). Further, the presence in DNAPL immediately north of these areas in wells WS-11-125 and WS-14-125, as identified by MFA (2004h), suggests the presence of NAPL in this area to depths as great as 125 feet bgs. The deeper NAPL penetration in this area has resulted in deeper dissolved phase contamination as compared to the western plume (Figures 5a and 5b).

3.1.3 Soil Analytical Results

Soil samples were collected at depths of 2.5, 11, and 26 feet bgs at boring B-56 to undergo laboratory analyses for BTEX, PAHs, and total cyanide analyses (Tables 9 through 12). Results of these tests indicated BTEX and cyanide to be non-detected at concentrations greater than laboratory reporting levels, while total PAH concentrations ranged from 14 parts per million (ppm) at 2 feet bgs to 525 ppm at 26 feet bgs, collected beneath the tarry zone described in Section 3.1.1.

3.2 Former Effluent Discharge and Low Area

Push probe borings B-53, B-54, B-55, B-57, B-58, B-59, and B-59A, in addition to monitoring wells MW-16-45, MW-16-65, and MW-16-125, were installed in the former low area that historically received MGP effluent that discharged directly to the Willamette River (Figures 2 and 3). Results of these investigatory activities are described below.

3.2.1 Subsurface Conditions

Observations regarding soil type and field screening information collected as part of the June 2004 push probe boring investigatory activities are summarized below. Further, Figure 11 identifies those depths at which tarry or oily soils were encountered across the northeastern portion of the site, as do cross-sections included as Figures 5 and 6.

- Soils consisted of gravelly sands, silts, brick and concrete fragments and large concrete and rock chunks (fill) to depths ranging from 25 feet bgs (B-55) to approximately 33.5 feet bgs (B-58). Beneath the fill were interbedded sands, silts, and silty sands characteristic of the Alluvial WBZ, extending to the maximum depth of exploration at 175 feet bgs (boring B-59).

- The silt layer that typically defines the top of the Alluvial WBZ but is often thin to absent in the vicinity of the Willamette River shoreline, was identified at the B-55 (25 feet bgs); B-57 (30.5 feet bgs); B-58 (33.5 feet bgs); B-59 (27 feet bgs); and MW-16 (26 feet bgs) locations.

- A soil matrix including tar (primarily black, patchy, solid to semi-solid) was identified within fill at depths ranging from 1 to 2 feet bgs and extending to depths ranging from approximately 22 to 30 feet bgs at all boring locations except P-53 and P-54 (near the river embankment), where only very minor patchy tar or tar flecks were identified within the fill.

- Several zones of patchy or massive hard carbon pitch were encountered within the fill at borings B-53 (patchy from 2.5 to 29 feet bgs); B-54 (patchy from 10 to 20 feet bgs); B-55 (massive from 22.5 to 25 feet bgs), B-57 (patchy from 20 to 23 feet bgs); B-58 (patchy from 17-22.5 feet bgs); and B-59 (patchy from 17.5-27 feet bgs).

- Visually-impacted zones containing oil were identified within and beneath the fill across depth intervals of 27.5 to 32 feet bgs at boring B-55; 26.5 to 37.5 feet bgs at boring B-57; 22.25 feet bgs (thin zone) and 30.5 to 37 feet bgs at boring B-58; and 30 to 38 feet bgs at boring B-59. Further, an impacted zone containing oil and extending from 27.5 to 40 feet bgs was previously identified at the former boring B-29 location (near B-59 and adjacent to the embankment) (Figures 5, 6, and 11).

- At certain locations (e.g., B-55 at 32 feet bgs; B-57 at 37.5 feet bgs; and B-59 at 38 feet bgs), a thin silt or sandy silt layer was identified that appeared to locally control vertical movement of the NAPL, with oily soils identified above the layer, while no oily soils were identified below the layer. At other boring locations (e.g., B-29 and B-58), no direct visual evidence of such a confining or partially confining silt layer was identified. However, the apparent base of the oil was visually identified at all boring locations.

- The presence of oil-bearing soils adjacent to the embankment appears limited to an approximate 200 foot length of shoreline within the former effluent discharge/low area (e.g., B-29, B-57, -58, -59, and MW-16-45 locations) with no oil identified to total depth at the B-9 or the MW-3 boring locations to the west, or within the boring for MW-4 to the east (Figures 5, 6, and 11).

- Boring logs indicate the presence of tars and carbon pitch (e.g., lampblack and/or pencil pitch) within materials used to fill the tar ponds and the adjacent low areas, with tarry soils identified immediately beneath the ground surface at many boring locations within these areas. However, based on borings installed closest to the river embankment (e.g., borings B-29, B-53, B-54, and MW-16), it appears that tarry soils were not used for construction of the river embankment (Figure 11).

Observations regarding soil type and field screening information collected as part of the boring investigatory activities related to the installation of the MW-16 well cluster (installed near the former B-29 boring location) are summarized below, while the boring logs are included within Appendix B.

- Soils consisted predominantly of gravelly sandy silt with brick fragments and concrete to a depth of 25 feet bgs. Likely native silt was encountered at a depth of 25 feet, underlain by interbedded silts, sands, and silty sands to the maximum depth of exploration at this location of 127.5 feet bgs.

- Likely carbon pitch flecks (black, hard fragments) were identified sporadically within fill across a depth interval of approximately 12 feet to 23 feet bgs.

- Semi-solid tar blebs were encountered in fill at a depth of 24.5 feet bgs, with black staining present between 24.5 feet through 27.5 feet bgs.

- Brown oil was observed to be coating soil between a depth interval of 27.5 feet bgs to 37.5 feet bgs, with less oil (limited to more of a petroleum sheen) observed between a depth interval of 37.5 and 40 feet bgs (Figures 5, 6, and 11). Oil was observed coating soil between 40 and 44 feet bgs, with no oil identified at depth below 44 feet bgs. Evidence of a possible silt layer at 44 feet was identified, however, due to vibrations and extrusion related to sample collection, the soil core was highly disturbed and interpretation of the representativeness of the silt layer was difficult.

3.2.2 Photo Evaluation and Physical Testing of Soil Core

Relatively undisturbed soil core was collected, frozen and shipped to PTS in Santa Fe Springs, California for detailed evaluation including photography and physical testing. The core was obtained across a depth interval of 26 to 46 feet bgs, as well as 60 to 61 feet bgs during drilling of the boring for monitoring well MW-16-65. Photographs and results of physical testing (Appendix I) indicate the following:

- **26 to 29 feet bgs:** Patchy zones of apparent oily tar were identified from 26 to 29 feet bgs, with individual blebs all less than 0.1-inch diameter through 27 feet bgs, becoming larger from 27 to 29 feet bgs (black and moist where cut). Sieve testing of this zone (27.5 feet bgs) indicates the mean grain size description to be silt, with the median grain size being 0.027 millimeters (mm). Porosity was measured as 50.6%, with approximately 11.2% of the pore fluid being NAPL.

- **29 to 31 feet bgs:** An apparent increase in sand content occurs between 29 and 30 feet bgs, with a respective increase in black oily tar content. There is evidence of layering of tar/oil from 29 to 30 feet bgs, while only small blebs of tar exist from 30 to 31 feet bgs. Sieve testing of this zone (29.2 feet bgs) indicates the mean grain size description to be silt, with the median grain size being 0.044 mm. Porosity was measured as 53%, with approximately 23.1% of the pore fluid being NAPL.

- **31 to 36 feet bgs:** The core appears sandier below 31 feet bgs, with oil (more brown than black in coloration) fairly uniformly present throughout core to a depth of approximately 36 feet bgs. Sieve testing of this zone (31.6, 33.5, and 35.7 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size ranging from 0.134 mm to 0.199 mm. Porosity was measured as ranging from 50.6% to 52.37%, with approximately 20.7% (at 33.5 feet bgs) to 50.3% (at 35.7 feet bgs) of the pore fluid being NAPL.

  A sample of core from a depth of 35.55 feet bgs that underwent a free product mobility screening analysis found 51.9% initial NAPL saturation, with 34.4% residual saturation remaining after the core was centrifuged at 1,000-times the force of gravity, an approximate 34% decline in NAPL saturation after centrifuging. The preceding decline in NAPL saturation, in addition to the entry of NAPL through the coarse-grained sand pack of well MW-16-45, suggests the potential for NAPL mobility across this depth interval under certain conditions (e.g., in the presence of a coarse-grained sand matrix).

- **36 to 39 feet bgs:** Between 36 and 39 feet bgs, oily zones within the core are somewhat more patchy, although the ultraviolet photograph continues to indicate the presence of petroleum throughout these soils. Sieve testing of this zone (38.9 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size being 0.187 mm. Porosity was measured as 51%, with approximately 33.8% of the pore fluid being NAPL.

- **39 to 42 feet bgs:** Below 39 feet there is a noticeable decline in oil content, with the greatest occurrences of oil found in blebs or layers up to 0.2 feet thick, although a thicker zone occurs between 41.5 and 42 feet bgs, with the potential petroleum presence in surrounding soils only indicated based on photography under ultraviolet light. Sieve testing of this zone (40.4 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size being 0.145 mm. Porosity was measured as 47.5%, with approximately 30.8% of the pore fluid being NAPL.

A sample of core from a depth of 40.10 feet bgs that underwent a free product mobility screening analysis found 23% initial NAPL saturation, with 17.3% residual saturation remaining after the core was centrifuged at 1,000-times the force of gravity, an approximate 25% decline in NAPL saturation after centrifuging. The preceding suggests the possibility of NAPL mobility across this depth interval under certain conditions.

- 42+ feet bgs: Below 42 feet bgs, there is no oil indicated within soils based on white light photographs. However, there are indications of a potential light presence of petroleum between 42 and 43 feet bgs; 44.5 and 45 feet bgs; and a potential very light presence between 60.5 and 61 feet bgs, as observed under ultraviolet light. Although unknown, it is possible that the lower depth and lower level indications of petroleum (especially that only appearing in ultraviolet photographs), could be related to drag-down resulting from drilling or core tube insertion. Drag down is apparent in other segments of the core, as evidenced by indications of petroleum extending downward along the surface of the core. Sieve testing of this zone (42.5, 44.8, and 45.3 feet bgs) indicates the mean grain size description to be fine sand, with the median grain size ranging from 0.175 mm to 0.257 mm. Porosity was measured as ranging from 42.2% to 48.1%, with no NAPL detected (60.7 feet bgs) to 3.2% NAPL detected (45.3 feet bgs).

  A sample of core from a depth of 42.35 feet bgs that underwent a free product mobility screening analysis found 1.2% initial NAPL saturation, with 1.2% residual saturation remaining after the core was centrifuged at 1,000-times the force of gravity, a 0% decline in NAPL saturation after centrifuging, indicating that the NAPL in this zone is not potentially mobile.

3.2.3 Groundwater Analytical Results

Results of the testing of groundwater samples collected from the boring B-59 location are summarized in Tables 1 through 4, while results of the testing of samples collected from the MW-16 well cluster are included within Tables 5 through 8. Hydrogeologic cross-sections through the B-59/MW-16 area (oriented parallel to the river), are included as Figures 5A (depicting benzene concentrations) and 5B (depicting naphthalene concentrations), while cross-sections oriented normal to the river are included as Figures 6A (depicting benzene concentrations) and 6B (depicting naphthalene concentrations). Additionally, plume iso-concentration maps depicting benzene and naphthalene concentrations within the Surficial Fill WBZ and the Alluvial WBZ across the site and the western portion of the adjacent Siltronic property, are provided as Figures 7 through 10. Key groundwater data from the former effluent discharge/low area, are summarized below:

- Analytical results from the testing of groundwater samples collected across multiple depths (beneath the identified oily soils) at the boring B-59 location indicate that the greatest contaminant concentrations (5,570 ppb benzene and 4,460 ppb naphthalene) were present across the shallowest interval sampled - a depth interval of 46 to 50 feet bgs, while no contaminant concentrations greater than indicated screening levels were detected below a depth of 120 feet bgs (Table 1).

- Analytical results from the testing of groundwater samples collected from well MW-16-45, screened across the oily zone within the uppermost Alluvial WBZ, indicate the presence of 2,880 ppb benzene and 7,500 ppb naphthalene. Vertically, concentrations of these constituents were found to decline significantly with depth, with benzene not detected above laboratory method detection limits at a depth of 115 to 125 feet bgs, while naphthalene was identified at a concentration of only 26.5 ppb (below screening level) across the same depth interval (Tables 5 and 6; Figures 5 and 6).

- Laterally, benzene concentrations within the upper Alluvial WBZ as identified at the B-59 / MW-16 location depict attenuating concentrations relative to the "benzene high" previously identified to the east at the MW-4-56 well location. Specifically, benzene concentrations are found to decrease in a westerly direction from 15,000 ppb identified at well MW-4-56, to approximately 3,000 to 5,000 ppb identified at the B-59/MW-16 location, and finally to less than 100 ppb as identified at the MW-3 well location (Figure 8). As described in Section 3.2.5, analysis of a NAPL sample recovered from well MW-16-45 did not detect the presence of benzene at concentrations greater than laboratory method reporting levels (10,000 ppb), and therefore the decrease in benzene concentration at well MW-16-45 relative to MW-4-57, even with the presence of NAPL in the well casing, does not appear anomalous.

- The naphthalene concentration as identified across the oily zone at well MW-16-45 (7,500 ppb), represents an increase in concentration relative to adjacent well locations. Specifically, less than 1 ppb naphthalene was identified within the upper Alluvial WBZ along the shoreline to the west at the MW-3 well location, while 3,780 ppb naphthalene was identified across the most heavily impacted zone (upper Alluvial WBZ) to the east at the MW-4-57 well location (Figure 10). As described in Section 3.2.5, analysis of a NAPL sample recovered from well MW-16-45 identified the presence of naphthalene at a concentration of 15,600,000 ppb (48% of the total PAH content), thereby providing rationale for the elevated naphthalene concentration identified in groundwater at this location.

- As depicted in Figures 5 through 10, the NAPL and dissolved phase hydrocarbon presence on-site within the Alluvial WBZ is primarily limited to the former tar pond area as well as the former effluent discharge area to the immediate west, while impacts within the overlying Surficial Fill WBZ across much of the same area are much less pronounced. The preceding suggests the petroleum impacts identified within the Alluvial WBZ at this portion of the site are likely the result of historical discharge of NAPL and tar effluent directly to the pre-fill ground surface (e.g., typically the alluvial silt) in these areas.

3.2.4 Soil Analytical Results

Soil samples were collected from a depth of 2.5 feet bgs at borings B-53 and B-55; and from depths of 2 feet and 7.5 feet bgs at the B-54 boring location to undergo laboratory analyses for BTEX and PAHs (Tables 9 and 10). Results of these tests indicated BTEX to be non-detect for samples collected from borings B-53 and B-54 (where no shallow tar was identified), while the sample collected from boring B-55 (which contained solid tar in the sample matrix), identified the presence of 137 ppm benzene. Similarly, the sample from boring B-55 containing tar identified the presence of 61,008 ppm total PAHs, while samples from borings B-53 and B-54 identified from 3.06 ppm (2 feet bgs at B-53) to 268.6 ppm (7.5 feet bgs at B-54) total PAHs.

3.2.5 NAPL Characterization

Well MW-16-45 was screened immediately adjacent to the river embankment within a zone of oily soils (Section 3.2.1), with a screen set in the upper Alluvial WBZ from 30 to 45 feet bgs, and a primary sand-pack extending from 27 to 45 feet bgs. A sump was placed below the screen interval, extending from 45 to 47.5 feet bgs.

On September 29, 2004 approximately 1.5 feet of brown oil (NAPL) was identified in the sump of well MW-16-45. The NAPL was subsequently removed from the sump of the well over several days with the use of a disposable bailer to provide sufficient volume of sample for lab analysis, as well as to conduct an initial evaluation of the ability to remove NAPL from this location. No NAPL has been identified in intermediate-depth Alluvial WBZ well MW-16-65, or in deep Alluvial WBZ well MW-16-125.

Table 17 depicts the measured NAPL thickness at the MW-16-45 location during each measurement event, as well as the estimated volume of NAPL removed from the well. The volume of NAPL removed from this well is also depicted graphically on Figure 12. As depicted, approximately 1 liter of oil was initially removed from the well, with successive events yielding between 0.25 and 0.5 liters of NAPL. The NAPL recovered from the well has been observed (qualitative) to be highly viscous and tacky.

Results of the chemical and physical testing of the recovered NAPL are summarized on Tables 14 through 16, and as follows:

- The fuel fingerprint indicates the NAPL contains diesel- and heavy oil-range petroleum hydrocarbons. Evaluation of the chromatogram with various standards (Appendix J) resulted in the following description provided by the laboratory.

"The sample exhibited a pattern consistent with a medium distillate non-fuel gas-oil (e.g., creosote or coal oil) by the HCID method. Further investigation by the GC-MS confirmed the majority of the sample was made up of polycyclic aromatic hydrocarbons (PAHs) although the majority were naphthalenes and its alkl homologues. From this we conclude the sample may have been derived from only a few likely sources, those being: coal oil based creosote or the cracking and coking operations in many refineries (e.g., light cycle oil residue or coke oil)." The preceding, in conjunction with knowledge of site history, strongly suggests the source of the oil to be cracking and coking processes related to the former oil gas MGP.

- The NAPL has a specific gravity of 1.084 at ambient temperature, and is therefore slightly denser than water (specific gravity of 1.0). At higher temperatures the NAPL was found to maintain a similar specific gravity.

- The NAPL has a viscosity of 105 centistokes (114 centipoise) at a temperature of 70 degrees F. For comparison, water has a viscosity of 1 centistoke or centipoise (by definition), while honey has a viscosity of approximately 10,000 centipoise. As summarized on Table 14, the NAPL at MW-16-45 has the greatest viscosity of any of the NAPL samples previously collected at the site, which ranged from 7.2 centistokes at well MW-6-32 (where active recovery is occurring) to 45.7 centistokes at well MW-11-32.

- Relatively low levels of aromatic hydrocarbons were identified within the NAPL as compared with NAPL from all other areas of the site, with ethylbenzene, toluene, xylene, and trimethlybenzenes all identified at concentrations less than 70 ppm (Table 14). Benzene was not detected within the NAPL at a concentration greater than laboratory method reporting levels (10 ppm).

- The NAPL has no flashpoint below 150°F (Table 12). The low level of volatile aromatic hydrocarbons in the oil likely contributes to the oil's high flash point.

- PAHs were identified within the NAPL at a combined total concentration of 32,787 ppm, of which the carcinogenic PAH fraction consisted of 2,647 ppm. Further, naphthalene comprised almost 50% of total PAHs, with 15,600 ppm identified (Tables 14 and 15). In addition to PAHs, one additional SVOC (2-methylnaphthalene at a concentration of 5,500 ppm) was identified.

3.2.6 NAPL Distribution and Mobility Screening

As depicted on Figures 11 and in a schematic cross-section included as Figure 13, NAPL has been identified beneath a portion of the former discharge / low area, with the extent of NAPL in proximity of the embankment having been delineated to the east by well cluster MW-4 and to the west by well cluster MW-3, to the north by RAA-8, RAA-15, RAA-18, RAA-19, and RAA-20, and to the south by borings B-9 and B-30. As described in Section 3.2.3, the source of the NAPL is likely a function of historical discharge to the pre-fill ground surface in the former low area / discharge area immediately south of the MW-3 / above-ground storage tank farm area. The estimated locations of former effluent discharge features within this area (wastewater outfall and ditch), based on aerial photographs and/or facility diagrams, are included on Figure 11.

As depicted in Figures 11 and 13, the thickness and depth of the oil (NAPL) tends to become greater in a northerly direction, toward the river (although not extending to the river), with the NAPL present primarily across the upper portion of the alluvial unit. As observed at numerous push probe boring locations, the vertical migration of the NAPL appears to have been interrupted by the presence of numerous individual thin silt layers in the upper Alluvial WBZ. Although the continuity of individual silt layers is unknown, it appears sufficient silt is present within the upper Alluvial WBZ such that vertical NAPL migration has been restricted, as evidenced by lack of field screening evidence of impact at depth, as well as diminishing concentrations of dissolved contaminants in groundwater with increasing depth.

As described in Section 3.2.2, results of physical testing of soil core collected from within the zone of NAPL occurrence at the MW-16-65 well location has provided physical data such as total porosity, particle size, pore fluid saturation (water and NAPL), specific gravity, density, viscosity, and interfacial / surface tension data for the core and/or NAPL (Appendix I).

Results of the preceding testing found the mean grain size of a majority of the soils within the NAPL zone to be classified as "fine sand", with total porosities ranging from 45.9% to 52%. NAPL saturations (as a percentage of total pore space) at select depth intervals between approximately 29 feet bgs and 40 feet bgs at the MW-16 location were found to range from 25.7% (at 33.5 feet bgs) to 62.6% (at 35.7 feet bgs). For comparison, residual (non-mobile) NAPL levels as cited in the literature (EPA 1992 and Jackson et.al. 2004), typically range from 5% to 50% of total porosity in soils present below the water table. Residual saturation of NAPL is the saturation at which the NAPL is immobilized by capillary forces as discontinuous ganglia under ambient groundwater flow conditions (Cohen and Mercer 1993).

With regard to NAPL mobility screening of site soils, minimum potential residual saturation levels were estimated by centrifuging soils at 1,000-times the force of gravity, an exertion of force much greater than would be exerted based on gravity, capillary effects, or hydraulic gradient. Based on the centrifuge testing results, minimum residual saturation levels (for soils in the primary zone of NAPL occurrence above 41 feet bgs) were identified as 17.3% (23% initial saturation), and 34.4% (51.9% initial saturation). Based on the preceding, it was possible to mobilize 25% to 34% of the NAPL with the application of sufficient force (1,000-times gravity), with an average minimum residual saturation after centrifuging of 26% (Appendix I).

The mobility screening evaluation is meant to indicate the magnitude of NAPL that may be present at levels greater than possible residual saturation levels, with the centrifuging meant to mimic an infinite amount of time under ambient gravity conditions (with a lack of adjacent barrier material). Due to the qualitative nature of the screening and the presence of apparent silt barrier material as observed in the shoreline borings, it is clear that the preceding estimation does not equate to a given percentage of NAPL that is presently mobile at the site. Rather, it suggests that NAPL is likely present at the site at levels greater than residual saturation, and as such, the NAPL has the potential for mobility given suitable conditions (i.e., as evidenced by flow into the course-grained sand pack of well MW-16-45).

In addition to the preceding, whether DNAPL or groundwater is the wetting fluid in the formation can have an effect on the distribution and fate of DNAPL in the saturated zone. Specifically, the size and distribution of NAPL ganglia or blebs in the saturated zone is affected by the wetting characteristic of the NAPL in the formation (Dwarakanath, et. al.). Water is typically the wetting fluid in the presence of NAPL, which results in smaller blebs of NAPL trapped within the soil pores, with minimal contact between the NAPL and soil (water preferentially coats the soil). Results of the site-specific wettability testing (Appendix I) found the NAPL/water system to be neutrally-wet, indicating that neither fluid (NAPL or water) has a preferred affinity over the other to spread over the soil particles. The preceding suggests that larger blebs of NAPL may become trapped within the soil pores (e.g., higher residual saturation) than would otherwise be encountered in a "typical" system where water is more strongly wetting.

Overall, the identified viscosity, specific gravity, and interfacial tension of the NAPL or NAPL/water system (Table 14) are within the typical range of an oil tar or creosote. With respect to mobility potential, the high viscosity, low specific gravity, and moderate interfacial tension all suggest limited mobility potential.

Section 3.3 of this report provides a description of tar/oil distribution in sediments immediately off-shore of the oil-bearing soils described herein, and is based on investigation and evaluation conducted by Anchor (Anchor 2004). The primary purpose of the evaluation provided in Section 3.3 is to assess the possibility that a complete migration pathway presently exists between NAPL in upland soils and NAPL observed in off-shore sediments.

3.3 Visible Tar Distribution in Offshore Sediments

As described by Anchor (2004), the physical characteristics of the tar material in offshore sediments were spatially heterogeneous and varied in consistency from soft, sticky, plastic, stiff and firm, to brittle. The brittle material is generally gravel-size lumps of tarry sand that appears to have weathered. Much of the brittle tar is found on the sediment surface and was generally found at stations closer into the shoreline in areas that have been exposed to air during low flow conditions. Small pieces of this material were also found at depth in some cores. Most of the tar present below this weathered layer was a softer consistency. Although it smears on surfaces it touches, it is too viscous to flow noticeably and the intermixed sands and non-plastic silt/sands prohibited it from acting viscid when sheared in place. None of the tar layers identified exhibited a noticeable sheen.

The visually contaminated zone in sediments varied in consistency from sediments with a slight hydrocarbon odor, slight sheen, slight oil staining, and minor blebs of oil and/or tar to sediments with more extreme hydrocarbon odor, heavy sheen, and sediments more heavily saturated in tar. In some cases, this saturation had the consistency of somewhat more liquid material that was still very viscous and sticky that was termed "oil" in field logs. No free liquid hydrocarbon product beyond small scattered oily blebs was identified in any of the cores either in tar or in visually contaminated sediments. All "oily" sediments encountered felt viscous to the touch, were intermixed in a mostly sand/silt matrix and did not flow noticeably during the core cutting and sampling procedure.

Based on the physical definitions discussed in Section 2.9 the lateral and vertical extents of the tar body were delineated. The elevations and thicknesses of the surface tar body and visibly contaminated zones are depicted in Figure 6A. As shown, the primary geologic unit in the nearshore zone is silt with discontinuous lenses of sands at variable depths. Discontinuous "pockets" of tar and very viscous "oily" sediment in the nearshore stations are confined to the sediments consisting primarily of sand just below the mudline elevation. Both the tar and "oily" sediment layers were viscous to the touch and exhibited no free flowing properties during sampling, in contrast to the tar and oil zones identified in the upland shoreline area.

The sediment layers where viscous "oily" saturated sands were observed are not laterally continuous with the tar and oil zones identified in the upland borings (see Figure 13). The upland areas with tar or oil product (B-59, B-29, MW-16) are intervened by offshore cores RAA-18, RAA-04, RAA-01, and RAA-02 with no (or very little) "oily" type products present (RAA- and AN-series boring logs are included in Appendix A). Similar observations were made at other intervening core locations (RAA-15, RAA-19, and RAA-20). One core, RAA-01, had very poor recovery in the top 10 feet of core, but the top material recovered was sandy tar and the material below this was firm sticky product in a silt matrix. The only oily type products in sediments were found further out in the AN-series cores in scattered relatively thin layers. In addition, the upland oils are present in alluvial soils with considerable sand content. Underneath these oils are silt layers that appear to extend towards a thicker sequence of surficial offshore silts. In the offshore sediments, this silt layer is typically quite thick and only occasionally interrupted by pockets of more sandy material. These silts appear to be acting as a barrier to the transport of the subsurface NAPL (Figure 13). Consequently, there appears to be no complete physical subsurface pathway between the upland oils in the alluvial sand material to the off-shore tar body or the scattered oily layers in the further offshore silts.

4.0 CONCLUSIONS

Perhaps the most significant finding derived from results of the upland and in-water investigation activities described herein is the lack of connectivity between oil saturated soils within the Alluvial WBZ beneath the upland portion of the site and oily or tarry sediments within the Willamette River, thereby indicating that the NAPL has not in the past, nor is it currently, discharging to Willamette River sediments. As such, oil and tar noted in Willamette River sediments appear to be the result of previous overland discharge of these waste products that occurred at this portion of the site between 1913 and approximately 1941.

In addition to the preceding primary conclusion, the following general conclusions regarding the nature and extent of groundwater impacts and NAPL distribution adjacent to the Willamette River down-gradient of the former tar ponds and the former effluent discharge area, including the pathway between the upland and river areas, are as follows:

Visual Impacts Within Fill

1) Fill encountered adjacent to the embankment within both the former tar pond area and the former effluent discharge area consisted of gravelly sands and silts, including patches or flecks of solid black carbon pitch, with the fill extending to depths of approximately 22.5 feet bgs (B-56) to 26 feet bgs (MW-16).

2) Tar was mixed with other materials for use as fill within the former low area/effluent discharge area, with tar identified within fill ranging from 1 to 2 feet bgs and extending to depths ranging from approximately 22 to 30 feet bgs at borings near, but not immediately adjacent to, the embankment. Direct observation of fill in borings along the embankment indicates that tar was not a component of the fill used to construct the river embankment.

3) An approximate 0.5-foot thick layer of solid, ductile tar identified on the inferred former ground surface riverward of the former tar ponds (B-56), and an approximate 0.5-foot zone containing oily/tar blebs identified near the inferred former ground surface riverward of the former effluent discharge area (MW-16) were likely the result of direct placement prior to filing.

Alluvial Unit Geology

4) Beneath the fill were interbedded sands, silts, and silty sands characteristic of the Alluvial WBZ, extending to a depth of approximately 179 feet bgs near the river embankment down-gradient of the former tar pond area, with similar depths anticipated below the former effluent area. A gravelly layer was observed at the base of the Alluvial unit, below which is inferred to be basaltic bedrock.

Alluvial Unit Groundwater Contaminant Nature and Extent

5) Groundwater data from boring B-56 suggest the presence of two apparently distinct petroleum-related contaminant plumes in the Alluvial WBZ down-gradient of the former tar pond area and the former effluent discharge area.

6) The western plume, located west of boring B-56 in the upper to mid-Alluvial WBZ, extends from approximately 45 feet bgs to 120 feet bgs near the river embankment (MW-4; B-59). The lateral extent of this plume is defined to the west by the MW-3 well cluster and to the east by the B-56 well point location. This plume appears to be the result of NAPL and groundwater penetration into the upper Alluvial WBZ within the southern portion of the former tar ponds/former Koppers waste discharge area.

7) The eastern plume, located east of boring B-56 in the mid to lower portions of the Alluvial WBZ, extends from approximately 70 to 150 feet bgs (MW-5). The lateral extent of this plume is defined to the west by the B-56 well point location and to the east by the Siltronic WS-12 well cluster location. This plume appears to be the result of deeper NAPL migration near the eastern limit of the former tar pond/tar pond overflow area proximate to the former Siltronic property line.

NAPL-Bearing Soils-Former Effluent Discharge Area

8) The lateral limit of oil-bearing soils in proximity to the river embankment at the Gasco site has been found to be limited to an approximate 200 foot interval between the MW-3 and MW-4 well cluster locations (i.e., limited to the former effluent discharge/low area). NAPL-bearing Alluvial soils were similarly identified in push probe borings installed within the former effluent/low area further south of the embankment (e.g., borings B-55 and B-57 through B-59). Borings installed at the base of the embankment show that oil-bearing soils present within the Alluvial WBZ do not extend northward to the Willamette River.

9) The source of the observed NAPL is likely a function of historical discharge to the pre-fill ground surface in the former low area / discharge area southeast of the MW-3 / above-ground storage tank farm area.

10) Vertically, NAPL upland of the river embankment at MW-16 has been identified within visually-impacted soils across a depth interval of approximately 26 to 42 feet bgs, with thin silt layers within the upper Alluvial WBZ observed to be inhibiting vertical migration.

11) Fuel fingerprint analyses indicate that the NAPL contains diesel- and heavy oil-range petroleum hydrocarbons with the chromatograph suggesting it to be a creosote or oil derived from

cracking/coking operations, both of which are consistent with operations historically conducted at the Gasco site.

12) Physical testing of soil core from the MW-16 NAPL zone indicates typical porosities ranging from 42% to 53%, with 11% to 25% of the pore fluids from 26 to 31 feet bgs consisting of NAPL; 20% to 50% of the pore fluids from 31 to 42 feet bgs consisting of NAPL; and 0 to 3% of the pore fluids below 42 feet bgs consisting of NAPL.

13) NAPL mobility screening results indicate that NAPL: is likely present at levels greater than residual saturation at depths between 29 feet bgs and 42 feet bgs at the MW-16 well location. Screening did not indicate potential NAPL mobility below 42 feet bgs. As such, and without consideration of underlying or adjacent low permeability silts, then migration of the NAPL across this depth interval would be deemed possible. However, observed NAPL distribution indicates the presence of underlying and adjacent silts have prevented NAPL migration from the MW-16 area to the adjacent river sediments. is not

14) Physical properties associated with the NAPL identify it as low density fluid (slightly more dense than water), with a high viscosity, moderate interfacial tension, and neutral wettability – all of which suggests poor mobility in the subsurface.

15) Limited NAPL removal activities at the MW-16-45 location suggests that removal of 15 to 30 liters (4 to 8 gallons) of NAPL per month from this location may be feasible, although the likely duration of such yields is not known.

Pathway Evaluation-Upland and Offshore NAPL

16) Sediment borings installed near the toe of the river embankment did not identify the presence of NAPL as identified at adjacent upland locations B-29 and MW-16.

17) Sediment layers offshore of the former effluent discharge area containing viscous oil and tar are laterally discontinuous with the tar and oil zones identified at upland boring locations.

18) A laterally thickening zone of silt present between the upland portion of the site and the river appears to be acting as a barrier to the transport of NAPL, with no complete physical subsurface pathway between the zone of NAPL below the upland portion of the site and the tar body or scattered oily layers identified in offshore sediments.

19) Tar and oil within off-shore sediments appears to be the result of previous overland discharge of these waste products that occurred at this portion of the site between 1913 and approximately 1941.

5.0 LIMITATIONS AND SIGNATURES

The information presented in this report was collected, analyzed, and interpreted following the standards of care, skill, and diligence ordinarily provided by a professional in the performance of similar services as of the time the services were performed. This report and the conclusions and/or recommendations contained in it are based solely upon research and/or observations, and physical sampling and analytical activities, if any, that were conducted at the Client's request.

The information presented in this report is based only upon activities witnessed by HAI or its contractors, and/or upon information provided to HAI by the Client and/or its contractors. The analytical data presented in this report, if any, document only the concentrations of the target analytes in the particular sample, and not the property as a whole.

Unless otherwise specified in writing, this report has been prepared solely for the use by the Client and for use only in connection with the evaluation of the subject property. Any other use by the Client or any use by any other person shall be at the user's sole risk, and HAI shall have neither liability nor responsibility with respect to such use.

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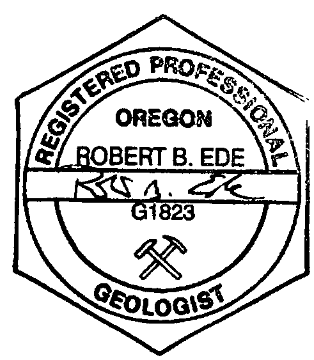

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7.0 GLOSSARY OF ABBREVIATIONS

Anchor	Anchor Environmental, LLC
API	American Petroleum Institute
ASTM	American Society of Testing Materials
bgs	below existing ground surface
BTEX	benzene, toluene, ethylbenzene, xylene
DEQ	Oregon Department of Environmental Quality
DNAPL	dense non-aqueous phase liquid
EPA	U.S. Environmental Protection Agency
FAMM	Fuel and Marine Marketing, Inc.
HAI	Hahn and Associates, Inc.
LTI	Limno-Tech, Inc.
MFA	Maul Foster Alongi, Inc.
mm	millimeter
msl	mean sea level
NAPL	non-aqueous phase liquid
NCA	North Creek Analytical
NPDES	National Pollution Discharge Elimination System
OAR	Oregon Administrative Rules
OD	outside diameter
OWRD	Oregon Water Resources Department
PAHs	polynuclear aromatic hydrocarbons
PCI	Pollution Control Industries, Inc.
PTS	PTS Laboratories, Inc.
ppb	parts per billion
ppm	parts per million
QA/QC	quality assurance / quality control
RCRA	Resource Conservation and Recovery Act
SVOCs	semi-volatile organic compounds
VOCs	volatile organic compounds

TABLES

TABLE 1 – Summary of Analytical Results for Groundwater Samples: Temporary Well Points

Volatile Organic Compounds by EPA Method 8260

Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	**Analytical Results – ug/L (ppb)** VOCs by EPA Method 8260											
				Aromatic VOCs (AVOCs)						Chlorinated VOCs					Other VOCs
				Benzene	Ethyl-benzene	Toluene	Total Xylenes	1,2,4-TMB	Naphthalene	1,1-DCE	cis-1,2-DCE	PCE	TCE	Vinyl Chloride	
Reference Level [1] ==>				51. [2]	7.3 [4]	9.8 [4]	13. [4]		620. [4]	3.2 [2]	590. [4]	590. [4]	30. [2]	530. [2]	
Push Probe Boring Samples															
B-56A	2708-040602-101	2-Jun-04	18-22	8.	5. U	5. U	10. U	5. U	328.	5. U	5. U	5. U	5. U	5. U	U
	2708-040603-102	3-Jun-04	40-44	1. U	1. U	1. U	2. U	1. U	2.57	1. U	1. U	1. U	1. U	1. U	U
	2708-040603-103	3-Jun-04	60-64	3.62	**70.**	1. U	**18.64**	2.06	140.	1. U	1. U	1. U	1. U	1. U	U
	2708-040603-104	3-Jun-04	80-84	5. U	5. U	5. U	10.6	5. U	441.	5. U	5. U	5. U	5. U	5. U	U
(duplicate)	2708-040603-105	3-Jun-04	80-84	3.1	2.02	2. U	6.96	2. U	273.	2. U	2. U	2. U	2. U	2. U	U
	2708-040604-106	4-Jun-04	100-104	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
B-56B	2708-040614-115	14-Jun-04	136-140	1. U	1. U	1. U	2. U	1. U	3.26	1. U	1. U	1. U	1. U	1. U	U
	2708-040614-116	14-Jun-04	174-178	1. U	1. U	1. U	2. U	1. U	4.2	1. U	1. U	1. U	1. U	1. U	U
B-59A	2708-040611-108	11-Jun-04	46-50	**5,570.**	**317.**	50. U	**85.5**	63.	**4,460.**	50. U	50. U	50. U	50. U	50. U	U
	2708-040611-109	11-Jun-04	76-80	**230.**	**25.8**	**12.4**	**26.**	6.65	582.	5. U	5. U	5. U	5. U	5. U	U
	2708-040611-110	11-Jun-04	96-100	**113.**	**9.78**	6.16	11.28	2.58	272.	2. U	2. U	2. U	2. U	2. U	U
	2708-040611-112	11-Jun-04	116-120	**166.**	3.02	2.16	7.05	1.51	116.	1. U	1. U	1. U	1. U	1. U	U
	2708-040611-113	11-Jun-04	144-148	19.3	2.58	1.43	3.58	1.17	119.	1. U	1. U	1. U	1. U	1. U	U
	2708-040614-114	14-Jun-04	171-175	2.29	1. U	1. U	2. U	1. U	3.46	1. U	1. U	1. U	1. U	1. U	U
Quality Control Samples															
Equipment Blank	2708-040602-100	2-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	TB57	-	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	2708-040604-098	4-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Equipment Blank	2708-040604-107	4-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	2708-040604-097	4-Jun-04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Equipment Blank	2708-040611-111	11-Jun-04	-	1. U	1. U	1.13	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U
Trip Blank	2708-040614-096	6/14/04	-	1. U	1. U	1. U	2. U	1. U	2. U	1. U	1. U	1. U	1. U	1. U	U

Note:
AVOCs = aromatic volatile organic compounds
bgs = below ground surface
AWQC = Ambient Water Quality Criteria
DCE = dichloroethene
PCE = tetrachloroethene
DEQ = Oregon Department of Environmental Quality
ppb = parts per billion
TCE = trichloroethene
TMB = trimethylbenzene
U = not detected above detection limit indicated
ug/L = micrograms per liter
VOCs = volatile organic compounds

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
Bold = Concentration exceeds Reference Level

TABLE 2 - Summary of Analytical Results for Groundwater Samples: Temporary Well Points

Polynuclear Aromatic Hydrocarbons by EPA Method 8270 SIM or 8270C

PAHs by EPA Method 8270 (SIM)				**Analytical Results in ug/L (ppb)**																
				Carcinogenic PAHs								Non Carcinogenic PAHs								
Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Indeno (1,2,3 cd) pyrene	Acenaph thene	Acenaph thylene	Anthracene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total PAHs
Reference Level [1] ==>				0.02 [2]	0.01 [4]	0.02 [2]		0.02 [2]	0.02 [2]	0.02 [2]	0.02 [2]	520. [4]		13. [4]	6.16 [4]	3.9 [4]	620. [4]	6.3 [4]	4,000. [2]	
Push Probe Boring Samples																				
B-56A	2708-040602-101	2-Jun-04	18-22	**7.99**	**9.45**	**7.03**	6.89	**6.04**	**10.2**	4. U	**4.81**	54.1	4.08	**14.1**	**44.2**	**23.3**	21.	**53.7**	50.7	317.6
	2708-040603-102	3-Jun-04	40-44	**0.0239**	**0.0196**	**0.0234**	0.1000 U	**0.0188**	**0.0345**	0.0100 U	0.0167	0.3420	0.1000 U	0.1000 U	0.1680	0.1320	3.6100	0.3300	0.2230	4.9419
	2708-040603-103	3-Jun-04	60-64	0.0100 U	0.0100 U	0.0100 U	0.1000 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.1030	0.1000 U	0.1000 U	0.1000 U	0.1000 U	63.8000	0.1000 U	0.1000 U	63.9030
	2708-040603-104	3-Jun-04	80-84	**0.0315**	**0.0313**	**0.0236**	0.1000 U	0.0166	**0.0416**	0.0100 U	0.0154	0.1260	0.1500 U	0.1000 U	0.1650	0.1500 U	358.00	0.2800	0.2300	358.9610
(duplicate)	2708-040603-105	3-Jun-04	80-84	0.03 U	0.0300 U	0.0300 U	0.1000 U	0.0300 U	0.0300 U	0.0300 U	0.0300 U	0.1500 U	0.1500 U	0.1000 U	0.1320	0.1500 U	405.00	0.2140	0.1840	405.5300
	2708-040603-106	4-Jun-04	100-104	0.0167	**0.0170**	0.0121	0.1000 U	0.0113	**0.0216**	0.0100 U	0.0108	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.8500	0.1000 U	0.1000 U	0.9395
B-56B	2708-040614-115	14-Jun-04	136-140	**0.1700**	**0.1370**	0.1000 U	0.1000 U	0.1000 U	**0.2140**	0.2000 U	0.1000 U	0.6460	0.1000 U	0.3920 U	1.1000	0.4490	2.5800	2.9900	1.3100	9.5960
	2708-040614-116	14-Jun-04	174-178	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.2000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.1000 U	0.9200	0.1440	0.1060	1.1700
Quality Control Samples																				
Equipment Blank	2708-040604-107	4-Jun-04	-	0.01 U	0.01 U	0.01 U	0.1 U	0.01 U	0.01 U	0.01 U	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Note:
AWQC = Ambient Water Quality Criteria
bgs = below ground surface
DEQ = Oregon Department of Environmental Quality
EB = equipment blank
EPA = U.S. Environmental Protection Agency
PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
U = not detected above detection limit indicated
ug/L = micrograms per liter

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
Bold = Concentration exceeds Reference Level

TABLE 3 - Summary of Analytical Results for Groundwater Samples: Temporary Well Points

Detected Semi-Volatile Organic Compounds by EPA Method 8270C

SVOCs by EPA Method 8270				Analytical Results in ug/L (ppb)																				
Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Acenaphthene	Anthracene	Benzenemethanol (alpha,alpha,-dimethyl)[5]	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (b) thiophene[5]	Benzo (ghi) perylene	Benzo (k) fluoranthene	Bis(2-ethylhexyl)phthalate	Carbazole	Chrysene	Fluoranthene	Fluorene	Indane[5]	Indeno (1,2,3-cd) pyrene	Naphthalene	Naphthalenecarboxylic acid[5] (Isomer)	1,8-Naphthalic anhydride[5]	Phenanthrene	Pyrene
Reference Level [1]				520. [4]	13. [4]	8.6 [4]	0.02 [2]	0.01 [4]	0.02 [2]	##	##	0.02 [2]	2.2 [2]	##	0.02 [2]	6.16 [4]	3.9 [4]	##	0.02 [2]	620. [4]	##	##	6.3 [4]	4,000. [2]
Push Probe Boring Samples																								
B-56A	02-101	2-Jun-04	18-22	71.3	**45.9**	50. U	**50.4**	**66.7**	**39.4**	50. U	50.9	**40.6**	50. U	25. U	**69.2**	**161.**	**34.5**	50. U	**36.9**	25. U	50. U	50. U	**136.**	199.
	03-102	3-Jun-04	40-44	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	**17.4**	5. U	5. U	5. U	5. U	-	5. U	5.19	-	-	5. U	5. U
	03-103	3-Jun-04	60-64	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	41.5	-	-	5. U	5. U
	03-104	3-Jun-04	80-84	5. U	5. U	**25.9** J	5. U	5. U	5. U	10.7 J	5. U	5. U	10. U	5. U	5. U	5. U	5. U	349. J	5. U	317.	15.5 J	90.7 J	5. U	5. U
	04-106	4-Jun-04	100-104	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	5. U	-	-	5. U	5. U
B-56B	14-115	14-Jun-04	136-140	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	5. U	-	-	5.16	5. U
	14-116	14-Jun-04	174-178	5. U	5. U	-	5. U	5. U	5. U	-	5. U	5. U	10. U	5. U	5. U	5. U	5. U	-	5. U	5. U	-	-	5. U	5. U

Note: Sample Prefix = 2708-0406
AWQC = Ambient Water Quality Criteria
bgs = below ground surface
DEQ = Oregon Department of Environmental Quality
EB = equipment blank
EPA = U.S. Environmental Protection Agency
PAHs = polynuclear aromatic hydrocarbons
ND = not detected
ppb = parts per billion
U = not detected above detection limit indicated
ug/l = micrograms per liter
J = estimated concentration

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
5 = Tentatively Identified Compound by GC/MS
Bold = Concentration exceeds Reference Level

TABLE 4 - Summary of Analytical Results for Groundwater Samples: Temporary Well Points

Metals and Cyanide

Well Point Location	Sample Number	Sample Date	Screen Interval (feet bgs)	Analytical Results - mg/l (ppm)													
				Dissolved Metals by EPA 6000/7000 Series Methods						Total Metals by EPA 6000/7000 Series Methods						EPA Method 9010	
				Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Amenable Cyanide	Cyanide
			Reference Level [1] ==>	1.4E-04 [2]	0.011 [2]	2.7E-03	5.4E-04 [3,5]	0.016 [2]	0.037 [3,5]								0.005 [2]
Push Probe Boring Samples																	
B-56A	2708-040602-101	2-Jun-04	18-22	**0.00134**	0.00100	0.00200 U	0.00100 U	**0.0238**	0.0199	0.00177	0.00803	0.00856	0.00446	0.0121	0.0288	0.0343	**0.0800**
	2708-040603-102	3-Jun-04	40-44	**0.00119**	0.00498	0.00218	0.00100 U	**0.0320**	**0.0647**	0.00401	0.0595	0.0202	0.00232	0.0256	0.270	0.105	**0.517**
	2708-040603-103	3-Jun-04	60-64	**0.00796**	0.00538	0.00200 U	0.00100 U	**0.0338**	0.0103	0.0143	0.0460	0.0336	0.00446 U	0.117	0.224	0.0842	**0.406**
	2708-040603-104	3-Jun-04	80-84	**0.00724**	0.00653	0.00200 U	0.00100 U	**0.0325**	**0.0755**	0.0179	0.316	0.194	0.0256	0.145	0.702	0.107	**0.506**
	2708-040604-106	4-Jun-04	100-104	**0.00515**	0.00123	0.00200 U	0.00100 U	**0.0173**	0.0103	0.00869	0.0375	0.0415	0.00457	0.0505	0.100	0.156	**0.533**
B-56B	2708-040614-115	14-Jun-04	136-140	**0.00582**	0.001 U	0.002 U	0.001 U	0.0162	**0.191**	0.0290	0.827	0.457	0.0306	0.291	6.51	0.005 U	**0.006**
	2708-040614-116	14-Jun-04	174-178	0.001 U	0.001 U	0.002 U	0.001 U	0.00445	**0.0383**	0.00369	0.0351	0.0218	0.00204	0.0246	0.177	0.0319	**0.0557**
Quality Control Samples																	
Equipment Blank	2708-040604-107	4-Jun-04	-	0.001 U	0.001 U	0.002 U	0.001 U	0.002 U	0.005 U	-	-	-	-	-	-	-	-

AWQC = Ambient Water Quality Criteria
bgs = below ground surface

EPA = U.S. Environmental Protection Agency
J = estimated concentration

1 = Reference Level is lowest of EPA AWQC for aquatic life protection, AWQC for human consumption of organisms only, or DEQ SLV for aquatic receptors
2 = Ambient Water Quality Criteria (EPA 822-R-02-047, November 2002) (AWQC) based on human consumption of organisms only
3 = AWQC based on Freshwater Aquatic Life Protection, CCC Values
4 = DEQ Level II Ecological Screening Level Values (SLVs) for aquatic receptors (December 2001)
Bold = Concentration exceeds Reference Level

Table 5 - Summary of Analytical Results for Groundwater Samples
August 2004 Sampling Event

Well Number	HAI Sample Number[1]	Sample Date	Analytical Results																					
			EPA Method 8021 or 8260B ug/l (ppb)					EPA Method 8260B ug/l (ppb)							EPA Method 9010A	EPA Method 9012A	Total (Unfiltered) Metals by EPA Method 6010B or 6020B						EPA Method 8270-SIM	
			Select Aromatic VOCs (AVOCs)					Select Halogenated VOCs (HVOCs)							mg/l (ppm)	mg/l (ppm)	mg/l (ppm)						ug/l (ppb)	
			Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	1,1-DCE	CIS-1,2-DCE	trans-1,2-DCE	TCE	PCE	chloroethane	Vinyl Chloride	Amenable Cyanide	Total Cynaide	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Carcinogenic PAHs	Total PAHs
Ambient Water Quality Criteria (AWQC) for Surface Water[2]			51.[4]	200,000.[4]	29,000.[4]	#	#	100.	100.	100.	100.	100.	100.	100.	#	620.[4]	0.00014[4]	0.011[3]	0.009[3]	0.0025[3]	0.052[4]	0.120[3]	#	#
MW-1-22	2708-040825-MW1-22-019	25-Aug-04	4.66	5.87	6.59	46.3	63.42	-	-	-	-	-	-	-	1.89	4.31	**0.00302**	**0.0315**	ND>0.00200	**0.0182**	**0.168**	**0.23**	0.26	589.25
MW-2-32	2708-040816-MW2-32-009	16-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.0285	0.0835	**0.00108**	ND>0.0010	ND>0.0020	ND>0.0010	0.00621	ND>0.0050	ND	ND
MW-2-61	2708-040813-MW2-61-002	13-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.09	0.82	**0.0016**	0.0017	ND>.00200	ND>.00100	0.0105	ND>.00500	ND	ND
MW-3-26	2708-048023-MW3-26-010	23-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.18	0.18	ND>0.0010	ND>0.0010	ND>.00200	ND>.00100	**0.0983**	0.0069	ND	ND
MW-3-56	2708-040823-MW3-56-011	23-Aug-04	10.6	ND>1.00	ND>1.00	ND>1.00	10.6	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	0.03	0.03	**0.0035**	0.0018	ND>.00200	ND>.00100	0.0042	ND>.00500	ND	56.64
MW-4-35	2708-040823-MW4-35-012	23-Aug-04	1.61	ND>0.500	ND>0.500	1.65	3.26	-	-	-	-	-	-	-	0.1	0.18	**0.0067**	ND>0.0010	ND>.00200	ND>0.0010	0.0073	ND>.00500	ND	65.33
MW-4-57	2708-040824-MW4-57-016	24-Aug-04	**15,000.**	ND>100	748.	122.	15,870.	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	0.26	1.76	**0.0126**	0.0011	ND>.00200	ND>0.0010	0.0079	ND>.00500	1.21	3,822.86
MW-4-101	2708-040816-MW4-101-007	16-Aug-04	**513.**	ND>2.5	3.14	ND>5.00	516.14	-	-	-	-	-	-	-	0.005	0.005	**0.0142**	ND>0.0010	ND>0.0020	ND>0.0010	ND>0.0020	ND>0.0050	ND	26.74
MW-5-32	2708-040816-MW5-32-008	16-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.175	0.521	ND>0.0010	ND>0.0010	ND>0.0020	ND>0.0010	0.00359	ND>0.0050	ND	0.27
MW-5-100	2708-040824-MW5-100-015	24-Aug-04	**11,500.**	ND>100	683.	253.	12,436.	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	ND>100	0.3	0.82	**0.0087**	ND>0.0010	ND>0.0020	ND>0.0010	0.002	ND>0.0050	ND	11,921.9
MW-5-175	2708-040824-MW5-175-013	24-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.01	0.01	**0.0062**	0.0012	ND>0.0020	ND>0.0010	0.0031	ND>0.0050	ND	ND
MW-8-29	2708-040825-MW8-29-022	25-Aug-04	**85.9**	13.4	14.3	29.1	142.7	-	-	-	-	-	-	-	0.138	2.69	**0.00243**	0.0066	ND>0.00200	ND>0.00100	0.0113	ND>0.00500	38.52	3,072.45
MW-8-56	2708-040825-MW8-56-021	25-Aug-04	**20,300.**	248.	795.	831.	22,174.	-	-	-	-	-	-	-	0.153	0.474	**0.00766**	0.0072	ND>0.00200	ND>0.00100	0.0076	0.00535	ND	10,832.7
MW-9-29	2708-040812-MW9-29-001	12-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.01	0.01	**0.002**	0.0014	ND>.00200	ND>.00100	0.0027	ND>.00500	ND	ND
MW-10-61	2708-040813-MW10-61-005	13-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.03	0.06	**0.0023**	0.0036	0.0041	ND>.00100	0.013	0.0183	0.1	0.53
MW-12-36	2708-040825-MW12-36-017	25-Aug-04	**235.**	584.	488.	991.	2,298.	-	-	-	-	-	-	-	ND>.00500	ND>.00500	**0.0297**	ND>0.00100	ND>0.00200	ND>0.00100	ND>0.00200	ND>0.00500	ND	696.31
MW-13-30	2708-040825-MW13-30-018	25-Aug-04	**1,150.**	8.25	120.	75.6	1,353.85	-	-	-	-	-	-	-	0.055	0.1	**0.0144**	ND>0.00100	ND>0.00200	ND>0.00100	ND>0.00200	ND>0.00500	ND	354.41
MW-13-61	2708-040813-MW13-61-003	13-Aug-04	2.19	ND>0.500	ND>0.500	ND>1.00	2.19	-	-	-	-	-	-	-	0.04	0.13	**0.0077**	0.0018	0.0024	ND>.00100	0.0138	0.0061	ND	0.28
MW-14-110	2708-040824-MW14-110-014	24-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	0.02	0.02	**0.0114**	ND>0.0010	ND>0.0020	ND>0.0010	0.0028	ND>.00500	ND	0.08
MW-15-50	2708-040825-MW15-50-020	25-Aug-04	**40,500.**	ND>250	288.	764.	41,552.	-	-	-	-	-	-	-	0.418	0.46	**0.0172**	0.00141	0.00265	ND>0.00100	0.00529	ND>0.00500	ND	6,268.1
MW-15-66	2708-040813-MW15-66-006	13-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND	-	-	-	-	-	-	-	ND>.00500	ND>.00500	**0.0048**	0.0027	0.003	ND>.00100	0.0055	0.00895	ND	ND
MW-16-45	2708-040826-MW16-45-028	26-Aug-04	**2,880.**	959.	460.	867.	5,166.	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50.0	ND>50	0.0725	0.138	**0.0092**	**0.0138**	0.00473	0.00138	**0.131**	0.011	10.77	7,946.17
MW-16-65	2708-040826-MW16-65-026	26-Aug-04	**1,370.**	388.	236.	552.	2,546.	ND>50	ND>50	ND>50	ND>50	ND>50	ND>50.0	ND>50	0.186	0.402	**0.00173**	0.00137	0.00201	ND>0.00100	0.0197	0.00762	0.54	3,838.12
	2708-040826-MW16-65-027	26-Aug-04	**1,250.**	339.	223.	486.	2,298.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.76	4,098.68
MW-16-125	2708-040826-MW16-125-025	26-Aug-04	ND>1.00	ND>1.00	ND>1.00	ND>2.00	ND	ND>1.00	ND>1.00	ND>1.00	ND>1.00	ND>1.00	1.17	ND>1.00	0.0747	0.0943	**0.00461**	0.00134	ND>0.00200	ND>0.00100	0.00542	ND>0.00500	ND	36.88

Note:
\# = Reference Level not established
AWQC = Ambient Water Quality Criteria
Bold = Detected above Reference Level
BTEX = benzene, toluene, ethylbenzene, and xylenes

DEQ = Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/l = milligrams per liter
ND = not detected above detection limit indicated

PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
ppm = parts per million
ug/l = micrograms per liter

1 = Sample Prefix: 2708-03
2 = Reference Level indicated is the lowest guidance value provided in the Ambient Water Quality Criteria (EPA-822-R-02-047, November 2002) based on Freshwater Chronic (Aquatic Life Protection) and Fish Consumption (Human Health Protection)
3 = Reference Level based on Aquatic Fresh Chronic Criteria of AWQC, November 2002 revision
4 = Reference Level based on Human Fish Consumption Criteria of AWQC, November 2002 revision

Table 6 - Summary of Analytical Results for Groundwater Samples: PAHs
August 2004 Sampling Event

Well Number	HAI Sample Number [1]	Sample Date	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenzo (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total PAHs
			PAHs by EPA Method 8270-SIM Analytical Results ug/l (ppb)																	
			Carcinogenic PAHs							Non-carcinogenic PAHs										
Ambient Water Quality Criteria (AWQC) for Surface Water [2]			0.018[4]	0.018[4]	0.018[4]	0.018[4]	0.018[4]	0.018[4]	0.018[4]	990. [3]	#	40,000[4]	#	140. [4]	5,300.[4]	620. [3]	#	4,000.[4]	#	#
MW-1-22	2708-040825-MW1-22-019	25-Aug-04	**0.130 J**	ND>0.100	ND>0.100	ND>0.100	**0.131 J**	ND>0.200	ND>0.100	50.	ND>0.5	7.	ND>0.5	2.61	46.9	403.	77.4	2.34	0.26	589.25
MW-2-32	2708-040816-MW2-32-009	16-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-2-61	2708-040813-MW2-61-002	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-3-26	208+040823-MW3-26-010	23-Aug-04	ND>0.050	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-3-56	2708-040823-MW3-56-011	23-Aug-04	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>0.50	ND>1.00	ND>0.50	25.8	0.500 J	2.29	ND>0.500	6.76	10.2	0.554 J	3.94	6.62	ND	56.64
MW-4-35	2708-040823-MW4-35-012	23-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>1.0	ND>0.500	32.8	1.39	1.02	ND>0.500	7.46	11.4	1.44	2.46	7.36	ND	65.33
MW-4-57	2708-040816-MW4-57-016	16-Aug-04	**0.275**	**0.168 J**	**0.167 J**	**0.207**	**0.275**	ND>0.2	**0.113 J**	42.1	ND>5.0	ND>5.0	ND>5.0	ND>5.0	ND>5.0	**3,780.**	ND>5.0	ND>5.0	1.21	3,822.86
MW-4-101	2708-040816-MW4-101-007	16-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	0.541	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	26.2	ND>0.100	ND>0.100	ND	26.74
MW-5-32	2708-040816-MW5-32-008	16-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	0.269	ND	0.27
MW-5-100	2708-040824-MW5-100-015	24-Aug-04	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	21.9	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	**11,900.**	ND>2.5	ND>2.5	ND	11,921.9
MW-5-175	2708-040824-MW5-175-013	24-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-8-29	2708-040825-MW8-29-022	25-Aug-04	**7.49**	**4.95**	**4.24**	**8.19**	**9.56**	ND>1.00	**4.09**	234.	2.82	16.1	6.01	27.8	56.6	**2,520.**	136.	34.6	38.52	3,072.45
MW-8-56	2708-040825-MW8-56-021	25-Aug-04	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>5.0	ND>2.5	165.	57.2	11.7	ND>2.5	14.7	59.8	**10,400.**	108.	16.3	ND	10,832.7
MW-9-29	2708-040812-MW9-29-001	12-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-10-61	2708-040813-MW10-61-005	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	**0.104**	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	0.11	0.14	ND>0.100	ND>0.100	ND>0.100	0.18	0.1	0.53
MW-12-36	2708-040825-MW12-36-017	25-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND>0.500	62.	ND>1.00	2.66	ND>0.500	6.34	29.6	554.	36.2	5.51	ND	696.31
MW-13-30	2708-040825-MW13-30-018	25-Aug-04	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND>0.500	171.	ND>1.50	6.46	ND>0.500	2.94	35.9	78.6	57.1	2.41	ND	354.41
MW-13-61	2708-040813-MW13-61-003	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	0.115	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	0.168	ND>0.100	ND>0.100	ND	0.28
MW-14-110	2708-040824-MW14-110-014	24-Aug-04	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.100	ND>0.050	0.0828 J	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND>0.050	ND	0.08
MW-15-50	2708-040825-MW15-50-020	25-Aug-04	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>2.5	ND>5.0	ND>2.5	35.3	50.9	4.23 J	ND>5.0	4.44 J	51.9	**6,130.**	3.93 J	ND>5.00	ND	6,268.1
MW-15-66	2708-040813-MW15-66-006	13-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND	ND
MW-16-45	2708-040826-MW16-45-028	26-Aug-04	**2.64**	**2.57**	ND>1.25	**2.23 J**	**3.33**	ND>2.5	ND>1.25	137.	17.8 J	22.4	ND>10.0	19.6 J	60.7	**7,500.**	154.	23.9	10.77	7,946.17
MW-16-65-026	2708-040826-MW16-65-026	26-Aug-04	**0.24**	ND>0.200	ND>0.200	ND>0.2	**0.3**	ND>0.400	ND>0.200	91.	ND>10.0	10.3	ND>5.0	5.54 J	42.8	**3,600.**	81.1	6.84 J	0.54	3,838.12
MW-16-65-027	2708-040826-MW16-65-027	26-Aug-04	**0.34**	ND>0.250	ND>0.250	ND>0.250	**0.41**	ND>0.500	ND>0.250	85.6	ND>10.0	10.3	ND>5.0	5.62 J	39.5	**3,870.**	80.2	6.70 J	0.76	4,098.68
MW-16-125	2708-040826-MW16-125-025	26-Aug-04	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.100	ND>0.200	ND>0.100	1.74	ND>0.500	0.676 J	ND>0.500	0.62	1.14	26.5	5.39	0.816 J	ND	36.88

Note: **Bold** = detected above Reference Level
ND = not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
ug/l = micrograms per liter

1 = Sample Prefix: 2708-03
2 = Reference Level indicated is the lowest guidance value provided in the Ambient Water Quality Criteria (EPA-822-R-02-047, November 2002) based on Freshwater Chronic (Aquatic Life Protection) and Fish Consumption (Human Health Protection)
3 = Reference Level based on Aquatic Fresh Chronic Criteria of AWQC, November 2002 revision
4 = Reference Level based on Human Fish Consumption Criteria of AWQC, November 2002 revision
J = Estimated concentration between method detection limit and method reporting level

Table 7 - Summary of Analytical Results for Groundwater Samples: SVOCs
August 2004 Sampling Event

Well Number	HAI Sample Number [1]	Sample Date	SVOCs by EPA Method 8270C Analytical Results ug/l (ppb)				
			Carbazole	4-Chloro-3-methylphenol	Dibenzofuran	2-Methylnapthalene	PAHs
Ambient Water Quality Criteria (AWQC) for Surface Water [2]			-	-	-	-	See Table 6
MW-3-56	2708-040823-MW3-56-011	23-Aug-04	18.6	ND>5.0	9.27	ND>5.0	See Table 6
MW-4-57	2708-040824-MW4-57-016	24-Aug-04	ND>500	ND>500	ND>500	ND>500	See Table 6
MW-5-100	2708-040824-MW5-100-015	24-Aug-04	ND>500	ND>500	ND>500	ND>500	See Table 6
MW-16-45	2708-040826-MW16-45-028	26-Aug-04	137.	ND>100	ND>100	544.	See Table 6
MW-16-65	2708-040826-MW16-65-026	26-Aug-04	ND>100	ND>100	ND>100	460.	See Table 6
MW-16-125	2708-040826-MW16-125-025	26-Aug-04	ND>5.00	6.27	ND>5.00	6.23	See Table 6

Note: **Bold** = detected above Reference Level
ND = not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppb = parts per billion
SVOCs = semi-volatile organic compound
ug/l = micrograms per liter

1 = Sample Prefix: 2708-03
2 = Reference Level indicated is the lowest guidance value provided in the Ambient Water Quality Criteria (EPA-822-R-02-047, November 2002) based on Freshwater Chronic (Aquatic Life Protection) and Fish Consumption (Human Health Protection)
3 = Reference Level based on Aquatic Fresh Chronic Criteria of AWQC, November 2002 revision
4 = Reference Level based on Human Fish Consumption Criteria of AWQC, November 2002 revision

Table 8 - Summary of Analytical Results for Quality Assurance / Quality Control (QA/QC) Samples
August 2004 Sampling Event

QA/QC Sample Type	HAI Sample Number [1]	Sample Date	Comment	**Analytical Results ug/l (ppb)**								
				EPA Method 8260B					EPA Method 8270			
				Select Aromatic VOCs (AVOCs)					Polynuclear Aromatic Hydrocarbons (PAHs) [2]			
				Acetone	Benzene	Toluene	Ethyl benzene	Xylenes	Naphthalene	Phenanthrene	All Others	Total PAHs
Equipment Blank	2708-040813-MW7-004	13-Aug-04	DI Water sampled from decontaminated pump after sampling MW-13-61	-	ND>0.500	ND>0.500	ND>0.500	ND>1.00	ND>0.100	ND>0.100	ND	ND
Equipment Blank	2708-040826-MW7-023	26-Aug-04	DI Water sampled from decontaminated pump after sampling MW-8-29	140.	ND>1.00	ND>1.00	ND>1.00	1.67	0.322	0.140	ND	0.462
Equipment Blank	2708-040826-MW7-024	26-Aug-04	DI Water sampled from decontaminated pump after sampling MW1-22	153.	ND>1.00	ND>1.00	ND>1.00	1.71	0.188	ND>0.0500	ND	0.188

Note:
'-' = not analyzed
BTEX = benzene, toluene, ethylbenzene, and xylenes
EPA = U.S. Environmental Protection Agency
ND = not detected above detection limit indicated

1 = Sample Prefix: 2708-03
2 = Only detected compounds shown

ppb = parts per billion
ug/l = micrograms/liter

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [3] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
FAMM	B-07	950927-B7-05	27-Sep-95	17.0							ND	ND							
	B-08	950918-B8-04	18-Sep-95	10.0				X		54.	185.	338.49							
		950918-B8-05	18-Sep-95	12.5						15.									
		950918-B8-08	18-Sep-95	18.0							ND	0.243							
	B-10	950925-B10-04	25-Sep-95	17.5							ND	ND	ND>0.3	ND>0.3	ND>0.3	ND>0.3		ND	ND>0.5
	B-47	000829-039	29-Aug-00	0.2							2.39	3.93							
		000829-040	29-Aug-00	0.2 (dup)							0.055	0.055							
		000829-041	29-Aug-00	5.0				X			54.09	105.89	ND>0.0031	ND>0.0031	ND>0.0031	ND>0.00904	ND		
		000829-042	29-Aug-00	11.5				X			213.5	841.	ND>0.00298	ND>0.00298	ND>0.00298	ND>0.00893	ND		
		000829-043	29-Aug-00	11.5 (dup)							875.	2,277.	ND>0.00309	ND>0.00309	ND>0.00309	ND>0.00926	ND		
		000829-045	29-Aug-00	31.0							54.55	181.34	ND>0.00294	0.004	0.017	0.062	0.083		
	B-51	000828-023	28-Aug-00	0.2							9.12	19.055							
		000828-024	28-Aug-00	2.0															
		000828-025	28-Aug-00	8.5															
	B-52	000828-026	28-Aug-00	0.2							7.355	13.55							
		000828-027	28-Aug-00	3.5	X														
		000828-028	28-Aug-00	10.5	X														
		000828-029	28-Aug-00	10.5 (dup)	X														
		950918-B8-06	18-Sep-95	12.5 (dup)						18.									
	GT-1	971117-001	17-Nov-97	3.0							2.24	4.34	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971117-004	17-Nov-97	10.5	X	X			300 [6]	13,400 [6]	ND	6.17	ND>0.025	ND>0.025	0.034	0.13	0.164		ND>0.03 UJ
		971117-006	17-Nov-97	16.0							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971117-008	17-Nov-97	20.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971117-011	17-Nov-97	35.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
	GT-2	971117-012	17-Nov-97	3.5							ND	0.084	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971117-017	17-Nov-97	15.5							ND	ND	0.027	ND>0.025	ND>0.075	ND>0.075	0.027		ND>0.02
		971117-021	17-Nov-97	33.0							ND	ND	ND>0.025 UJ	ND>0.025 UJ	ND>0.075 UJ	ND>0.075 UJ	ND		ND>0.02
	GT-3	971118-023	18-Nov-97	3.0							21.9	43.09	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971118-026	18-Nov-97	12.5							ND	0.05	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971118-032	18-Nov-97	36.0							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
	GT-4	971118-034	18-Nov-97	13.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02
		971118-038	18-Nov-97	40.5							ND	ND	ND>0.025	ND>0.025	ND>0.075	ND>0.075	ND		ND>0.02

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [3] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
FAMM	MW-13-61	971218-M13-02	18-Dec-97	6.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
(cont.)		971218-M13-03	18-Dec-97	10.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-04	18-Dec-97	13.5							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-05	18-Dec-97	18.0							0.342	1.	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		971218-M13-08	18-Dec-97	24.5							ND	ND	0.069	ND>0.025	ND>0.025	ND>0.075	0.069		0.04
		971218-M13-10	18-Dec-97	28.0							ND	0.058							
		971218-M13-11	18-Dec-97	31.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		0.02
		971218-M13-17	18-Dec-97	57.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	SS-5	981112-SS-05	12-Nov-98	0.2				X			255.3	398.5							1.3
	SS-6	981112-SS-06	12-Nov-98	0.2							1.532	2.568							0.58
	SS-10	981112-SS-10	12-Nov-98	0.2	Prussian Blue			X			16.52	35.28							41.
Office Area	B-38	000828-014	28-Aug-00	0.2							10.39	19.18							
		000828-015	28-Aug-00	2.0				X			4.9	10.4	ND>0.00284	ND>0.00284	ND>0.00284	ND>0.00852	ND		
		000828-016	28-Aug-00	8.5				X			0.395	0.72	ND>0.00305	ND>0.00305	ND>0.00305	ND>0.00915	ND		
	B-39	000828-004	28-Aug-00	0.2							6.49	11.57							
		000828-005	28-Aug-00	3.0							ND	ND	ND>0.00294	ND>0.00294	ND>0.00294	ND>0.00882	ND		
		000828-006	28-Aug-00	9.5							ND	ND	ND>0.00278	ND>0.00278	ND>0.00278	ND>0.00833	ND		
	B-40	000828-010	28-Aug-00	0.2							32.38	56.155							
		000828-011	28-Aug-00	2.5							ND	ND	ND>0.00269	ND>0.00269	ND>0.00269	ND>0.00806	ND		
		000828-012	28-Aug-00	9.5							ND	ND	ND>0.00329	ND>0.00329	ND>0.00329	ND>0.00987	ND		
	B-41	000828-007	28-Aug-00	0.2							14.885	27.285							
		000828-008	28-Aug-00	2.5							12.58	26.43	ND>0.00278	ND>0.00278	ND>0.00278	ND>0.00833	ND		
		000828-009	28-Aug-00	9.5							ND	ND	ND>0.00278	ND>0.00278	ND>0.00278	ND>0.00833	ND		
Retorts / Koppers	B-11	950928-B11-01	28-Sep-95	0.2						1,600. J									
		950928-B11-06	28-Sep-95	12.5	X					1,700. J	3.26	972.87	ND>0.3	ND>0.3	3.4 J	3. J	6.4		
		950928-B11-09	28-Sep-95	23.0							ND	1.051							
	B-13	951006-B13-03	6-Oct-95	10.5	X	X			1,000.	2,700.	3,915.9	29,386.9	**28.**	ND>20	**110.**	22.	160.	ND	ND>0.1
		951006-B13-07	6-Oct-95	18.5							ND	ND							
		951006-B13-10	6-Oct-95	24.0					ND>10	ND>5	ND	ND							
	B-14	950928-B14-01	28-Sep-95	0.2															
		950928-B14-02	28-Sep-95	2.5	X					280 J									
		950928-B14-03	28-Sep-95	5.0							ND	ND							
	B-15	951006-B15-05	6-Oct-95	21.0	X				70.	200.	45.9	637.6	**7.9**	ND>0.3	3.9	2.5	14.3		
		951006-B15-08	6-Oct-95	27.0							0.21	1.791							
	B-17	950929-B17-01	29-Sep-95	3.0							24.07	59.079							
		950929-B17-05	29-Sep-95	16.5	X	X			2400. J	4700. J	114.1	1,814.						ND	
		950929-B17-07	29-Sep-95	23.5							ND	0.888							

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation: Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Analytical Results mg/kg (ppm): DEQ Method TPH-G: Gasoline	DEQ Method 418.1M: Diesel/Oil	EPA Method 8270 SIM: Carcinogenic PAHs	Total PAHs	EPA Method 8020: Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	EPA Method 8270: Total Phenols	EPA Method 9010: Total Cyanide
				EPA PRGs for Industrial Soil [3] ==>	#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Retorts / Koppers (cont.)	B-18	950919-B18-05	19-Sep-95	12.0	X				3,100.	99.	0.659	59.306	**360.**	**280.**	**31.**	220.	891.	0.36	ND>0.25
		950919-B18-08	19-Sep-95	19.5	X				850.	44.									
		950919-B18-09	19-Sep-95	22.0					24.	380.									
		950919-B18-10	19-Sep-95	24.5							ND	ND							
	B-19	950919-B19-01	19-Sep-95	0.2						68.	324.2	933.22	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		950919-B19-03	19-Sep-95	6.5	X	X			1,600.	1,500.	35.76	408.26	**41.**	**120.**	**39.**	160.	360.	ND	
		950919-B19-04	19-Sep-95	10.5	X				3,200. J	1,500. J									
		950919-B19-05	19-Sep-95	12.0					1,900.	6,800.									
		950920-B19-07	20-Sep-95	18.0					130. J	760. J	0.101	80.001							
		950920-B19-08	20-Sep-95	27.0							0.027	1.956							
	B-20	950929-B20-03	29-Sep-95	10.5	X	X			940 J	340. J	244.507	1,092.607	**120 J**	64.	16.	60.	260.	ND	
		950929-B20-07	29-Sep-95	23.5					220 J	11.	0.255	12.686							
	B-21	951003-B21-04	3-Oct-95	11.5							0.418	7.107							
	B-22	951003-B22-01	3-Oct-95	3.5	X	X				530.									
		951003-B22-05	3-Oct-95	13.5	X						1.727	40.268	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951003-B22-09	3-Oct-95	24.0	X	X				600.	30.23	485.234	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951003-B22-10	3-Oct-95	26.5						12.									
	B-23	951003-B23-02	3-Oct-95	10.5	X				1,300.	930.									0.17
		951003-B23-05	3-Oct-95	18.5	X					16.									
		951003-B23-08	3-Oct-95	26.5	X			X		110.	1.117	76.897	**13 J**	ND>0.3	ND>0.3	1.3	14.3	ND	
		951003-B23-10	3-Oct-95	31.5	X														
		951003-B23-12	3-Oct-95	34.5							ND	ND	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	ND		
	B-24	951002-B24-03	2-Oct-95	10.5	X		X		1,500.	640.	276.5	1,091.8							
		951002-B24-10	2-Oct-95	29.0							ND	0.14	**6.8 J**	2.3 J	ND>0.3 UJ	0.34 J	9.44		
	B-25	951002-B25-03	2-Oct-95	12.5	X				120. J	35.	3.328	12.458							
		951002-B25-05	2-Oct-95	20.0							ND	0.45							
	B-27	950920-B27-06	20-Sep-95	13.0	X					8.5									
		950920-B27-08	20-Sep-95	18.0															
		950920-B27-10	20-Sep-95	23.0	X	X			700.	570.	90.5	1,243.4	**110.**	46.	ND>30	ND>30	156.	ND	
		950920-B27-12	20-Sep-95	28.0					94.	ND>5	9.605	125.405	**22.**	3.6	ND>0.6	1.2	26.8		
		950920-B27-15	20-Sep-95	35.5							1.211	12.241							
	B-42	000828-020	28-Aug-00	0.2							0.825	1.52							
		000828-021	28-Aug-00	1.0							15.535	29.745	ND>0.00269	ND>0.00269	ND>0.00269	ND>0.00806	ND		
		000828-022	28-Aug-00	7.5							2.	6.315	ND>0.00272	ND>0.00272	ND>0.00272	ND>0.00815	ND		
	B-43	000829-050	29-Aug-00	0.2				pencil pitch			10,340.	16,920.							
		000829-046	29-Aug-00	2.0							6.16	10.835	ND>0.00266	ND>0.00266	ND>0.00266	ND>0.00798	ND		
		000829-047	29-Aug-00	2.0 (dup)							2.8	4.235	ND>0.00269	ND>0.00269	ND>0.00269	ND>0.00806	ND		
		000829-048	29-Aug-00	8.5							843.	1,410.75	ND>0.00275	ND>0.00275	ND>0.00275	ND>0.00824	ND		
		000829-049	29-Aug-00	8.5 (dup)							184.75	316.6	ND>0.00275	ND>0.00275	ND>0.00275	ND>0.00824	ND		

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
				EPA PRGs for Industrial Soil [3] ==>	#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Retorts /	B-44	000829-052	29-Aug-00	0.2							32.28	99.95							
Koppers		000829-051	29-Aug-00	3.5							5.525	8.46	ND>0.00263	ND>0.00263	ND>0.00263	ND>0.00789	ND		
(cont.)		000829-053	29-Aug-00	10.0	X		X	X			13,770.	62,405.	**56.7**	9.21	0.792	8.65	75,352.		
	B-45	000829-054	29-Aug-00	0.2							234.25	388.2							
		000829-055	29-Aug-00	2.0							0.06	0.06	ND>0.00333	ND>0.00333	ND>0.00333	ND>0.010	ND		
		000829-056	29-Aug-00	2.0 (dup)							0.085	0.16	ND>0.00333	ND>0.00333	ND>0.00333	ND>0.010	ND		
		000829-057	29-Aug-00	8.5							5.315	8.355	ND>0.00281	ND>0.00281	ND>0.00281	ND>0.00843	ND		
	B-46	000829-058	29-Aug-00	0.2							144.25	240.15							
		000829-059	29-Aug-00	5.0							2.065	3.135	ND>0.00272	ND>0.00272	ND>0.00272	ND>0.00815	ND		
		000829-060	29-Aug-00	10.5	X						0.14	0.36	ND>0.00312	ND>0.00312	ND>0.00312	ND>0.00938	ND		
	MW-06-61	951107-M6-01	7-Nov-95	2.5							ND	ND							
		951107-M6-08	7-Nov-95	30.0	X	X					1,389.	20,614.	**67.**	ND>30	**140.**	56.	263.		
		951107-M6-10	7-Nov-95	38.5							0.108	1.819	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		
		951107-M6-11	7-Nov-95	43.0							ND	0.056							
	MW-09-29	951023-M9-01	23-Oct-95	0.2							11.7	21.502							
		951023-M9-04	23-Oct-95	5.0						19.	78.5	163.02	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		518.
		951023-M9-05	23-Oct-95	11.5							0.163	0.521							
	MW-10-61	951108-M10-01	8-Nov-95	0.2							45.	78.741						ND	
		951108-M10-02	8-Nov-95	0.2 (dup)							64.1	106.99							
		951108-M10-09	8-Nov-95	28.0							ND	0.764	**43.**	3.	0.73	ND>0.3	46.73		
	MW-12-36	951023-M12-01	23-Oct-95	0.2						29. J	65.5	116.21							
		951023-M12-06	23-Oct-95	22.0	X	X			160.	30.	0.27	8.6	ND>3.	8.2	3.5	21.	32.7	ND	
		951023-M12-07	23-Oct-95	26.5							ND	ND							
	M-15	990628-02	28-Jun-99	6.0									ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	MW-15-66	990628-03	28-Jun-99	9.5									**4.8**	18.4	**111.**	289.	423.2		
		990629-12	29-Jun-99	51.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		990629-16	29-Jun-99	64.0							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	Dust -1	960212-D1-01	12-Feb-96	N/A							210.8	381.3							
	Dust -2	960227-D2-01	12-Feb-96	N/A				pencil pitch			15,554.	26,919.							
	SS-12	000829-061	29-Aug-00	0.2							1.795	2.925							
	SS-13	000829-062	29-Aug-00	0.2							1.46	3.72							
	SS-14	000829-063	29-Aug-00	0.2							9.795	16.5							
	SS-15	000829-064	29-Aug-00	0.2							197.25	662.							
	SS-15	000829-064	29-Aug-00	0.2 (dup)							314.5	527.6							

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [3] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Spent Oxide	B-01	950921-B1-01	21-Sep-95	0.2					ND>10 UJ	130.	7.17	13.358	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		0.427
		950921-B1-02	21-Sep-95	0.2 (dup)						220.	26.14	55.96							0.382
		950921-B1-05	21-Sep-95	10.5	X			X		640.	336.7	1,279.7							50.7
		950921-B1-06	21-Sep-95	12.0						560.									
		950921-B1-09	21-Sep-95	21.0							0.926	5.026							4.07
	B-02	950927-B2-05	27-Sep-95	16.0				X											4.51
		950927-B2-07	27-Sep-95	20.5															
	B-03	950921-B3-05	21-Sep-95	10.5				X		120.	23.04	49.04	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	7.44
		950921-B3-07	21-Sep-95	15.0						5.9	ND	ND							
		950921-B3-10	21-Sep-95	22.5															3.07
	B-04	950921-B4-05	21-Sep-95	16.5															0.277
	B-05	950928-B5-05	28-Sep-95	15.5						780. J	0.94	3.64							2.67
	B-06	950927-B6-02	27-Sep-95	8.0	X		X			810. J	4,413.	12,486.8							
		950927-B6-03	27-Sep-95	15.5						54. J	40.2	86.45							
	B-36	000828-017	28-Aug-00	0.2							6.59	11.09							
		000828-018	28-Aug-00	3.5							0.515	1.16	ND>0.00294	ND>0.00294	ND>0.00294	ND>0.00882	ND		
		000828-019	28-Aug-00	10.0							0.315	0.635	ND>0.00305	ND>0.00305	ND>0.00305	ND>0.00915	ND		
	B-37	000828-001	28-Aug-00	0.2							36.04	63.855							
		000828-002	28-Aug-00	4.5							1.965	3.705	ND>0.00266	ND>0.00266	ND>0.00266	ND>0.00798	ND		
		000828-003	28-Aug-00	11.0							ND	ND	ND>0.00275	ND>0.00275	ND>0.00275	ND>0.00824	ND		
	MW-01-22	951024-M1-01	24-Oct-95	0.2							3.07	5.78							0.25
		951024-M1-02	24-Oct-95	3.5						460.	8.35	12.84							ND>.5
		951024-M1-06	24-Oct-95	23.5						ND>5	ND	0.461							0.88
	MW-02-32	951106-M2-01	6-Nov-95	0.2							5.2	10.293							0.47
		951106-M2-06	6-Nov-95	24.0						ND>5	0.152	0.432							
	MW-02-61	981007-M2-01	7-Oct-98	2.0							54.3	110.	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981007-M2-02	7-Oct-98	5.5							2,299.8	5,425.3	0.03 J	ND>0.025 UJ	ND>0.025 UJ	0.17 J	0.2		61.
		981007-M2-03	7-Oct-98	32.0							ND	0.424	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
	SS-7	981112-SS-07	12-Nov-98	0.2							108.3	183.55							13.
	SS-8	981112-SS-08	12-Nov-98	0.2							ND	ND							ND>0.50
	SS-9	981112-SS-09	12-Nov-98	0.2	Prussian Blue			X			22.4	55.51							56.

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation: Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Analytical Results mg/kg (ppm): DEQ Method TPH-G: Gasoline	DEQ Method 418.1M: Diesel/Oil	EPA Method 8270 SIM: Carcinogenic PAHs	EPA Method 8270 SIM: Total PAHs	EPA Method 8020: Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	EPA Method 8270: Total Phenols	EPA Method 9010: Total Cyanide
		EPA PRGs for Industrial Soil [3] ==>			#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Tar Pond	B-09	950918-B9-02	18-Sep-95	10.0	X		X		1,200.	25.	2,421.5	19,437.5	**104.**	44.2	**78.2**	102.6	329.		
		950918-B9-08	18-Sep-95	28.0	X				270.	1,600.									
		950918-B9-09	18-Sep-95	30.5	X						9.48	43.54							
		950918-B9-10	18-Sep-95	34.0							ND	0.464							
	B-26	951003-B26-01	4-Oct-95	0.2							5.13	9.319							
		951003-B26-06	4-Oct-95	20.5	X	X			1,300.	1,600.	861.7	15,529.7	**160.**	**110.**	16.	90.	376.	ND	
		951003-B26-13	4-Oct-95	39.5					ND>10	ND>5	ND	1.12							
	B-28	951002-B28-01	2-Oct-95	0.2					ND>10 UJ	35.	45.5	86.836	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951002-B28-02	2-Oct-95	0.2 (dup)							65.5	135.19							
		951002-B28-07	2-Oct-95	15.0	X	X			24 J	200.	167.2	611.5	**5.5 J**	ND>2	ND>2	2.3	7.8	ND	
		951002-B28-11	2-Oct-95	24.0					ND>10 UJ	ND>5	ND	2.298	0.99 J	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	0.99		
	B-29	950922-B29-01	22-Sep-95	0.2						190.	138.8	230.07							
		950922-B29-08	22-Sep-95	18.0			X												
		950922-B29-10	22-Sep-95	23.5					ND>10	9.3									
		950922-B29-12	22-Sep-95	28.0	X	X			53.	220.									
		950922-B29-15	22-Sep-95	35.5	X	X			1,800.	4,800.	5,214.1	58,821.7	**150.**	**140.**	**35.**	110.	435.	ND	
		950925-B29-17	25-Sep-95	44.0					ND>10	44.	2.614	16.454							
		950925-B29-18	25-Sep-95	47.0							ND	0.18							
	B-30	950922-B30-01	22-Sep-95	0.2						390.	500.	964.5							
		950922-B30-06	22-Sep-95	11.5	X			X	320.	3,200.	938.7	6,775.7	**18.**	1.9	12.	20.	51.9	ND	3.03
		950922-B30-08	22-Sep-95	17.0															
		950922-B30-12	22-Sep-95	28.5	X				150.	120.	94.3	853.	**17.**	ND>3.	2.8	ND>3.	19.8		
		950922-B30-13	22-Sep-95	33.5					12.	ND>5									
	B-31	950925-B31-01	25-Sep-95	0.2					-	240.	22.98	38.148	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND		0.59
		950925-B31-06	25-Sep-95	21.0	X		X	X	250.	2,200.	1,846.1	12,665.7	ND>3	ND>3	9.1	9.6	18.7	ND	
		950925-B31-08	25-Sep-95	24.5					ND>10	34.	2.089	5.494							
		950925-B31-10	25-Sep-95	28.0							ND	ND							
		950925-B31-11	25-Sep-95	28.0 (dup)							ND	ND							
	B-32	951003-B32-01	4-Oct-95	0.2						66 J	34.8	61.21							
		951003-B32-03	4-Oct-95	11.5				X	760.	6,600.	3,156.3	28,772.3							3.02
		951003-B32-15	4-Oct-95	46.5	X	X			1,400.	4,100.	1,728.	21,961.							
		951003-B32-18	4-Oct-95	58.5	X						ND	1.202	0.95 J	ND>0.3 UJ	ND>0.3 UJ	ND>0.3 UJ	0.95		
	B-33	951005-B33-01	5-Oct-95	0.2						170 J	575.3	955.4							
		951005-B33-02	5-Oct-95	3.0						140 J	151.77	37.51							
		951005-B33-03	5-Oct-95	5.5	X		X		430.	2,700.J	1,054.4	8,238.4	**47.**	22.	**29.**	28.	126.	ND	3.9
		951005-B33-11	5-Oct-95	38.5	X		X		1,700.	7,600. J									
		951005-B33-14	5-Oct-95	54.0	X		X		36.	230.	3.02	65.04	0.72	0.82	1.	1.1	3.64	ND	
		951006-B33-18	6-Oct-95	69.0							0.525	5.682							

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
			EPA PRGs for Industrial Soil [3] ==>		#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Tar Pond (cont.)	B-34	950926-B34-01	26-Sep-95	0.2						41 J	49.2	94.09							
		950926-B34-05	26-Sep-95	11.5	X		X		3,400.	4,200. J	1,639.	13,499.							6.48
		950926-B34-12	26-Sep-95	36.5	X	X			1,900.	69.									
	B-35	951005-B35-01	5-Oct-95	0.2						27. J	19.49	38.94	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	
		951005-B35-06	5-Oct-95	22.0	X	X			2,200.	7,700. J	4,013.5	41,601.5							0.67
		951005-B35-10	5-Oct-95	29.0							0.784	9.294							
	B-48	000828-031	28-Aug-00	5.0	X		X	X			2,270.	11,925.	**107.**	78.1	**103.**	141.	429.1		
		000828-032	28-Aug-00	9.5	X		X	X			424.5	2,387.	**6.8**	8.26	15.6	19.8	50.46		
	B-49	000828-036	28-Aug-00	0.2															
		000828-037	28-Aug-00	1.5				X			343.4	562.1	ND>0.00301	ND>0.00301	ND>0.00301	ND>0.00904	ND		
		000828-038	28-Aug-00	8.0	X		X	X			634.	3,992.	**1.78**	0.895	18.	24.5	45.175		
	B-50	000828-033	28-Aug-00	0.2															
		000828-034	28-Aug-00	1.0	X		X	X			369.5	1,740.5	**14.3**	5.68	**21.2**	43.9	85.08		
		000828-035	28-Aug-00	6.0	X		X	X			1,272.5	10,585.5	**11.6**	ND>3.330	**27.2**	31.5	70.3		
	B-53	040607-011	7-Jun-04	2.5 - 3.0				X			30.58	56.621	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
	B-54	040608-013	8-Jun-04	2.0 - 2.5							1.64	3.06	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
		040608-014	8-Jun-04	7.5 - 8.0							107.3	268.6	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
	B-55	040607-006	7-Jun-04	2.5 - 3.0			X				5,831.	61,008.	**137.**[7]	95.6	**77.3**	92.6	402.5		
	B-56	040601-001	1-Jun-04	2.5 - 3.5							13.4 U	14.	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		0.435 U
		040601-003	1-Jun-04	11 - 12							170.5	356.9	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		0.379 U
		040601-004	1-Jun-04	26 - 27							193.1	525.2	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500	ND < 0.0500		
	MW-03-56	951101-M3-10	1-Nov-95	31.0	X						3.718	10.128							
		951101-M3-13	1-Nov-95	38.0							ND	ND							
		951101-M3-17	1-Nov-95	53.5							ND	ND							
		951101-M3-18	1-Nov-95	53.5 (dup)							0.044	0.157							
	MW-04-57	951030-M4-01	30-Oct-95	0.2						57.	114.	195.1						ND	0.8
		951030-M4-06	30-Oct-95	25.5	X						872.	3,261.	ND>0.3	ND>0.3	ND>0.3	ND>0.3	ND	ND	1.3
		951030-M4-15	30-Oct-95	57.0							ND	0.263							
	MW-04-101	981014-M4-01	14-Oct-98	2.0							722.9	976.4	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981014-M4-02	14-Oct-98	6.0							0.257	0.367	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981014-M4-03	14-Oct-98	10.5							0.77	1.44	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
	MW-05-32	951027-M5-01	27-Oct-95	0.2							0.817	1.43							
		951027-M5-05	27-Oct-95	15.5					ND>10 UJ	350. J	810.	1,942.1							
		951027-M5-07	27-Oct-95	21.5							0.242	0.908							
		951027-M5-10	27-Oct-95	31.5							ND	ND							
	MW-05-175	981019-M5-01	19-Oct-98	5.0							63.2	112.35	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981019-M5-02	19-Oct-98	5.0 (dup)							19.53	67.21	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		
		981019-M5-03	19-Oct-98	9.5							ND	ND	ND>0.025	ND>0.025	ND>0.025	ND>0.075	ND		ND>0.02
		981020-M5-09	20-Oct-98	71.0							ND	ND							

TABLE 9 – Summary of Analytical Results for Soil Samples
TPH, BTEX, Total PAHs, Total Phenols, and Cyanide

Study Area	Soil Boring Number	Sample Number[1]	Sample Date	Depth (feet bgs)	Field Observation				Analytical Results mg/kg (ppm)										
									DEQ Method		EPA Method 8270 SIM		EPA Method 8020					EPA Method 8270	EPA Method 9010
									TPH-G	418.1M									
					Sheen	Oil	Tar	Carbon Pitch (lampblack or pencil pitch)	Gasoline	Diesel/Oil	Carcinogenic PAHs	Total PAHs	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	Total Phenols	Total Cyanide
EPA PRGs for Industrial Soil [3] ==>					#	#	#	#	#	#	see Table 5	see Table 5	1.30	520	20	420	#	see Table 6	12,000
Tar Pond (cont.)	MW-08-56	951025-M8-01	25-Oct-95	0.2							203.4	280.8							0.61
		951025-M8-11	25-Oct-95	44.0	X						0.783	8.063							
		951025-M8-15	25-Oct-95	55.0							ND	0.642							
	M-11	951102-M11-01	2-Nov-95	0.2						14.	67.4	105.83							
		951102-M11-09	2-Nov-95	39.0	X						9.723	7.876							
		951102-M11-10	2-Nov-95	43.5							0.966	10.915							
	MW-14-110	981014-M14-01	14-Oct-98	3.5				X			1,610.2	5,876.7	**7.6**	1.9	10.	19.	38.5		
		981014-M14-02	14-Oct-98	6.0				X			632.4	1,697.2	**2.3**	ND>1.25	5.2	7.7	15.2		
		981014-M14-03	14-Oct-98	10.0		X					389.8	1,410.1	0.3	0.6	5.	6.4	12.3		1.1
		981014-M14-07	14-Oct-98	43.5							1.55	10.83	ND>0.025 UJ	ND>0.025 UJ	ND>0.025 UJ	ND>0.025 UJ	ND		
		981016-M14-13	16-Oct-98	69.5							ND	ND	0.68	ND>0.025	ND>0.025	ND>0.025	0.68		
		981019-M14-20	19-Oct-98	106.0							ND	ND							
	SS-1	981112-SS-01	12-Nov-98	0.2							1.898	3.222							0.68
	SS-2	981112-SS-02	12-Nov-98	0.2							6.61	11.598							ND>0.50
	SS-3	981112-SS-03	12-Nov-98	0.2				X			54.5	84.8							0.58
	SS-4	981112-SS-04	12-Nov-98	0.2							12.77	21.202							ND>0.50
	SS-11	981112-SS-11	12-Nov-98	0.2							0.497	0.821							ND>0.50

NOTE:
1 = Sample number prefix: 2708-
2 = Reserved
3 = EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/1/2002)
4 = Reserved
5 = Reserved
6 = Analyzed via Northwest Methods NW-TPH-G and NW-TPH-Dx
7 = Leachable benzene by TCLP = 4.10 milligrams per liter
J indicates an estimated value (validation qualifier)

# = not established
BTEX = benzene, toluene, ethylbenzene, and xylenes
DEQ = Oregon Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
U = not detected above concentration indicated

ND = not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppm = parts per million
TPH = total petroleum hydrocarbons
BOLD = Detected above Reference Level

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
EPA PRGs for Industrial Soil [3] ==>					2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
FAMM	B-07	950927-B7-05	27-Sep-95	17.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
	B-08	950918-B8-04	18-Sep-95	10.0	**18.**	**40.**	12.	**47.**	24.	**6.**	**38.**	0.48	4.	2.8	58.	26.	0.71	2.3	7.2	52.	185.	153.49
		950918-B8-08	18-Sep-95	18.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.18 J	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.063 J	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	0.243
	B-10	950925-B10-04	25-Sep-95	17.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	B-47	000829-039	29-Aug-00	0.2	0.3	0.445	0.315 J	**0.445**	0.365	0.135	0.385	ND [a]	ND [a]	ND [a]	0.48	0.455	ND [a]	ND [a]	0.18	0.425	2.39	1.54
		000829-040	29-Aug-00	0.2 (dup)	ND [a]	ND [a]	0.055 J	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.055	ND
		000829-041	29-Aug-00	5.0	**8.7**	**8.45**	7.85	**11.4**	9.45	**1.14**	**7.1**	1.65	ND [a]	2.14	8.05	15.6	0.675	0.085	8.5	15.1	54.09	51.8
		000829-042	29-Aug-00	11.5	**42.** J	**27.5** J	**29.** J	**40.** J	45.5 J	**8.** J	**21.5** J	59.5	ND <5,000	76.5	23.5 J	136.	42.	12. J	166.	112.	213.5	627.5
		000829-043	29-Aug-00	11.5 (dup)	**146.** J	**132.** J	**127.** J	**176.** J	156. J	**30.** J	**108.** J	100.	ND <5,000	108.	120. J	306.	69.	87. J	332.	280.	875.	1,402.
		000829-045	29-Aug-00	31.0	**8.2**	**7.65**	6.85	**12.**	10.1	**1.6**	**8.15**	9.95	1.75	6.25	10.8	25.8	4.94	14.2	24.7	28.4	54.55	126.79
	B-51	000828-023	28-Aug-00	0.2	1.24	1.6	1.02	**1.74**	1.6	**0.39**	1.53	0.06	0.175	ND [a]	1.82	2.78	0.065	0.425	2.02	2.59	9.12	9.935
		000828-024	28-Aug-00	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-025	28-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-52	000828-026	28-Aug-00	0.2	0.85	1.35	0.97	**1.52**	1.5	**0.245**	0.92	ND [a]	0.13	0.32	1.14	1.61	ND [a]	0.23	0.825	1.94	7.355	6.195
		000828-027	28-Aug-00	3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-028	28-Aug-00	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-029	28-Aug-00	10.5 (dup)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GT-1	971117-001	17-Nov-97	3.0	0.27	0.5	0.16	**0.58**	0.25	ND [a]	0.48	ND [a]	ND [a]	ND [a]	1.	0.38	ND [a] UJ	ND [a]	0.06 J	0.66 J	2.24	2.1
		971117-004	17-Nov-97	10.5	ND [f]	ND [f]	ND [f]	ND [f]	ND [f]	ND [f]	ND [f]	1.4	ND [f]	0.97	ND [f]	ND [f]	2.1	ND [f]	ND [f]	1.7	ND	6.17
		971117-006	17-Nov-97	16.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971117-008	17-Nov-97	20.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971117-011	17-Nov-97	35.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	GT-2	971117-012	17-Nov-97	3.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.084	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	0.084
		971117-017	17-Nov-97	15.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971117-021	17-Nov-97	33.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	GT-3	971118-023	18-Nov-97	3.0	**2.2**	**3.3**	8.4	**3.8**	1.8	ND [a]	**2.4**	0.33	0.29	0.11	4.1	7.5	ND [a]	0.14	0.12	8.6	21.9	21.19
		971118-026	18-Nov-97	12.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.05	ND [a]	ND [a]	ND [a]	0.049	ND	0.099
		971118-032	18-Nov-97	36.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	GT-4	971118-034	18-Nov-97	13.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971118-038	18-Nov-97	40.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	MW-13	971218-M13-02	18-Dec-97	6.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971218-M13-03	18-Dec-97	10.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971218-M13-04	18-Dec-97	13.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971218-M13-05	18-Dec-97	18.0	0.09	0.071	ND [a]	0.061	0.12	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.16	ND [a]	0.23	0.093	0.17	0.342	0.653
		971218-M13-08	18-Dec-97	24.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971218-M13-10	18-Dec-97	28.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.058	ND [a]	ND	0.058
		971218-M13-11	18-Dec-97	31.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		971218-M13-17	18-Dec-97	57.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	SS-05	981112-SS-05	12-Nov-98	0.2	**21.9**	**60.9**	17.	**69.1**	29.7	**9.4**	**47.3**	0.59	11.1	2.	69.9	16.1	0.61	5.	4.7	33.2	255.3	143.2
	SS-06	981112-SS-06	12-Nov-98	0.2	0.13	0.37	0.11	**0.36**	0.15	0.062	0.35	ND[a]	0.078	ND[a]	0.55	0.15	ND[a]	ND[a]	0.058	0.2	1.532	1.036
	SS-10	981112-SS-10	12-Nov-98	0.2	**2.6**	**5.8**	1.6	ND[a]	3.5	**0.52**	**2.5**	0.14	0.31	0.36	3.1	5.	0.12	0.23	2.7	6.8	16.52	18.76

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
			EPA PRGs for Industrial Soil [3] ==>		2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Office Area	B-38	000828-014	28-Aug-00	0.2	**1.58**	1.8	1.12	**2.08**	1.76	**0.43**	1.62	0.13	ND [a]	ND [a]	1.93	2.94	ND [a]	ND [a]	1.11	2.68	10.39	8.79
		000828-015	28-Aug-00	2.0	1.15	1.55	ND [e]	**0.85**	0.8	ND [e]	0.55	ND [e]	ND [e]	ND [e]	0.65	1.15	ND [e]	ND [e]	1.85	1.85	4.9	5.5
		000828-016	28-Aug-00	8.5	0.095	0.135	ND [a]	ND [a]	0.09	0.075	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.09	ND [a]	ND [a]	0.135	0.1	0.395	0.325
	B-39	000828-004	28-Aug-00	0.2	1.	1.16	0.705	**1.36**	1.13	**0.255**	0.88	0.085	0.055	ND [a]	1.02	1.62	ND [a]	0.06	0.52	1.72	6.49	5.08
		000828-005	28-Aug-00	3.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		000828-006	28-Aug-00	9.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	B-40	000828-010	28-Aug-00	0.2	**4.86**	**5.45**	4.14	**6.5**	5.2	**1.47**	**4.76**	0.36	0.065	0.56	5.8	7.05	0.14	ND [a]	3.	6.8	32.38	23.775
		000828-011	28-Aug-00	2.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		000828-012	28-Aug-00	9.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	B-41	000828-007	28-Aug-00	0.2	**2.16**	**2.64**	1.74	**3.1**	2.43	**0.595**	**2.22**	0.165	0.17	ND [a]	2.56	3.86	0.07	0.075	1.68	3.82	14.885	12.4
		000828-008	28-Aug-00	2.5	**1.87**	**2.13**	1.58	**2.86**	2.23	**0.42**	1.49	0.13	0.26	0.41	2.09	3.26	ND>0.1	0.24	2.26	5.2	12.58	13.85
		000828-009	28-Aug-00	9.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
Retorts / Koppers	B-11	950928-B11-06	28-Sep-95	12.5	0.83	0.5	ND [a]	**0.53**	1.4	ND [a]	ND [a]	7.8	0.61	2.7	ND [a]	4.2	6.7	**915.**	25.2	7.4	3.26	969.61
		950928-B11-09	28-Sep-95	23.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.071 J	ND [a] UJ	0.094 J	ND [a] UJ	0.17 J	0.076 J	ND [a] UJ	0.35 J	0.29 J	ND	1.051
	B-13	951006-B13-03	6-Oct-95	10.5	**564.**	**752.**	**238.**	**942.**	**811.**	**89.9**	**519.**	1,630.	155.	578.	747.	2,350.	481.	**13,000.**	2,950.	3,580.	3,915.9	25,471.
		951006-B13-07	6-Oct-95	18.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		951006-B13-10	6-Oct-95	24.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a] UJ	ND [a]	ND [a]	ND [a] UJ	ND [a]	ND	ND
	B-14	950928-B14-03	28-Sep-95	5.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
	B-15	951006-B15-05	6-Oct-95	21.0	**6.8**	**9.7**	3.2	**9.3**	9.7	**1.**	**6.2**	16.1	4.1	6.6	9.	27.7	6.9	**400.**	80.	41.3	45.9	591.7
		951006-B15-08	6-Oct-95	27.0	ND [a]	0.05	0.16	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.053	0.13	ND [a]	0.24 J	0.038	0.13	0.59 J	0.4	0.21	1.581
	B-17	950929-B17-01	29-Sep-95	3.0	**3.5** J	**5.6** J	1.3 J	**5.7** J	3.6 J	**0.67** J	**3.7** J	0.026 J	0.22 J	0.92 J	5.3 J	10.5 J	0.15 J	0.093 J	4. J	13.8 J	24.07	35.009
		950929-B17-05	29-Sep-95	16.5	**28.**	**15.**	5.8	**16.**	44.	**1.1**	**4.2**	161.	10.	111.	5.9	114.	119.	**478.**	477.	224.	114.1	1,699.9
		950929-B17-07	29-Sep-95	23.5	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.078 J	ND [a] UJ	0.086 J	ND [a] UJ	0.072 J	0.062 J	0.16 J	0.32 J	0.11 J	ND	0.888
	B-18	950919-B18-05	19-Sep-95	12.0	0.17	0.09	0.032	0.074	0.26	ND [a]	0.033	1.9	0.16	0.44	0.047	1.1	1.8	44.8	6.7	1.7	0.659	58.647
		950919-B18-10	19-Sep-95	24.5	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
	B-19	950919-B19-01	19-Sep-95	0.2	**53.1**	**57.6**	**29.6**	**61.**	71.4	**10.**	**41.5**	6.8	0.52	212.	46.	115.	20.1	2.9	91.7	114.	324.2	609.02
		950919-B19-03	19-Sep-95	6.5	**7.6**	**5.4**	2.4	**5.8**	9.7	**0.96**	**3.9**	13.4	4.6	14.4	5.1	25.4	13.	180.	83.3	33.3	35.76	372.5
		950920-B19-07	20-Sep-95	18.0	0.054 J	ND [a] UJ	0.047 J	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.5 J	0.17 J	ND [a] UJ	ND [a] UJ	0.18 J	0.77 J	76.3 J	1.7 J	0.28 J	0.101	79.9
		950929-B19-08	20-Sep-95	27.0	0.027 J	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.081 J	ND [a] UJ	0.081 J	ND [a] UJ	0.13 J	0.097 J	1.1 J	0.3 J	0.14 J	0.027	1.929
	B-20	950929-B20-03	29-Sep-95	10.5	**40.4**	**44.5**	19.	**45.**	67.1	**4.707**	**23.8**	35.8	9.4	122.	29.3	113.	57.8	27.8	239.	214.	244.507	848.1
		950929-B20-07	29-Sep-95	23.5	0.048 J	0.06 J	ND [a] UJ	0.053 J	0.054 J	ND [a] UJ	0.04 J	0.068 J	0.095 J	0.063 J	0.055 J	0.18 J	0.11 J	11.2 J	0.36 J	0.3 J	0.255	12.431
	B-21	951003-B21-04	3-Oct-95	11.5	0.12 J	0.079 J	0.079 J	ND [a] UJ	0.14 J	ND [a] UJ	ND [a] UJ	1.3 J	0.44 J	0.2 J	ND [a] UJ	0.59 J	0.089 J	0.71 J	2.5 J	0.86 J	0.418	6.689
	B-22	951003-B22-05	3-Oct-95	13.5	0.63	0.19	0.12	0.15	0.58	ND [a]	0.057	9.4	0.076	1.2	0.055	5.3	5.7	0.31	12.2	4.3	1.727	38.541
		951003-B22-09	3-Oct-95	24.0	**9.2**	**4.**	1.7	**2.6**	12.	0.15	0.58	78.8	0.504	17.6	0.49	65.4	59.9	0.41	160.2	71.7	30.23	455.004
	B-23	951003-B23-08	3-Oct-95	26.5	0.2	0.19	0.097	0.2	0.27	ND [a]	0.16	0.87	1.2	0.52	0.19	1.4	3.	58.8	8.2	1.6	1.117	75.78
		951003-B23-12	3-Oct-95	34.5	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
	B-24	951002-B24-03	2-Oct-95	10.5	**41.9**	**53.2**	**21.3**	**59.5**	64.1	**5.5**	**31.**	52.4	7.5	34.9	42.	132.	28.5	115.	186.	217.	276.5	815.3
		951002-B24-10	2-Oct-95	29.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.14 J	ND [a] UJ	ND [a] UJ	ND	0.14

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
EPA PRGs for Industrial Soil [3] ==>					2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Retorts / Koppers (cont.)	B-25	951002-B25-03	2-Oct-95	12.5	0.41	0.71	0.25	**0.78**	0.6	0.078	0.5	0.41	0.15	0.29	0.75	1.2	0.53	1.2	2.5	2.1	3.328	9.13
		951002-B25-05	2-Oct-95	20.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.45 J	ND [a] UJ	ND [a] UJ	ND	0.45
	B-27	950920-B27-10	20-Sep-95	23.0	**17.2**	**16.3**	6.2	**18.3**	21.	**1.9**	**9.6**	53.	32.6	21.9	13.6	79.1	45.7	**586.**	208.	113.	90.5	1,152.9
		950920-B27-12	20-Sep-95	28.0	1.9	1.6	0.78	**1.7**	2.6	0.11	0.915	8.6	2.	3.1	1.3	9.9	6.5	44.7	26.4	13.3	9.605	115.8
		950920-B27-15	20-Sep-95	35.5	0.31 J	0.26 J	0.091 J	0.16 J	0.28 J	ND [a] UJ	0.11 J	1.1 J	0.14 J	0.36 J	0.15 J	1.3 J	0.88 J	1.8 J	3.5 J	1.8 J	1.211	11.03
	B-42	000828-020	28-Aug-00	0.2	0.12	0.135	0.17	0.185	0.16	ND [a]	0.055	ND [a]	ND [a]	ND [a]	0.18	0.205	ND [a]	ND [a]	0.115	0.195	0.825	0.695
		000828-021	28-Aug-00	1.0	**2.47**	**2.47**	1.83	**3.26**	2.68	**0.605**	**2.22**	0.22	ND [a]	ND [a]	2.77	4.86	0.08	0.18	1.98	4.12	15.535	14.21
		000828-022	28-Aug-00	7.5	0.255	0.275	0.21	**0.405**	0.37	0.09	0.395	ND [a]	0.26	ND [a]	0.675	0.64	0.085	0.58	1.36	0.715	2.	4.315
	B-43	000829-050	29-Aug-00	0.2	**1,490.**	**1,760.**	**1,460.**	**2,020.**	**1,650.**	**500.**	**1,460.**	110.	ND >5	139.	1,600.	1,980.	55.	11.	825.	1,860.	10,340.	6,580.
		000829-046	29-Aug-00	2.0	0.355	0.95	0.565	**1.26**	0.595	**0.345**	2.09	ND [a]	0.165	ND [a]	3.28 J	0.49 J	ND [a]	0.1	0.105	0.535 J	6.16	4.675
		000829-047	29-Aug-00	2.0 (dup)	0.16	0.545	0.315	**0.595**	0.275	0.16	0.75	ND [a]	0.11	ND [a]	1.03 J	0.125 J	ND [a]	ND [a]	ND [a]	0.17 J	2.8	1.435
		000829-048	29-Aug-00	8.5	**125.** J	**146.** J	**118.** J	**171.** J	138. J	**25.** J	**120.** J	10.2 J	ND [e]	14.2 J	132. J	172. J	5.15 J	1.2	75. J	158. J	843.	567.75
		000829-049	29-Aug-00	8.5 (dup)	**27.4** J	**35.2** J	**28.** J	**40.4** J	29. J	**6.15** J	**18.6** J	2.5 J	ND [e]	4. J	19.8 J	39.2 J	1.15 J	ND [e]	18.8 J	46.4 J	184.75	131.85
	B-44	000829-052	29-Aug-00	0.2	**5.05**	**4.58**	3.55	**6.85**	6.25	**1.08**	**4.92**	0.17	4.1	3.17	6.1	14.5	2.92	1.21	18.3	17.2	32.28	67.67
		000829-051	29-Aug-00	3.5	0.5	1.	0.595	**1.32**	0.755	**0.245**	1.11	ND [a]	0.14	ND [a]	1.55	0.53	ND [a]	ND [a]	ND [a]	0.715	5.525	2.935
		000829-053	29-Aug-00	10.0	**2,450.**	**1,720.**	**1,700.**	**2,780.**	**2,880.**	**440.**	**1,800.**	125.	3,480.	2,580.	2,000.	8,000.	1,900.	**8,300.**	14,000.	8,250.	13,770.	48,635.
	B-45	000829-054	29-Aug-00	0.2	**33.6**	**47.1**	**36.6**	**47.**	38.5	**7.75**	**23.7**	2.15	ND [e]	4.3	23.3	52.5	1.4	ND [e]	24.8	45.5	234.25	153.95
		000829-055	29-Aug-00	2.0	ND [a]	0.06	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.06	ND
		000829-056	29-Aug-00	2.0 (dup)	ND [a]	0.085	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.075	ND [a]	ND [a]	ND [a]	ND [a]	0.085	0.075
		000829-057	29-Aug-00	8.5	0.355	0.98	0.635	**1.05**	0.665	**0.23**	1.4	ND [a]	0.21	ND [a]	1.98	0.36	ND [a]	ND [a]	ND [a]	0.49	5.315	3.04
	B-46	000829-058	29-Aug-00	0.2	**19.5**	**29.7**	**21.9**	**30.8**	22.8	**4.95**	**14.6**	1.3	ND [e]	2.45	15.1	29.6	0.75	ND [e]	14.3	32.4	144.25	95.9
		000829-059	29-Aug-00	5.0	0.135	0.385	0.29	**0.48**	0.19	0.15	0.435	ND [a]	0.075	ND [a]	0.625	0.095	ND [a]	ND [a]	0.135	0.14	2.065	1.07
		000829-060	29-Aug-00	10.5	ND [a]	0.09	ND [a]	ND [a]	ND [a]	ND [a]	0.05	ND [a]	ND [a]	ND [a]	0.085	ND [a]	ND [a]	ND [a]	0.135	ND [a]	0.14	0.22
	MW-06-61	951107-M6-01	7-Nov-95	2.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		951107-M6-08	7-Nov-95	30.0	**340.**	**170.**	**120.**	**190.**	**450.**	**25.**	**94.**	2,350.	25.	1,420.	130.	1,900.	990.	**3,650.**	5,780.	2,980.	1,389.	19,225.
		951107-M6-10	7-Nov-95	38.5	0.042	ND [a]	ND [a]	ND [a]	0.066	ND [a]	ND [a]	0.22	ND [a]	0.16	ND [a]	0.22	0.095	0.076	0.6	0.34	0.108	1.711
		951107-M6-11	7-Nov-95	43.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.056 J	ND [a] UJ	ND	0.056
	MW-09-29	951023-M9-01	23-Oct-95	0.2	1.4 J	**2.7**	0.88	**2.5**	1.9	**0.42**	1.9	0.12	0.17	0.31	2.6	2.2	0.055 J	0.087	0.96	3.3	11.7	9.802
		951023-M9-04	23-Oct-95	5.0	**7.4** J	**19.6**	5.	**14.4**	13.3	**2.7**	**16.1**	0.12	1.3	2.	22.6	17.9	0.4 J	1.2	8.6	30.4	78.5	84.52
		951023-M9-05	23-Oct-95	11.5	0.028 J	0.035	ND [a]	0.032	0.041	ND [a]	0.027	ND [a]	ND [a]	0.03	0.036	0.076	ND [a] UJ	ND [a]	0.096	0.12	0.163	0.358
	MW-10-61	951108-M10-01	8-Nov-95	0.2	**6.7**	**11.**	5.1	**9.5**	6.3	**1.4**	**5.**	0.83	ND [a]	1.7	6.7	11.	0.23	0.081	3.3	9.9	45.	33.741
		951108-M10-02	8-Nov-95	0.2 (dup)	**10.**	**17.**	6.2	**14.**	7.5	**2.2**	**7.2**	1.1	ND [a]	1.1	9.	14.	0.36	0.13	5.2	12.	64.1	42.89
		951108-M10-09	8-Nov-95	28.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.038	ND [a]	0.038	ND [a]	0.078	ND [a]	0.23	0.22	0.16	ND	0.764
	MW-12-36	951023-M12-01	23-Oct-95	0.2	**8.5** J	**15.3**	5.2	**13.3**	12.3	**2.2**	**8.7**	1.5	0.23	2.	10.8	12.4	0.54 J	0.34	5.8	17.1	65.5	50.71
		951023-M12-06	23-Oct-95	22.0	ND [e] UJ	ND [e]	ND [e]	ND [e]	0.27	ND [e]	ND [e]	0.34	ND [e]	0.99	ND [e]	0.97	0.4 J	0.23	4.	1.4	0.27	8.33
		951023-M12-07	23-Oct-95	26.5	ND [a] UJ	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a] UJ	ND [a]	ND [a]	ND [a]	ND	ND
	MW-15-66	990629-12	29-Jun-99	51.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		990629-16	29-Jun-99	64.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
	Dust -1	960212-D1-01	12-Feb-96	N/A	**33.**	**47.6**	17.9	**41.4**	36.1	**7.5**	**27.3**	4.4	1.7	5.6	36.5	53.7	1.9	1.1	23.7	41.9	210.8	170.5
	Dust -2	960227-D2-01	12-Feb-96	N/A	**2,600.**	**3,436.**	**1,292.**	**2,915.**	**2,856.**	**547.**	**1,908.**	375.	ND>20	444.	2,543.	3,483.	145.	68.	1,501.	2,806.	15,554.	11,365.
	SS-12	000829-061	29-Aug-00	0.2	0.255	0.35	0.29	**0.35**	0.265	0.09	0.195	ND [a]	ND [a]	ND [a]	0.215	0.375	ND [a]	ND [a]	0.215	0.325	1.795	1.13
	SS-13	000829-062	29-Aug-00	0.2	0.205	0.275	0.22	**0.275**	0.235	0.085	0.165	ND [a]	ND [a]	ND [a]	0.195	1.04	ND [a]	ND [a]	0.75	0.275	1.46	2.26
	SS-14	000829-063	29-Aug-00	0.2	1.34	1.74	1.52	**2.01**	1.6	**0.385**	1.2	0.125	ND [a]	ND [a]	1.34	2.22	0.05	ND [a]	0.93	2.04	9.795	6.705
	SS-15	000829-064	29-Aug-00	0.2	**40.7**	**34.4**	**25.6**	**23.1**	58.5	**3.45** J	**11.5** J	2.35	2.5	37.2 J	12.	198.	3.2	ND [e]	57.5	152.	197.25	464.75
		000829-064	29-Aug-00	0.2 (dup)	**42.6**	**60.5**	**47.4**	**68.5**	49.4	**11.4** J	**34.7** J	3.1	ND [e]	5.55 J	33.8	71.5	1.75	ND [e]	32.4	65.	314.5	213.1

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
			EPA PRGs for Industrial Soil [3] ==>		2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Spent Oxide	B-01	950921-B1-01	21-Sep-95	0.2	1. J	1.6 J	0.52 J	**1.5** J	1.4 J	**0.22** J	0.93 J	0.14 J	ND[a]	0.14 J	1.3 J	1.3 J	0.055 J	0.073 J	0.88 J	2.3 J	7.17	6.188
		950921-B1-02	21-Sep-95	0.2	**3.7** J	**5.6** J	1.7 J	**5.2** J	5.6 J	**0.84** J	**3.5** J	0.51 J	0.41 J	1.1 J	5.1 J	5.7 J	0.34 J	0.46 J	5.8 J	10.4 J	26.14	29.82
		950921-B1-05	21-Sep-95	10.5	**45.3**	**72.3**	**26.7**	**55.7**	82.8	**7.7**	**46.2**	6.1	5.8	21.7	65.8	140.	9.6	**313.**	142.	239.	336.7	943.
		950921-B1-09	21-Sep-95	21.0	0.19 J	0.21 J	0.056 J	0.17 J	0.19 J	ND[a] UJ	0.11 J	0.13 J	ND[a] UJ	0.24 J	0.17 J	0.36 J	0.14 J	0.21 J	2.2 J	0.65 J	0.926	4.1
	B-03	950921-B3-05	21-Sep-95	10.5	**3.2**	**5.2**	1.9	**4.8**	4.1	**0.64**	**3.2**	0.3	0.14	3.1	4.2	5.9	0.2	0.16	3.1	8.9	23.04	26.
		950921-B3-07	21-Sep-95	15.0	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND	ND
	B-05	950928-B5-05	28-Sep-95	15.5	ND[b] UJ	0.2 J	ND[b] UJ	0.18 J	ND[b] UJ	ND[b] UJ	0.56 J	0.14 J	0.44 J	0.19 J	1.1 J	0.34 J	ND[b] UJ	ND[b] UJ	ND[b] UJ	0.49 J	0.94	2.7
	B-06	950927-B6-02	27-Sep-95	8.0	**574.**	**972.**	**370.**	**767.**	**833.**	**159.**	**738.**	21.	124.	191.	1,080.	1,680.	73.8	**884.**	1,180.	2,840.	4,413.	8,073.8
		950927-B6-03	27-Sep-95	15.5	**5.7** J	**8.8** J	3.5 J	**7.1** J	7.6 J	**1.1** J	**6.4** J	ND>1.0 UJ	0.55 J	2.1 J	9.6 J	10.2 J	ND>1.0 UJ	ND>1.0 UJ	5.5 J	18.3 J	40.2	46.25
	B-36	000828-017	28-Aug-00	0.2	0.98	1.23	1.05	**1.38**	1.16	**0.215**	0.575	0.105	ND[a]	ND[a]	0.6	1.52	ND[a]	0.105	0.7	1.47	6.59	4.5
		000828-018	28-Aug-00	3.5	0.07	0.11	0.065	0.1	0.08	ND[a]	0.09	ND[a]	ND[a]	ND[a]	0.13	0.155	ND[a]	0.12	0.07	0.17	0.515	0.645
		000828-019	28-Aug-00	10.0	0.09	0.12	ND[a]	0.05	0.055	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	0.08	ND[a]	ND[a]	0.135	0.105	0.315	0.32
	B-37	000828-001	28-Aug-00	0.2	**4.7**	**6.5**	4.92	**7.35**	5.85	**1.67**	**5.05**	0.455	0.06	0.735	6.3	8.55	0.2	0.055	3.96	7.5	36.04	27.815
		000828-002	28-Aug-00	4.5	0.25	0.33	0.25	**0.365**	0.3	0.095	0.375	ND[a]	ND[a]	ND[a]	0.475	0.54	ND[a]	ND[a]	0.21	0.515	1.965	1.74
		000828-003	28-Aug-00	11.0	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND	ND
	MW-01-22	951024-M1-01	24-Oct-95	0.2	0.41 J	0.66	ND[a]	**0.61**	0.64 J	ND[a]	0.75	ND[a]	ND[a]	ND[a]	1.	0.71	ND[a]	ND[a]	ND[a]	1.	3.07	2.71
		951024-M1-02	24-Oct-95	3.5	0.91 J	1.5	0.74	**1.7**	1.3 J	**0.4**	1.8	ND[b]	ND[b]	ND[b]	2.3	0.79	ND[b]	ND[b]	ND[b]	1.4	8.35	4.49
		951024-M1-06	24-Oct-95	23.5	ND[a] UJ	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	0.19	ND[a]	0.032	ND[a]	ND[a]	0.15	0.089	ND	0.461
	MW-02-32	951106-M2-01	6-Nov-95	0.2	0.73	1.2	0.49	**1.1**	0.83	0.16	0.69	0.047	0.083	0.14	1.	1.4	ND>0.05	0.053	0.57	1.8	5.2	5.093
		951106-M2-06	6-Nov-95	24.0	0.039	0.036	ND[a]	0.04	0.037	ND[a]	ND[a]	0.2	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	0.08	ND[a]	ND[a]	0.152	0.28
	MW-02-61	981007-M2-01	7-Oct-98	2.0	**9.7**	**13.1**	ND[e]	**12.8**	8.8	**1.9**	**8.**	1.3	ND[e]	2.3	11.3	14.3	ND[e]	0.6	9.	16.9	54.3	55.7
		981007-M2-02	7-Oct-98	5.5	**315.**	**563.**	**179.**	**432.**	**334.**	**87.8**	**389.**	ND[g]	30.4	34.2	490.	591.	12.9	**923.**	309.	735.	2,299.8	3,125.5
		981007-M2-03	7-Oct-98	32.0	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	0.07	ND[a]	0.074	ND[a]	0.28 J	ND[a]	ND[a]	ND	0.424
	SS-07	981112-SS-07	12-Nov-98	0.2	**12.8**	**25.**	6.9	**23.7**	14.3	**1.9**	**23.7**	0.64	2.8	1.3	22.2	15.	0.41	1.8	6.9	24.2	108.3	75.25
	SS-08	981112-SS-08	12-Nov-98	0.2	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND	ND
	SS-09	981112-SS-09	12-Nov-98	0.2	**3.7**	**6.6**	1.7	**3.4**	4.3	**0.5**	**2.2**	0.38	0.19	1.3	2.5	10.	0.39	0.55	7.	10.8	22.4	33.11
Tar Pond	B-09	950918-B9-02	18-Sep-95	10.0	**472.**	**420.**	**139.**	**487.**	**601.**	**56.5**	**246.**	558.	457.	603.	344.	1,350.	464.	**7,560.**	3,410.	2,270.	2,421.5	17,016.
		950918-B9-09	18-Sep-95	30.5	1.6	1.8	0.66	**2.1**	1.9	**0.22**	1.2	1.9	0.17	1.3	1.8	4.4	0.99	8.3	7.8	7.4	9.48	34.06
		950918-B9-10	18-Sep-95	34.0	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	0.054 J	ND[a] UJ	0.08 J	ND[a] UJ	ND[a] UJ	0.2 J	0.13 J	ND	0.464
	B-26	951003-B26-01	4-Oct-95	0.2	0.73	1.2	0.49	**0.99**	0.77	0.16	0.79	0.092	ND[a]	0.097	0.84	1.5	ND[a]	ND[a]	0.46	1.2	5.13	4.189
		951003-B26-06	4-Oct-95	20.5	**124.**	**134.**	**57.**	**138.**	**265.**	**20.7**	**123.**	608.	449.	1,220.	171.	949.	681.	**6,420.**	2,630.	1,540.	861.7	14,668.
		951003-B26-13	4-Oct-95	39.5	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	0.059	0.046	0.051	ND[a]	0.066	0.059	0.55	0.19 J	0.099	ND	1.12
	B-28	951002-B28-01	2-Oct-95	0.2	**6.1**	**10.1**	4.3	**8.6**	8.2	**1.6**	**6.6**	0.73	0.26 J	4.6	8.2	9.7	0.246	0.3	4.6	12.7	45.5	41.336
		951002-B28-02	2-Oct-95	0.2	**9.5**	**14.9**	6.3	**14.1**	9.5	**2.4**	**8.8**	1.1	0.86 J	1.8	12.3	17.3	0.55	0.88	9.2	25.7	65.5	69.69
		951002-B28-07	2-Oct-95	15.0	**19.1**	**33.4**	12.6	**42.7**	30.2	**3.6**	**25.6**	23.8	3.7	11.2	39.5	66.1	14.	102.	74.	110.	167.2	444.3
		951002-B28-11	2-Oct-95	24.0	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	0.057 J	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	2.2 J	0.041 J	ND[a] UJ	ND	2.298
	B-29	950922-B29-01	22-Sep-95	0.2	**10.5**	**31.7**	11.6	**32.5**	19.3	**4.8**	**28.4**	0.4	7.3	3.3	41.8	9.4	0.47	2.4	3.4	22.8	138.8	91.27
		950922-B29-15	22-Sep-95	35.5	**1,540.**	**758.**	**308.**	**571.**	**1,810.**	**46.1**	**181.**	9,210.	77.6	1,650.	230.	8,480.	4,530.	**7,400.**	15,500.	6,530.	5,214.1	53,607.6
		950925-B29-17	25-Sep-95	44.0	0.56 J	0.45 J	0.12 J	**0.51** J	0.68 J	0.054 J	0.24 J	1.1 J	0.33 J	1. J	0.3 J	1.6 J	0.84 J	0.77 J	5.1 J	2.8 J	2.614	13.84
		950925-B29-18	25-Sep-95	47.0	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	0.18 J	ND[a] UJ	ND[a] UJ	ND	0.18
	B-30A	950922-B30-01	22-Sep-95	0.2	**49.8**	**110.**	**45.**	**99.6**	75.4	**20.2**	**100.**	9.2	13.4	16.	129.	110.5	5.9	9.4	37.3	133.8	500.	464.5
	B-30	950922-B30-06	22-Sep-95	11.5	**167.**	**167.**	**71.9**	**182.**	**245.**	**16.5**	**89.3**	220.	228.	417.	125.	739.	310.	**1,730.**	1,260.	808.	938.7	5,837.
		950922-B30-12	22-Sep-95	28.5	**14.3**	**17.4**	7.4	**22.**	19.8	**1.8**	**11.6**	15.2	68.8	28.7	17.7	53.3	31.	**327.**	126.	91.	94.3	758.7

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
		EPA PRGs for Industrial Soil [3] ==>			2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Tar Pond (cont.)	B-31	950925-B31-01	25-Sep-95	0.2	2.1	**5.4**	1.8	**4.8**	3.	**0.98**	**4.9**	0.11	1.3	0.59	6.8	1.6	0.058	0.3	0.71	3.7	22.98	15.168
		950925-B31-06	25-Sep-95	21.0	**319.**	**321.**	**119.**	**374.**	**394.**	**45.1**	**274.**	1,120.	50.6	473.	364.	1,290.	422.	**2,880.**	2,620.	1,600.	1,846.1	10,819.6
		950925-B31-08	25-Sep-95	24.5	0.28 J	0.35 J	0.11 J	**0.7** J	0.39 J	0.039 J	0.22 J	0.072 J	ND [a] UJ	0.18 J	0.27 J	0.88 J	0.063 J	ND>0.05 UJ	0.54 J	1.4 J	2.089	3.405
		950925-B31-10	25-Sep-95	28.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
		950925-B31-11	25-Sep-95	28.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
	B-32	951004-B32-01	4-Oct-95	0.2	**2.9**	**6.9**	2.5	**7.4**	5.6	**1.8**	**7.7**	0.09	1.7	0.53	12.4	2.7	0.11	0.82	0.66	7.4	34.8	26.41
		951004-B32-03	4-Oct-95	11.5	**495.**	**500.**	**292.**	**585.**	**824.**	**87.3**	**373.**	990.	807.	1,190.	529.	2,050.	810.	**11,100.**	4,560.	3,580.	3,156.3	25,616.
		951004-B32-15	4-Oct-95	38.5	**259.**	**285.**	**81.**	**386.**	**427.**	**52.**	**238.**	1,330.	39.	1,280.	354.	1,180.	520.	**11,100.**	2,440.	1,990.	1,728.	20,233.
		951004-B32-18	4-Oct-95	58.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.064	ND [a]	0.061	ND [a]	0.13	0.047	0.38	0.31	0.21	ND	1.202
	B-33	951005-B33-01	5-Oct-95	0.2	**34.6**	**124.**	**44.**	**129.**	70.	**32.7**	**141.**	1.3	29.1	9.9	202.	29.5	1.6	9.1	10.5	87.1	575.3	380.1
		951005-B33-02	5-Oct-95	3.0	1.9	**2.4**	0.88	**2.8**	2.5	**0.29**	1.5	1.7	0.23	0.96	2.1	6.4	0.85	1.5	4.1	7.4	12.27	25.24
		951005-B33-03	5-Oct-95	5.5	**181.**	**185.**	**72.1**	**225.**	**262.**	**21.3**	**108.**	369.	133.	263.	152.	527.	266.	**3,460.**	1,190.	824.	1,054.4	7,184.
		951005-B33-14	5-Oct-95	54.0	ND [c]	0.57	ND [c]	**0.7**	1.1	ND [c]	ND [c]	3.4	ND [c]	2.1	0.62	3.4	1.5	37.	8.6	5.4	2.37	62.02
		951006-B33-18	6-Oct-95	69.0	0.045 J	0.054 J	ND [a] UJ	**0.37** J	0.056 J	ND [a] UJ	ND [a] UJ	0.06 J	0.35 J	0.12 J	0.047 J	0.18 J	0.12 J	3.5 J	0.47 J	0.31 J	0.525	5.157
	B-34	950926-B34-01	26-Sep-95	0.2	**6.**	**10.**	4.5	**9.9**	9.6	**1.6**	**7.6**	0.99	0.46	1.5	9.5	11.7	0.44	1.1	5.6	13.6	49.2	44.89
		950926-B34-05	26-Sep-95	11.5	**227.**	**256.**	**153.**	**356.**	**383.**	**41.**	**223.**	253.	452.	1,289.	318.	849.	409.	**5,420.**	1,580.	1,290.	1,639.	11,860.
	B-35	951005-B35-01	5-Oct-95	0.2	**2.2**	**4.**	1.5	**4.1**	4.1	**0.59**	**3.**	ND [d]	0.54	0.88	4.5	4.	ND [d]	0.34	2.2	6.7	19.49	19.16
		951005-B35-06	5-Oct-95	22.0	**613.**	**780.**	**269.**	**954.**	**809.**	**91.5**	**497.**	532.	1,960.	880.	714.	2,600.	982.	**20,700.**	4,890.	4,330.	4,013.5	37,588.
		951005-B35-10	5-Oct-95	29.0	0.13	0.14	0.068	0.17	0.18	ND [a]	0.096	0.52	0.28	0.27	0.14	0.5	0.28	4.3	1.4	0.82	0.784	8.51
	B-48	000828-031	28-Aug-00	5.0	**425.**	**225.**	**285.**	**475.**	**535.**	**55.**	**270.**	725.	ND [a]	590.	365.	1,460.	545.	**835.**	3,020.	1,640.	2,270.	9,655.
		000828-032	28-Aug-00	9.5	**77.**	**54.5**	**51.**	**88.**	92.	**11.**	**51.**	114.	30.	77.5	65.	212.	65.	**755.**	386.	258.	424.5	1,962.5
	B-49	000828-036	28-Aug-00	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-037	28-Aug-00	1.5	**28.5**	**66.**	**40.**	**114.**	39.4	**9.4**	**46.1**	0.65	12.5	2.1	105.	22.8	ND [e]	6.2	8.95	60.5	343.4	218.7
		000828-038	28-Aug-00	8.0	**116.**	**77.**	**71.5**	**132.**	140.	**17.**	**80.5**	199.	43.	121.	106.	334.	121.	**1,300.**	750.	384.	634.	3,358.
	B-50	000828-033	28-Aug-00	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-034	28-Aug-00	1.0	**69.**	**41.5**	**44.**	**76.5**	86.	**9.**	**43.5**	145.	16.	86.	58.	220.	82.	76.	434.	254.	369.5	1,371.
		000828-035	28-Aug-00	6.0	**244.**	**150.**	**142.**	**259.**	**284.**	**33.5**	**160.**	344.	330.	342.	207.	875.	310.	**4,100.**	1,810.	995.	1,272.5	9,313.
	B-53	040607-011	7-Jun-04	2.5 - 3.0	**4.21**	**4.97**	4.21	**6.82**	5.32	**1.04**	**4.01**	0.67 U	0.745	0.996	5.48	6.43	0.67 U	0.67 U	2.69	9.7	30.58	26.041
	B-54	040608-013	11-Jun-04	2.0 - 2.5	0.24	0.303	0.211	**0.323**	0.33	0.168 U	0.233	0.168 U	0.168 U	0.168 U	0.306	0.37	0.168 U	0.168 U	0.29	0.454	1.64	1.42
		040608-014	11-Jun-04	7.5 - 8.0	**15.7**	**20.9**	11.8	**22.1**	20.4	3.35 U	**16.4**	3.35 U	3.35 U	3.35 U	24.2	56.8	3.35 U	3.35 U	18.2	62.1	107.3	161.3
	B-55	040607-006	7-Jun-04	2.5 - 3.0	**1,240.**	**688.**	**731.**	**1,170.**	**1,480.**	335. U	**522.**	977.	2,400.	1,760.	700.	4,890.	1,740.	**27,600.**	9,750.	5,360.	5,831.	55,177.
	B-56	040601-001	1-Jun-04	2.5-3.5	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	14.	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	14.
		040601-003	1-Jun-04	11-12	**23.1**	**31.4**	**24.7**	**35.1**	30.7	13.4 U	**25.5**	13.4 U	13.4 U	13.4 U	37.	41.7	13.4 U	13.4 U	38.7	69.	170.5	186.4
		040601-004	1-Jun-04	26-27	**32.7**	**33.6**	**25.**	**41.9**	37.7	13.4 U	**22.2**	13.4 U	13.4 U	14.	32.2	95.3	13.4 U	13.4 U	47.6	143.	193.1	332.1
	MW-03-56	951101-M3-10	1-Nov-95	31.0	0.53	0.83	0.3	**0.84**	0.51	0.098	0.61	0.19	0.14	0.14	0.96	1.4	0.16	0.65	0.77	2.	3.718	6.41
		951101-M3-13	1-Nov-95	38.0	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND
		951101-M3-17	1-Nov-95	53.5	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND	ND
		951101-M3-18	1-Nov-95	53.5 (dup)	ND [a]	0.044	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.04	0.031	ND [a]	ND [a]	ND [a]	0.042	0.044	0.113
	MW-04-57	951030-M4-01	30-Oct-95	0.2	**10.**	**26.**	10.	**28.**	15.	**4.**	**21.**	ND>5.0	4.4	2.6	35.	12.	ND>5.0	1.7	3.4	22.	114.	81.1
		951030-M4-06	30-Oct-95	25.5	**190.**	**200.**	**68.**	**210.**	180.	**24.**	ND [d]	65.	ND [d]	110.	190.	640.	49.	25.	480.	830.	872.	2,389.
		951030-M4-15	30-Oct-95	57.0	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.03	ND [a]	ND [a]	ND [a]	0.053	ND [a]	0.08	0.033	0.067	ND	0.263
	MW-04-101	981014-M4-01	14-Oct-98	2.0	**67.8**	**209.**	**49.9**	**183.**	82.1	**21.1**	**110.**	1.1	25.1	7.9	ND [c]	53.2	1.5	6.1	13.6	145.	722.9	253.5
		981014-M4-02	14-Oct-98	6.0	ND [a]	0.1	ND [a]	0.1	0.057	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.11	0.257	0.11
		981014-M4-03	14-Oct-98	10.5	0.13	0.25	ND [a]	**0.23**	0.16	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	ND [a]	0.21	ND [a]	ND [a]	ND [a]	0.46	0.77	0.67
	MW-05-32	951027-M5-01	27-Oct-95	0.2	0.13	0.22	0.077	0.15	0.13	ND [a]	0.11	ND [a]	ND [a]	ND [a]	0.15	0.2	ND [a]	ND [a]	0.073	0.19	0.817	0.613
		951027-M5-05	27-Oct-95	15.5	**115.**	**170.**	**58.**	**208.**	130.	**25.**	**104.**	19.	15.	41.	153.	330.	16.	8.1	113.	437.	810.	1,132.1
		951027-M5-07	27-Oct-95	21.5	0.067 J	0.039 J	ND [a] UJ	0.051 J	0.085 J	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	0.072 J	0.044 J	0.17 J	ND [a] UJ	ND [a] UJ	0.15 J	0.23 J	0.242	0.666
		951027-M5-10	27-Oct-95	31.5	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND [a] UJ	ND	ND

Table 10 – Summary of Analytical Results for Soil Samples, PAHs by EPA Method 8270 (SIM)

PAHs by EPA Method 8270 (SIM)					Analytical Results mg/kg (ppm)																	
					Carcinogenic PAHs							Non-carcinogenic PAHs										
Study Area	Soil Boring	Sample Number[1]	Sample Date	Sample Depth (feet bgs)	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Chrysene	Dibenz (ah) anthracene	Indeno (1,2,3-cd) pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (ghi) perylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAHs	Total Non-Carcinogenic PAHs
EPA PRGs for Industrial Soil [3] ==>					2.1	2.1	21.	0.21	210.	0.21	2.1	29,000.	#	100,000.	#	22,000.	26,000.	190.	#	29,000.	#	#
Tar Pond (cont.)	MW-05-175	981019-M5-01	19-Oct-98	5.0	**7.1**	**14.4**	3.5	**16.3**	9.3	**2.1**	**10.5**	0.47	1.6	0.95	15.1	10.5	0.39	0.54	2.6	17.	63.2	49.15
		981019-M5-02	19-Oct-98	5.0 (dup)	**3.2**	**3.9**	1.4	**4.3**	3.6	**0.53**	**2.6**	1.7	0.64	2.	3.6	11.	1.2	0.24	13.	14.3	19.53	47.68
		981019-M5-03	19-Oct-98	9.5	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND	ND
		981020-M5-09	20-Oct-98	71.0	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND	ND
	MW-08-56	951025-M8-01	25-Oct-95	0.2	**12.** J	**39.6**	13.8	**41.7**	20.5 J	**9.1**	**46.2**	ND>0.50	3.2	1.8	56.5	6.7	ND[a]	2.2	1.4	26.1	203.4	97.9
		951025-M8-11	25-Oct-95	44.0	0.17 J	0.12 J	0.053 J	0.15 J	0.21 J	ND[a] UJ	0.08 J	0.74 J	0.3 J	0.22 J	0.13 J	0.6 J	0.48 J	2.6 J	1.5 J	0.71 J	0.783	7.28
		951025-M8-15	25-Oct-95	55.0	ND[a] UJ	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	0.057	ND[a]	0.065	ND[a]	0.31	0.11	0.1	ND	0.642
	M-11	951102-M11-01	2-Nov-95	0.2	**8.1**	**18.**	6.	**10.**	6.9	**2.3**	**9.2**	0.73	0.91	0.82	12.	12.	0.3	0.37	4.2	14.	67.4	45.33
		951102-M11-09	2-Nov-95	39.0	0.16	0.11	0.046	0.077	0.13	ND[a]	0.047	0.85	0.083	0.21	0.063	0.94	0.65	1.5	2.1	0.91	9.723	7.306
		951102-M11-10	2-Nov-95	43.5	0.26 J	0.14 J	0.07 J	0.16 J	0.26 J	ND[a] UJ	0.076 J	0.8 J	0.089 J	0.4 J	0.11 J	1.4 J	0.65 J	2. J	3.1 J	1.4 J	0.966	9.949
	MW-14-110	981014-M14-01	14-Oct-98	3.5	**357.**	**411.**	**99.2**	**400.**	**343.**	ND[c]	ND[c]	42.3	138.	1.4	ND[c]	1,390.	57.	36.8	411.	2,190.	1,610.2	4,266.5
		981014-M14-02	14-Oct-98	6.0	**116.**	**133.**	**37.3**	**136.**	152.	ND[c]	**58.1**	10.6	21.9	23.	90.2	292.	14.2	12.9	118.	482.	632.4	1,064.8
		981014-M14-03	14-Oct-98	10.0	**71.3**	**74.6**	**24.**	**82.5**	94.8	ND[a]	**42.6**	39.3	6.6	37.1	57.	194.	33.	93.3	250.	310.	389.8	1,020.3
		981014-M14-07	14-Oct-98	43.5	0.31	0.33	ND[a]	**0.36**	0.35	ND[a]	0.2	0.39	0.36	0.36	0.32	1.2	0.45	2.1	2.3	1.8	1.55	9.28
		981016-M14-13	16-Oct-98	69.5	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND[a]	ND	ND
		981019-M14-20	19-Oct-98	106.0	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND[a] UJ	ND	ND
	SS-01	981112-SS-01	12-Nov-98	0.2	0.21	0.46	0.14	**0.44**	0.23	0.068	0.35	ND[a]	0.064	ND[a]	0.5	0.29	ND[a]	ND[a]	0.1	0.37	1.898	1.324
	SS-02	981112-SS-02	12-Nov-98	0.2	0.79	1.5	0.47	**1.5**	0.93	**0.22**	1.2	ND[a]	0.2	0.08	1.6	1.2	ND[a]	0.088	0.22	1.6	6.61	4.988
	SS-03	981112-SS-03	12-Nov-98	0.2	**4.7**	**14.2**	3.5	**14.1**	6.2	**1.5**	**10.3**	0.1	1.9	ND[a]	14.4	3.4	0.13	0.9	0.97	8.5	54.5	30.3
	SS-04	981112-SS-04	12-Nov-98	0.2	1.3	**3.1**	0.88	**2.9**	1.7	**0.49**	**2.4**	0.083	0.5	0.25	3.1	1.4	0.059	0.23	0.61	2.2	12.77	8.432
	SS-11	981112-SS-11	12-Nov-98	0.2	0.061	0.14	ND[a]	0.13	0.066	ND[a]	0.1	ND[a]	ND[a]	ND[a]	0.15	0.075	ND[a]	ND[a]	ND[a]	0.099	0.497	0.324

Note:
DEQ = Oregon Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
ND = Not detected above detection limit indicated
PAHs = polynuclear aromatic hydrocarbons
ppm = parts per million
J indicates an estimated value (validation qualifier)
UJ indicates an estimated reporting limit (validation qualifier)

# = Reference level not established
1 = Sample number prefix: 2708-
2 = Reserved
3 =EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/2/2002)
Bold = Detected above Reference Levels

a = detection limit is 0.05 mg/kg (ppm)
b = detection limit is 0.2 mg/kg (ppm)
c = detection limit is 1 mg/kg (ppm)
d = detection limit is 100 mg/kg (ppm)
e = detection limit is 0.5 mg/kg (ppm)
f = detection limit is 0.7 mg/kg (ppm)

TABLE 11 – Summary of Analytical Results for Soil Samples
Phenols by EPA Method 8270

Phenols by EPA Method 8270						Analytical Results mg/kg (ppm)															
Study Area	Soil Boring	Sample Number[1]	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	4-Chloro-3-methylphenol	2-Chlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2-Methyl-4,6-dinitrophenol	Cresols, Total	4-Methylphenol	2-Nitrophenol	4-Nitrophenol	2,3,4,6-Tetrachlorophenol	Pentachlorophenol	Phenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	Total Phenols
	EPA PRGs for Industrial Soil [3] ==>					#	240	1,800	12,000	1,200	#	#	3,100	#	#	18,000	9.00	100,000	62,000	62	#
FAMM	B-10	950925-B10-04	2708-S013	25-Sep-95	17.5	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>9.9	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND
Retort / Koppers	B-13	951006-B13-03	2708-S035	6-Oct-95	10.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-17	950929-B17-05	2708-S022	29-Sep-95	16.5	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>9.9	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND
	B-18	950919-B18-05	2708-S003	19-Sep-95	12.0	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	0.36	ND>0.17	ND>0.17	ND>0.17	0.36
	B-19	950919-B19-01	2708-S003	19-Sep-95	0.2	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
		950919-B19-03	2708-S004	19-Sep-95	6.5	ND>26	ND>26	ND>26	ND>26	ND>50	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND
	B-20	950929-B20-03	2708-S022	29-Sep-95	10.5	ND>26	ND>26	ND>26	ND>26	ND>50	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND
	B-22	951003-B22-05	2708-S027	3-Oct-95	13.5	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
		951003-B22-09	2708-S028	3-Oct-95	24.0	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
	B-23	951003-B23-08	2708-S029	3-Oct-95	26.5	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>2.0	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND>0.8	ND
	B-27	950920-B27-10	2708-S005	20-Sep-95	23.0	ND>26	ND>26	ND>26	ND>26	ND>50	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND>26	ND
	MW-10-60	951108-M10-01	2708-S052	8-Nov-95	0.2	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>6.6	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND>3.4	ND
	MW-12-34	951023-M12-06	2708-S038	23-Oct-95	22.0	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>3.3	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND
Spent Oxide	B-03	950921-B3-05	2708-S007	21-Sep-95	10.5	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>3.3	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND>1.7	ND
Tar Pond	B-26	951003-B26-06	2708-S030	4-Oct-95	20.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-28	951002-B28-01	2708-S025	2-Oct-95	0.2	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>9.9	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND>5.1	ND
		951002-B28-07	2708-S025	2-Oct-95	15.0	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-29	950922-B29-15	2708-S012	22-Sep-95	35.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-30	950922-B30-06	2708-S010	22-Sep-95	11.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-31	950925-B31-06	2708-S014	25-Sep-95	21.0	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
	B-33	951005-B33-03	2708-S034	5-Oct-95	5.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
		951005-B33-14	2708-S034	5-Oct-95	54.0	ND>17	ND>17	ND>17	ND>17	ND>33	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND>17	ND
	B-35	951005-B35-01	2708-S033	5-Oct-95	0.2	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.33	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND>0.17	ND
	MW-04-57	951030-M4-01	2708-S043	30-Oct-95	0.2	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND
		951030-M4-06	2708-S043	30-Oct-95	25.5	ND>51	ND>51	ND>51	ND>51	ND>99	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND>51	ND

Note: DEQ = Oregon Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram

ND = Not detected above detection limit indicated
ppm = parts per million

[1] = Sample number prefix: 2708-
[2] = Reserved
[3] = Reference Levels are EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/2/2002)
# = Reference level not established

TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)												
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
					EPA PRGs for Industrial Soil [1] ==>	410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
					Background Levels[2]==>	4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
FAMM	B-47	000829-039	2708-S075	29-Aug-00	0.2	1.57 J	ND[a]	ND[a]	ND[a]	1.8	5.87	ND[a]	ND[b]	1.1	ND[a]	ND[a]	ND[c]	33.4
		000829-040	2708-S075	29-Aug-00	0.2 (dup)	1.42 J	ND[a]	ND[a]	ND[a]	2.46	5.92	ND[a]	ND[b]	1.95	ND[a]	ND[a]	ND[c]	35.5
		000829-041	2708-S076	29-Aug-00	5.0	1.02 J	**5.25**	ND[a]	ND[a]	16.1	19.6	12.1	ND[b]	13.5	ND[a]	ND[a]	ND[c]	55.2
		000829-042	2708-S076	29-Aug-00	11.5	1.07 J	**2.67**	ND[a]	ND[a]	13.9	17.6	14.6	<u>2.</u>	14.7	ND[a]	ND[a]	ND[c]	53.
		000829-043	2708-S076	29-Aug-00	11.5 (dup)	ND[a] UJ	**3.33**	ND[a]	ND[a]	15.1	19.4	11.9	ND[b]	12.2	ND[a]	ND[a]	ND[c]	52.5
		000829-045	2708-S076	29-Aug-00	31.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-51	000828-023	2708-S071	28-Aug-00	0.2	2.26 J	**3.14**	ND[a]	ND[a]	70.9	34.7	30.4	ND[b]	146.	ND[a]	ND[a]	ND[c]	114.
		000828-024	2708-S073	28-Aug-00	2.0	ND[a] UJ	**2.57**	ND[a]	ND[a]	12.9	11.	2.4	ND[b]	14.8	ND[a]	ND[a]	ND[a]	ND[a]
		000828-025	2708-S073	28-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-52	000828-026	2708-S071	28-Aug-00	0.2	ND[a] UJ	ND[a]	ND[a]	ND[a]	ND[a]	3.83	4.01	ND[b]	3.78	ND[a]	ND[a]	ND[a]	28.4
		000828-027	2708-S073	28-Aug-00	3.5	ND[a] UJ	**2.54**	ND[a]	ND[a]	11.8	11.8	1.78	ND[b]	14.3	ND[a]	ND[a]	ND[a]	35.9
		000828-028	2708-S073	28-Aug-00	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-
		000828-029	2708-S073	28-Aug-00	10.5 (dup)	-	-	-	-	-	-	-	-	-	-	-	-	-
	GT-1	971117-001	2708-S054	17-Nov-97	3.0	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		971117-004	2708-S054	17-Nov-97	10.5	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		971117-006	2708-S054	17-Nov-97	16.0	-	**2.4**	-	-	-	-	-	-	-	-	-	-	-
		971117-008	2708-S054	17-Nov-97	20.5	-	1.5	-	-	-	-	-	-	-	-	-	-	-
		971117-011	2708-S054	17-Nov-97	35.5	-	1.2	-	-	-	-	-	-	-	-	-	-	-
	GT-2	971117-012	2708-S054	17-Nov-97	3.5	-	1.1	-	-	-	-	-	-	-	-	-	-	-
		971117-017	2708-S055	17-Nov-97	15.5	-	**2.2**	-	-	-	-	-	-	-	-	-	-	-
		971117-021	2708-S055	17-Nov-97	33.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
	GT-3	971118-023	2708-S056	18-Nov-97	3.0	-	**2.7**	-	-	-	-	-	-	-	-	-	-	-
		971118-026	2708-S056	18-Nov-97	12.5	-	**1.9**	-	-	-	-	-	-	-	-	-	-	-
		971118-032	2708-S056	18-Nov-97	36.0	-	1.	-	-	-	-	-	-	-	-	-	-	-
	GT-4	971118-034	2708-S056	18-Nov-97	13.5	-	2.	-	-	-	-	-	-	-	-	-	-	-
		971118-038	2708-S057	18-Nov-97	40.5	-	1.3	-	-	-	-	-	-	-	-	-	-	-

TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)												
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
					EPA PRGs for Industrial Soil [1] ==>	410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
					Background Levels[2]==>	4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
FAMM (cont.)	MW-13	971218-M13-02	2708-S058	18-Dec-97	6.0	-	**2.7**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-03	2708-S058	18-Dec-97	10.0	-	**2.8**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-04	2708-S058	18-Dec-97	13.5	-	**2.7**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-05	2708-S058	18-Dec-97	18.0	-	**2.5**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-08	2708-S058	18-Dec-97	24.5	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-10	2708-S058	18-Dec-97	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-11	2708-S058	18-Dec-97	31.0	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		971218-M13-17	2708-S059	18-Dec-97	57.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Office Area	B-38	000828-014	2708-S071	28-Aug-00	0.2	1.71 J	**5.26**	ND[a]	ND[a]	24.7	52.1	33.5	ND[b]	25.6	ND[a]	ND[a]	ND[a]	69.3
		000828-015	2708-S072	28-Aug-00	2.0	2.92 J	**6.37**	ND[a]	ND[a]	19.7	35.2	40.3	ND[b]	17.9	ND[a]	ND[a]	ND[a]	70.3
		000828-016	2708-S072	28-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-39	000828-004	2708-S071	28-Aug-00	0.2	1.43 J	**5.05**	ND[a]	ND[a]	18.9	22.	36.6	ND[b]	84.	ND[a]	ND[a]	ND[a]	82.7
		000828-005	2708-S072	28-Aug-00	3.0	1.42 J	**4.86**	ND[a]	ND[a]	15.1	14.9	15.7	ND[b]	12.5	ND[a]	ND[a]	ND[a]	55.6
		000828-006	2708-S072	28-Aug-00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-40	000828-010	2708-S071	28-Aug-00	0.2	1.01 J	**3.39**	ND[a]	ND[a]	16.2	23.2	55.4	ND[b]	39.8	ND[a]	ND[a]	ND[a]	92.9
		000828-011	2708-S072	28-Aug-00	2.5	ND[a] UJ	**2.69**	ND[a]	ND[a]	13.1	12.2	2.27	ND[b]	15.6	ND[a]	ND[a]	ND[a]	36.9
		000828-012	2708-S072	28-Aug-00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-41	000828-007	2708-S071	28-Aug-00	0.2	1.96 J	**4.97**	ND[a]	ND[a]	14.7	19.7	21.4	ND[b]	20.9	ND[a]	ND[a]	ND[a]	74.4
		000828-008	2708-S072	28-Aug-00	2.5	1.24 J	**4.1**	ND[a]	ND[a]	13.7	19.	24.6	ND[b]	21.1	ND[a]	ND[a]	ND[a]	57.9
		000828-009	2708-S072	28-Aug-00	9.5	ND[a] UJ	**2.55**	ND[a]	ND[a]	12.9	12.5	1.94	ND[b]	15.3	ND[a]	ND[a]	ND[a]	36.2
Retorts/Koppers	B-42	000828-020	2708-S071	28-Aug-00	0.2	1.16 J	ND[a]	ND[a]	ND[a]	ND[a]	4.3	ND[a]	ND[b]	ND[a]	ND[a]	ND[a]	ND[a]	27.5
		000828-021	2708-S073	28-Aug-00	1.0	ND[a] UJ	**2.74**	ND[a]	ND[a]	13.7	12.4	3.19	ND[b]	16.5	ND[a]	ND[a]	ND[a]	64.2
		000828-022	2708-S073	28-Aug-00	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-43	000829-050	2708-S075	29-Aug-00	0.2	3.76 J	**3.04**	ND[a]	ND[a]	22.3	40.9	94.6	3.23	19.8	ND[a]	ND[a]	ND[c]	226.
		000829-046	2708-S076	29-Aug-00	2.0	ND[a] UJ	**2.89**	ND[a]	ND[a]	11.4	11.8	2.44	0.105	17.3	ND[a]	ND[a]	ND[c]	35.9
		000829-047	2708-S076	29-Aug-00	2.0 (dup)	ND[a] UJ	**2.93**	ND[a]	ND[a]	12.3	11.8	1.97	ND[b]	15.5	ND[a]	ND[a]	ND[c]	36.8
		000829-048	2708-S076	29-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
		000829-049	2708-S076	29-Aug-00	8.5 (dup)	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-44	000829-052	2708-S075	29-Aug-00	0.2	NDa UJ	**3.4**	ND[a]	ND[a]	12.6	12.5	1.76	ND[b]	14.6	ND[a]	ND[a]	ND[c]	37.9
		000829-051	2708-S076	29-Aug-00	3.5	ND[a] UJ	**2.46**	ND[a]	ND[a]	10.8	11.9	1.7	ND[b]	13.8	ND[a]	ND[a]	ND[c]	36.1
		000829-053	2708-S076	29-Aug-00	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 12 – Summary of Analytical Results for Soil Samples
Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						**Analytical Results mg/kg (ppm)**												
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
					EPA PRGs for Industrial Soil [1] ==>	410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
					Background Levels[2]==>	4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
Retorts/Koppers (cont.)	B-45	000829-054	2708-S075	29-Aug-00	0.2	1.44 J	ND[a]	ND[a]	ND[a]	4.96	10.1	2.77	ND[b]	3.16	ND[a]	ND[a]	ND[c]	42.3
		000829-055	2708-S076	29-Aug-00	2.0	1.11 J	**9.02**	ND[a]	ND[a]	15.8	21.3 J	10.2 J	ND[b]	14.4	ND[a]	ND[a]	ND[c]	58.8
		000829-056	2708-S076	29-Aug-00	2.0 (dup)	1.02 J	**5.52**	ND[a]	ND[a]	16.5	70.7 J	31.1 J	ND[b]	18.9	ND[a]	ND[a]	ND[c]	60.4
		000829-057	2708-S077	29-Aug-00	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-46	000829-058	2708-S075	29-Aug-00	0.2	1.16 J	ND[a]	ND[a]	ND[a]	11.1	11.5	8.2	ND[b]	6.57	ND[a]	ND[a]	ND[c]	71.4
		000829-059	2708-S077	29-Aug-00	5.0	ND[a] UJ	**2.75**	ND[a]	ND[a]	12.5	11.5	1.65	ND[b]	13.3	ND[a]	ND[a]	ND[c]	35.7
		000829-060	2708-S077	29-Aug-00	10.5	ND[a] UJ	1.46	ND[a]	ND[a]	9.21	10.1	1.36	ND[b]	12.3	ND[a]	ND[a]	ND[a]	28.5
	SS-12	000829-061	2708-S075	29-Aug-00	0.2	ND[a] UJ	ND[a]	ND[a]	ND[a]	5.55	21.7	3.74	ND[b]	4.89	ND[a]	ND[a]	ND[c]	45.9
	SS-13	000829-062	2708-S075	29-Aug-00	0.2	ND[a] UJ	ND[a]	ND[a]	ND[a]	1.07	6.24	1.23	ND[b]	ND[a]	ND[a]	ND[a]	ND[c]	32.7
	SS-14	000829-063	2708-S075	29-Aug-00	0.2	1.34 J	ND[a]	ND[a]	ND[a]	3.21	5.41	4.17	ND[b]	2.08	ND[a]	ND[a]	ND[c]	55.1
	SS-15	000829-064	2708-S075	29-Aug-00	0.2	1.13 J	**3.34**	ND[a]	ND[a]	4.94	11.	132 J	0.578	5.78	ND[a]	ND[a]	ND[c]	58.5
		000829-065	2708-S075	29-Aug-00	0.2 (dup)	ND[a] UJ	ND[a]	ND[a]	ND[a]	5.47	6.73	4.33 J	ND[b]	3.02	ND[a]	ND[a]	ND[c]	37.9
Spent Oxide	B-1	950921-B1-01	2708-S009	21-Sep-95	0.2	ND[a]	**6.6 J**	ND[a]	ND[a]	26.	41.	60.	ND[b]	21.	ND[a]	ND[a]	4.1	140.
		950921-B1-02	2708-S009	21-Sep-95	0.2 (dup)	6.6	**21 .J**	ND[a]	1.1	30.	60.	58.	ND[b]	26.	ND[a]	ND[a]	7.6	160.
		950921-B1-05	2708-S009	21-Sep-95	10.5	ND[a]	**14.**	ND[a]	3.4	11.	80.	130.	ND[b]	36.	ND[a]	ND[a]	3.	670.
	B-2	950927-B2-05	2708-S016	27-Sep-95	16.0	ND[a]	**4.9**	ND[a]	4.3	12.	20.	15.	ND[b]	31.	ND[a]	ND[a]	3.8	3,000.
	B-3	950921-B3-05	2708-S007	21-Sep-95	10.5	ND[a] UJ	**7.**	ND[a]	ND[a]	30 J	36 J	22.	ND[b]	41 J	ND[a]	ND[a]	5.	120 J
	B-36	000828-017	2708-S071	28-Aug-00	0.2	1.27 J	**4.16**	ND[a]	ND[a]	18.	29.7	40.2	ND[b]	14.4	ND[a]	ND[a]	ND[c]	82.8
		000828-018	2708-S072	28-Aug-00	3.5	1.59 J	**4.89**	ND[a]	ND[a]	15.2	18.9	47.	ND[b]	12.3	ND[a]	ND[a]	ND[a]	67.3
		000828-019	2708-S073	28-Aug-00	10.0	1.26 J	**2.07**	ND[a]	ND[a]	6.58	13.1	8.56	ND[b]	6.91	ND[a]	ND[a]	ND[a]	45.2
	B-37	000828-001	2708-S071	28-Aug-00	0.2	1.73 J	ND[a]	ND[a]	ND[a]	5.43 J	10.2	7.69	ND[b]	3.98	ND[a] UJ	ND[a]	ND[a] UJ	49.8
		000828-002	2708-S072	28-Aug-00	4.5	ND[a] UJ	**3.2**	ND[a]	ND[a]	13.5	10.3	2.61	ND[b]	16.1	ND[a]	ND[a]	ND[a]	51.9
		000828-003	2708-S072	28-Aug-00	11.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW-02-61	981007-M2-01	2708-S060	7-Oct-98	2.0	-	**3.44**	-	-	-	-	-	-	-	-	-	-	-
		981007-M2-02	2709-S060	7-Oct-98	5.5	-	**4.**	-	-	-	-	-	-	-	-	-	-	-
		981007-M2-03	2709-S060	7-Oct-98	32.0	-	**3.**	-	-	-	-	-	-	-	-	-	-	-

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Priority Pollutant Metals by EPA Methods 6010 and 7471

Total Metals by EPA Method 6010 and 7471						Analytical Results mg/kg (ppm)												
Area	Soil Boring	Sample Number (Prefix: 2708-)	Chain of Custody Number	Sample Date	Sample Depth (feet bgs)	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
					EPA PRGs for Industrial Soil [1] ==>	410.	1.6	1,900.	810.	450.	41,000.	750.	310.	2,000.	5,100.	5,100.	67.	100,000.
					Background Levels[2]==>	4.	7.	#	1.	42.	36.	17.	0.07	28.	2.	1.	#	86.
Tar Pond	B-48	000828-030	2708-S071	28-Aug-00	0.2	1.57 J	ND[a]	ND[a]	ND[a]	5.01	12.9	3.78	ND[b]	5.44	ND[a]	ND[a]	ND[c]	54.4
		000828-031	2708-S073	28-Aug-00	5.0	1.03 J	ND[a] UJ	ND[a]	ND[a]	8.86	9.23	18.3	ND[b]	11.1	ND[a] UJ	ND[a]	ND[c] R	43.4
		000828-032	2708-S073	28-Aug-00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-49	000828-036	2708-S071	28-Aug-00	0.2	1.62 J	ND[a]	ND[a]	ND[a]	9.26	9.62	6.93	ND[b]	4.7	ND[a]	ND[a]	ND>100	63.9
		000828-037	2708-S074	28-Aug-00	1.5	1.54 J	ND[a]	ND[a]	ND[a]	10.6	9.9	6.68	ND[b]	6.9	ND[a]	ND[a]	ND[c]	53.
		000828-038	2708-S074	28-Aug-00	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	B-50	000828-033	2708-S071	28-Aug-00	0.2	1.87 J	1.11	ND[a]	ND[a]	11.9	16.7	10.8	ND[b]	5.92	ND[c]	ND[c]	ND>100	67.2
		000828-034	2708-S073	28-Aug-00	1.0	1.52 J	ND[a]	ND[a]	ND[a]	10.2	10.7	11.1	ND[b]	8.65	ND[a]	ND[a]	ND[c]	62.6
		000828-035	2708-S073	28-Aug-00	6.0	1.59 J	ND[a]	ND[a]	ND[a]	10.	10.4	12.6	ND[b]	10.1	ND[a]	ND[a]	ND>100	61.4
	MW-04-101	981014-M4-01	2708-S063	14-Oct-98	2.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M4-02	2708-S063	14-Oct-98	6.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M4-03	2708-S063	14-Oct-98	10.5	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
	MW-05-175	981019-M5-01	2708-S065	19-Oct-98	5.0	-	1.1	-	-	-	-	-	-	-	-	-	-	-
		981019-M5-02	2708-S065	19-Oct-98	5.0 (dup)	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981019-M5-03	2708-S065	19-Oct-98	9.5	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981020-M5-09	-	20-Oct-98	71.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW-14-110	981014-M14-01	2708-S063	14-Oct-98	3.5	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M14-02	2708-S063	14-Oct-98	6.0	-	ND[a]	-	-	-	-	-	-	-	-	-	-	-
		981014-M14-03	2708-S063	14-Oct-98	10.0	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		981014-M14-07	2708-S063	14-Oct-98	43.5	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-
		981016-M14-13	2708-S064	16-Oct-98	69.5	-	**5.2**	-	-	-	-	-	-	-	-	-	-	-
		981019-M14-20	2708-S065	19-Oct-98	106.0	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE:
bgs = below ground surface
dup = field duplicate sample
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
J indicates an estimated value (validation qualifier)
UJ indicates an estimated reporting limit (validation qualifier)
R result is unusable due to serious deficiencies in meeting quality control criteria (validation qualifier)
Underline = Concentration exceeds default background level
Bold = Concentration exceedsEPA PRG for residential soil
Bold and Underline = Concentration exceeds default background level and EPA PRG for residential soil

ND = Not detected above detection limit indicated
ppm = parts per million
1 = Reference Levels are EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (Revised 10/2/2002)
2 = DEQ Default Background Concentrations for Metals (October 2002)
# = Reference level not established

a = detection limit is 1.00 mg/kg (ppm)
b = detection limit is 0.100 mg/kg
c = detection limit is 10 mg/kg

TABLE 13 – Summary of Analytical Results for Soil Samples: Physical Properties

Study Area	Soil Boring Number	Sample Number[1]	Chain of Custody Number	Sample Date	Depth (feet bgs)	Soil Description (surficial fill unit unless otherwise noted)	Analytical Results				
							EPA Method 160.3M	ASTM Method D4129-82M	ASTM Method E1109-86	ASTM Method D854-83	ASA Method 921-2.2
							Total Solids (%)	TOC (%)	Density (g/cm^3)	Specific Gravity	Porosity (% Pore Space)
FAMM	B-47	000829-042	2708-S076	29-Aug-00	11.5	Silty Sand	83.	0.35	1.04	1.8	42.
		000829-043	2708-S076	29-Aug-00	11.5 (dup)	Silty Sand	79.7	1.21	-	-	-
		000829-045	2708-S076	29-Aug-00	31.0	Sand (Alluvial)	84.6	2.47	-	-	-
	B-51	000828-025	2708-S073	28-Aug-00	8.5	Sand	92.6	0.85	1.05	2.	47.
	B-52	000828-028	2708-S073	28-Aug-00	10.5	Sand	82.6	0.44	-	-	-
		000828-029	2708-S073	28-Aug-00	10.5 (dup)	Sand	63.2	-	1.32	1.37	4.
Office	B-38	000828-016	2708-S072	28-Aug-00	8.5	Gravelly Silt	79.3	5.23	1.03	1.74	41.
	B-39	000828-006	2708-S072	28-Aug-00	9.5	Sand	90.	0.18	-	-	-
	B-40	000828-012	2708-S072	28-Aug-00	9.5	Silt (Alluvial)	75.3	0.8	-	-	-
	B-41	000828-009	2708-S072	28-Aug-00	9.5	Sand (Alluvial)	89.9	0.45	1.04	1.89	45.
Retort / Koppers	B-42	000828-022	2708-S073	28-Aug-00	7.5	Sand	90.	0.39	1.06	1.87	43.
	B-43	000829-048	2708-S076	29-Aug-00	8.5	Sand	93.1	1.49	-	-	-
	B-44	000829-053	2708-S076	29-Aug-00	10.0	Tarry Sand and Gravel	85.5	42.	-	-	-
	B-45	000829-057	2708-S077	29-Aug-00	8.5	Sand	93.4	3.85	-	-	-
	B-46	000829-059	2708-S077	29-Aug-00	5.0	Sand	93.7	0.26	1.17	2.04	43.
Spent Oxide	B-36	000828-019	2708-S073	28-Aug-00	10.0	Sandy Gravelly Silt	80.4	-	1.26	1.79	30.
	B-37	000828-003	2708-S072	28-Aug-00	11.0	Sand	94.6	0.22	1.13	2.22	49.
Tar Pond	B-48	000828-032	2708-S073	28-Aug-00	9.5	Tarry Sandy Gravel	81.7	17.9	-	-	-
	B-49	000828-037	2708-S074	28-Aug-00	1.5	Sandy Silty Gravel	87.7	4.56	-	-	-
	B-50	000828-035	2708-S073	28-Aug-00	6.0	Tarry Silty Sandy Gravel	76.2	27.9	1.01	1.56	35.
	MW-16-65	MW-16-65	-	19-Jul-04	multiple	See PTS Laboratories Physical Properties Data Tables and Charts included within Appendix I					

NOTE:
ASA = American Standards Associaton
ASTM = American Society of Testing Materials
bgs = below ground surface

1 = Sample number prefix: 2708-

dup = field duplicate sample
EPA = U.S. Environmental Protection Agency
TOC = total organic carbon
g/cm^3 = gram per cubic centimeter

TABLE 14
Summary of DNAPL Testing Results: Physical and Chemical

Parameter	Unit of Measure	Analytical Result			
		Well MW-6-32	**Well MW-10-25**	**Well MW-11-32**	**Well MW-16-45**
		Sample No.2708-981214-MW6-32-01	Sample No. 2708-981214-MW10-25-02	Sample No. 2708-981214-MW11-32-03	Sample No. 2708-041011MW-16-45-0il
Total Metals [1]	mg/kg (ppm)				
Arsenic		2.75	3.85	-	-
Barium		ND>0.500	0.700	-	-
Cadmium		ND>0.500	ND>0.500	-	-
Chromium		0.700	0.850	-	-
Lead		ND>10	ND>10	-	-
Mercury		0.059	ND>0.0500	-	-
Selenium		0.550	ND>0.500	-	-
Silver		ND>0.500	ND>0.500	-	-
Aromatic Hydrocarbons [2]	mg/kg (ppm)				
Benzene		589	14,400	2,740	ND>10.0
Ethylbenzene		2,220	5,320	1,760	34.4
1,2,4-Trimethylbenzene		-	-	-	54.9
1,3,5-Trimethylbenzene		-	-	-	16.2
Naphthalene		-	-	-	1,720
Toluene		ND>5.00	21,900	2,950	17.8
Xylene		1,240	19,500	4,400	66.1
PAHs [3]	mg/kg (ppm)				
Total PAHs		214,900	189,700	164,470	32,787
Total Carcinogenic PAHs		9,300	19,490	16,210	2,647
Petroleum Hydrocarbon ID [4]	None				
Gasoline-Range		Detected [12]	Detected [12]	Detected [12]	Not Detected
Diesel-Range		Detected [12]	Detected [12]	Detected [12]	Detected [12]
Heavy Oil-Range		Detected [12]	Detected [12]	Detected [12]	Detected [12]
Reactive Cyanide [5]	mg/kg (ppm)	ND>0.200	ND>0.200	-	-
Reactive Sulfide [6]	mg/kg (ppm)	434	ND>50.0	-	-
Specific Gravity [7]	gm/cc	1.05	1.05	1.09	1.084 @ 70F; 1.079 @100F; 1.080 @130F
Viscosity [8]	cSt	7.2	14.7	45.7	105 @ 70F; 40.1@100F; 18.7@130F
Ignitability [9]	degrees F	No Flash to 150 degrees F	94.0 degrees F	-	No Flash to 150 degrees F
Heating Value [10]	BTU/lb	9,230	12,230	12,280	-
pH [11]	pH unit	6.26	4.30	-	8.28

NOTE:

1 = EPA Method 6010/6020/7471
2 = EPA Method 8020A or EPA 8260B
3 = EPA Method 8270 SIM
4 = EPA Method 8015M or NW-TPH Methodology
5 = EPA Method 9010A
6 = EPA Method 9030
7 = SM 2710F
8 = ASTM Method D-445
9 = EPA Method 1010
10 = ASTM Method D2015
11 = EPA Method 150.1/9040A
12 = Laboratory reports that detected hydrocarbons have pattern and range consistent with creosotes

cc=cubic centimeter
cSt = centistokes
BTU = british thermal unit
DNAPL = dense non-aqueous phase liquids
EPA = U. S. Environmental Protection Agency
gm = gram
lb = pound
mg/kg = milligrams/kilogram
ND = not detected above detection limit indicated
ppm = parts per million

TABLE 15
Summary of DNAPL Testing Results:
PAHs by EPA 8270 SIM

Analytical Parameters	**Laboratory Analytical Testing Results** in mg/kg (ppm)							
Sample Location ==>	MW-6-32		MW-10-25		MW-11-32		MW-16-45	
Sample Number ==>	MW-6-32-01		MW-10-25-02		MW-11-32-03		MW-16-45-oil	
Sample Date ==>	14-Dec-98		14-Dec-98		14-Dec-98		11-Oct-04	
Non-Carcinogenic PAHs								
Acenaphthene	25,800.		14,500.		9,140.		1,500.	
Acenaphthylene	2,010.	U	4,940.		7,480.		165.	
Anthracene	16,200.		10,300.		9,810.		1,110.	
Benzo (ghi) perylene	2,010.	U	2,370.		2,630.		385.	
Fluoranthene	25,700.		27,200.		25,000.		1,800.	
Fluorene	13,000.		12,100.		10,100.		1,100.	
Naphthalene	31,300.		13,300.		13,400.		15,600.	
Phenanthrene	67,100.		58,200.		45,900.		6,200.	
Pyrene	26,500.		27,300.		24,800.		2,280.	
Carcinogenic PAHs								
Benzo (a) anthracene	4,030.		4,890.		4,060.		565.	
Benzo (a) pyrene	2,010.	U	4,000.		3,920.		508.	
Benzo (b) fluoranthene	2,010.	U	2,040.		2,010.	U	289.	
Benzo (k) fluoranthene	2,010.	U	2,330.		2,790.		277.	
Chrysene	5,270.		6,230.		5,440.		666.	
Dibenz (a,h) anthracene	2,010.	U	2,010.	U	2,010.	U	68.2	
Indeno (1,2,3-cd) pyrene	2,010.	U	2,010.	U	2,010.	U	274.	
Total Carcinogenic PAHs	9,300.		19,490.		16,210.		2,647.2	
Total PAHs	214,900.		189,700.		164,470.		32,787.2	

Note:
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
PAHs = polynuclear aromatic hydrocarbons
ppm = parts per million
U = not detected above concentration indicated

TABLE 16
Summary of DNAPL Testing Results:
SVOCs by EPA 8270C

Analytical Parameters	**Laboratory Analytical Testing Results** in mg/kg (ppm)
Sample Location ==>	MW-16-45
Sample Number ==>	MW-16-45-oil
Sample Date ==>	11-Oct-04
Acenaphthene	1,570.
Anthracene	1,020.
Fluoranthene	1,780.
Fluorene	995.
2-Methylnaphthalene	5,500.
Naphthalene	15,400.
Phenanthrene	6,020.
Pyrene	2,210.
All Others	Not Detected

Note:
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams/kilogram
ppm = parts per million
SVOCs = semi-volatile organic compounds

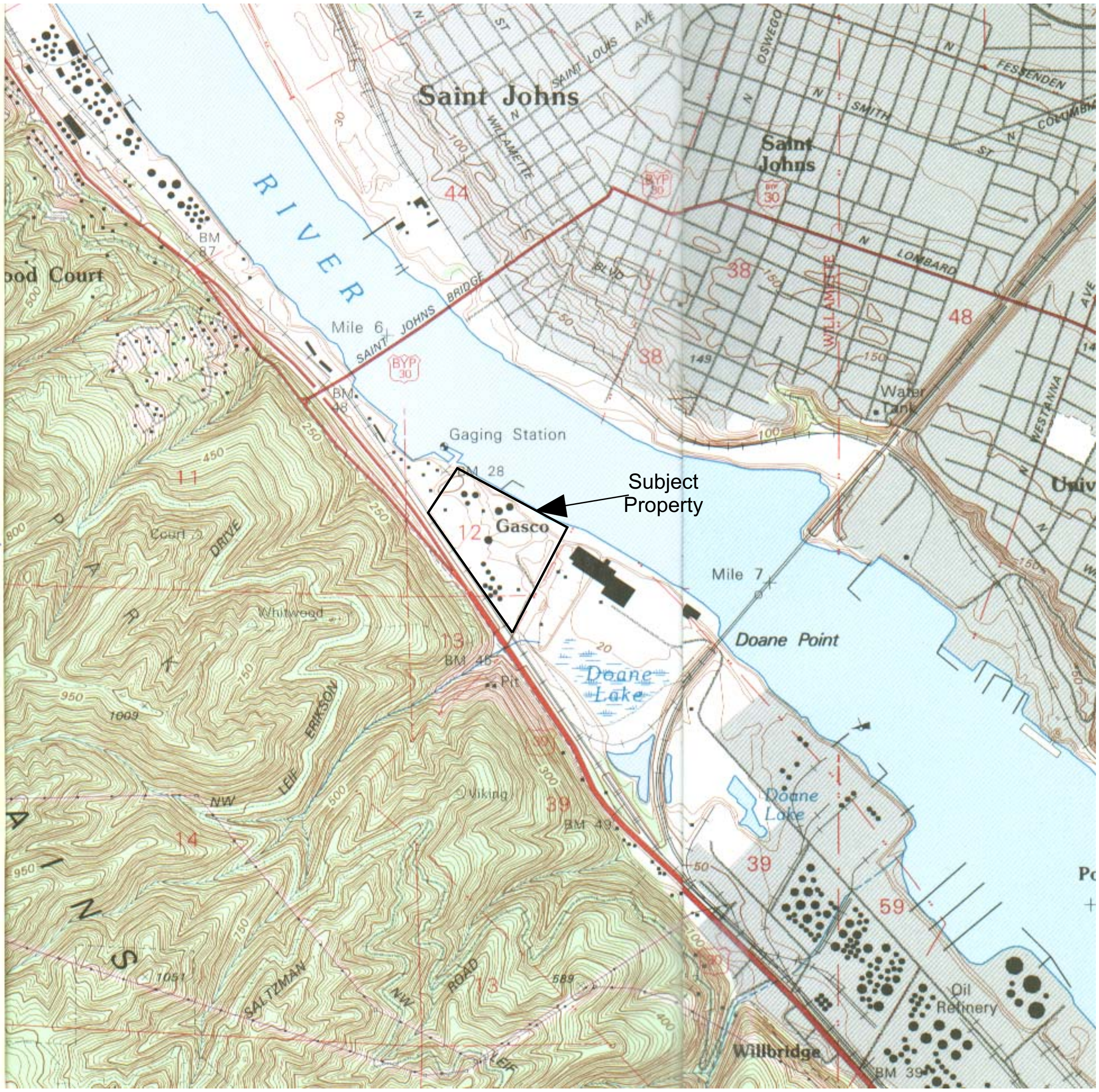
Table 17 - Summary Of DNAPL Recovery Volume: Well MW-16-45
NW Natural
7900 NW St. Helens Road
Portland, Oregon

Project No. 2708

Date	DNAPL Recovered (per event)	Cumulative Volume Recovered	NAPL Thickness In Well (feet)
05-Oct-04	1.0	1	1.6
06-Oct-04	0.5	2	0.09
11-Oct-04	0.5	2	0.85
15-Oct-04	0.25	2	0.45
18-Oct-04	0.5	3	0.75
29-Oct-04	1.0	4	1.0
03-Nov-04	0.5	4	0.75
01-Dec-04	0.25	5	1.15

Notes: DNAPL = dense non-aqueous phase liquids

FIGURES



Note: Base Map from Linnton (1990) and Portland (1990), Oregon, USGS 7.5-Minute Quadrangles

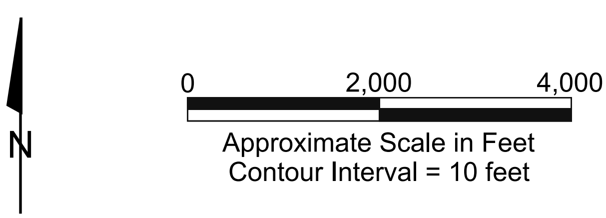


FIGURE 1

Location Map

NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.

Project No. 2708 December 2004

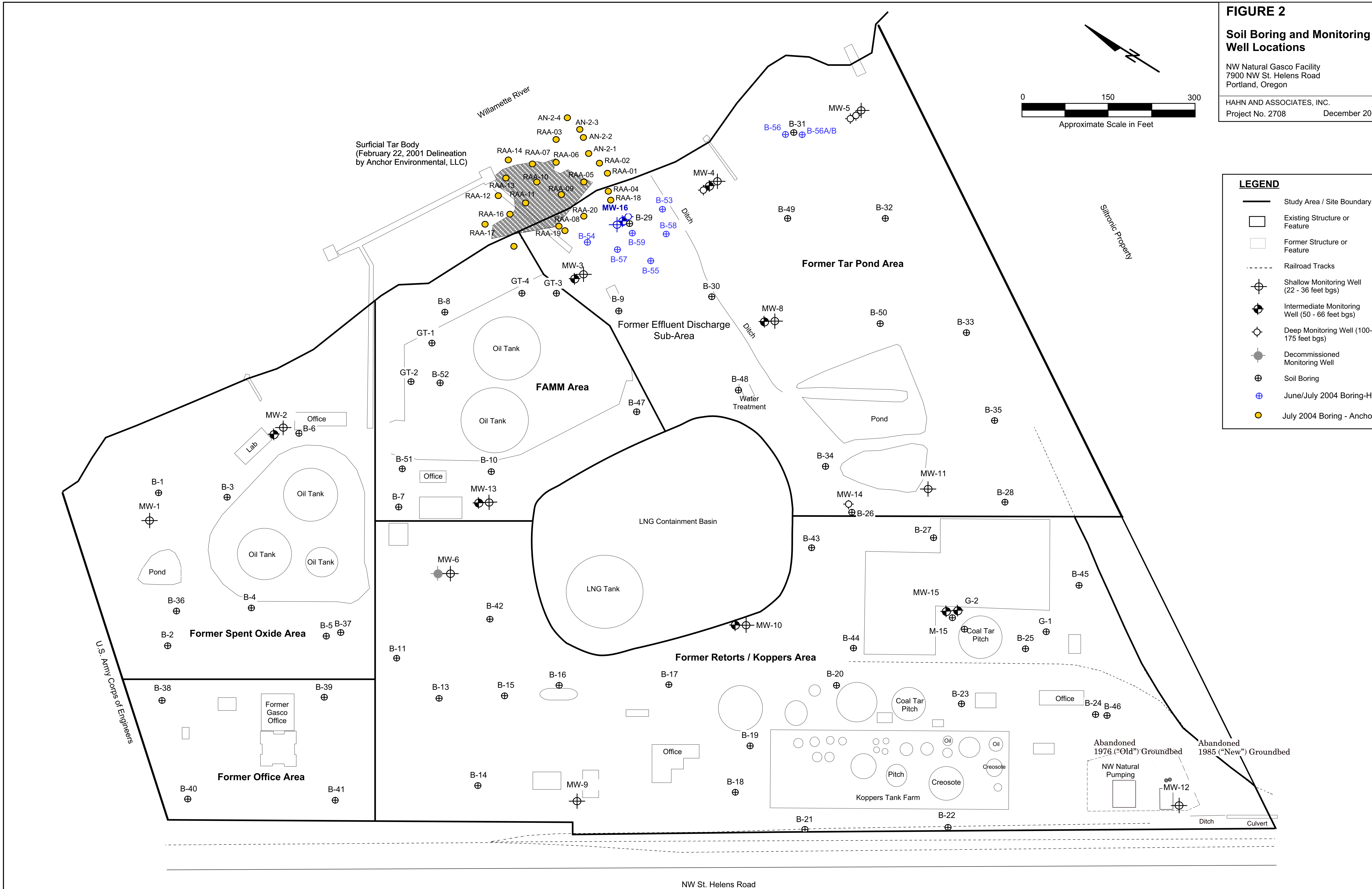
File: 2708-01 Location Map

FIGURE 2

Soil Boring and Monitoring Well Locations

NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 December 2004



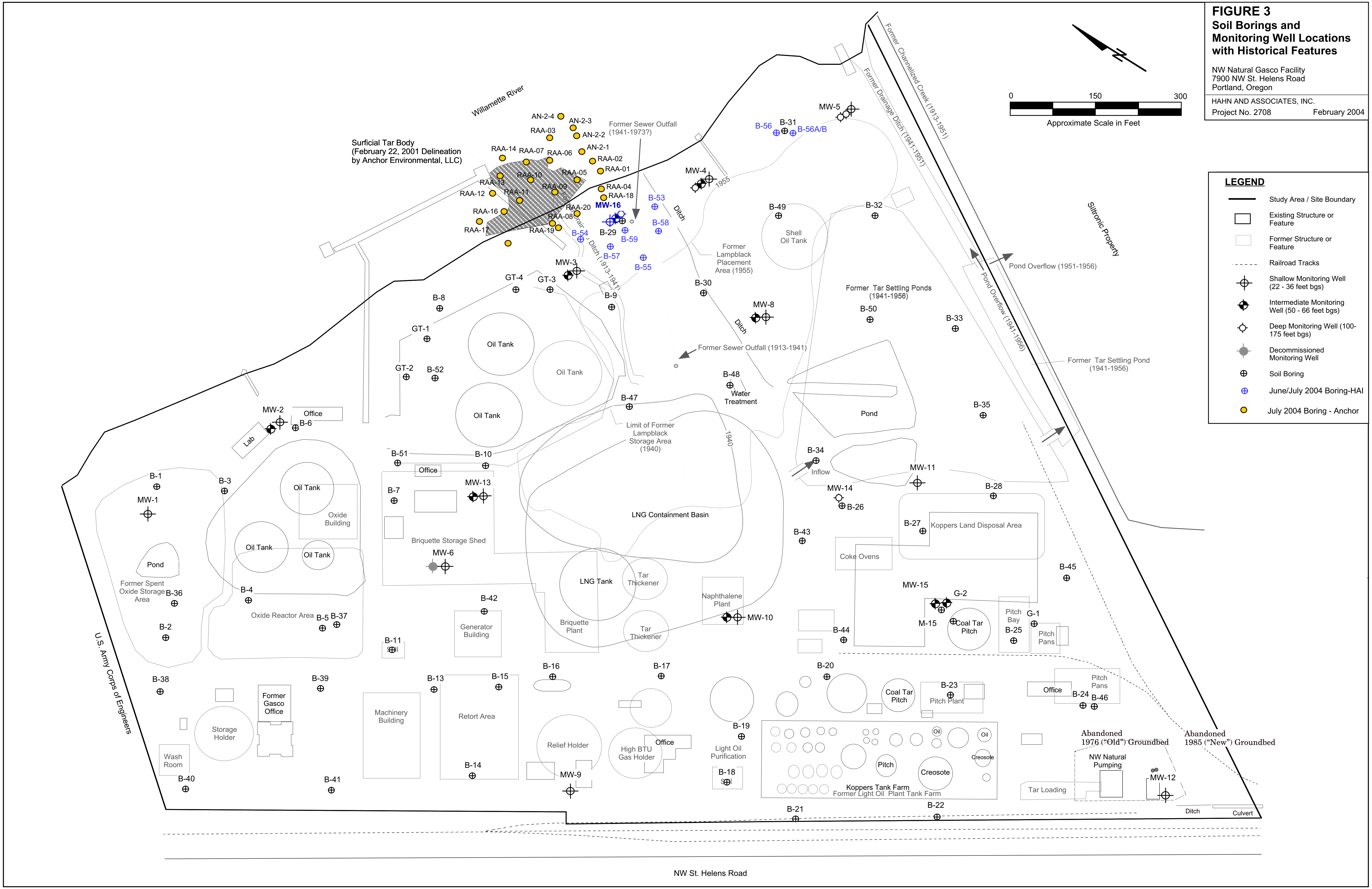


FIGURE 3
Soil Borings and Monitoring Well Locations with Historical Features

NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

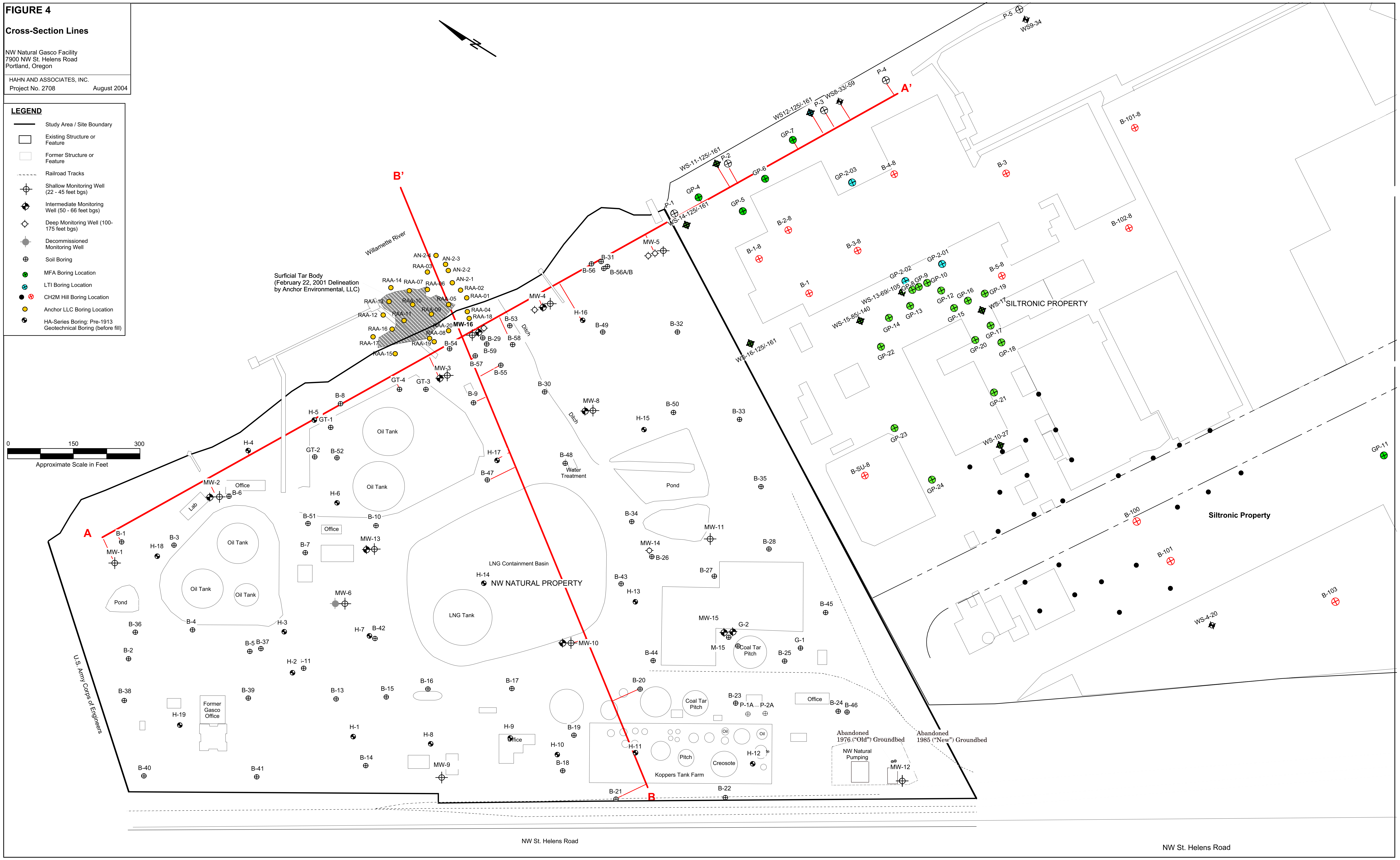
HAHN AND ASSOCIATES, INC.
Project No. 2708 February 2004

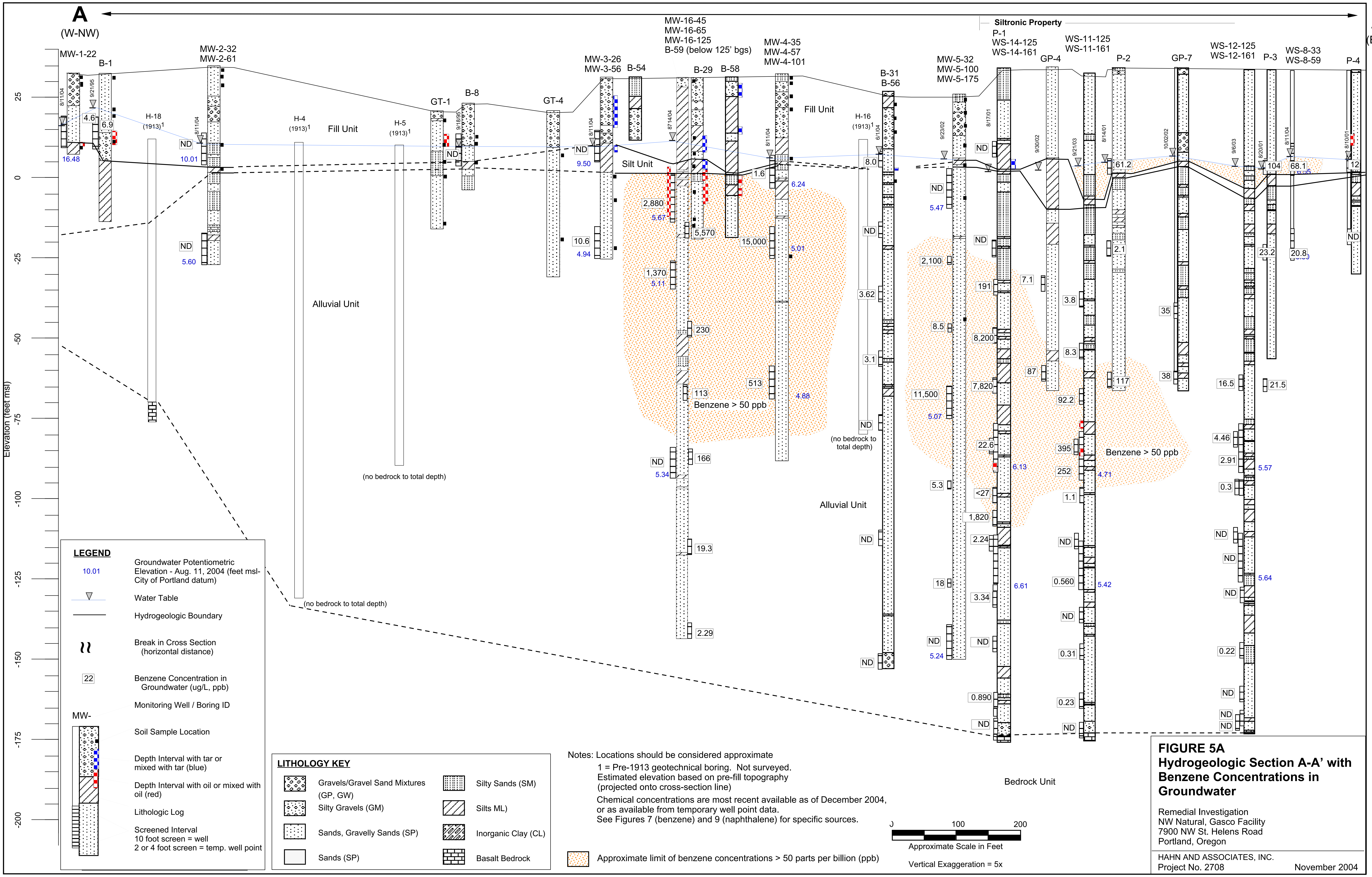
FIGURE 4

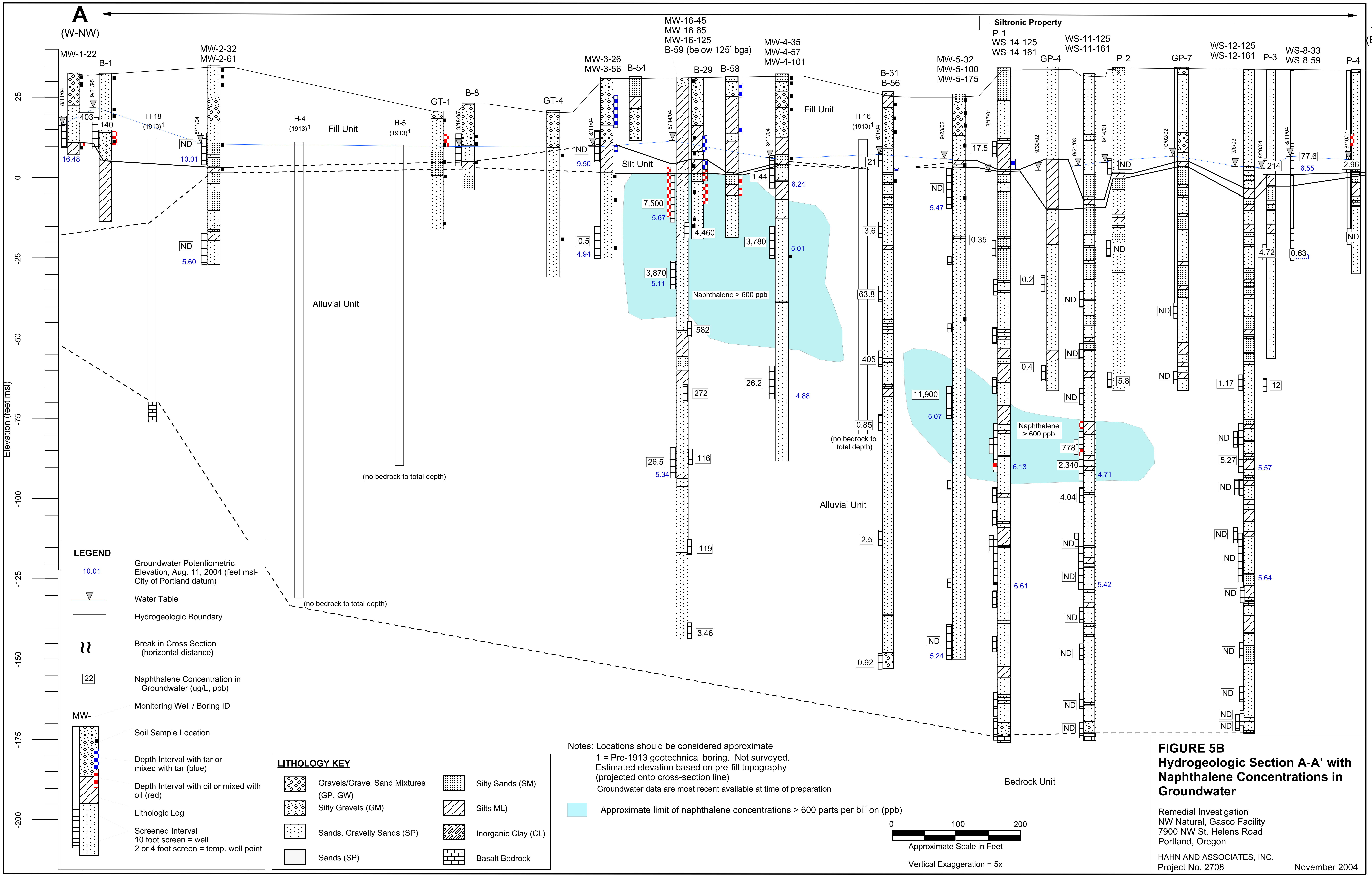
Cross-Section Lines

NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 August 2004




A
(W-NW)
A'
(E-SE)
Siltronic Property
MW-1-22
B-1
MW-2-32
MW-2-61
H-18
(1913)1
H-4
(1913)1
Fill Unit
H-5
(1913)1
GT-1
B-8
GT-4
MW-3-26
MW-3-56
B-54
MW-16-45
MW-16-65
MW-16-125
B-59 (below 125' bgs)
B-29
B-58
MW-4-35
MW-4-57
MW-4-101
Fill Unit
H-16
(1913)1
B-31
B-56
MW-5-32
MW-5-100
MW-5-175
P-1
WS-14-125
WS-14-161
GP-4
WS-11-125
WS-11-161
P-2
GP-7
WS-12-125
WS-12-161
P-3
WS-8-33
WS-8-59
P-4
Silt Unit
Alluvial Unit
Alluvial Unit
Benzene > 50 ppb
Benzene > 50 ppb
(no bedrock to total depth)
(no bedrock to total depth)
(no bedrock to total depth)
Bedrock Unit
Elevation (feet msl)
25
0
-25
-50
-75
-100
-125
-150
-175
-200
LEGEND
10.01 Groundwater Potentiometric Elevation - Aug. 11, 2004 (feet msl-City of Portland datum)
Water Table
Hydrogeologic Boundary
Break in Cross Section (horizontal distance)
22 Benzene Concentration in Groundwater (ug/L, ppb)
Monitoring Well / Boring ID
MW-
Soil Sample Location
Depth Interval with tar or mixed with tar (blue)
Depth Interval with oil or mixed with oil (red)
Lithologic Log
Screened Interval
10 foot screen = well
2 or 4 foot screen = temp. well point
LITHOLOGY KEY
Gravels/Gravel Sand Mixtures (GP, GW)
Silty Gravels (GM)
Sands, Gravelly Sands (SP)
Sands (SP)
Silty Sands (SM)
Silts ML)
Inorganic Clay (CL)
Basalt Bedrock
Notes: Locations should be considered approximate
1 = Pre-1913 geotechnical boring. Not surveyed.
Estimated elevation based on pre-fill topography
(projected onto cross-section line)
Chemical concentrations are most recent available as of December 2004,
or as available from temporary well point data.
See Figures 7 (benzene) and 9 (naphthalene) for specific sources.
Approximate limit of benzene concentrations > 50 parts per billion (ppb)
0 100 200
Approximate Scale in Feet
Vertical Exaggeration = 5x
FIGURE 5A
Hydrogeologic Section A-A' with Benzene Concentrations in Groundwater
Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon
HAHN AND ASSOCIATES, INC.
Project No. 2708
November 2004



A
(W-NW)
A'
(E-SE)
Siltronic Property
MW-1-22
B-1
H-18 (1913)[1]
MW-2-32
MW-2-61
H-4 (1913)[1]
H-5 (1913)[1]
GT-1
B-8
GT-4
MW-3-26
MW-3-56
B-54
MW-16-45
MW-16-65
MW-16-125
B-59 (below 125' bgs)
B-29
B-58
MW-4-35
MW-4-57
MW-4-101
H-16 (1913)[1]
B-31
B-56
MW-5-32
MW-5-100
MW-5-175
P-1
WS-14-125
WS-14-161
GP-4
WS-11-125
WS-11-161
P-2
GP-7
WS-12-125
WS-12-161
P-3
WS-8-33
WS-8-59
P-4
Fill Unit
Silt Unit
Alluvial Unit
Bedrock Unit
Naphthalene > 600 ppb
(no bedrock to total depth)
(no bedrock to total depth)
(no bedrock to total depth)
Elevation (feet msl)
25
0
-25
-50
-75
-100
-125
-150
-175
-200
LEGEND
10.01 Groundwater Potentiometric Elevation, Aug. 11, 2004 (feet msl-City of Portland datum)
Water Table
Hydrogeologic Boundary
Break in Cross Section (horizontal distance)
22 Naphthalene Concentration in Groundwater (ug/L, ppb)
MW- Monitoring Well / Boring ID
Soil Sample Location
Depth Interval with tar or mixed with tar (blue)
Depth Interval with oil or mixed with oil (red)
Lithologic Log
Screened Interval
10 foot screen = well
2 or 4 foot screen = temp. well point
LITHOLOGY KEY
Gravels/Gravel Sand Mixtures (GP, GW)
Silty Gravels (GM)
Sands, Gravelly Sands (SP)
Sands (SP)
Silty Sands (SM)
Silts ML)
Inorganic Clay (CL)
Basalt Bedrock
Notes: Locations should be considered approximate
1 = Pre-1913 geotechnical boring. Not surveyed. Estimated elevation based on pre-fill topography (projected onto cross-section line)
Groundwater data are most recent available at time of preparation
Approximate limit of naphthalene concentrations > 600 parts per billion (ppb)
0 100 200
Approximate Scale in Feet
Vertical Exaggeration = 5x
FIGURE 5B
Hydrogeologic Section A-A' with Naphthalene Concentrations in Groundwater
Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon
HAHN AND ASSOCIATES, INC.
Project No. 2708
November 2004

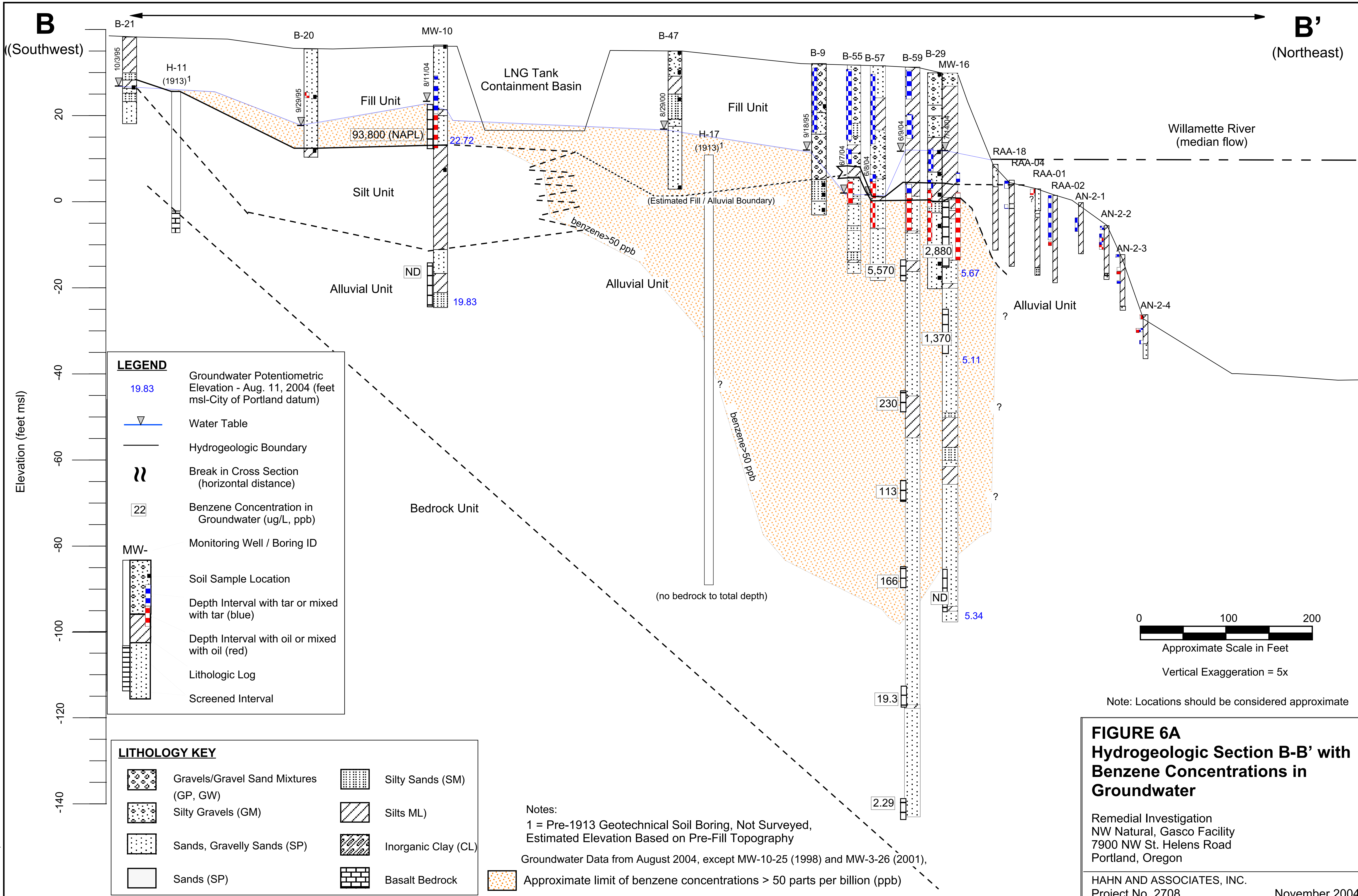


FIGURE 6A
Hydrogeologic Section B-B' with Benzene Concentrations in Groundwater

Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 November 2004

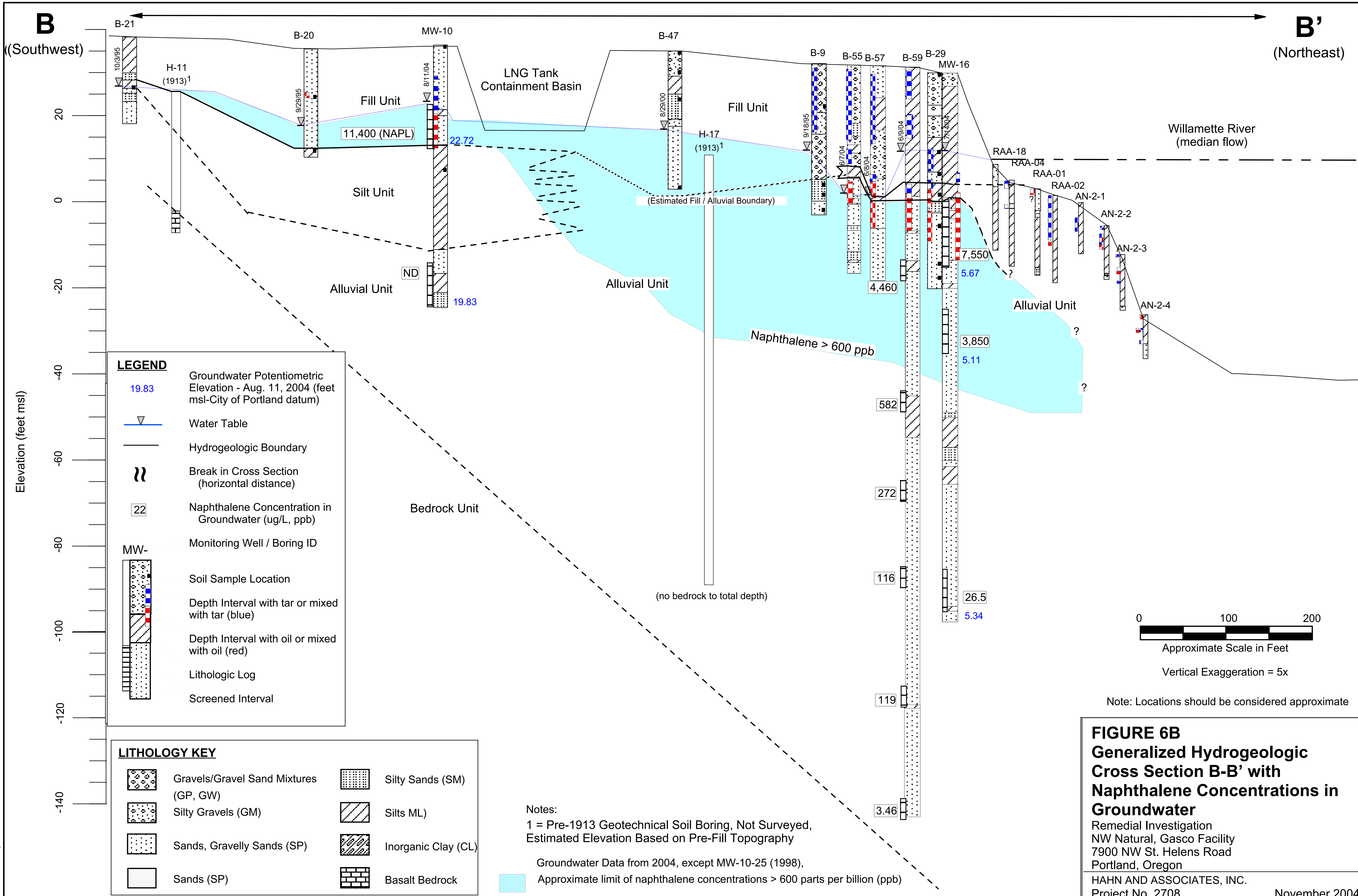


FIGURE 6B
Generalized Hydrogeologic Cross Section B-B’ with Naphthalene Concentrations in Groundwater
Remedial Investigation
NW Natural, Gasco Facility
7900 NW St. Helens Road
Portland, Oregon
HAHN AND ASSOCIATES, INC.
Project No. 2708 November 2004

FIGURE 7

Benzene Concentration Contours: Surficial Fill WBZ (0 to 35 feet bgs)

NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 December 2004

Notes:
Groundwater concentrations used for contouring are most recent available at time of map preparation (December 2004), or as available from temporary well point data

- -NW Natural Gasco Data
  - August 2004 Full Monitoring Event (except MW-10 and MW-11 NAPL zones- June 1998 monitoring event)
- - Siltronic Property Data
  1) HAI boring (TWP) data from August 2001
  2) LTI boring (TWP) data from March 2002
  3) MFA boring (TWP) data: GP-4 through GP-7 data from Sep./Oct. 2002
  4) MFA boring (TWP) data: GP-8 through GP24 data from July 2004
  5) CH2M Hill boring (TWP) data from October 1990
  6) Monitoring well data WS-1 through WS-7 from August 1985
  7) Monitoring well data WS-8 and WS-9 from July 2002;
  8) Monitoring well data WS-10 through WS-13 (15 foot screen) from Oct. 2003; exploratory data (2 foot screen) from Sept. 2003
  9) Exploratory well data WS-14 through WS-17 (2 foot screen) from June/July/Aug. 2004

Groundwater flow direction based on most recent groundwater elevation maps from NW Natural Gasco Site and from Siltronic property. Flow directions are sesonally consistent.

All locations should be considered approximate

LEGEND

- Study Area / Site Boundary
- Existing Structure or Feature
- Former Structure or Feature
- Railroad Tracks
- Shallow Monitoring Well (22 - 36 feet bgs)
- Intermediate Monitoring Well (50 - 66 feet bgs)
- Deep Monitoring Well (100-175 feet bgs)
- Decommissioned Monitoring Well
- Soil Boring
- MFA Boring Location
- LTI Boring Location
- CH2M Hill Boring Location
- ND @ 16'-26' / 430 @ 46'-56' — Benzene concentration in groundwater in parts per billion (ug/L) at feet bgs
- 50 — Estmated Iso-Concentration Limit of Chemical in Groundwater
- Anchor LLC Boring Location
- Interpreted Groundwater Flow Direction

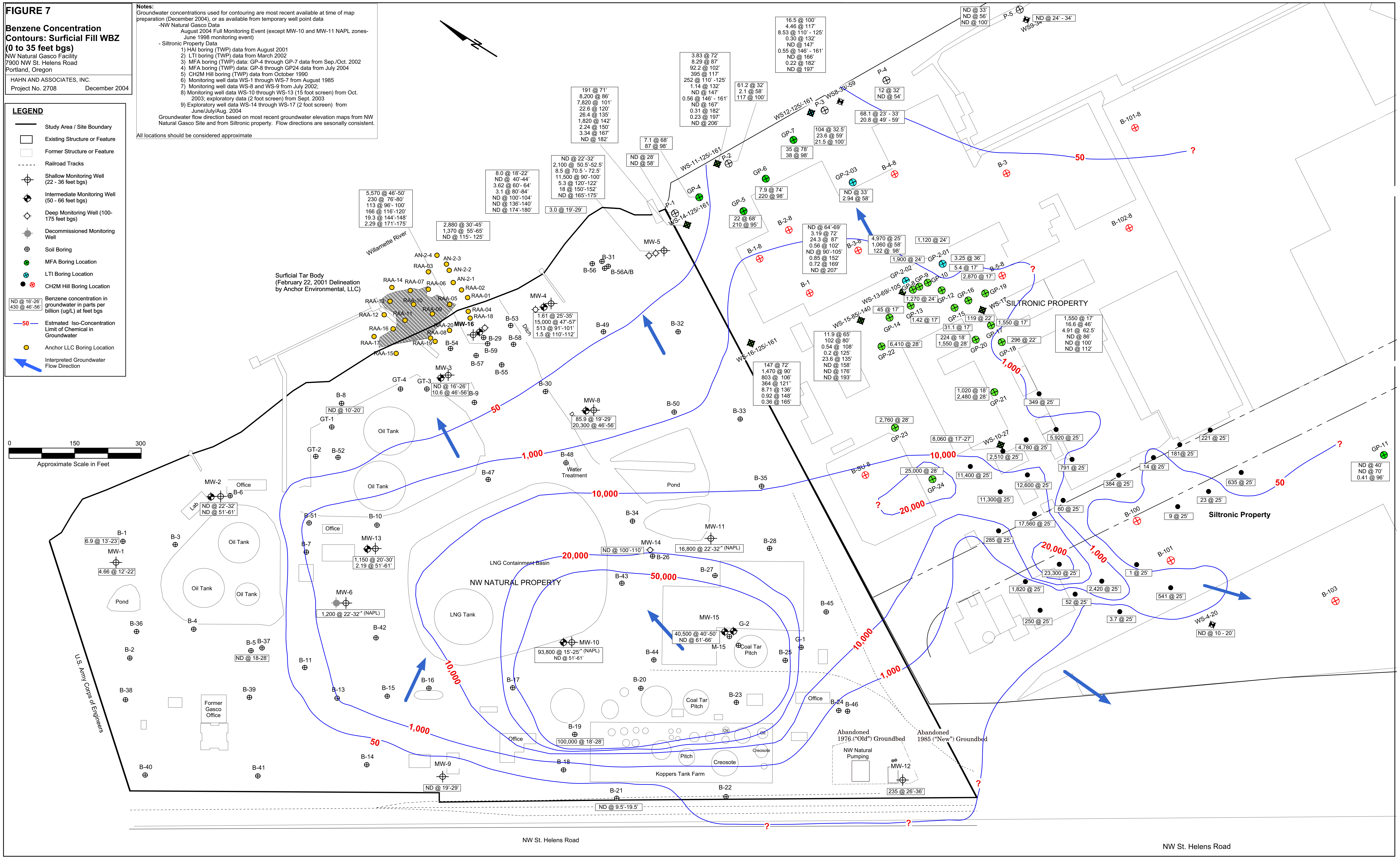


FIGURE 8

Benzene Concentration Contours: Alluvial WBZ (50 to 100 feet bgs)

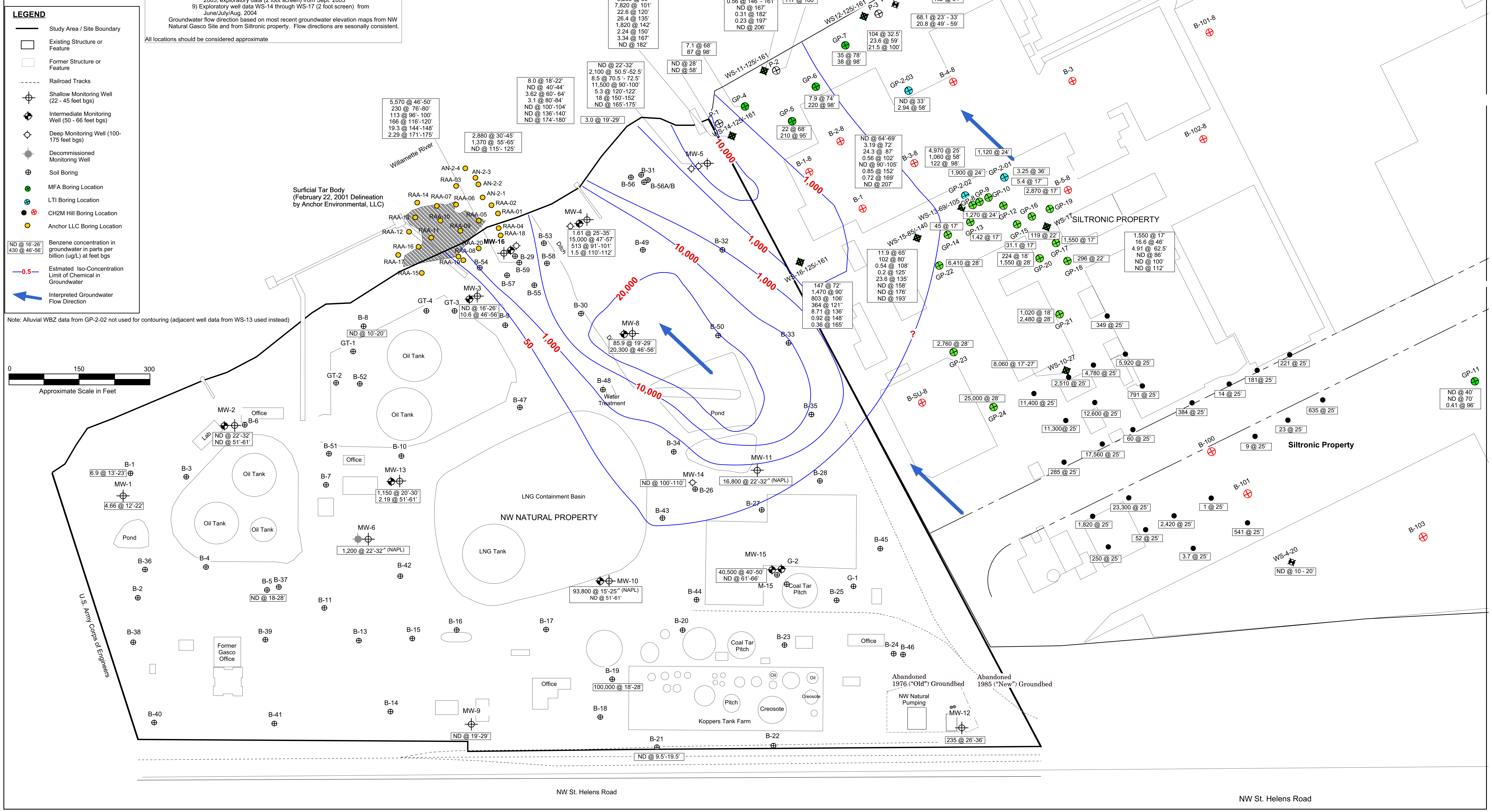
NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 August 2004

Notes:
Groundwater concentrations used for contouring are most recent available at time of map preparation (December 2004), or as available from temporary well point data
- -NW Natural Gasco Data
  - August 2004 Full Monitoring Event (except MW-10 and MW-11 NAPL zones- June 1998 monitoring event)
- - Siltronic Property Data
  1) HAI boring (TWP) data from August 2001
  2) LTI boring (TWP) data from March 2002
  3) MFA boring (TWP) data: GP-4 through GP-7 data from Sep./Oct. 2002
  4) MFA boring (TWP) data: GP-8 through GP24 data from July 2004
  5) CH2M Hill boring (TWP) data from October 1990
  6) Monitoring well data WS-1 through WS-7 from August 1985
  7) Monitoring well data WS-8 and WS-9 from July 2002;
  8) Monitoring well data WS-10 through WS-13 (15 foot screen) from Oct. 2003; exploratory data (2 foot screen) from Sept. 2003
  9) Exploratory well data WS-14 through WS-17 (2 foot screen) from June/July/Aug. 2004

Groundwater flow direction based on most recent groundwater elevation maps from NW Natural Gasco Site and from Siltronic property. Flow directions are sesonally consistent.

All locations should be considered approximate



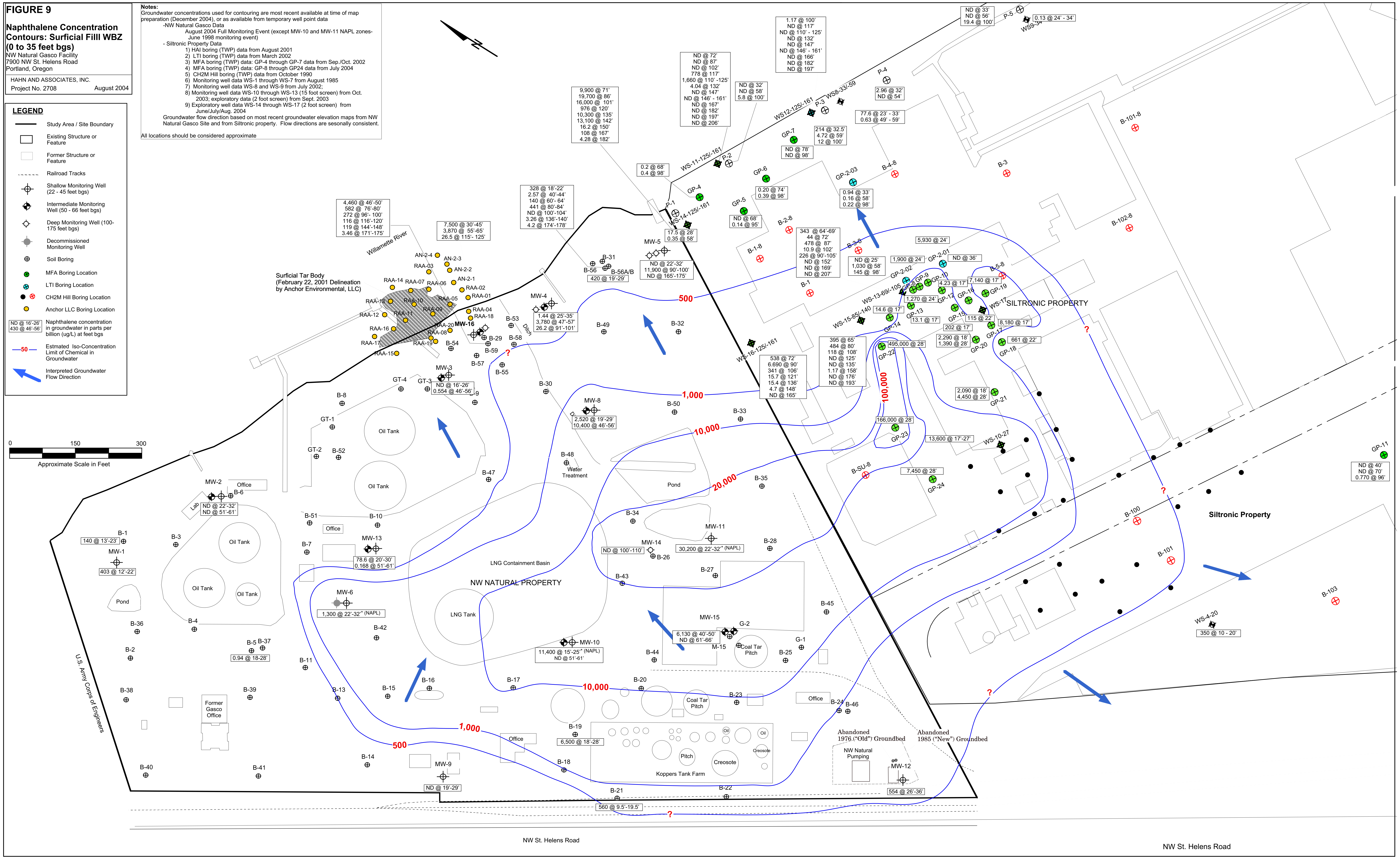


FIGURE 9
Naphthalene Concentration Contours: Surficial Filll WBZ (0 to 35 feet bgs)
NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon
HAHN AND ASSOCIATES, INC.
Project No. 2708
August 2004
Notes:
Groundwater concentrations used for contouring are most recent available at time of map preparation (December 2004), or as available from temporary well point data
-NW Natural Gasco Data
August 2004 Full Monitoring Event (except MW-10 and MW-11 NAPL zones- June 1998 monitoring event)
- Siltronic Property Data
1) HAI boring (TWP) data from August 2001
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9) Exploratory well data WS-14 through WS-17 (2 foot screen) from June/July/Aug. 2004
Groundwater flow direction based on most recent groundwater elevation maps from NW Natural Gasco Site and from Siltronic property. Flow directions are sesonally consistent.
All locations should be considered approximate
LEGEND
Study Area / Site Boundary
Existing Structure or Feature
Former Structure or Feature
Railroad Tracks
Shallow Monitoring Well (22 - 45 feet bgs)
Intermediate Monitoring Well (50 - 66 feet bgs)
Deep Monitoring Well (100-175 feet bgs)
Decommissioned Monitoring Well
Soil Boring
MFA Boring Location
LTI Boring Location
CH2M Hill Boring Location
Anchor LLC Boring Location
ND @ 16'-26'
430 @ 46'-56'
Naphthalene concentration in groundwater in parts per billion (ug/L) at feet bgs
50
Estimated Iso-Concentration Limit of Chemical in Groundwater
Interpreted Groundwater Flow Direction
0
150
300
Approximate Scale in Feet
Willamette River
Surficial Tar Body (February 22, 2001 Delineation by Anchor Environmental, LLC)
SILTRONIC PROPERTY
Siltronic Property
NW NATURAL PROPERTY
LNG Containment Basin
LNG Tank
Oil Tank
Pond
Water Treatment
Koppers Tank Farm
Coal Tar Pitch
Creosote
Pitch
Office
Lab
Former Gasco Office
U.S. Army Corps of Engineers
Abandoned 1976 ("Old") Groundbed
Abandoned 1985 ("New") Groundbed
NW Natural Pumping
Ditch
500
1,000
10,000
20,000
100,000
NW St. Helens Road

FIGURE 10

Naphthalene Concentration Contours: Alluvial WBZ (50 to 100 feet bgs)

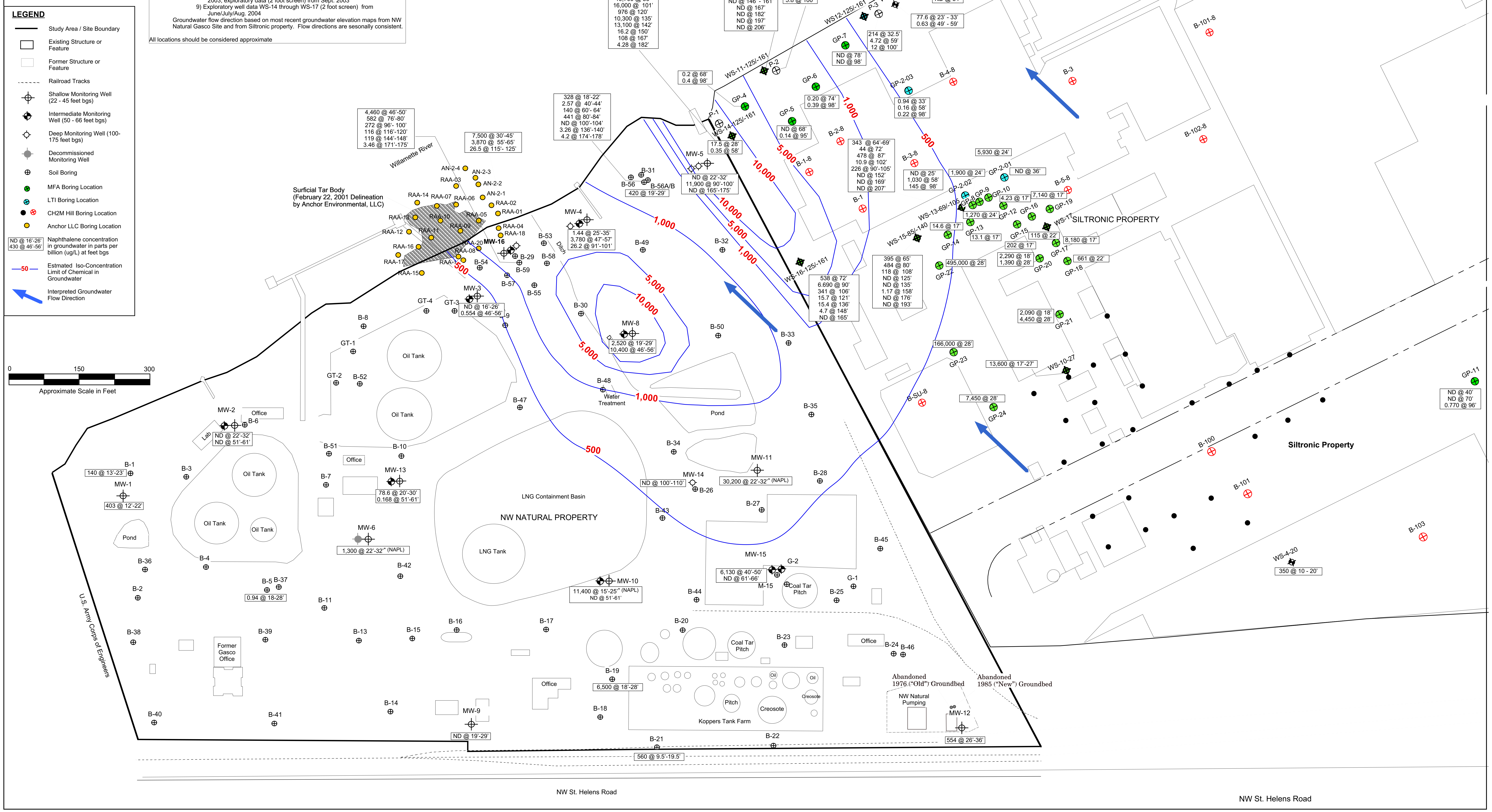
NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon

HAHN AND ASSOCIATES, INC.
Project No. 2708 August 2004

Notes:
Groundwater concentrations used for contouring are most recent available at time of map preparation (December 2004), or as available from temporary well point data
- NW Natural Gasco Data
  - August 2004 Full Monitoring Event (except MW-10 and MW-11 NAPL zones- June 1998 monitoring event)
- Siltronic Property Data
  1) HAI boring (TWP) data from August 2001
  2) LTI boring (TWP) data from March 2002
  3) MFA boring (TWP) data: GP-4 through GP-7 data from Sep./Oct. 2002
  4) MFA boring (TWP) data: GP-8 through GP24 data from July 2004
  5) CH2M Hill boring (TWP) data from October 1990
  6) Monitoring well data WS-1 through WS-7 from August 1985
  7) Monitoring well data WS-8 and WS-9 from July 2002;
  8) Monitoring well data WS-10 through WS-13 (15 foot screen) from Oct. 2003; exploratory data (2 foot screen) from Sept. 2003
  9) Exploratory well data WS-14 through WS-17 (2 foot screen) from June/July/Aug. 2004

Groundwater flow direction based on most recent groundwater elevation maps from NW Natural Gasco Site and from Siltronic property. Flow directions are sesonally consistent.

All locations should be considered approximate



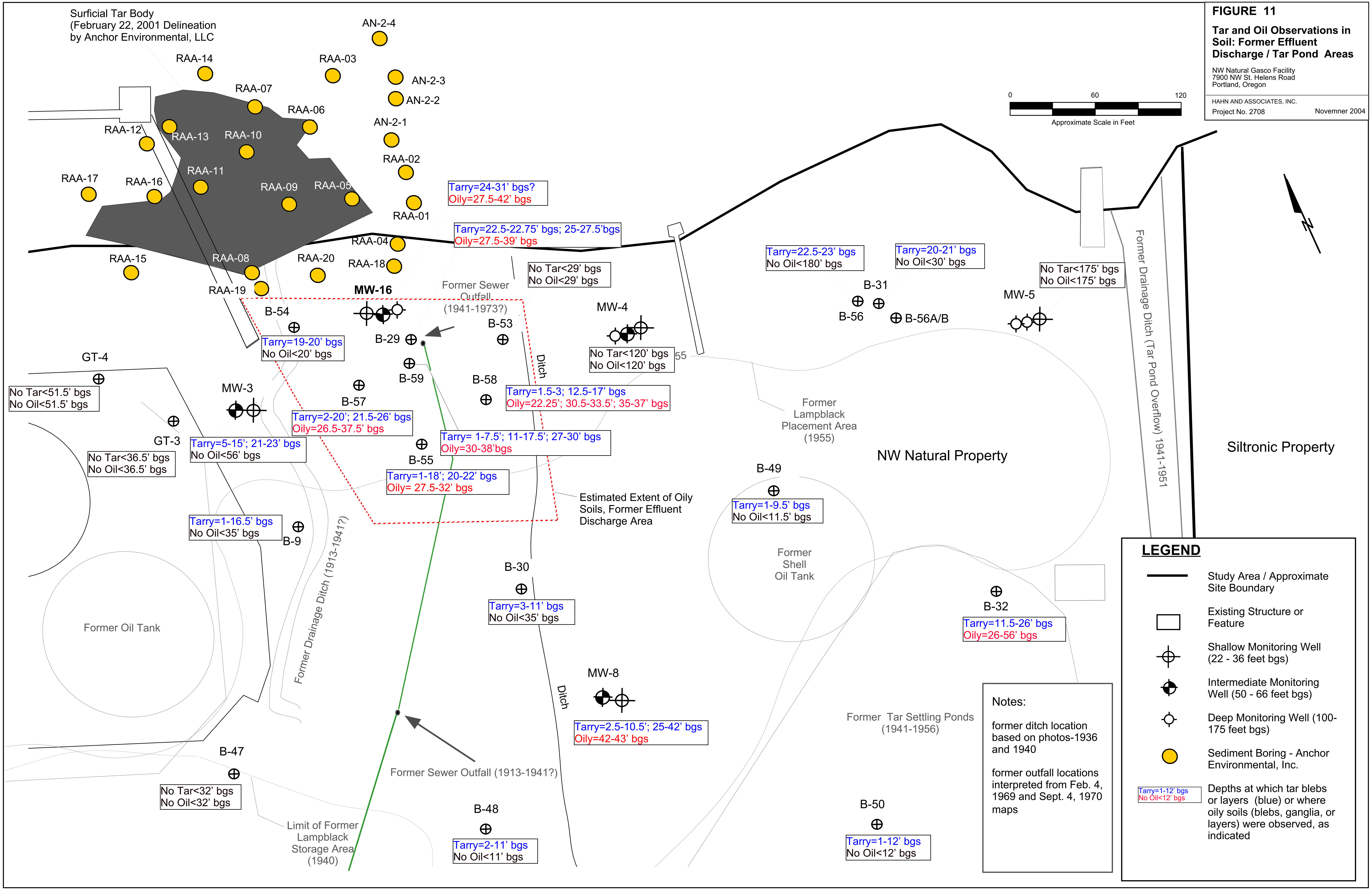
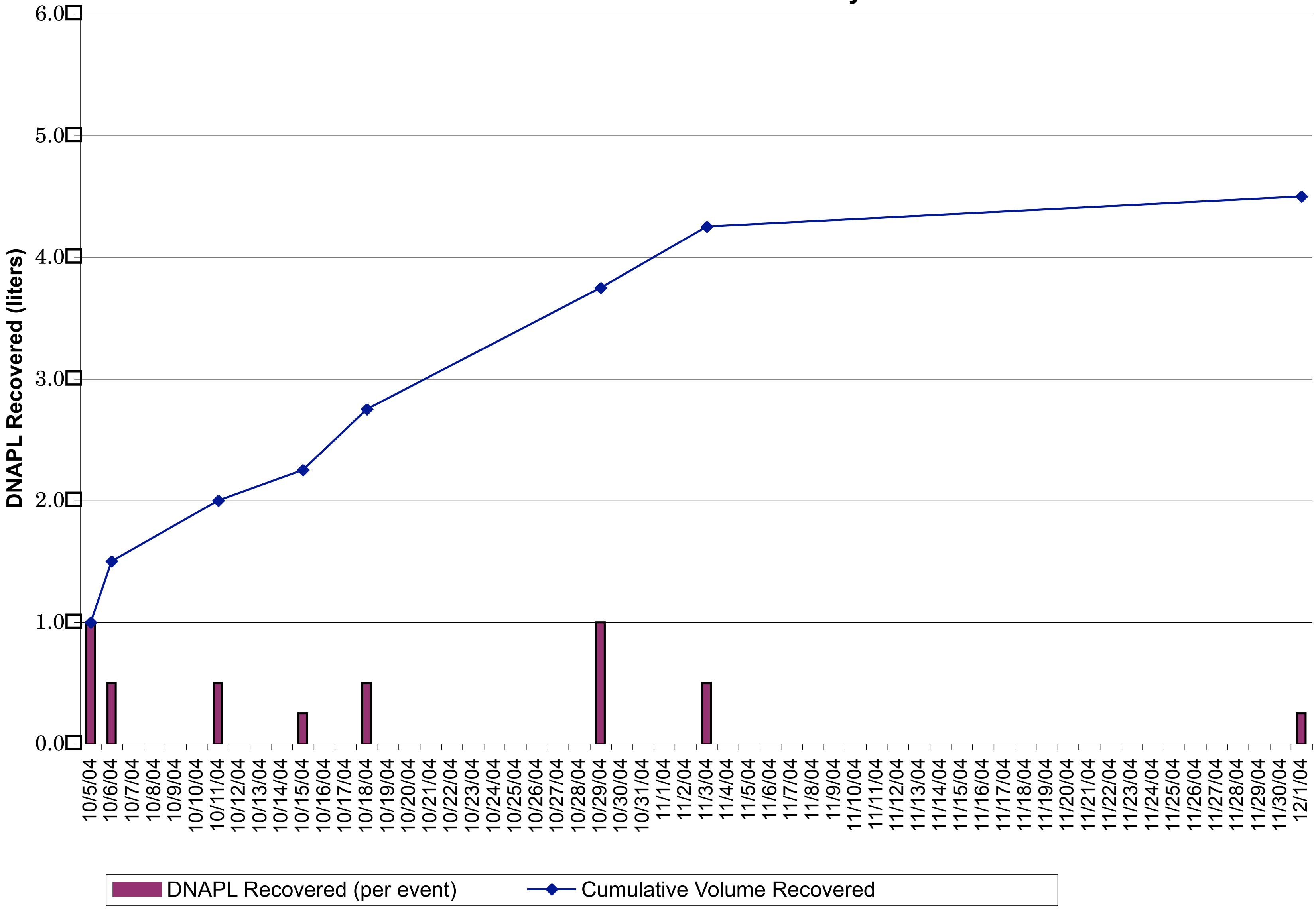


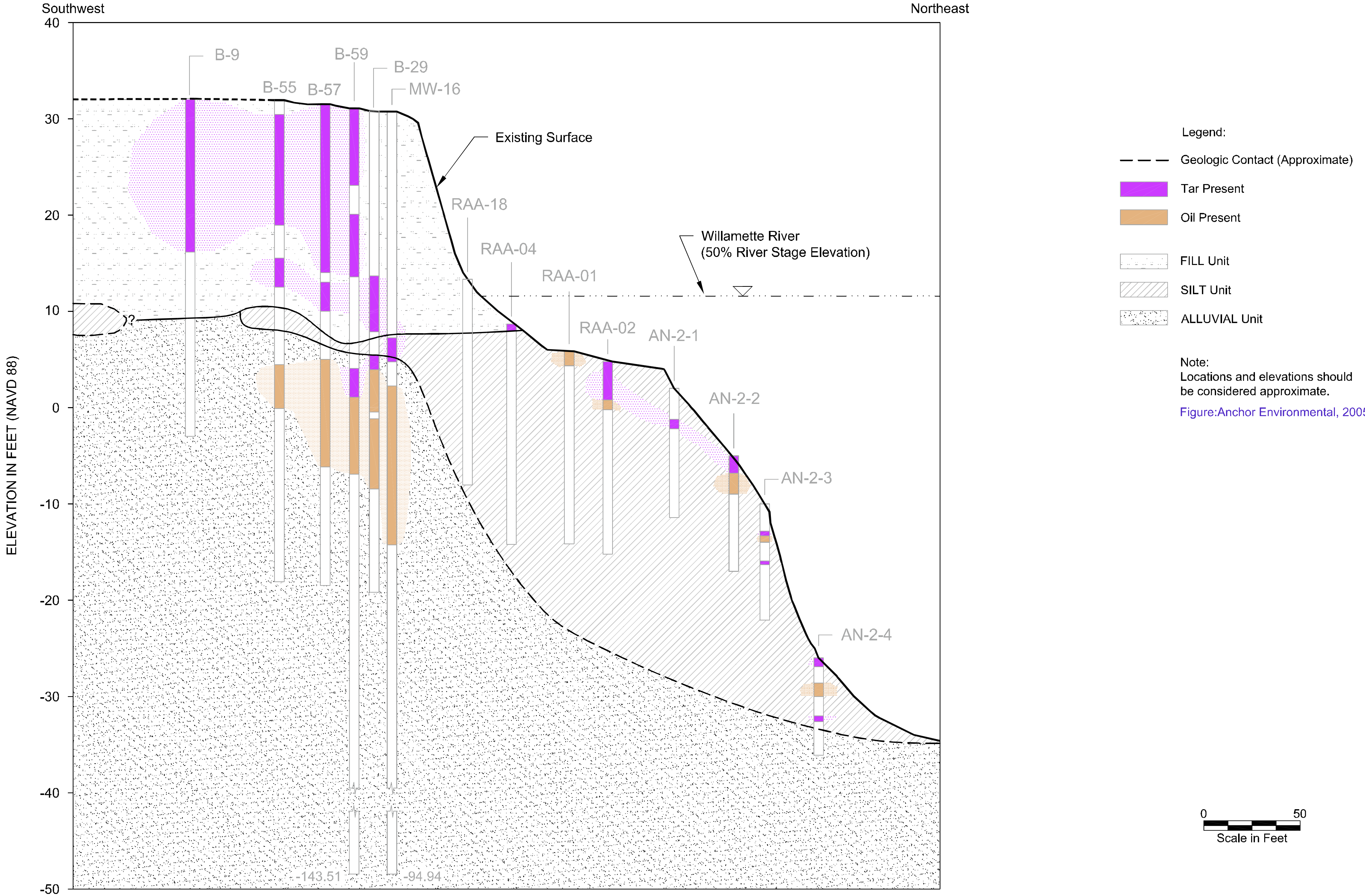
FIGURE 11
Tar and Oil Observations in Soil: Former Effluent Discharge / Tar Pond Areas
NW Natural Gasco Facility
7900 NW St. Helens Road
Portland, Oregon
HAHN AND ASSOCIATES, INC.
Project No. 2708
Novemner 2004
0
60
120
Approximate Scale in Feet
Surficial Tar Body
(February 22, 2001 Delineation
by Anchor Environmental, LLC
AN-2-4
RAA-14
RAA-03
AN-2-3
AN-2-2
RAA-07
RAA-06
AN-2-1
RAA-12
RAA-13
RAA-10
RAA-02
RAA-17
RAA-16
RAA-11
RAA-09
RAA-05
RAA-01
Tarry=24-31' bgs?
Oily=27.5-42' bgs
Tarry=22.5-22.75' bgs; 25-27.5'bgs
Oily=27.5-39' bgs
RAA-04
RAA-15
RAA-08
RAA-20
RAA-18
RAA-19
No Tar<29' bgs
No Oil<29' bgs
Tarry=22.5-23' bgs
No Oil<180' bgs
Tarry=20-21' bgs
No Oil<30' bgs
No Tar<175' bgs
No Oil<175' bgs
MW-16
Former Sewer Outfall
(1941-1973?)
B-31
B-56
B-56A/B
MW-5
B-54
MW-4
B-53
B-29
Tarry=19-20' bgs
No Oil<20' bgs
No Tar<120' bgs
No Oil<120' bgs
55
Ditch
GT-4
B-59
B-58
No Tar<51.5' bgs
No Oil<51.5' bgs
MW-3
B-57
Tarry=1.5-3; 12.5-17' bgs
Oily=22.25'; 30.5-33.5'; 35-37' bgs
Former Lampblack Placement Area
(1955)
Tarry=2-20'; 21.5-26' bgs
Oily=26.5-37.5' bgs
GT-3
Tarry=5-15'; 21-23' bgs
No Oil<56' bgs
Tarry= 1-7.5'; 11-17.5'; 27-30' bgs
Oily=30-38'bgs
NW Natural Property
Siltronic Property
No Tar<36.5' bgs
No Oil<36.5' bgs
B-55
Tarry=1-18'; 20-22' bgs
Oily= 27.5-32' bgs
B-49
Estimated Extent of Oily Soils, Former Effluent Discharge Area
Tarry=1-9.5' bgs
No Oil<11.5' bgs
Former Drainage Ditch (Tar Pond Overflow) 1941-1951
Tarry=1-16.5' bgs
No Oil<35' bgs
B-9
Former Drainage Ditch (1913-1941?)
Former Shell Oil Tank
B-30
Tarry=3-11' bgs
No Oil<35' bgs
B-32
Tarry=11.5-26' bgs
Oily=26-56' bgs
Former Oil Tank
MW-8
Ditch
Tarry=2.5-10.5'; 25-42' bgs
Oily=42-43' bgs
Former Tar Settling Ponds
(1941-1956)
Notes:
former ditch location based on photos-1936 and 1940
former outfall locations interpreted from Feb. 4, 1969 and Sept. 4, 1970 maps
B-47
Former Sewer Outfall (1913-1941?)
No Tar<32' bgs
No Oil<32' bgs
B-48
Tarry=2-11' bgs
No Oil<11' bgs
Limit of Former Lampblack Storage Area
(1940)
B-50
Tarry=1-12' bgs
No Oil<12' bgs
LEGEND
Study Area / Approximate Site Boundary
Existing Structure or Feature
Shallow Monitoring Well (22 - 36 feet bgs)
Intermediate Monitoring Well (50 - 66 feet bgs)
Deep Monitoring Well (100-175 feet bgs)
Sediment Boring - Anchor Environmental, Inc.
Tarry=1-12' bgs
No Oil<12' bgs
Depths at which tar blebs or layers (blue) or where oily soils (blebs, ganglia, or layers) were observed, as indicated

Figure 12
DNAPL Recovery Volume: Well MW-16-45
NW Natural - Gasco Facility



Updated: 3/11/05 RBE
File: 2708-12 DNAPL Recovery Chart-MW-16-45.xls/ Discharge Chart

HAHN AND ASSOCIATES, INC.
Project # 2976



Note:
Locations and elevations should be considered approximate.

Figure:Anchor Environmental, 2005

ANCHOR ENVIRONMENTAL, L.L.C.

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS
434 NW 6th AVENUE, SUITE 203
PORTLAND, OREGON 97209

FIGURE 13
Schematic Cross-Section: Nearshore Area
NW Natural Gasco Site