

**AGENCY-REVIEW
FINAL DRAFT**

Supplemental Remedial Investigation

Former USG Taylor Way Plant Site
2301 Taylor Way
Tacoma, Washington
Cleanup Site ID 5003

USG Corporation
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Chicago, Illinois 60661-36761

September 30, 2016

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Smith**

A Report Prepared For:

USG Corporation
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**AGENCY-REVIEW FINAL DRAFT
SUPPLEMENTAL REMEDIAL INVESTIGATION
2301 TAYLOR WAY
TACOMA, WASHINGTON**

September 30, 2016

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Acronyms

| | |
|----------|---|
| < | less than |
| > | greater than |
| AGI | AGI Technologies Inc. or Applied Geotechnology Inc. |
| APS | Applied Professional Services, Inc. |
| AST | Above ground storage tank |
| bgs | below ground surface |
| CBN/T | Commencement Bay Nearshore/Tideflats |
| CDF | controlled density fill |
| CDM | Camp Dresser & McKee Inc. |
| DLH | DLH Environmental Consulting |
| DOF | Dalton, Olmsted & Fuglevand, Inc. |
| DPT | direct push technology |
| Ecology | Washington State Department of Ecology |
| ESA | environmental site assessment |
| ESL | ecological screening levels |
| °F | degrees Fahrenheit |
| FS | feasibility study |
| ft | feet |
| ft/dy | feet per day |
| HDPE | high density polyethylene |
| IA | interim action |
| Kd | partition coefficient |
| KeV | Kiloelectron volts |
| KJC | Kennedy Jenks Consultants |
| L/kg | liters per kilogram |
| mg/kg | milligrams per kilogram |
| µg/L | micrograms per liter |
| µmhos/cm | micromhos per centimeter |
| mg/L | milligrams per liter |
| mv | millivolts |
| NAVD 88 | North America Vertical Datum 1988 |
| NBA | north boundary area (Arkema Property) |
| NGVD 29 | National Vertical Geodetic Datum 1929 |
| MLLW | mean lower low water |
| MSL | mean sea level |
| MTCA | Model Toxics Control Act |
| NTU | nephelometric turbidity units |
| PAH | polycyclic aromatic hydrocarbons |
| PCE | tetrachloroethene |
| PCB | polychlorinated biphenyl |
| PCS | petroleum contaminated soil |
| PLP | potential liable party |
| Port | Port of Tacoma |
| ppm | parts per million |

| | |
|-------|---|
| PQL | practical quantitation limit |
| QA | quality assurance |
| RCRA | Resource Conservation and Recovery Act |
| R | Retardation Factor |
| RI | remedial investigation |
| ROD | Record of Decision |
| SQO | sediment quality objectives |
| SVOC | semivolatile organic compounds |
| SWPPP | stormwater pollution prevention plan |
| TCLP | toxicity characteristic leaching procedure |
| TEE | terrestrial ecological assessment |
| TPH-D | total petroleum hydrocarbons quantified as diesel |
| TPH-G | total petroleum hydrocarbons quantified as gasoline |
| TPH-O | total petroleum hydrocarbons quantified as oil |
| USEPA | United States Environmental Protection Agency |
| USG | United States Gypsum Corporation |
| USGI | USG Interiors, LLC. |
| UST | underground storage tank |
| VOC | volatile organic compound |
| XRF | X-Ray fluorescence |

Executive Summary

This report presents the results of a Supplemental Remedial Investigation (RI) for the site generally located at 2301 Taylor Way, Tacoma, Washington (the Site). The purpose of this work was to define the nature and extent of existing contamination in soil and groundwater throughout the Site in accordance with the Washington State Model Toxics Control Act (MTCA). The work was conducted under Agreed Order No. DE3405 between the Washington State Department of Ecology (Ecology) and USG Corporation (USG) and the Port of Tacoma (the Port). The Site includes the property at 2301 Taylor Way (“Taylor Way Property”) and to the extent that the contaminants originating from the Taylor Way property may have impacted adjacent properties, this RI includes the former Murray Pacific Property to the north and the area referred to as the “North Boundary Area” (NBA) on the former Arkema Property to the southeast. Mineral fiber insulation products were produced on the Taylor Way Property between 1946 and 2002. Slag obtained from ASARCO’s copper smelter in Ruston, Washington was used as raw material from at least 1959 to 1973. ASARCO slag was later found to typically contain high concentrations of metals, including arsenic, copper, lead, cadmium, zinc, antimony, and silver. However, arsenic and lead are typically the metals that drive cleanups at sites contaminated by ASARCO slag, with arsenic being the primary driver due to its relative toxicity and mobility. These metals were also present in some of the waste products produced at the Taylor Way facility (baghouse dust, a sand-sized cylindrical material called “shot,” cupola bottom material, and off-spec product) and therefore became a source of contamination on the Taylor Way Property.

The Site is located in the Commencement Bay industrial area in the Puyallup Valley near the mouth of the Puyallup River. Historically, the Puyallup River discharged to Commencement Bay through tidal marshes laced by a network of channels. In the early part of the 1900s, waterways were constructed along the Puyallup River and major streams by dredging and hydraulically filling the intervening marsh and tidelflat sediments. The Site abuts the Hylebos Waterway on the northeast. Imported fill and waste material were also used as fill material at many industrial sites in this area. A zone of perched water, referred to as the “surface aquifer” occurs in the fill on top of the tidelflat sediments. The second aquifer, which is tidally influenced, occurs in the deltaic sediments below the tidelflat sediments.

In 2005 the Taylor Way property was redeveloped. The existing manufacturing facility was demolished and a warehouse was constructed, which is currently occupied by Carlile Trucking. The Taylor Way Property is currently entirely covered by buildings and pavement, except for a few small landscaped areas.

The Taylor Way Property has been the subject of numerous environmental assessments, beginning in the early 1990s. Various interim actions (IAs) were subsequently completed as conditions were identified that required such actions. As the phased environmental assessments identified the locations of arsenic-contaminated soils and residual source materials (and also two areas with petroleum hydrocarbon contamination), a series of interim actions involving soil removal were subsequently conducted. Over 32000 tons of contaminated soils and source material were removed from the Taylor Way Property during these IAs.

The two adjacent properties currently/historically have been impacted by arsenic, also known or suspected to be ASARCO-related. At the former Murray Pacific Property on the north, ASARCO slag

was used as ballast to support heavy log sorting equipment. In 1995 and 1996 approximately 196,000 tons of soils, slag, and wood waste were removed from the Murray Pacific Property in an effort to remove all soils and source materials exceeding 20 milligrams per kilogram (mg/kg) arsenic. The former Arkema Property NBA is an approximately 4-acre portion of the Arkema facility adjacent to the southeast side of the Taylor Way property. The NBA was occupied by Waggoner's Wallow, which consisted of a series of ditches used for treatment (natural decomposition to brine) of absorber liquor. Immediately adjacent to the NBA were large mounds of salt that were used to make brine. Based on a review of historic aerial photographs, the area also had a long history of undocumented filling. In 2012 an investigation conducted by the Port of Tacoma identified high arsenic and lead concentrations in soil in the NBA. The source of this contamination has not been resolved, and the Port of Tacoma and USG have not reached agreement on allocation of costs for any needed remediation in the NBA.

The following sections summarize the most salient conclusions of this Supplemental RI regarding the nature and extent of residual soil and groundwater contamination on the Site.

Soil and Source Materials

- Interim actions on the Taylor Way Property have removed substantial amounts of arsenic-containing sources in soils (i.e., baghouse dust, shot, slag, and off-spec material). However, there are areas, generally within the upper 4 feet, where scattered pieces of slag and thin lenses of shot or slag exist. At two locations source material was identified at depths of 6 to 7 feet bgs. The preponderance of soil data, combined with the groundwater data, indicate the most highly leachable source material (i.e., baghouse dust) has been substantially removed throughout the Taylor Way Property.
- Arsenic concentrations in soils throughout the Taylor Way Property still commonly exceed the MTCA Method A soil cleanup level of 20 mg/kg. This is much more prevalent than residual source material as it was caused by the initial leaching of historic source materials and subsequent adsorption onto soils.
- Arsenic concentrations close to or exceeding 1,000 mg/kg occur in three areas on the Taylor Way Property and are associated with the presence of residual source material.
 - Arsenic concentrations exceeding 1,000 mg/kg occurs along the former railroad spur. Shot or slag were observed at depths ranging between approximately 1.5 and 4 feet below ground surface (bgs) in four borings and one test pit located within this area. The shot or slag occurred in 3 to 7-inch thick lenses.
 - An area with soil exceeding 1,000 mg/kg occurs in the south corner along the property line adjacent to the NBA. Apparent slag was observed at approximately 3 feet bgs in three borings located within this area, either as a 6-inch lens or scattered pieces.
 - DPT10 contained 960 mg/kg within a 5" thick black lens of source material, at a depth of 6 feet bgs.
- Arsenic concentrations on the Murray Pacific Property were found to be low, consistent with remediation of that property, with one exception. Along the edge of the tide bank next to the Murray Pacific/Taylor Way Property line arsenic concentrations, beginning at about 5.5 ft bgs (about 1.5 ft above the saturated zone) and throughout the saturated zone (to about 10 ft bgs),

are typically around 200 mg/kg. In a very thin layer at approximately the groundwater interface, arsenic concentrations over 1,000 mg/kg were observed. In one of the two boreholes where arsenic concentrations exceeded 1,000 mg/kg wood fibers were noted at the same depth.

- Arsenic concentrations in soils decline significantly within a very short interval of source materials unless organics are present in combination with groundwater, conditions which appear to occur within the Murray Pacific/Taylor Way Property line and the south corner area. Other areas throughout the site where arsenic concentrations are relatively high (i.e., greater than 200 mg/kg), but where source material(s) has not been observed, occur within the upper 3 feet, with the exception of the MW9 area which had greater overall historical impacts by baghouse dust.
- In the NBA, two areas with arsenic and lead concentrations greater than 1,000 mg/kg were identified. One area, which generally occurs in the 4- to 7-foot depth (with elevated arsenic concentration extending as much as 13 feet deep) occurs in a historical low spot that was frequently inundated by Waggoner's Wallow and is adjacent to the Taylor Way Property, across from the baghouse and where waste materials exited the building. The second area is shallower, generally within the 0- to 3-foot interval, and occurs next to and south of the hypochlorite pond. Three isolated boring locations with arsenic concentrations over 100 mg/kg at depths of 10 feet bgs were noted, including at two borings next to Waggoner's Wallow and one boring in the railroad right-of-way.
- Because it does not have the same propensity to leach as arsenic, elevated lead concentrations (i.e., exceeding industrial land use MTCA Method A standards) are associated with the presence of ASARCO-related source material.
- IAs conducted by USGI and Thermafiber removed petroleum hydrocarbon contaminated soils on the Taylor Way Property.

Groundwater

Surface Aquifer

Arsenic concentrations in the surface aquifer monitoring wells on the Taylor Way Property for the years 2006-2014 range between 1.6 micrograms per liter ($\mu\text{g/L}$) and 1,040 $\mu\text{g/L}$. The groundwater standard currently considered protective of surface water is 5 $\mu\text{g/L}$. The distribution of arsenic in groundwater is very complex. Arsenic concentrations in groundwater are not strictly correlative with arsenic concentrations in soils. Other factors such as the leachability of the residual source material, the subsurface-specific chemistry, presence of organics (i.e., wood, petroleum hydrocarbon metabolites) and seasonal gradients factor into the arsenic concentrations at any given location. Arsenic in groundwater exists predominantly in the reduced arsenite (mobile) form at the site. However, iron and arsenic concentrations are attenuated by ferric and ferrous phosphates, ferrous carbonates, and ferric oxyhydroxides, which results in arsenic transport being 27.9 times slower than the groundwater, resulting in extremely long travel times for arsenic to travel downgradient (on the order of hundreds of years). Specific observations with respect to groundwater include:

- At MW9, since the removal of source material, arsenic concentrations have declined by three orders of magnitude from 19,000 micrograms per liter ($\mu\text{g/L}$) in 1998 to an average of 55 $\mu\text{g/L}$ between 2006 and 2012.

- Arsenic concentrations inland from the Hylebos Waterway exceed 5 µg/L. However, soil and groundwater data have shown that: 1) most residual source materials are not in contact with groundwater, 2) most residual source materials are not highly leachable, 3) remaining source areas of any significance occur greater than 500 feet from the Hylebos Waterway, and 4) arsenic concentrations attenuate by an order of magnitude for every 75 to 150 feet of distance from the source.
- Except at the property line with the Murray Pacific Property, arsenic concentrations in groundwater at the two wells along the Taylor Way Property where it abuts the Hylebos Waterway are very low (about 2 µg/L or less). Using the MTCA Method A cleanup level of 5 µg/L as the concentration that is protective of surface water, these arsenic concentrations are protective of surface water.
- Monitoring wells situated on the Taylor Way Property and Murray Pacific Property boundary next to the Hylebos Waterway and just into the Murray Pacific Property were found to contain high concentrations of arsenic (i.e., up to ~870 µg/L). The leachability of arsenic in soils at the Murray Pacific and Taylor Way Property boundary adjacent to the Hylebos Waterway may have been enhanced by the presence of a residual hydrocarbon plume and wood waste, resulting in relatively higher dissolved arsenic concentrations in the surface aquifer at this location.
- Arsenic concentrations generally decline between the northern Taylor Way Property boundary and wells located inland on the Murray Pacific Property; however, arsenic concentrations in groundwater at wells along the tide bank are greater than in wells located inland from the tide bank wells, indicating an additional arsenic source that is specific to the former Murray Pacific Property. Groundwater samples collected on the Murray Pacific Property are generally consistent with — or lower than — earlier data when Ecology acknowledged that the consent decree requirements had been satisfactorily completed; however, arsenic concentrations exceed 5 µg/L.
- Arsenic concentrations in groundwater near the southern corner of the Taylor Way Property are consistently higher than anywhere else on the Site. The various parties involved with this RI differ in their interpretations as to the cause of this. Regardless, given the inland nature of the MW1 area and the ability of the site to attenuate arsenic, there is no reason to believe that this area would ever adversely impact groundwater discharge to the Hylebos at the shoreline of the site. However, there is potential for the contaminated groundwater to enter the City of Tacoma storm drain lines in this vicinity, which discharge to the Hylebos Waterway.
- The other metals of potential concern (i.e., antimony, cadmium, chromium, copper, lead, nickel, and zinc) have also attenuated current with IAs and do not currently exceed marine life protective surface water standards. Antimony exceeds human health-based standards at two locations (MW9 and MW4); however, these two wells are upgradient and significantly distant from the Hylebos Waterway, such that it is attenuated before reaching the Hylebos.
- Both diesel and oil-range total petroleum hydrocarbon concentrations exceed the MTCA Method A cleanup level at the USGI/Murray Pacific property line adjacent to the Hylebos Waterway, just downgradient of the historical Bunker C above ground storage tank remedial excavation area. The width of the plume adjacent to the Hylebos Waterway approximately 100 feet or less. However, as indicated above, this weathered hydrocarbon plume appears to be enhancing the solubility of residual arsenic within this area.

Second Aquifer

With the exception of arsenic at MW13R at the south end of the property, metals concentrations in the second aquifer have similarly declined over time subsequent to the completion of IAs and current concentrations are below or only slightly above surface water and human health-based standards. Any exceedances are minor and occur in the upgradient wells. At MW13R, the arsenic concentration in a sample collected in 2012 was reported at 188 µg/L. Considering that: 1) arsenic concentrations at this well in 2002 and 2006 were 5.1 and 11 µg/L, respectively, and 2) this concentration is nearly three times higher than ever reported for this well over the past 18 years, this concentration is anomalous and suspect.

Stormwater

The storm drain system on the Taylor Way Property has a low rate of flow during dry weather, indicating there is a source of groundwater infiltration into the stormwater system. A camera survey conducted on the system indicates the source of dry weather flow is related to unsealed areas in the Carlile Trucking storm drain system. Additionally, there is potential for contaminated groundwater to infiltrate the City of Tacoma storm drain system in the vicinity of the south corner of the Taylor Way Property.

Data Gaps

CDM Smith identified the following data gaps, with the recommendation for further evaluation during the Feasibility Study:

- Additional sampling needs to be conducted at MW13R to verify the anomalous 2012 arsenic concentration.
- The extent of arsenic contamination in soils along the former railroad spur between DPT2 and the western corner is not defined.
- The extent of arsenic in groundwater around the DPT10 boring is not defined.

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Section 1

Introduction

1.1 Purpose

This report presents the results of a Supplemental Remedial Investigation (RI) for the site generally located at 2301 Taylor Way, Tacoma, Washington (the Site). The purpose of this work was to define the nature and extent of existing contamination in soil and groundwater throughout the Site in accordance with the Washington State Model Toxics Control Act (MTCA). The work was conducted under Agreed Order No. DE3405 between the Washington State Department of Ecology (Ecology) and USG Corporation (USG) and the Port of Tacoma (the Port). USG Corporation, on behalf of its subsidiary USG Interiors, LLC. (USGI), retained CDM Smith Inc. (CDM Smith) to conduct this Supplemental RI. It should be noted that several predecessor companies of CDM Smith conducted RI and interim action activities at the Site. These include: Applied Geotechnology Inc. (AGI), AGI Technologies (AGI), and Camp Dresser & McKee Inc. (CDM). These predecessor companies are also referred to as CDM Smith throughout the report, but the referenced documents are reported by the company's name in effect at the time.

1.2 Property Description

1.2.1 Location and Current Description

The Site lies within the Commencement Bay Nearshore /Tideflats (CBN/T) Superfund Site of Tacoma, Washington, within the Head of Hylebos Waterway 'problem area' identified in the Record of Decision (ROD) for the site (**Figure 1**). The Site includes the property at 2301 Taylor Way ("Taylor Way Property") and to the extent that the contaminants originating from the Taylor Way property may have impacted adjacent properties, this RI includes discussions of the former Murray Pacific Property to the north and the former Arkema Property to the southeast. **Figure 2** is an aerial photograph that shows the current layout of the Taylor Way Property and these adjacent properties. All three of these properties are currently owned by the Port of Tacoma. USGI formerly owned the Taylor Way Property. The Murray Pacific property is listed on Ecology's cleanup site database as Murray Pacific #1, with facility/site ID 1210. The Arkema Property is listed on the database as Arkema Inc., with facility/site ID 1220.

The Taylor Way Property is a roughly L-shaped 9.4-acre parcel; Taylor Way borders the southwest side and the Hylebos Waterway borders the northeast side of the property. It is currently leased and occupied by Carlile Transportation (Carlile). **Figures 2** and **3** show the current facility layout. Current structures on the property include a large dock high concrete tilt-up warehouse and an open-sided I-beam supported metal-roofed structure with a concrete slab floor where maintenance activities, such as welding, occur. The rest of the Taylor Way Property is asphalt-paved.

Bordering the southeast side of the Taylor Way Property is an approximately 45-acre property formerly occupied by a chemical manufacturing plant (chlor-alkali and arsenic pesticide/herbicide) with the address of 2901 Taylor Way (Arkema Property). The facility structures have been demolished from this property and it is currently vacant. The grassy area immediately adjacent to the Taylor Way Property is referred to in later sections of this report as the "North Boundary Area" in

reference to the north boundary of the Arkema property (**Figure 2**). The North Boundary Area (NBA) is bound on the southeast by the former Salt Pad Storage area and to the northeast by the Hylebos Waterway. A constructed salt marsh is located between the NBA and the Hylebos Waterway. Soil piles, which were apparently generated during construction of the salt marsh are situated at the northeast end of the NBA.

North of the Taylor Way Property is an approximately 18-acre gravel-surfaced yard that is currently leased and used by Carlile for parking long haul trailers (**Figures 2 and 3**). This property was formerly occupied by the Murray Pacific Log Sort Yard #1 and is referred to in this report as the Murray Pacific Property. The Murray Pacific Property is associated with the historical addresses of 2245 Taylor Way, 3510 Lincoln Avenue, and 3502 Lincoln Avenue.

Further description and discussion of the Murray Pacific and Arkema Properties is provided in later sections of this report.

1.2.2 Taylor Way Property Historical Description and Processes

The Taylor Way Property was originally developed in the early 1940s to supply insulation material for the war effort. It was operated by Pacific Carbide Corp. from 1943 until 1946 (TLI Systems, 1996). Mineral fiber insulation products were produced on the Taylor Way Property between 1946 and 2002. Between 1946 and 1959, Mineral Fiber Producing Company and Feltrock Insulation Manufacturing Company owned the Taylor Way Property (Kennedy Jenks Consultants [KJC, 2002]). In 1959 United States Gypsum Company purchased the Taylor Way Property and continued the same manufacturing operations. Ownership was transferred in 1985 to USG Acoustical Products Company, created out of the former Acoustical Products Division of United States Gypsum Company. In 1987, USG Acoustical Products Company was renamed USG Interiors, Inc. and is now known as USG Interiors, LLC (USGI). In 1996 USGI sold the Taylor Way Property to Thermafiber who also manufactured mineral fiber insulation. Thermafiber sold the property to the Port of Tacoma in December 2002. **Figure 4** shows the historical plant layout.

Mineral fiber insulation manufacturing consisted of mixing and heating raw materials (such as steel slag and basalt rock) to a molten state and extruding these materials under pressure to produce a mineral fiber (TLI Systems, 1996). Specifically, the raw material was conveyed to a cupola furnace where it was melted using foundry coke (TLI Systems, 1996). The molten material was drawn from the cupola and transported by a troft or revolving disk where it was struck by a blast of air, causing the molten material to cool and fiberize. The fibrous material was drawn down onto a continuous belt into a cooling chamber. One production process involved the application of formaldehyde binder by overhead spray heads in a cooling chamber as the material was conveyed. The bonded material was then packaged in bag form. The other process did not involve the application of a binder. The granulated or unbonded material was packaged in bags at the end of the production process. (TLI Systems, 1996).

Slag obtained from ASARCO's copper smelter in Ruston, Washington was used by USG as a raw material from the time they began operating the plant in 1959 until June of 1973. (TLI Systems, 1996). Prior mineral fiber insulation companies operating at the site may have also used ASARCO slag as raw material. ASARCO slag was later found to typically contain high concentrations of metals, including arsenic, copper, lead, cadmium, zinc, antimony, and silver. However, arsenic and lead are typically the metals that drive cleanups at sites contaminated by ASARCO slag, with arsenic being the primary driver due to its relative toxicity and mobility.

These metals were also present in some of the waste products produced at the Taylor Way facility (baghouse dust, a sand-sized cylindrical material called “shot,” cupola bottom material and off-spec product) and therefore became a source of contamination on the Taylor Way Property. These materials are described below (KJC 2002, TLI Systems, Inc., 1996):

- Shot consisted of very small, rounded, glassy particles that were the broken ends of the extruded mineral fibers during the production process. Reportedly, the plant generated approximately 6,000 tons of shot per year, and the shot consisted of about 0.4 percent arsenic by weight (TLI Systems, Inc., 1996).
- Baghouse dust was generated after the baghouse was installed in 1970 to control air particulate emissions. Baghouse dust consisted of small particles generated from the manufacturing process and had the consistency of dry, loose silt. During the time Asarco slag was used as a raw material, arsenic and other metals were concentrated in the dust, which reportedly contained about 23% arsenic and about 8.5% lead, by weight. The baghouse was reported to produce up to 30,000 pounds of dust per week (TLI Systems, Inc., 1996).
- Cupola bottoms consisted of heavier materials, mainly iron, that accumulated during the melting process. These materials were knocked out of the bottoms of the cupolas when cooled. During the time Asarco slag was used as a raw material, cupola bottoms were sold back to Asarco to be reintroduced into the smelting process for metals reclamation.
- Off-spec product is, as the name implies, product that did not meet the required specifications and was typically reintroduced into the production process.

Waste materials exited the plant at the eastern side of the production building adjacent to the baghouse (**Figure 4**). Cupola bottoms were removed from the cupolas and dropped into a holding bin located next to the building. Cupola bottoms were sold for their iron recycle value and transported offsite. Other waste materials were typically mixed together and either loaded directly from the holding bins for disposal or were temporarily stockpiled in the back portion of the property (material stockpile area, **Figure 4**) pending disposal. A 1993 report described approximately 13,000 tons of shot being stored on the site at that time. (TLI Systems, Inc., 1996). Some of the waste was landfilled at sites in Fife and Puyallup in the early 1970’s, but other disposal sites are not known. (The Fife and Puyallup sites are being cleaned up under separate administrative orders with Ecology).

Prior plant structures included a laboratory, office, and manufacturing buildings (warehouse, production, storage); a block bin; 17,000 gallon above-ground bunker C oil tank, and; vehicle garages (**Figure 4**). Two railroad spurs entered the Taylor Way Property from the west and aligned with the northeast and southwest sides of the manufacturing buildings. The northeast railroad spur, constructed on a berm and a trestle, was used to bring in raw materials.

Prior to 1970, pavement was primarily limited to areas immediately adjacent to and between the plant buildings. The parking lot northwest of the office building and all but one of the truck loading areas south of the plant were paved between 1970 and 1978. The remaining southern truck loading area and truck passageway on the east side of the plant were paved between 1978 and 1981. The area between the plant and the waterway, where waste material piles were temporarily stored, was paved in 1998. Areas that apparently were never paved while the plant was in operation included the south corner and the western corner of the property.

Prior raw material and waste management practices at the Site are not well documented. A number of historical operations or practices that resulted in source areas of contamination at the Site were ascertained during phases of initial site assessments and interim actions. Some of these material management practices and source areas included the following:

- Temporary stockpiles of raw material (ASARCO slag, steel slag and blast furnace slag, metallurgical coke, basalt rock) and waste material (mixture of shot, slag fines, baghouse dust, off-spec product, cupola bottoms) were located on mostly unpaved surfaces at the back (northeastern) side of the property and southeastern side of the production building.
- Shot and other waste products, some of which were derived from the ASARCO slag, had been used as fill throughout the material stockpile area and southeastern truck passageway to raise the grade.
- The baghouse area where baghouse dust settled and accumulated.
- A soil/waste material berm that divided the Taylor Way and the Murray Pacific Properties. The berm was constructed to protect employees from the risk posed by unstable log piles. It was found to contain slag and waste products derived from the use of ASARCO slag in material production.
- The Hylebos Waterway embankment, which apparently had been extended with fill; some of the fill used included USGI plant waste materials.
- The railroad berm, which contained slag and industrial process waste materials.

In approximately 1973 USGI removed visible source material¹ (i.e., primarily shot) that existed as a surface layer across the material stockpile area (**Figure 4**) and transported this material to an offsite landfill.

Between 1996 and 1999, USGI undertook a series of source control actions to reduce metals concentrations (primarily arsenic) and petroleum hydrocarbons in the Taylor Way Property soil and groundwater. These included removal of residual source materials and contaminated soils, replacement of the storm drain system, and installation of pavement across the temporary material stockpile area between the plant facilities and the Hylebos Waterway. In 2005, USGI also undertook an additional independent interim action (IA) to remove arsenic-contaminated soils from an area near the new Carlile warehouse building that was being constructed on the property. These actions are summarized in Section 4.1.

¹ Source material is used herein to mean ASARCO slag and ASARCO slag-derived waste materials with the potential to adversely impact stormwater, groundwater or sediment. Source materials were identified based on visual observation and/or laboratory analyses.

1.2.3 Redevelopment into the Carlile Facility

The Thermafiber facility was closed in August 2002. Demolition of the plant apparently occurred in early 2003. During late 2004/early 2005 the area of the proposed new facility had a soil preload.² Construction of the new Carlile facility occurred in 2005 and opened for business in 2006.

The property did not require significant grade changes as a result of the redevelopment. As a result of the redevelopment the entire property became covered in pavement or buildings, except for the few small planter areas. The existing gravel surfacing on the adjacent Murray Pacific Property remained essentially unchanged.

The storm drain system was mostly replaced as a result of the redevelopment. An oil/water separator was installed off the north corner of the Carlile warehouse. The section of storm drain line downstream of the oil/water separator to the outfall was not replaced. Upstream of the oil/water separator, existing manholes were reused (with some modifications), but the remainder of the catch basins and the storm drain lines were replaced. **Appendix A** contains copies of the drawings for the storm drain system. The details of the construction of this system (i.e., whether its construction was specified to be water tight to secure it from groundwater seepage) were not provided. In its comments regarding the Determination of Nonsignificance for the Carlile facility, Ecology noted that the storm system should be constructed such that infiltration of groundwater would be prevented and that the system should be pressure tested. Ecology files indicate that Ecology requested the system be tested but do not include confirmation that it was done.

1.2.4 Prior Parcel Ownership

This report describes the Taylor Way Property as consisting of the approximate 9.4 acres of property where the mineral fiber manufacturing facility was located. However, USGI owned a total of approximately 14 contiguous acres from 1959 until 1992. A 4.6-acre portion at the north end of the property was sold to Murray Pacific in 1992. USGI used this 4.6-portion of the property for raw material storage from the 1940s through the early 1960s (Hydrometrics, 1993). In the late 1960s Commencement Bay Log and Storage (which soon thereafter changed its name to Pan Pacific Trading Company) leased the 4.6-acre portion of the USGI property (Hydrometrics, 1993). West Fork Timber Company purchased Pan Pacific in about 1973 and formed Murray Pacific Corporation (Hydrometrics, 1993). Between 1984 and 1991 Edman Company leased the property (Hydrometrics, 1993). **Figure 4** shows the location of the 4.6-acre parcel.

1.3 Regulatory History

In 1992 Ecology discovered antimony, arsenic, copper, lead, zinc, chromium, nickel, silver, and mercury in the Site stormwater and tide bank seep samples that were collected during its efforts to identify and control sources of contaminants to the Hylebos Waterway problem area of the CBN/T Superfund site.

In March 1994, Ecology entered into Agreed Order No. DE 93TC-S163 with USGI to conduct a Phased RI, develop a public participation plan, submit a draft and final work plan for cleaning the Site storm

² The application of a surcharge load (i.e., a temporary soil stockpile) on the Site prior to construction of the permanent structure until most of the primary settlement has occurred.

drain system, and submit a Stormwater Pollution Prevention Plan (SWPPP). USGI subsequently entered into two amendments to the Agreed Order on August 10, 1995 and May 13, 1996. The purpose of the amendments was for USGI to conduct IAs to control pollution discharges that could recontaminate sediments in the Hylebos Waterway. It was determined that the feasibility study (FS) mentioned in the initial Agreed Order was not necessary in order to proceed with IAs.

The first amendment required USGI to develop a plan for removal of the soil berm at the north property boundary (i.e., the boundary with the Murray Pacific property). It also required development of a source control plan, which involved investigation of contaminated materials in the Hylebos Waterway embankment, and development of methods to mitigate contaminants in stormwater runoff and prevent surface water infiltration (i.e., pavement). The second amendment required USGI to remove the berm, clean up the Hylebos Waterway embankment, replace the stormwater system, conduct Site paving, and conduct confirmation groundwater monitoring. USGI completed the requirements of Agreed Order No. DE 93TC-S163 and its amendments in June 2002, following submittal of the 4th quarterly groundwater monitoring report for 2001. The groundwater monitoring report which summarized two years of quarterly groundwater monitoring, indicated that the IAs were effective, in that arsenic concentrations in groundwater decreased after the materials were removed.

IAs were completed between 1996 and 2005 and were not limited to those specified under the Agreed Order and its amendments. Throughout the years, as new areas of concern were identified, USGI and the Port of Tacoma conducted additional IAs to remove arsenic contaminated soil and source material (i.e., primarily shot), as well as voluntary cleanups of petroleum contaminated soils. These actions are summarized in Section 4.

While Agreed Order-required IAs and other voluntary IAs were completed, contaminated soil and groundwater (primarily arsenic) still remained at the Site. Ecology acknowledged that a substantial amount of soil and groundwater data existed for the Site, but determined that a full assessment of potential sources, pathways, and receptors had not been completed. Therefore, on August 31, 2006, USG Corporation and the Port of Tacoma entered into Agreed Order No. DE3405 with the Washington State Department of Ecology (Ecology) to conduct a Supplemental RI and produce a Feasibility Study for the Site.

USGI submitted a draft Supplemental RI in 2010 in accordance with Agreed Order DE3405. Subsequently, Ecology requested and USGI obtained additional data to further define the nature and extent of contamination at the Site. Following this, Ecology determined that an amendment to the Agreed Order was necessary to require a resubmittal of the Supplemental RI to include the additional data collected, to update the schedule of the FS, and to add a requirement for a Draft Cleanup Action Plan. The Agreed Order was amended on April 15, 2015.

1.4 Relationship with Adjacent Contaminated Sites

As described previously in Section 1.2.1, the Taylor Way Property lies within the Head of Hylebos Waterway Problem Area of the CNB/T Superfund Site. Contaminants identified within the problem area include antimony, arsenic, cadmium, copper, lead, mercury, zinc, and various organic compounds such as polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) (USEPA, 1989). Sediments at the head of the Hylebos Waterway were most severely contaminated with arsenic, PAHs, and PCBs prior to waterway (sediment) remedial actions. The CBN/T ROD identified

Arkema, Tacoma Boatbuilding Company, and log sorting yards as some of the predominant sources of arsenic contamination within the Hylebos Waterway. (The Ecology Urban Bay Action Team later identified the USG plant site as a source of contaminants to Hylebos Waterway). Arkema had manufactured sodium arsenite (a commercial herbicide) utilizing baghouse dust from the Asarco Tacoma smelter. The log sorting yards were a source of arsenic due to their use of ASARCO slag as ballast (to keep the logs off of the ground and to support heavy equipment). As indicated in Section 1.2.2, ASARCO slag contains relatively high concentrations of arsenic, lead, and other metals.

An additional objective of the Supplemental RI was to assess the possible relationship between arsenic in groundwater on the Taylor Way Property and soil and groundwater contamination on the adjacent Arkema and Murray Pacific properties. The following sections summarize the historical activities, investigation, and cleanup actions on the Murray Pacific and Arkema Properties.

1.4.1 Murray Pacific Property

1.4.1.1 Prior Operations and Environmental Studies

The Murray Pacific Property had a long history of lumber-related activities. In 1913, Buffelen Woodworking, a door manufacturing plant, occupied a significant portion of the property (Hydrometrics, 1993). In the 1940s, large kilns were constructed near the center of the property and remained there for about 10 years (Hydrometrics, 1993). In the early years, a log dump was located on the Hylebos Waterway, about midway between current property lines (**Figure 5**) and a railroad track extended from Lincoln Avenue to the log dump (Hydrometrics, 1993). Logs were brought in by rail and unloaded directly into the water (Hydrometrics, 1993). The railroad line use ended by the 1970s (Hydrometrics, 1993). The property was also used as a log sort yard from approximately 1967 to 1985 (Hydrometrics, 1992). Between 1984 and 1991 Edman Company leased two corners of the property and had a log chipping operation (Hydrometrics, 1993). In 1985, Seaport Bark established a plant on the main part of the property for separating bark from rock, slag, and soil. The bark was used as landscaping bark (Hydrometrics, 1993).

Between 1975 and 1980, Murray Pacific used slag from ASARCO as ballast to support heavy log sorting equipment (Hydrometrics, 1993). Approximately 29,000 tons of slag was brought onsite during this time period (Hydrometrics, 1993).

As discussed in Section 1.2.4, USGI owned approximately 4.6 acres of this 18-acre property until 1992. However, USGI did not occupy this area after approximately the late 1960s. Historical aerial photographs show that by 1970 the property was completely covered by logs as a part of the log sort operations in effect at the time. According to a Phase II environmental assessment conducted for the site in 1991, material stockpiles—reportedly lime or gypsum—occupied this 4.6-acre portion of the property from the mid-1940s until the mid to late 1960s (AGI, 1991). The Phase II environmental assessment included excavation of 10 test pits, drilling of three soil borings, and installation of monitoring wells in two of the borings. Throughout these subsurface explorations, surficial fill was found to consist of silt, silty sand, and silty gravel with variable amounts of wood debris and slag. There was no obvious indication that USGI-related wastes (i.e., shot, mineral fiber, cupola bottoms) were present at these locations. The samples were analyzed for volatile organic compounds (VOCs), petroleum hydrocarbons and calcium, but not for metals, such as arsenic. A few of the samples contained elevated concentrations of calcium, which supports the report that the material stockpiles located here were lime or gypsum. Reportedly, in September 1992 Ecology collected surficial surface soil samples from this area, one of which had the appearance of containing rock wool and the second

contained shot (TLI Systems, 1996). Arsenic was detected at concentration of 140 and 110 milligrams per kilogram (mg/kg), respectively. The samples also contained chromium concentrations of 500 mg/kg which, at the time, were over twice the MTCA cleanup level of 500 mg/kg. The current MTCA cleanup level for trivalent chromium is 2,000 mg/kg.

On September 30, 1991, Ecology, Murray Pacific Corporation, and ASARCO Incorporated entered into Agreed Order No. DE 91-S234 to complete a Remedial Investigation/Feasibility Study (RI/FS). The RI was submitted to Ecology in December 1993 and the FS was finalized in February 1994. The results of the RI/FS showed elevated concentrations of arsenic, copper, lead, and zinc in soil and groundwater as a result of the use of ARSCO slag. The remedial alternative selected under the FS was excavation and offsite disposal of slag and arsenic-contaminated soil and wood debris.

1.4.1.2 Summary of Final Cleanup Actions

Remediation of the Murray Pacific Property was completed under the terms of a 1995 Consent Decree (95 2 12876 4). Remedial actions were conducted at the Murray Pacific Property in two phases over the course of two years. Remedial actions involved removal of slag, wood waste, and soil in upland areas exceeding the MTCA Method A soil cleanup level (unrestricted land use) of 20 mg/kg, and removal of contaminated soils and wood waste below the Ordinary High Water line of the Hylebos Waterway that exceeded the Commencement Bay Sediment Quality Objective for arsenic of 57 mg/kg. Remedial actions are summarized in a report prepared by Hydrometrics entitled *Final Engineering Report, Murray Pacific Log Sort Yard No. 1 Remediation* dated December 1996.

Phase I remedial actions occurred between October 1995 and January 1996 and during this time period 120,000 tons of slag and wood waste were removed. Phase II began in April 1996 and was completed in October 1996. During this time frame approximately 76,000 tons of soils were removed. As removal actions were completed, the Murray Pacific Property was divided into 100 by 100 foot grids and each grid was subdivided into 50 by 50 foot quadrants for purposes of confirmation sampling (**Figure 5**). Confirmation samples were collected from each quadrant and analyzed by X-Ray Fluorescence (XRF) technology with a subset of split samples being analyzed by standard wet chemistry methods (USEPA Methods 6010, 6020, and 200.8). Additional soil was removed from some quadrants as necessary until confirmation sample results met the cleanup levels.

Removed material was replaced with 161,000 tons of backfill, and the property was graded and surfaced with gravel. Geotextile was placed over portions of the property prior to the gravel surfacing and grading (**Figure 5**) and a stormwater detention facility was also constructed (**Figure 3**).

A report entitled *Supplemental Sediment Investigation Data Report* (Floyd & Snider Inc. et. al, 1998) was prepared to clarify remediation completed along the Hylebos Waterway. The intertidal sediment cleanup level for arsenic of 57 mg/kg was used, based on the corresponding Commencement Bay Sediment Quality Objective (SQO). According to the Floyd & Snider report, intertidal sediment along the tide bank was excavated to native silts between approximately +6 and +10 feet Mean Lower Low Water (MLLW) at both sides of the former bulkhead/ log ramp area and to between 0 and +10 feet MLLW in the former bulkhead/log ramp area (see **Figure 5**). Six subtidal surface sediment and 22 subsurface sediment samples were collected from the Hylebos Waterway adjacent to the Murray Pacific Property and analyzed for arsenic. None of these samples exceeded the sediment quality standard of 57 mg/kg.

Semiannual groundwater monitoring was conducted for 2 years following remedial activities. **Figure 5** shows the locations of monitoring wells that were monitored. At the end of the 2-year period, arsenic concentrations in shallow aquifer well MW17 (closest to the Hylebos Waterway) were on the order of approximately 1,000 micrograms per liter ($\mu\text{g/L}$). For comparison purposes, the MTCA Method A groundwater cleanup level is 5 $\mu\text{g/L}$.

In August 1998, Murray Pacific's consultant Shenk+Associates LLC noted that the scope of work for the Consent Decree had been largely completed. It was observed that arsenic concentrations had not declined below levels reported in the first post-remedial semi-annual monitoring report (see **Appendix B**). Shenk+Associates LLC surmised that arsenic in the shallow aquifer was unable to precipitate due to a lack of oxygen and that conditions were largely stagnant. However, the stagnant conditions also reduced discharge to the waterway and, therefore, Shenk+Associates opined that continued monitoring would serve no useful purpose.

In a letter dated January 14, 1999, Shenk+Associates LLC noted that Ecology was requiring an additional year of monitoring at MW17 and reassessment of the data thereafter. The follow-up data were provided to Ecology in a letter dated May 15, 2000, indicating MW17 arsenic concentrations as of July 16, 1999 were 0.27 milligrams per liter (mg/L) (270 $\mu\text{g/L}$) and on January 28, 2000 they were 0.31 mg/L (310 $\mu\text{g/L}$) (see **Appendix B**). These concentrations were about one third of that observed in August 1998.

In a letter dated September 1, 2000, Ecology documented the satisfactory completion of all Consent Decree requirements and began the process of proposing the Murray Pacific Property for delisting (**Appendix B**), and the site was subsequently removed from the Hazardous Sites List.

In 2004, additional cleanup occurred at the Murray Pacific Site shore as a part of the Hylebos Waterway Superfund cleanup. The slope of the embankment was excavated to a depth of 4 feet, extending along the length of shoreline from the top of the embankment slope to -5 feet MLLW. In some areas the top of the embankment was cut back into the site upland to provide a more gradual slope for backfill/capping. After excavation, an 18" layer of sand was applied to the slope and covered with an 18" layer of quarry spalls (Connestoga-Rovers & Associates, 2015).

1.4.2 Arkema Property

1.4.2.1 Facility Background Information

This facility was established in the 1920s (Ecology, 1982) and ceased operations in 1997 (Malcolm Pirnie, 2007). The facility was operated by several entities, including Arkema, Atofina Chemicals, Elf Atochem, and Pennwalt, producing a number of industrial chemicals, including chlorine, sodium chlorate, sodium hypochlorite, and hydrochloric acid (KJC, 1987). Sodium arsenite (a commercial herbicide) was also manufactured at this facility under the trade name of Penite between the years of 1940 and 1971 (KJC, 1987). Pennwalt also conducted basic research with agricultural herbicides and pesticides (Ecology, 1982) at the far southeastern end of the facility, on the opposite side of Taylor Way.

The manufacturing operations were centrally located on the Arkema Property. Penite was produced using baghouse dust from the Asarco Smelter. During the production of Penite, the product was filtered to remove the sludge. This sludge was held in storage tanks and then disposed of in two shallow surface pits (KJC, 1987). The sodium arsenite disposal surface pits were located immediately

south-southeast of the facilities, approximately 700 feet southeast of the Taylor Way Property. Sludge sampled from these pits contained as much as 190,000 mg/kg total arsenic (KJC, 1987).

Extensive soil, groundwater, surface water, and sediment environmental studies and IAs have been conducted at the facility over the past 27 years. Arsenic contamination is primarily concentrated in soil and groundwater around the plant facilities as a result of the Penite waste sludge disposal in surface pits within the former plant area. IAs completed around these areas have generally resulted in elimination of some contaminant source areas, reduction in contaminant concentrations, and reduction of contaminant mobility and offsite migration.

This property is also undergoing a MTCA cleanup under Agreed Order (No. DE5668) with Ecology. An RI dated September 2013 has been completed (DOF, 2013). Arsenic contamination originating from the plume associated with the centrally-located manufacturing operations is not suspected to be impacting the Taylor Way Property. However, recent studies of the undeveloped Arkema property adjacent to the Taylor Way property, known as the North Boundary Area, indicate the presence of arsenic and lead contamination in soil, and arsenic contamination in groundwater. The history and scope and findings of environmental studies specific to this area, referred to as the NBA are summarized below.

1.4.2.2 North Boundary Area

The NBA is an approximately 4-acre portion of the Arkema facility closest to the Taylor Way Property as shown on **Figure 6**. The NBA is currently vacant. It lies between the Taylor Way Property line and the former Arkema salt pads. It was formerly occupied by a portion of a feature known as Waggoner's Wallow.

The salt pads consisted of two approximately 600-foot-long piles of sea salt that stretched across nearly the entire width of the Arkema Property. Their northwestern side was parallel to and approximately 250 feet from the Taylor Way Property boundary. The base of the salt pads was asphalt-pavement covered by a 100 mil polyvinyl chloride liner (Malcom Pirnie, 2007)—we do not know when the lining or pavement occurred. Dissolved salt (brine) from the piles was collected in sumps and pumped to the plant for processing. The salt piles were present into 1995 and removed around 1997 when plant operations ceased.

A maze of ditches encircled the southeast, south, and west side of the salt pads—referred to as Waggoner's Wallow. Close to the southwest corner and part of Waggoner's Wallow was what was referred to as the hypochlorite pond. Waggoner's Wallow was reported to have been used between approximately 1969 and 1985-1986 (Malcolm Pirnie, 2007). However, aerial photographs show the presence of a ditch through the NBA as early as 1946 (**Appendix C**). Waggoner's Wallow was used for treatment (natural decomposition to brine) of absorber liquor (Aware, 1981). In 1981, between 3,000 and 7,000 gallons of sodium hypochlorite from absorber tanks and off-gas from the chlorine process were discharged into the ditches each week (Aware, 1981). Waggoner's Wallow was used until December 1985 (Hart Crowser, 1986) and the ditches were filled in 1989 (DOF, 2013).

CDM Smith has not found detailed information regarding the filling of the Waggoner's Wallow area (i.e., sources of fill). However, the NBA had a long history of filling, based on review of aerial photographs (**Appendix C**). Not counting the original tideflat filling, fill has been brought into the NBA going back to at least the 1950s and on into the 2000s. While fill piles and fill are observed in most years, their presence is particularly apparent in aerial photographs dated 1965, 1977, 1978,

1981, 1985, 1986 (March and September), 1989, and 2004-2009. In 1981 a substantial amount of grading occurred between the hypochlorite pond and the Hylebos such that it appeared that the earlier stockpiles had been graded level. In 1985 additional fill and grading was apparent in the same area. In 1986, a substantial amount of fill was brought into the NBA. New fill was placed all along the southeastern side, graded level, and the hypochlorite pond was filled, as was at least the southern portion of the Waggoner's Wallow ditch system (the year that the ditch system was filled is inconsistent with that reported by DOF). In 1989 additional fill stockpiles were apparent in the end nearest the Hylebos, as well as some in the Hypochlorite pond and centrally in the NBA. In 1990-2001 none of these piles are apparent, likely having been graded flat. 2003 appears to have been the year that construction of the salt marsh between the Hylebos Waterway and the NBA started. However, besides the commencement of work next to the Hylebos, there also appears to have been some excavating and stockpiling going on in the area between the former Hypochlorite Pond and the Taylor Way Property. In 2004 there was a large amount of stockpiled soil on the NBA, apparently generated from the constructed salt marsh. Undecipherable ground disturbance was also noted in the south corner area. In 2006, some of the stockpiles had been removed and recent grading was apparent; the remaining piles were the same in the 2007 and 2009 aerial photographs. During the Supplemental RI work there were several soil stockpiles located in the northwestern half of the NBA, which appear to be the same as those observed in the 2006-2009 aerial photographs; they also appear to contain concrete and other debris.

According to aerial photographs, Waggoner's Wallow and the Hypochlorite Pond commonly overtopped and flooded the western portion of the NBA. In 1965 there appeared to be standing water in the west corner. In 1978 and 1986, a large volume of standing water could be observed extending from the ditch on the northwest side of the salt pads on over to the low spot area near the eastern side of the USG production building and baghouse, and then to the west corner of the NBA as indicated on **Figure 7**. Sometimes the flooding appeared to extend into the Taylor Way Property. In addition, salt accumulations were observed as a result of the overtopping of the looped portion of the Waggoner's Wallow ditch system (before the Hypochlorite Pond) based on 1981 and 1985 aerial photographs. The salt accumulations extended toward Taylor Way and then appeared to follow the property line to the western corner of the NBA. Stormwater runoff from the NBA onto the Taylor Way property was reported in a 1996 document by TLI Systems where it was described as entering the south end of the Taylor Way Property and flowing across the truck/trailer parking area to collection basins near the office building.

1.4.2.2.1 1990 Evaluation of Fill

In 1990, Arkema (ATOCHEM North America) undertook a study of a bark sludge material placed across the NBA and southwest of the salt pads (**Figure 6**). The bark sludge consisted of sediments excavated from the Taylor Lake sludge ponds and wood remaining from a wood processing operation. The Taylor Lake ponds reportedly contained primarily a brine and calcium carbonate sludge and the wood was reportedly from wood waste piles at a property adjacent to the chemical plant (believed to be the 3009 Taylor Way log sort yard) (Parametrix, 1990). According to a letter report prepared by Boateng & Associates (Boateng), the bark sludge was spread across this area (thickness not specified) with the intention of later mixing the material with topsoil and planting with grass (Boateng, 1990). The date of the bark sludge application is not indicated. According to historical aerial photographs reviewed by CDM Smith, this bark sludge might have been placed over a thick layer of fill soil (source not ascertained) that was spread across the NBA and southwest of the salt pads in 1986 and possibly on into 1989.

The study, conducted in September 1990, consisted of the collection of thirty bark sludge samples from 4-6" deep across an established grid, and analysis for total and leachable metals. The results of this sampling showed total arsenic concentrations ranging between 4 and 42 mg/kg in the 30 samples collected. Total lead concentrations ranged from 12.7 and 36.0 mg/kg. Leachable arsenic concentrations ranged up to 0.9 mg/L and leachable lead concentrations ranged up to 0.3 mg/L (Boateng, 1990).

1.4.2.2.2 2006 Malcom Pirnie Investigation

In July 2006 Malcolm Pirnie completed a report entitled *Evaluation of Media and Chemicals of Potential Concern, Exposure Pathways, and Cleanup Standards - Part 1* (Malcolm Pirnie, 2007). As a result of this evaluation, Malcolm Pirnie determined that additional field investigation was required to characterize contaminants of concern in soil, including the NBA. Results of the additional investigation were published in a report entitled *Soils Data Summary Report* (Malcolm Pirnie, 2007). The data are summarized below.

Malcolm Pirnie's 2007 soils investigation involved extending 12 borings throughout the NBA using direct push technology (DPT) sampling methods. Soil samples collected from the borings were either surficial (top 3 inches) or a composite of a nearly 6 foot (ft) interval (3 inch to 6 ft below ground surface interval). Groundwater samples were collected from the temporary DPT test holes using low flow (i.e., micropurge) sampling methods. In addition, composite soil samples were collected from ten soil piles located in the northern portion of the NBA. These samples were 10-point composites; the sample points were collected approximately 2-feet into each pile.

Malcolm Pirnie analyzed soil and groundwater samples for metals, including arsenic, and these data are summarized on **Figure 6**. Surficial soil arsenic concentrations ranged between 3.7 mg/kg and 30 mg/kg. Arsenic concentrations in two of the samples were greater than the MTCA Method A unrestricted land use cleanup level of 20 mg/kg. Lead concentrations ranged between <5.6 and 44 mg/kg.

The deeper composite soil sample arsenic concentrations ranged between 12 mg/kg and 480 mg/kg. The highest concentration samples (SPA3 and SPA4 having > 400 mg/kg) were located northwest of the salt pad storage area. SPA3 appeared to be situated within the Waggoner's Wallow ditch and SPA4 appeared to be far outside of the hypochlorite pond and Waggoner's Wallow ditch areas. Four additional deeper composite soil samples also contained elevated arsenic concentrations (i.e., exceeding 20 mg/kg), ranging between 22 and 57 mg/kg. These samples were scattered throughout the NBA. Lead concentrations in these samples ranged between 8.1 and 450 mg/kg, with SPA3 and SPA4 having the greatest lead concentrations (160 and 450 mg/kg, respectively).

Arsenic concentrations in the soil stockpile samples were not particularly high, ranging between 7.1 and 33 mg/kg. Three samples exceeded the MTCA Method A cleanup level of 20 mg/kg. Lead concentrations ranged between 0.6 and 110 mg/kg.

Dissolved arsenic concentrations in screening groundwater samples from the DPT borings varied substantially, ranging from 13 to 1,900 µg/L. The greatest arsenic concentration was located at SPA3, within the former Waggoner's Wallow ditch just northwest of the salt pads, also where the highest arsenic concentrations in soil occurred. The arsenic concentration in groundwater sampled from SPA10, located between SPA3 and the Taylor Way property, at 880 µg/L, was about half that at SPA3.

The second greatest arsenic concentration (1,800 µg/L) occurred at SPA11 located in the southwestern corner of the property.

1.4.2.2.3 2012 North Boundary Area (NBA) Investigation

In July 2012, Dalton, Olmsted & Fuglevand, Inc. (DOF) conducted an investigation of the soils within the NBA in accordance with an Ecology approved “*Data Gap Work Plan and Sampling and Analysis Plan*” (DOF, 2012), which was a precursor to the Arkema (site-wide) Remedial Investigation report. During that investigation 46 borings were extended during the NBA investigation, including seven within the Taylor Way Property and two on the railroad right-of-way property. The boring locations, NB-2 through NB-49 (excluding NB-28 and NB-39, which were not drilled), are shown on **Figure 7**. The purpose of this investigation was to assess the presence and extent of arsenic in soil within the NBA, because earlier samples had identified elevated levels of arsenic in the area.

CDM Smith field personnel were onsite throughout this investigation and field screened soils for metals and arsenic using an XRF instrument. CDM Smith also collected split soil samples. The work that was completed and CDM Smith’s findings are briefly summarized below. The DOF NBA data are presented in the DOF final RI report for the Arkema site (DOF, 2013). As the work progressed, it became apparent that soils within the NBA are contaminated with arsenic and lead. The interpretations of USG and the Port differ as to the cause of contamination. To this end, the two parties and Ecology have agreed that the Taylor Way Property/Arkema Property line is the functional boundary for purposes of the RI/FS and that the allocation of liability will occur separate from the RI/FS process.

The soil borings were conducted using DPT methods and were extended to depths of 12- to 15- feet below ground surface (bgs). At the beginning of this investigation, DOF intended to collect 2-foot composite soil samples from the soil cores. However, results of the initial XRF screening showed that elevated arsenic concentrations are not homogenous, but could be found within very narrow depth intervals and/or soil pores, and that compositing 2-foot samples could in effect dilute the metals and arsenic concentrations. Thereafter, DOF collected samples at both targeted depth intervals and 2-foot-composite intervals (when the data indicated low arsenic concentrations). CDM Smith collected split samples only at specific depth intervals.

The XRF was used to field screen for metals and arsenic at 300 discrete depth intervals. CDM Smith collected samples at 234 of these field screened depths and submitted them to our in-house laboratory in Denver where they were air dried and analyzed for metals again by a laboratory grade XRF instrument (Spectrace 5000 with Mo-K alpha source). A subset consisting of 16 of these samples was submitted to Columbia Analytical Services Inc. in Kelso, Washington for analysis of arsenic, cadmium, copper, iron, lead, nickel, silver, and zinc by U.S Environmental Protection Agency (USEPA) Methods 6010C/6020A. Analytical summary tables and the laboratory report are included in **Appendix D**. DOF’s analytical summary table and boring logs from the Arkema RI are also included in **Appendix D**.

In borings NB-10, NB-11, NB-15, NB-16, NB-17, NB-35, NB-37, NB-42 and NB-49, high arsenic concentrations were associated with a material typically described as a black, red-black, or grey-black sand. Only one boring (NB-18), centrally located within the former Arkema site area of the NBA investigation, specifically identified ‘slag’, where slag with wood chips was noted at a depth of 0.5 to 1.5 feet bgs. “Slag-like” fragments were noted in logs for NBA investigation borings that were installed on the former USG plant site side of the property line (NB-40 and NB-41), similar to observations from

borings previously installed in that area by USGI – these are discussed in Section 7.2.1. Shot was not visually apparent in the borings.

CDM Smith later conducted an electron microprobe study of samples from eight of the NBA investigation boring locations that had contained elevated arsenic concentrations (CDM Smith, 2013a). That study found arsenic to be present in spherical grains of shot; fine, sand-sized angular material with composition consistent with slag (interpreted to be sandblast grit); and in secondary phases (precipitates formed from dissolved arsenic). The study found few shot particles with the majority of arsenic-bearing particles consisting of the sand-sized slag material. Secondary phases found are consistent with arsenic that would have leached from primary sources, such as baghouse dust, sandblast grit, shot, raw slag, or other waste materials.

In many areas the boring logs show the presence of bark, wood chips, asphalt, concrete, and/or brick. The layer of scattered wood chips and bark tended occur under a shallow layer of fill soil, beginning at 0.5 to 2 feet bgs, indicating the bark sludge that was spread across the NBA was later covered over with an additional layer of fill. Sometimes soils with high arsenic concentrations in the mid to deep sample intervals contained a yellow precipitate. The yellow precipitate is believed to be from precipitation of dissolved arsenic carried by rainwater or groundwater from areas where it leached from soils containing the original source materials. The electron microprobe analysis of this material identified the yellow precipitate as an iron silicate or iron hydroxide phase cementing fine silica-bearing grains (too small to resolve as separate grains by the instrument).

Figures 8a-8c and **9a-9c** show the arsenic and lead concentrations for three depth intervals: 0 to 3 feet bgs, 4 to 7 feet bgs, and 8 to 12 feet bgs. The only depth outliers are in **Figures 8c** and **9c**, where the 7-foot sample for NB-32 was used as there was no sample deeper than this, and the 13-foot sample for NB-11 was used because it had a higher arsenic concentration than the 10-foot sample. The laboratory XRF (air dried samples) data were used in these figures, except when laboratory (wet chemistry) data were available. The only other exception was the 2.5-foot sample at NB-37 where the field-screened XRF data was used because of its significantly greater arsenic and lead concentrations than at the other depth intervals and there was not sufficient sample for CDM Smith to collect a sample for laboratory analysis. The boring symbols in these figures are also color-coded. Green denotes samples where the arsenic/lead concentrations were less than their Method A cleanup levels of 20 mg/kg and 250 mg/kg, respectively³. Blue denotes concentrations where the Method A cleanup level was exceeded by less than one order of magnitude (i.e., for arsenic, the concentration would be between 21 and 99 mg/kg). Orange denotes concentrations where the Method A cleanup level was exceeded by one order of magnitude, and red denotes concentrations where the Method A cleanup level was exceeded by two orders of magnitude.

Within the 0- to 3-foot depth, arsenic concentrations across the NBA exceeded the Method A cleanup level in all but four samples (**Figure 8a**). A cluster of samples in the south corner (at and south of the Hypochlorite Pond) of the NBA exceeded the Method A cleanup level by one to three orders of magnitude (up to 1,288 ppm). Three other samples with arsenic concentrations ranging between 188 and 328 ppm are widely scattered across the NBA, two of which appear to be close to, or within the

³ Milligrams per kilogram and parts per million (ppm) are approximately the same. The XRF provides data in ppm while laboratory analytical data are in mg/kg. When only XRF are being discussed, the values will be referred to in units of ppm. When both XRF and laboratory, just laboratory data, and Method A cleanup levels are being discussed, the values will be referred to in units of mg/kg.

former Waggoner's Wallow ditch. On the Taylor Way Property adjacent to the NBA, beginning at the south corner and extending northeastward for a distance of approximately 200 feet, arsenic concentrations in the 1- to 2.5-foot samples ranged between 168 and 720 mg/kg. A railroad right-of-way sample collected next to the NBA, approximately 20 feet from the Taylor Way Property south corner contained 333 ppm arsenic.

Within the 4- to 7-foot depth and area of arsenic concentrations greater than the Method A cleanup level by one to two orders of magnitude (up to 5,192 ppm) exists in the central northwestern side of the NBA (**Figure 8b**). This area of higher arsenic concentrations occurs in the historical low spot that was frequently inundated by Waggoner's Wallow and is adjacent to the Taylor Way Property, across from the baghouse and where waste materials exited the building. On the Taylor Way Property, next to the NBA, arsenic concentrations generally decreased with depth with the exception of NB-27, which had a similar arsenic concentration (300 ppm at 5 feet bgs) to the sample above it (168 ppm at 1 foot bgs). NB-45, which is right on the boundary between the Taylor Way Property and the railroad right-of-way, is very similar to the other two samples collected in the railroad right-of-way – all three of which contained over 100 ppm at this depth interval. At NB-46, located about 90 feet from the Taylor Way Property line the arsenic concentration increased from 33 ppm at 1 foot to 357 mg/kg at 6 feet.

Within the 8- to 12-foot depth, arsenic concentrations in the same central area next to the northwestern side of the NBA are similarly high (up to 2,269 ppm), but within an overall smaller footprint (**Figure 8c**). There are three additional locations with notably high arsenic concentrations (108-215 ppm) at this depth interval, two of which occur next to the Waggoner's Wallow ditch and the third is at NB-46 in the railroad right-of-way. The log for NB-46 indicated "carry down" in the 10-foot sample. Carry down, also referred to as "drag down", is when the direct push sampler drags impacted sediments from a shallower zone to deeper within the boring.

For lead, within the 0- to 3-foot depth, elevated lead concentrations occur in the same south corner area of the NBA (at and south of the Hypochlorite Pond) as was seen for arsenic, with concentrations ranging up to 5,975 ppm (**Figure 9a**). While lead concentrations were elevated (i.e., greater than background in various other samples in the NBA, only two other samples exceeded the Method A cleanup level, one of which was apparently located in the Waggoner's Wallow ditch (NB-48) and the other (NB-16) located in the central area of the NBA. On the Taylor Way Property two samples located along the NBA exceeded the Method A cleanup level; these same two samples had the greatest arsenic concentrations at this depth interval.

Within the 4- to 7-foot depth interval, lead concentrations ranged between 934 and 7,990 ppm within the same central location on the northwestern side of the NBA as where the cluster of high arsenic concentrations occurred at this same depth (**Figure 9b**). Beyond this area, lead concentrations did not exceed the Method A cleanup level.

Within the 8- to 12-foot interval, the only sample that exceeded its Method A cleanup level was NB-06, located next to the Waggoner's Wallow ditch (**Figure 9c**). This 10-foot sample, which contained 305 ppm lead, also contained 155 ppm arsenic.

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Section 2

Physical Setting

2.1 Climate

Tacoma's coastal marine climate is affected and moderated largely by air movements from the Pacific Ocean. The warmest months are July and August, when the high temperatures average around 77 degrees Fahrenheit (°F). The coldest month is December, when the high averages around 47 °F and a low of 36 °F. The comfort index, which is based on humidity during the hot months, is 69 out of 100 (where a higher value is more comfortable).

Tacoma gets around 39 inches of rain per year and averages 146 days of measurable precipitation. On average, winter months are wetter than summer months. The wettest month of the year is November, with an average rainfall of 6.5 inches. There are, on average, 141 sunny days per year in Tacoma. Snowfall averages less than 1 inch per year.

2.2 Regional Geology

The Site is located in the Commencement Bay industrial area in the Puyallup Valley near the mouth of the Puyallup River. Historically, the Puyallup River discharged to Commencement Bay through tidal marshes laced by a network of channels (**Figure 10**). In the early part of the 1900s, waterways were constructed along the Puyallup River and major streams by dredging and hydraulically filling the intervening marsh and tideflat sediments. Imported fill and waste material were also used as fill material.

2.3 Geology

Approximately 1 to 4 feet of surficial fills (gravelly sand, gravelly silty sand, gravel, gravelly sandy clay) underlie the Taylor Way Property. The surficial fill is thicker in some areas, such as where significant remedial actions (i.e., soil excavation) have occurred and along the section of the storm drain line between the oil/water separator and the Hylebos Waterway.

The surficial fill is typically underlain by hydraulically placed fill. The hydraulic fill may range as much as 12 feet thick at the northeast side (Hylebos Waterway) of the Taylor Way Property and becomes very thin to nonexistent along the southwest side. The hydraulic fill grades from fine/medium-grained sand at the east end closest to the Hylebos Waterway, to sandy silt and clayey silt along the southwest side. The total fill thickness ranges between 8 and 12 feet.

It is sometimes difficult to differentiate between hydraulically placed fill and fill placed by other means. Significant variation was observed between adjacent boreholes, suggesting another possible source of fill besides hydraulic placement.

The fill is underlain by approximately 1 to 8 feet of clayey silt tidal marsh sediments that represent an aquitard. The upper 1 to 5 feet of the clayey silt aquitard contains abundant undecomposed marsh grasses and other organic materials that are less abundant with depth. The underlying deltaic sediments consist of a complex sequence of interbedded sand, silt, and clayey silt. The Deltaic sediments are coarser near the Hylebos Waterway and become finer grained toward Taylor Way.

Subsurface conditions on the Murray Pacific Property and the NBA are generally similar. Remedial actions on the Murray Pacific Property have generally resulted in about 2 to 4 feet of recent fill across the entire property, with some thicker layers of fill—mostly along the waterway. The tideflat layer was encountered at depths of 7.5 to 10.5 ft bgs. In the NBA, the tideflat layer appears to be generally shallower, ranging from about 2 to 7 ft bgs. In Waggoner’s Wallow the original topography and fill conditions are a little more complicated due to the ditch and pond system and that the property had several other low areas. Based on historical aerial photographs reviewed, the NBA area was also used as a fill site for many decades. Fill containing bark, wood chips, asphalt, concrete, and/or brick debris was commonly observed in borings drilled in the NBA, ranging up to six feet thick (see boring logs for NB9, NB10, NB13, NB18, and others in **Appendix D**).

2.4 Hydrogeology

Groundwater occurs under water table conditions in the fill. The fill contains the uppermost water-bearing zone and which is referred to, herein, as the “surface aquifer.” Marsh sediments are referred to as the first aquitard. The deltaic sediments contain the next water-bearing zone (referred to as the “second aquifer”), which occurs under confined conditions and is tidally influenced.

Ultimately, all groundwater discharges to the Hylebos Waterway. To greater or lesser extents Site hydrogeology is influenced by tides of the Hylebos Waterway, surface water features, paved and unpaved surfaces, underground utilities, fill type, geologic sediments, and perhaps other undetermined conditions.

During this Supplemental RI, CDM Smith conducted:

- High and low tide water level measurements across the properties.
- Continuous water level measurements in three surface aquifer and two second aquifer wells during a 24-hour period.
- Slug testing on four surface aquifer wells to estimate hydraulic conductivities.

Results of the aquifer testing are provided in **Appendix E**. Water level measurements, along with corresponding high and low tide information for years 2007 through 2014 are provided in **Table 1**. Recent and historic potentiometric surface maps were also compiled. Our evaluation of these data is provided below.

2.4.1 Surface Aquifer

2.4.1.1 Depth to Groundwater and Water Level Fluctuation

Depth to groundwater across the Taylor Way Property is the shallowest at the south end (MW1), where it has been as shallow as approximately 1.8 ft bgs, and deepest at the northeast corner (MW5), where it has been as deep as approximately 10.5 ft bgs.

Figure E-1 in **Appendix E** shows continuous water level measurements in three surface aquifer wells (MW2, MW5, MW6) on January 30 and 31, 2007. A minor tidal effect (0.1 to 0.18 ft) was observed in the two surface aquifer wells located adjacent to the Hylebos Waterway, but no effect was observed at MW2, approximately 300 ft away. A lag time of 4 hours was observed between the tidal fluctuations and fluctuations observed in the surface aquifer wells.

Water level fluctuation in the surface aquifer is primarily seasonally based. Water level measurements taken during the course of this Supplemental RI, showed that seasonal water level variation in the surface aquifer across the properties generally varied by less than 1 foot with the notable exceptions of 1C3-1, MW1R, MW9, 2B1-1, and 2A1-1, as shown on **Table 2-1** below.

Table 2-1 Wells with Seasonal Fluctuations Greater than 1 Foot

| Well ID | Observed Seasonal Fluctuation (ft)* |
|---------|-------------------------------------|
| 1C3-1 | 4.4 |
| MW1R | 3.2 |
| MW9 | 3.0 |
| 2B1-1 | 2.1 |
| 2A1-1 | 1.5 |

*Difference between measurements on February 26, 2007 and August 27, 2008

Seasonal groundwater elevations at these wells are relatively higher than other locations during the winter months. Accordingly, groundwater gradients are slightly steeper during the wet season than the dry season. This is likely caused by seasonal groundwater recharge, which predominantly occurs from unpaved areas within the NBA. In fact, as will be discussed in the following section, a mounding effect is noted in the NBA at well 1B4-1, which is centrally located within the wells noted above (unfortunately there was not sufficient water level data for 1B4-1 to provide a seasonal fluctuation as for the wells above)

2.4.1.2 Groundwater Flow Direction

Figures 11a through **11i** show potentiometric surfaces of the surface aquifer in December 1994, April 1998, October 2000, October 2001, February 2007, and August 2008, June 2009, March 2012, and January 2014, respectively. The 2012 potentiometric surface map was taken from the Arkema RI (DOF, 2013). The figures indicate whether the water level measurements occurred specifically within the time of a low or high tide event, although no significant differences were observed between high and low tide.

It should be noted that the vertical datum used for the monitoring well elevations changed over the years. From the early 1990s until the facility was demolished, the survey reference was a brass monument in the front step of the USG office building, which was based on National Geodetic Vertical Datum 1929 (NGVD 29). In 2008 the wells were all resurveyed using MLLW as the vertical reference. For this Supplemental RI, groundwater elevation data between 2007 and 2009, as presented in **Table 1**, use MLLW as the vertical reference. In 2014 the MLLW elevations were converted to North America Vertical Datum 1988 (NAVD 88). To convert NGVD 29 to MLLW, one would add approximately 6.17 feet. The conversion of MLLW to NAVD 88 was made by subtracting 2.67 feet. Therefore, while the groundwater contours shown may be similar between the years, the overall groundwater elevations may appear to be significantly higher or lower, but in reality are not.

The first comprehensive measurement of water levels across the properties occurred in December 1994 (**Figure 11a**). At that time, it indicated a mound of groundwater in the NBA, which was flowing into the Taylor Way Property. Centrally within the Taylor Way Property there appeared to be a groundwater divide in the vicinity of the USG production building with the resulting groundwater flow toward the northwest and northeast.

Water levels were not measured on the Arkema and Murray Pacific Properties during the 1998 through 2001 groundwater sampling events. In 1998 and 2000 (**Figures 11b** and **11c**), groundwater is clearly indicated to be entering the Taylor Way Property from the south-southeast and migrating under the property in a north to northwesterly direction. In 2001 (**Figure 11d**) there appeared to be a groundwater divide under the production building and groundwater movement toward both the west and east/northeast.

The 2007, 2008 and 2009 potentiometric surface maps do not contain data on the Arkema Property and partial data for the Murray Pacific Property. The February 2007 water level data indicate the groundwater flow direction to be toward the north-northeast (**Figure 11e**). The August 2008 water level data indicate an easterly gradient, with groundwater apparently flowing from the Taylor Way Property toward the Arkema Property (**Figure 11f**). However, in June 2009, the groundwater flow had moved back toward a north-northeasterly direction (**Figure 11g**).

The most recent and most comprehensive sets of water level measurements occurred in 2012 and 2014. The potentiometric surfaces for both of these years show a distinct groundwater mound that occurs in the NBA, about 225 feet northeast of the Taylor Way Property's south corner (**Figures 11h** and **11i**). From this mound, groundwater is flowing north-northwest into the Taylor Way Property and northeast across the NBA. Through the Taylor Way Property, groundwater flows in a northerly direction. On the Murray Pacific Property, groundwater flows in an easterly direction. The groundwater flow on the Murray Pacific and Taylor Way Properties converges at about the property line, which appears to be the discharge to the Hylebos Waterway.

The following can be inferred, based on the potentiometric surface maps:

- Tidal fluctuation does not create noticeable changes to the groundwater flow directions in the surfaced aquifer.
- The mounding effect within the NBA has probably always existed, it was just not readily apparent when the water level was not measured in 1B4-1. (Water levels were not measured in 1B4-1 until 2012).

The NBA appears to be a significant recharge area during some times of the year, as evidenced by the groundwater mounding in this area.

- Seasonal variation in groundwater flow direction is not very apparent.
- Earlier potentiometric surface maps (1994-2002) indicate groundwater flowing in a westerly direction in the western section of the Taylor Way property, but this is not apparent in the later years. The change is coincident with the replacement of MW12 with MW27 following construction of the Carlile facility. MW12 never produced much water; its boring log indicated silty clay beginning at 2.5 feet bgs and extending to the organic silt tideflat at 6 feet bgs, with only a thin sand lens at 5 feet bgs. The boring log for MW27 indicated 4.5 feet of gravelly sand, followed by an interlayered silty sand/sandy silt to 6.5 feet, and clayey silt fill from 6.5 to 8 feet bgs where the tideflat layer was encountered. The conclusion is that MW12 appears to have been installed in a small, localized area of fill soils having a low permeability, which in turn caused a misrepresentation of the actual groundwater flow direction.

- The area of apparent discharge to the Hylebos Waterway may be caused by an artifact of the predevelopment tideflat configuration, or the existing storm drain line, or both. **Figure 10** depicts the pre-development tideflat drainage patterns mapped in 1877 (Bortleson et. al., 1980). This specific area coincidentally overlaps a large historic tideflat channel that looped right up against the current edge of the current waterway. The storm drain line does have its outfall in the same area; however, during replacement of the storm drain line which occurred as a part of interim actions, a large section of the trench closest to the waterway was backfilled with controlled density fill (CDF) to limit permeability (see Section 4.1.4 for further details).

2.4.1.3 Hydraulic Properties

Appendix E contains the results of slug testing performed at surface aquifer wells MW2, MW25, MW29, and MW30 to estimate the ranges of hydraulic conductivities for the surface aquifer. Hydraulic conductivities were estimated by three different methods for each well and a mean was calculated from the three methods. Hydraulic conductivity values ranged between 0.78 and 2.42 feet per day (ft/day) and were within the expected ranges for the soil types encountered at the individual locations.

The groundwater velocity for the areas between MW2-MW6 and MW9-MW5 were calculated using wet season gradients determined from the January and February 2007 groundwater measurements and dry season gradients using August 2008 groundwater measurements. The range of gradients and hydraulic properties of the surface aquifer wells are tabulated in **Table 2-2**.

Table 2-2 Surface Aquifer Hydraulic Properties and Gradient Ranges

| Wells Used for Gradient Determination | Season | Hydraulic Conductivity (K) ft/day | Gradient (i) ft/ft | Effective Porosity (n) | Velocity = Ki/n (ft/day) | Velocity (ft/year) | |
|---------------------------------------|--------|-----------------------------------|--------------------|------------------------|--------------------------|--------------------|----|
| MW9 to MW-5 | Wet | 2 | 0.009 | 0.20 | 0.09 | | |
| MW2 to MW6 | | 1.6 | 0.003 | 0.20 | 0.024 | | |
| MW9 to MW-5 | Dry | 2 | 0.001 | 0.20 | 0.01 | | |
| MW2 to MW6 | | 1.6 | 0.0007 | 0.20 | 0.0056 | | |
| Average Groundwater Velocity | | | | | 0.0324 | | 12 |

As shown, the calculated groundwater velocities reflect slight differences in hydraulic conductivity across the Site and a decreasing gradient from wet to dry season. Averaging all of the seasonally variability and changing hydraulic conductivity results in a groundwater velocity equal to about 12 ft/year.

2.4.2 Second Aquifer

2.4.2.1 Groundwater Flow Direction

Figures 12a and **12b** show the high and low tide potentiometric surfaces of the second aquifer in August 2008. The gradient during low tide is generally northeasterly toward the Hylebos Waterway. At high tide there is a gradient reversal that extends approximately 175 to 300 feet inland before it equalizes with the groundwater flow from the other direction. This creates a valley, or bowl-like, effect centrally across the Site.

2.4.2.2 Water Level Fluctuation

The amount of fluctuation in second aquifer wells depends on both the amount of tidal fluctuation and the distance from the waterway. **Figure E-1** in **Appendix E** shows continuous water level measurements in two second aquifer wells (MW18, and MW14) on January 30 and 31, 2007. The tidal effect in the second aquifer was far greater than the surface aquifer. In MW18 (approximately 150 ft

from the Hylebos) a 7.7-ft response was observed with a lag time of only 1 hour. MW14 (approximately 300 away) showed a 1.7-ft response and a 3-hour lag time.

Based on high/low tide water level measurements in February 2007, there was a 7.24 ft difference between the high and low tide in MW28, which is adjacent to the Hylebos Waterway, and a 9.26 ft difference during the August 2008 measurement.

For well 1C2-2, located in the NBA and farthest from the Hylebos Waterway, the February 2007 fluctuation was only 0.06 ft and the August 2008 fluctuation 1.55 ft. There was a greater difference between the tidal fluctuations in the Hylebos Waterway during these two events. There was a 9.46 ft difference between the high and low tide in the Hylebos during the February 2007 measurements and a 13.2 ft difference between the high and low tide water levels during the August 2008 measurements.

The amount of tidal influence, lag time, and tidal fluctuation vary during any given cycle, and even the competency of the aquitard will all affect the water levels at any given monitoring well at any given time. While the potentiometric surfaces illustrated in **Figures 12a** and **12b** were based on water level measurements taken over a narrow period of time around the low and high tides, a more accurate snapshot of the potentiometric surface across the properties would entail installing continuous water level measurement devices in every monitoring well.

2.5 Stormwater

2.5.1 Taylor Way Property

The Taylor Way Property has always had a stormwater conveyance system. The areas captured by the original stormwater system were limited to paved portions of the Site. However, direct discharge to the Hylebos Waterway via overland flow was never substantial due, collectively, to the stormwater system, the porous nature of soils in previously unpaved areas which allowed for direct infiltration, and Site topography. The original stormwater system is shown on **Figure 4**. In 1998, the majority of the original stormwater system was replaced and extended into the material stockpile area (see Section 4.1.4 for further discussion). This stormwater system is what is shown on the remaining figures throughout this Supplemental RI.

When the Taylor Way Property was redeveloped with the Carlile facility, an oil/water separator was installed off the north corner of the Carlile warehouse. The section of storm drain line between the oil/water separator and the outfall was not replaced. Upstream of the oil/water separator, existing manholes were reused, some of which were retrofitted to serve a dual purpose as catch basins, but the remainder of the catch basins and the storm drain lines were replaced. The stormwater system plans for the Carlile facility are included in **Appendix A**. As-built drawings were not provided.

2.5.2 Murray Pacific Property

Following remedial actions in 1996, a stormwater detention pond was constructed on the Murray Pacific Property adjacent to the Hylebos Waterway to capture surface water runoff (**Figure 3**). From this detention pond, stormwater reportedly passes through an oil/water separator and then discharges to the Hylebos Waterway.

2.5.3 North Boundary Area

The NBA is unpaved except for the salt pads. The Arkema stormwater collection system has been plugged so that stormwater that collects on unpaved surfaces generally infiltrates into the ground surface instead of flowing offsite as surface runoff. Many areas of the Arkema Property are submerged

during periods of high rainfall, a condition which delayed some of the field work that occurred during this Supplemental RI.

In prior years some stormwater from Arkema (i.e., the NBA) reportedly entered the south end of the Taylor Way Property and would flow across the truck/trailer parking area to stormwater catch basins near the office building (TLI Systems, 1996).

2.6 Seeps

After completion of interim actions along the tide bank in 1997 and 1998 (see Section 4.1.2), the tide bank was observed for the presence of seeps during the groundwater and stormwater sampling events conducted between April 1998 and February 2007. Seeps were observed and sampled in April 1998 and April 1999. No seeps were observed thereafter.

Seeps are also not currently evident along the Murray Pacific Property tide bank, which, following the 1996 remedial excavation and subsequent 2005 Hylebos waterway cleanup, was regraded, had a layer of geotextile and sand placed over it, and surfaced with quarry spalls (Conestoga-Rovers & Associates, 2015). CDM Smith has not studied or investigated seeps along the NBA.

2.7 Offsite Underground Utilities

A 30-inch storm drain line and a 21-inch sanitary sewer line extend along Taylor Way parallel to the southwestern property line. The storm line appears to run approximately 60 feet from the property line and the sewer line runs approximately 12 feet from the property line, according to information on govME.org and an older drawing provided by the Port (**Appendix A**). Drawings indicate there are three manholes situated along the length of the Taylor Way Property. One exists at the south corner at the first Carlile entrance and a catch basin exists within a few feet of the manhole. The drawings indicate there is a second catch basin in the Carlile driveway, but this was not observed. It is possible that such a catch basin exists, but that it has been overgrown by the junipers, or was paved over during the redevelopment.

The depth of these underground utility lines was not determined, but given the shallow groundwater conditions and that these are main trunks, both of these utilities are likely at least partially submerged. While the Site is generally downgradient of these utility lines, the mounding that occurs at 1B4-1 may cause sufficient reversal in the groundwater flow direction to reach either or both of these lines.

Ecology sampled dry weather flow in this manhole in May 2015, the results of which are summarized in Section 10.

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Section 3

Prior Site Assessments

A number of environmental assessments of the Taylor Way Property have been conducted since the early 1990s. Various IAs were subsequently completed as conditions were identified that required such actions. Section 3 summarizes prior assessments completed up until the initiation of this Supplemental RI and the general findings. Except where specifically noted, CDM Smith and its predecessors have conducted the environmental assessments summarized below.

As noted in Section 1, arsenic and lead are typically the metals that drive cleanups at sites contaminated by the use of ASARCO slag, with arsenic being the primary driver due to its relative toxicity and mobility. Therefore, the discussion that follows focusses primarily on arsenic when contamination related to the use of ASARCO slag is being discussed. Further discussion on potential contaminants of concern (PCOC) is presented in Section 5, with further assessment of PCOC in later sections.

As cleanup levels or remediation levels have not yet been determined, initial assessments (and IAs) initially focused on the MTCA Method A unrestricted land use and industrial land use soil cleanup levels and MTCA Method A groundwater cleanup levels. The Method A industrial land use soil cleanup level for arsenic has changed since the initiation of work on the Site. Initially it was 200 mg/kg. The industrial land use Method A cleanup level was changed to 20 mg/kg, the same as the unrestricted land use cleanup level, when MTCA was amended in 2001. During assessments completed in conjunction with Site redevelopment, the Port utilized the Method C (conditional land use, direct contact pathway) soil cleanup level for arsenic, which is 87.5 mg/kg. The Method A groundwater cleanup level for arsenic has remained the same at 5 µg/L. Conversely, the MTCA Method A soil cleanup level for diesel and oil range petroleum hydrocarbons—another contaminant assessed—was initially 200 mg/kg, and has since changed to 2,000 mg/kg. Further discussion of cleanup levels is provided in Section 5.

3.1 Phase I and II Remedial Investigation

The first Site investigation was conducted in two phases completed in 1994 and 1995 (AGI, 1994a; AGI 1995). The investigation scope included the following:

- Collecting composited surface soil samples across the material stockpile area.
- Installing nine shallow aquifer monitoring wells and five second aquifer wells identified as MW1 through MW14. Of these wells, MW3, MW7, MW8, MW10, MW11, and MW12 no longer exist. MW1 and MW13 were replaced in December 2006 as part of the Supplemental RI work. Monitoring well locations are shown on **Figure 4**.
- Locating and sampling seeps along the Hylebos Waterway embankment.
- Sampling the stormwater outfall.
- Conducting 48-hour continuous water level testing.

- Submitting composited surface soil samples, discrete subsurface soil samples collected from MW7 through MW14, and groundwater samples for fuel hydrocarbon and/or metal analyses.

The Phase I RI (AGI, 1994a) found arsenic concentrations in eight surficial soil samples collected from the material/waste stockpile area ranging between 3.8 and 140 mg/kg. None of the samples exceeded the MTCA Method A industrial soil cleanup level of 200 mg/kg that was in effect at the time. Cadmium concentrations ranged between <0.25 and 3.8 mg/kg (MTCA Method A cleanup level is 2 mg/kg). Lead concentrations ranged between 11 and 240 mg/kg (MTCA Method A industrial soil cleanup level is 1,000 mg/kg). Chromium concentrations ranged between 23 and 890 mg/kg, with five of the samples containing greater than 500 mg/kg (MTCA Method A cleanup level for trivalent chromium is 2,000 mg/kg and for hexavalent chromium it is 19 mg/kg). Samples containing the greatest arsenic and lead concentrations did not correspond with the samples containing the greatest chromium concentrations, indicating the higher chromium concentrations were mostly associated with the more recent materials stored on the property. Because of the relatively high chromium concentrations found, groundwater was also analyzed for hexavalent chromium, but was not detected indicating chromium, while elevated, was not an issue. Because the soil samples were so shallow, they were inconclusive regarding the completeness of source removal across this area, but indicated there was no longer ASARCO derived wastes on the ground surface.

During the Phase II RI (AGI, 1995) near surface (vadose) soil samples collected from borings MW7 through MW14 were found to contain between 1.3 and 170 mg/kg total arsenic. With the exception of boring MW9, arsenic concentrations in soil samples collected below the water table were low, ranging between 4.8 and 15 mg/kg. In MW9, located at the southeast side of the Site, near the baghouse and dry filter, shot was visually identified in the upper few feet and the arsenic concentration in the 8-foot sample was 300 mg/kg (the water table at MW9 ranges between about 3 and 5 feet bgs). Because of its proximity to the baghouse, baghouse dust may also have been a contributing source of arsenic in this area.

Fuel-related hydrocarbons were not detected in groundwater samples (AGI, 1994a). Arsenic concentrations in the surface aquifer samples were variable, ranging from a high of 1,900 µg/L in MW9 (located near the baghouse), to less than 10 µg/L in MW5 (located in the former material stockpile area at the downgradient end of the Site next to the Hylebos Waterway) (AGI, 1994a; AGI, 1995). The monitoring well location having the next highest arsenic concentration was MW1, located at the south (upgradient) end of the property, with an arsenic concentration of as much as 1,600 µg/L (AGI, 1995). In the second aquifer, arsenic concentrations were much lower, ranging from less than 5 µg/L to 23 µg/L (AGI, 1995).

The storm drain outfall at the Hylebos Waterway was observed to have dry weather flow, apparently as a result of groundwater infiltration. The arsenic concentration in the dry weather discharge was as much as 1,000 µg/L (AGI, 1995).

Arsenic was detected in three of the four seeps sampled along the tide bank at concentrations ranging between 35 µg/L (totals basis) and 590 µg/L (totals basis) (AGI, 1995). While elevated, these arsenic concentrations were significantly lower than in seep samples collected by Ecology in 1980 (2,100 µg/L) and in 1992 (1,460 µg/L).

3.2 Berm Evaluation

Until its removal in 1996, a soil berm existed along the property boundary between the Taylor Way Property and the Murray Pacific Property (**Figure 4**). USGI personnel originally constructed the berm to protect personnel from possible collapse of the log piles. The berm extended in a southwest to northeast alignment between the railroad siding trestle and the Hylebos Waterway. The berm was approximately 520 feet long, 6 to 12 feet high, and 20 to 25 feet wide at its base (AGI, 1996a).

Berm soils typically consisted of brown to gray silty sand with gravel in the northern half (portion closest to the Hylebos Waterway) to brown sand with some silt in the southern half (AGI, 1996a). The berm contained some visible slag and USGI arsenic-containing waste materials. The berm also contained other debris such as cupola bottoms, concrete, and brick (AGI, 1996a).

In February 1996 the berm soils were sampled for waste designation purposes (AGI, 1996a,b). To do so, the berm was divided into thirty 10- to 25-foot long segments (S1-S30) comprising an average estimated volume of 90 cubic yards each (AGI, 1996a,b). One 10-point composite sample was collected from each segment (AGI, 1996a,b). In addition, four discrete samples were collected from the solidified material (i.e., cemented sand/gravel) found within four of the segments located near the berm's north end (AGI, 1996b).

All samples were analyzed for total arsenic, cadmium, and lead. Samples that exceeded 200 mg/kg arsenic, 10 mg/kg cadmium, and/or 500 mg/kg lead were also submitted for analysis of leachable metals concentrations by the toxicity characteristic leaching procedure (TCLP) (AGI, 1996b).

Total arsenic concentrations in berm soils ranged between 81 and 5,300 mg/kg (AGI, 1996b). Total cadmium concentrations ranged between 0.48 and 18 mg/kg (AGI, 1996b). Total lead concentrations ranged between 79 and 3,200 mg/kg (AGI, 1996b). Cadmium and lead concentrations were generally correlative with the arsenic concentrations, consistent with USGI plant waste being used in the berm.

Arsenic concentrations in all samples collected from the northern half of the berm (S14-S30) and all four of the solidified soil samples exceeded the dangerous waste characteristic leaching criteria of 5 mg/L, ranging to as much as 93 mg/L (AGI, 1996b). None of the material classified as dangerous waste based on leachable lead or cadmium concentrations.

3.3 Tide Bank Investigation

The material makeup of the embankment that adjoins the Hylebos Waterway was investigated in three phases during 1996 (AGI, 1996b; AGI, 1997d). The tide bank consisted of a "bank top" (i.e., the ground surface, which is level with the rest of the property) and "bank slope." These investigations involved excavating a series of backhoe dug test pits along the bank top and extending a series of hand augered borings along the bank slope in order to observe subsurface conditions and collect soil samples for analysis.

3.3.1 Bank Top

During the initial investigation, eight test pits (TP1 through TP8) were extended along the bank top and soil samples were collected from the 0-2 and 2-4 foot intervals (AGI, 1996b). Source material (i.e., shot) was found in several of these test pits. Of the samples collected, total arsenic, copper, and lead concentrations exceeded marine Sediment Quality Objectives (SQOs) published as part of the CBN/T Record of Decision (USEPA, 1989) in all but one sample. Total arsenic concentrations ranged from 5.5 to a high of 2,900 mg/kg (AGI, 1996b).

An additional six test pits (TP9 through TP14) were excavated along the bank top during two subsequent field investigations to delineate the extent of source material laterally and vertically, and to determine the depth at which soils beneath the source material would meet proposed cleanup levels (200 mg/kg for arsenic). Additionally, soil samples collected from the initial and subsequent investigations were subjected to TCLP and 96-hour static acute bioassay testing using rainbow trout for waste designation purposes.

Samples collected from TP1 through TP8 that contained arsenic concentrations greater than 200 mg/kg were subjected to leachable arsenic testing by TCLP. The maximum TCLP arsenic concentration of 1.8 mg/L was well below the dangerous waste limit of 5 mg/L (AGI, 1996b).

Bioassay testing was conducted on three samples collected from TP9 through TP11, with arsenic concentrations ranging from 2,300 to 6,400 mg/kg; survivorship of the control and test fish were within acceptable limits (AGI, 1997b).

The investigation results indicated that, laterally, the source material began about 60 feet from the property line with the Arkema Property and extended northwestward to the area of the storm drain outfall, or approximately 25 feet from the Murray Pacific Property (AGI, 1997b). The maximum estimated depth of source material and soils exceeding 200 mg/kg was about 6 feet below the bank top.

3.3.2 Bank Slope

The bank slope was investigated during the first two phases of the tide bank investigation (AGI, 1996b; AGI, 1997d). This involved extending 23 hand auger borings to collect sediments at varying depths, analyzing them for arsenic, chromium, copper, lead, nickel, and zinc, and comparing metals concentrations to the marine SQO's. Samples were collected at depths of 0-1 ft, 1-2 ft, 2-3 ft, and 3-4 ft.

Arsenic concentrations in 16 of the 23 1-ft samples collected exceeded the respective SQO of 57 mg/kg, ranging to a high of 3,400 mg/kg. Arsenic in 13 of the 19 2-ft samples exceeded the SQO, ranging to 4,600 mg/kg. Arsenic concentrations in all six of the 3-ft samples exceeded the SQO, ranging to 2,400 mg/kg. Arsenic in two of the three 4-ft samples exceeded the SQO, ranging to 700 mg/kg. Three of the target 4-ft samples could not be collected due to excessive sloughing. Copper, lead, and zinc concentrations followed similar trends. There were no exceedances of the SQOs for these metals when arsenic did not exceed its SQO (AGI, 1997b).

The ten bank slope samples collected during the initial tide bank investigation that contained arsenic concentrations exceeding 200 mg/kg were also analyzed for leachable arsenic by the TCLP method—none exceeded dangerous waste criteria.

3.4 Hydrocarbon Assessment

In 1992 USGI removed an above ground storage tank (AST) from the area between the plant and the Hylebos Waterway (**Figure 4**), adjacent to the soil berm (AGI, 1993; AGI 1994b). The tank had an approximate capacity of 17,000 gallons and was used to store Bunker C fuel oil (AGI, 1993; AGI 1994b). A test pit exploration identified total petroleum hydrocarbons quantified in the diesel-range (TPH-D) in soil at concentrations of 13,600 mg/kg to 33,600 mg/kg under the area of the former AST (AGI, 1993). The hydrocarbons had migrated to groundwater, located 4 feet below ground surface, and a plume of free phase hydrocarbons had migrated toward the north (AGI, 1994b). At the time, the

downgradient limit of the plume was not defined because hydrocarbons extended beneath the large soil berm located along the property line (see Section 3.2) (AGI, 1997c).

3.5 MW9 Area Investigation

In 1998 the extent of elevated arsenic concentrations found at MW9, located off the southeastern side of the plant building next to the baghouse and dry filter, was investigated. Results of this investigation are presented in a 1998 Soil Quality Investigation report (AGI, 1998a) and are summarized below.

This investigation involved hand augering 26 borings and drilling five borings using a hollow-stem auger drill rig. Hand augered boring depths ranged between 0.5 and 6.25 ft bgs. Refusal occurred at about 0.5 ft bgs in three of these borings and between approximately 1.5 and 2 ft bgs in 7 other borings. Drilled boring depths ranged between 7.5 and 9.0 ft bgs.

A total of 63 samples were analyzed for total arsenic, copper, lead, and zinc. A subset of these samples was also analyzed for leachable metals using the TCLP. Total arsenic concentrations ranged from <6.6 mg/kg to 15,000 mg/kg. The greatest arsenic concentrations occurred in samples collected at depths of 3 ft bgs and shallower. Four shallow soil samples collected from borings closest to MW9 (depths of 1 to 3 ft bgs) contained the highest arsenic concentrations (6,900, 7,700, 14,000 and 15,000 mg/kg). The next highest arsenic concentrations within the investigation area were 4,300 and 4,400 mg/kg in samples collected from depths of 0.5 and 0.5-1.3 ft bgs, respectively at two borings also located near MW9. Arsenic concentrations declined considerably in deeper samples. Of the 11 samples collected at depths between 4 and 9 ft bgs, six samples contained less than 20 mg/kg arsenic and five samples contained between 42 and 230 mg/kg arsenic.

Leachable arsenic concentrations exceeded dangerous waste limits in 16 of the samples, but lead did not exceed characteristic dangerous waste limits in any sample.

This investigation also defined a layer of shot, ranging from 0.6 to 2.4 feet in thickness (average approximately 1.4 feet thick), which appeared to have been spread across the area in an effort to raise the grade. It was just below the basecourse material and mostly limited to the upper 2 to 3 feet. This area extended along the access road between the plant building and the fence, beginning at the dry filter and extending northeastward past the railroad spur by about 60 or 70 feet. It also extended into the waste material off-loading area between the baghouse and the railroad spur. **Figure 4** shows the location of these historical features.

3.6 Groundwater/Stormwater Monitoring

During 2000 and 2001 CDM Smith conducted quarterly groundwater monitoring in accordance with the second amendment to the 1994 Agreed Order. At the end of this two-year monitoring period, CDM Smith concluded that arsenic in the historically most impacted well, MW9, had declined by an order of magnitude since completing interim actions (CDM, 2002). Arsenic concentrations in wells downgradient of MW9 (MW3B, MW2, and MW6) had declined by a factor of 3 or 4, indicating a positive effect by IAs. To some extent, arsenic concentrations appeared, at the time, to be increasing in two shallow aquifer wells (MW5, MW10) and in three of the four second aquifer wells (MW8, MW11, MW13).

Stormwater sampling was also conducted once in 1999 and during the 2000 and 2001 quarterly sampling period—after the storm drain system was replaced to prevent further groundwater infiltration—as allowed by seasonal conditions. Possible dry weather flow was observed twice and

north end (near MW30), MW9 at the west side, MW4 at the northeast side, and MW5 at the northeast end, next to the Hylebos Waterway. There is no reason to suspect the presence of hydrocarbons at all these locations. Further discussion as to the probable cause of these detections is provided in Section 8.2.

KJC's Phase I ESA noted the presence of VOCs in groundwater on the Arkema Property and in one monitoring well on the Taylor Way Property. In December 2001, groundwater samples collected from wells located on the northeastern side of the salt pads approximately 100 yards from the Taylor Way Property contained cis-1,2-dichloroethene (3,480 µg/L) and tetrachloroethene (33,600 µg/L). The presence of chlorinated solvents on the northeastern side of the salt pads is noteworthy, as KJC's groundwater sampling identified the presence of two degradation products of tetrachloroethene (PCE), cis- and trans-1,2-dichloroethene, in the Taylor Way Property's MW4. The concentrations of each at less than 3 µg/L are low; however, they do demonstrate groundwater migration across the NBA into the Taylor Way Property. USGI was known to have used 1,1,1-trichloroethane to clean oxygen supply equipment lines, but not PCE (TLI Systems, 1996).

3.8 Building Pre-Load Sampling

In 2004 KJC conducted supplemental soil sampling within the proposed new building footprint (location of demolished mineral fiber plant and current location of the Carlile building) where soil preloading was planned to occur (KJC, 2005). In September 2004, 1-foot-deep subsurface soil samples were collected from locations identified as B-100 through B-109 within the building footprint. In three of the samples arsenic was not detected (<11 mg/kg – two of these were taken within the backfill area from a previous hydrocarbon excavation), and in the remaining seven samples arsenic concentrations ranged between 20 and 1,100 mg/kg. In October 2004, 2-foot-deep samples were collected at the five locations where the arsenic concentration exceeded the MTCA Method C cleanup level of 87.5 mg/kg. Arsenic was not detected in one sample (<5 mg/kg), and ranged between 13 and 240 mg/kg in the remaining four samples. The third sampling event, conducted in November 2004, to evaluate arsenic concentrations at the 3-foot depth in the southwestern portion of the pre-loading area and included test pits B-1 through B-4. In the 3-foot samples, arsenic was not detected in three samples (<5 mg/kg), but was present in one sample at a concentration of 240 mg/kg.

In April 2005, five test pits (TP-102 through TP-106) were excavated on either side of the pre-load area. TP-102 was excavated next to the southeasterly side of the proposed building, and the remaining four test pits were excavated at the northerly end, on both sides of the proposed building. Samples were collected at depths of 0-1 to 5-6 feet bgs. Arsenic concentrations were variable, ranging from 8 to 890 mg/kg. The sample containing 890 mg/kg of arsenic was within the footprint of the removed berm discussed in Section 3.2. The test pit locations are presented on **Figure 13**. These data are not presented in any report, so there is no documentation regarding the sampling methodology or observations at the time of sampling. They were provided to Joyce Mercuri at Ecology in a facsimile sent by Doug Hillman with the Port of Tacoma (Hillman, 2005).

3.9 Former Railroad Spur Investigation

In 2005, CDM Smith conducted a test pit investigation under the former railroad spur berm (CDM, 2005b). The berm had been removed in December 2002-January 2003; however, no confirmation sampling of the underlying soils had been conducted to determine residual metals concentrations.

CDM Smith excavated 10 test pits (TP1 through TP10; **Figure 13**) to depths of 3 to 4.5 ft bgs and screened soils for metals using an XRF. At a subset of the XRF locations, samples were collected for laboratory analysis of total arsenic. The results of this investigation confirmed the variability of arsenic concentrations in Site soils. With the exception of TP9, total arsenic concentrations ranged from <5 mg/kg to 307 mg/kg.

An approximately 7-inch thick layer of shot was observed on the east sidewall of test pit TP9 between about 12 and 18 inches bgs. The shot layer thinned out and disappeared about midway through the test pit, indicating it to be small pocket of residual material. The arsenic concentration of the shot was approximately 1,700 mg/kg.

3.10 B13 and B23 Borings

In June 2005, CDM Smith investigated arsenic and lead concentrations in soils in the vicinity of KJC's borings B13 and B23 (CDM, 2005a). Eight test pits (B13-1 through B13-8, and B23-1 through B23-8) were excavated throughout each area (see area of B13 and B23 excavations, **Figure 14**). Soil samples were collected from each test pit at depths of 1, 2 and 3 ft bgs and submitted for laboratory analysis.

In the B13 test pits, arsenic was detected in every sample, ranging from 6.6 to 2,800 mg/kg. In some instances, the arsenic concentrations were greater in the 3-foot samples than in the 1- and 2-foot samples. Lead was detected in 15 of the 24 samples. In the 1-foot samples, lead concentrations ranged from 6.5 to 1,200 mg/kg. But generally decreased with depth, with lead concentrations at the 3-foot depth ranging to a maximum concentration of 46 mg/kg.

In the B23 test pits, arsenic was also detected in every sample, with concentrations ranging between 10 and 1,900 mg/kg in the 1-foot samples, and between 13 and 430 mg/kg in the 3-foot samples. Lead was detected in 11 of the 24 samples, ranging up to a maximum concentration of 91 mg/kg (in a 2-foot sample). Lead concentrations in the 3 foot samples ranged up to 11 mg/kg.

During this same time period, CDM Smith also conducted characterization of an approximately 2,500 cubic yard soil stockpile that had been generated during onsite construction activities (CDM, 2005a). Twenty samples were collected from the pile and submitted for analysis of total arsenic, lead, and cadmium. Based on the analytical data, seven samples were analyzed for leachable arsenic and lead using TCLP. None of the samples failed the TCLP (i.e., less than 5 mg/L total arsenic/lead) so none of the material designated as a dangerous waste.

Section 4

Interim Actions

As the phased environmental assessments identified arsenic-contaminated soil, residual source materials, and petroleum hydrocarbon contaminated soil, a series of interim actions were subsequently conducted by CDM Smith and KJC. Not counting the initial source material removal conducted by USGI in 1973, over 31,900 tons of soils and source material have been removed from the Taylor Way Property during the IAs.

Individual IAs completed on the Taylor Way Property are summarized in the following sections and on **Table 2**. For IAs involving soil excavation, **Figure 14** shows the excavation limits and depths. Arsenic concentrations at the limits of each excavation are provided on **Table 3** and shown on **Figure 15**. In **Figure 15**, the average arsenic concentrations are shown for the base of each excavation, rather than at individual sample locations.

4.1 Soil-Related IAs Conducted by CDM Smith/USGI (1996-2005)

Between 1996 and 1999, USGI undertook a series of source control actions to reduce metals concentrations (primarily arsenic) and petroleum hydrocarbons in the Taylor Way Property soil and groundwater. Investigation and interim actions were conducted in accordance with various work plans (AGI, 1994b; AGI, 1994c; AGI, 1996c; AGI, 1996d; 1997b). In 2005, USGI also undertook an additional independent IA to remove arsenic contaminated soils from an area near the new Carlile warehouse building that was being constructed on the property. These actions are summarized in the following sections. Summary tables and figures copied from the referenced source control action summary reports are included in **Appendix F**.

4.1.1 Soil Berm Removal and Bunker C Oil Excavation

During May and June 1996, the soil/waste material berm along the Taylor Way Property's northeastern property line (constructed to protect USGI employees from possible collapse of log piles on the adjacent Murray Pacific property) was removed (AGI, 1996a; AGI, 1996b). 2,380 tons of material were removed and disposed of at a RCRA Subtitle C hazardous waste landfill. 2,040 tons of material were removed and disposed of at a RCRA Subtitle D nonhazardous waste landfill. At first, the berm was removed down to existing grade. The ground surface formerly covered by the berm was then divided into 19 numbered "cells" and sampled. Based on the results of the initial testing, some of the cells were excavated below grade until an arsenic concentration of 200 mg/kg or less was achieved. At the northeast end, closest to the Hylebos Waterway, soils were excavated 2 to 4 feet below grade in order to remove soils containing greater than 200 mg/kg total arsenic. These locations were beneath the part of the berm that had contained the greatest overall total and leachable arsenic concentrations (see Section 3.2). Following berm removal, residual arsenic concentrations in soils at the bottom of the excavation limits of the individual cells directly underlying the berm ranged between <7.5 and 210 mg/kg. An analytical summary table and figure showing the cell locations with corresponding metals data is included in **Appendix F**.

During and following berm removal, about 5,000 tons of petroleum contaminated soils (PCS) related to the former Bunker C fuel AST was excavated and properly disposed of at a permitted landfill as an independent remedial action (AGI, 1997c). Hydrocarbon contamination extended from the ground surface to the silt layer (approximately 7 ft bgs) in the source area (i.e., the location of the AST) and was removed entirely. Downgradient of the AST, hydrocarbon contamination was found to be following a 2 to 4-foot-thick smear zone above the native silt layer (approximately 3 to 5 ft bgs). Soil excavation followed the smear zone downgradient of the AST and extended as much as 30 feet into the Murray Pacific Property. The PCS excavation ultimately overlapped approximately one third of the berm area, and that portion of the berm footprint was excavated further (a total of 7 ft bgs). Because soil containing arsenic concentrations exceeding applicable limits was considered removed as a result of the berm disposal, soils overlying the smear zone were stripped off and segregated for later use as backfill in the excavation.

Fifteen confirmation samples were collected from the Bunker C remedial excavation limits. TPH-D and TPH-O were detected in one soil sample at concentrations of 21 and 98 mg/kg respectively, below the then-current Method A cleanup level of 200 mg/kg. An analytical summary table and figure showing the sample locations from the 1995 hydrocarbon remediation report is provided in **Appendix F**. Ten samples collected from the clean soil stockpile were analyzed for petroleum hydrocarbons. One sample exceeded the 200 mg/kg TPH soil cleanup level, so a portion of these soils were removed from the stockpile for landfill disposal. The TPH concentrations in the remaining soils ranged to a maximum of 150 mg/kg TPH-D.

Prior to backfilling, short-term groundwater treatment was also implemented. Groundwater treatment involved removal of free phase hydrocarbons on the water surface using sorbent booms and pads. Groundwater was then pumped from the excavation, amended with nutrients, and sprayed back into the excavation to increase oxygen levels in an effort enhance biodegradation. At the conclusion of groundwater treatment, the concentration of diesel-range petroleum hydrocarbons in groundwater sampled (grab samples) from the open excavation was about 1,500 µg/L. This was well below the presumed Site-specific cleanup level of 10,000 µg/L, which was considered applicable for protection of surface water for diesel-range petroleum hydrocarbons at industrial sites at that time.

A combination of imported fill material and the excavated stockpiled soil was used to backfill the excavation. Quarry spalls were used as backfill at the bottom of the excavation and placed to approximately 1 foot above the water table elevation. The quarry spall thickness ranged from 1.5 to 4 feet. The stockpiled soil was placed on the quarry spalls, and ranged from 1 to 3 feet thick. Imported pit run sand and gravel was then used to fill the excavation level with the surrounding grade.

4.1.2 Intertidal and Bank Excavation

During the summer of 1997, soil, sediment, and source materials totaling 3,134 tons were excavated from the intertidal bank (2,062 tons) and upland area (1,072 tons) along the top of the bank. These materials were properly disposed of at a permitted landfill (AGI, 1997a). Following excavation, the bank was reconstructed with erosion control/habitat systems approved by both state and federal regulatory and fisheries agencies. The bank IA was formally approved by both Ecology and the U.S. Environmental Protection Agency (USEPA).

At the conclusion of this excavation, the upland portion of the tide bank had been excavated two to seven feet deep and the intertidal bank had been excavated from one to eight feet deep, reaching the native tideflat layer. The average arsenic concentration at the base of the upland excavation was 51

mg/kg and in the intertidal bank excavation the average arsenic concentration was 8.1 mg/kg. Arsenic concentrations in the sidewall samples ranged between 6.7 and 220 mg/kg in the upland portion of the excavation and were non-detect in the tide bank sidewall samples. **Figure 15** shows the area of the intertidal and bank excavations and the arsenic concentrations at the excavation limits. **Appendix F** contains analytical summary tables and figures showing the excavation limits during various phases of the excavation.

In August 1998, an approximately 500 square-foot area north and west of the original intertidal bank excavation was also excavated after identifying a limited area of additional source material (AGI, 1999). Excavated material, totaling 87 tons was transported offsite for disposal at a permitted landfill. Arsenic concentrations at the final excavation limits ranged from <11 to 46 mg/kg.

4.1.3 MW9 Area Soil Excavation

During the summer of 1999, an area of high arsenic concentrations in soils along the Taylor Way Property's southeast side (the area of monitoring well MW9 and vicinity of the baghouse and dry filter) was excavated and disposed of at permitted RCRA Subtitle D and C landfills, as appropriate (AGI, 2000). About 1,358 tons of hazardous and 2,740 tons of nonhazardous material were disposed of. The majority of the hazardous contaminated soil was located within the upper 1 to 2 feet in the area generally surrounding the baghouse and dry filter (Areas 2, 4, 5, 6, see **Appendix F**; AGI, 2000).

The MW-9 area excavation ranged between 2 and 5 feet deep. Arsenic concentrations in the bottom samples ranged from non-detect to 290 mg/kg and averaged 75 mg/kg. Laterally, the excavation was limited by the buildings on the westerly side and the Arkema Property on the easterly side. The westerly areas were subsequently excavated during the B13 and B23 IAs (Section 4.1.5). On the easterly side, the excavation extended approximately 5 feet beyond the fence into the Arkema property. At this point mineral fiber and shot were no longer observed and the soil type was visibly different. Arsenic concentrations in soils along the easterly excavation sidewalls ranged between 120 and 640 mg/kg (at about 2-3 ft depth). An analytical summary table and a figure that shows the sample locations with corresponding metals data is included in **Appendix F**. USGI did not perform additional excavation on the Arkema Property, based on USGI's belief that remaining arsenic could not clearly be associated with the Taylor Way Property because of the lack of mineral fiber and shot. Ecology later required that area to be investigated through the Arkema RI, which resulted in the North Boundary Area investigation discussed in Section 1.4.2.2.3.

4.1.4 Stormwater System and Paving

The Taylor Way Property's entire stormwater system was replaced and added to in 1998 and 1999 (AGI, 2000). The old stormwater system was replaced because its loose joints allowed groundwater infiltration, which then discharged directly into the Hylebos Waterway. High Density Polyethylene (HDPE) and SDR 35 PVC pipe were used for stormwater conveyance. The stormwater runoff was captured by Type 2 sediment control and Type 1 catch basins and conveyed to new concrete manholes. The pipes were bedded in pea gravel or bedding sand. One exception is a section of the main discharge line, approximately 50 feet up gradient of the Hylebos, where CDF was used as fill around the line in an effort to minimize the drain line backfill from acting as a conduit for groundwater discharge (AGI, 1998b).

The entire stormwater conveyance system, including catch basin and manhole structures were thoroughly flushed and cleaned using a vacuum truck and jet flush. Each pipe section was then pressure tested using compressed air to verify tightness (AGI, 2000).

In the summer of 1999, areas where process by-products and raw products were temporarily stored or handled were also paved with asphalt, including the material stockpile area and the truck passageway on the southeast side of the property (AGI, 2000).

4.1.5 B13 and B23 Excavations

In June and July 2005, USGI voluntarily excavated soils from two areas referred to as the B13 and B23 excavations (CDM, 2005a). B13 and B23 were two of KJC's 2002 Phase II ESA test hole locations where soil arsenic concentrations within the upper two feet exceeded 1,000 mg/kg. The objective of these excavations was to achieve arsenic concentrations of 200 mg/kg or less, as reasonably feasible. XRF was used to screen arsenic concentrations and guide the excavation. These two excavations ultimately bounded most of the MW9 excavation on the east and on the northwestern side and came within about 40 feet of the new (Carlisle) warehouse building that was under construction (see **Figure 14**)

The B13 excavation occurred under the former baghouse area and the B23 excavation occurred under a former concrete pad used for material storage. The B13 excavation ranged between 4 and 8 ft deep and the B23 excavation ranged between 2 and 5 ft deep, based on the XRF field screening.

Arsenic concentrations in samples collected from the base of the excavation ranged from <10 to 53 mg/kg. The average arsenic concentration at the base of the B13 excavation was 26.5 mg/kg, Arsenic concentrations in the sidewall samples range between <8 and 280 mg/kg. Sidewall samples collected from depths of 3 feet and deeper were relatively low (most less than 50 mg/kg), with the greatest arsenic concentration being 106 mg/kg. In the B23 excavation, the arsenic concentrations at the base of the excavation ranged from <3 to 59 mg/kg and averaged 23 mg/kg. Sidewall samples ranged between <7 and 290 mg/kg. **Appendix F** contains analytical summary tables and figures showing the sample locations with corresponding analytical data.

An approximately 2,500-cubic-yard soil stockpile that had been generated by the Port during excavation of arsenic contaminated soils prior to preloading (for the warehouse) was also sampled for profiling purposes. A total of 20 soil samples, 10 from each side of the stockpile were collected. The samples were evenly spaced across the pile and collected by digging an approximately 6-inch hole in the pile and transferring a sample of the soil into a sample jar. Based on the analytical testing, approximately 500 tons of the soil (containing less than 87 mg/kg arsenic) was used as backfill for the B13 excavation. The remainder was disposed of at a permitted RCRA Subtitle D facility (see Sections 3.8 and 4.2.3). A total of 8,176 tons of soil were disposed of during this Site work.

The B13 excavation was backfilled by laying down geotextile fabric, followed by 2 feet of quarry spalls, another layer of geotextile fabric, 2 feet of import structural fill, a one-foot layer of the previously stockpiled soil, and finally 1 foot of imported fill. The B23 excavation was backfilled entirely with imported pit run.

4.2 Soil-Related IA Conducted by KJC/Port of Tacoma (2003-2005)

4.2.1 Rail Berm Removal

In 2003 KJC, on behalf of Thermafiber, excavated an approximately 265-foot-long stretch of railroad spur berm soils down to pre-existing grade (KJC, 2003). The approximate extent of the removal area is shown on **Figure 14**. Exploration of the berm makeup prior to removal determined that 2 to 4 feet

of the berm surface (i.e., top and sides) consisted of basaltic rock and other materials with a metallic or slag-like appearance (approximately 40%), USGI waste materials including shot (less than 10% and mainly on the northern side of the berm), and rock-like material (possibly cupola bottoms) (30%). Underlying this material was a well-graded gravel with silt and sand (i.e., pit run) which did not contain any apparent USGI waste material or slag (KJC, 2003). A total of 1,006 tons of the removed berm soils were transported to Chemical Waste Management's Arlington, Oregon Subtitle C landfill for stabilization and disposal because of samples that failed Ecology's dangerous waste criterion of 5 mg/L leachable lead or 5 mg/L for leachable arsenic. Another 1,500 tons of berm soil were classified as nonhazardous and transported to Rabanco's Subtitle D landfill in Roosevelt, Washington. KJC did not conduct confirmation sampling beneath the berm footprint. However, CDM Smith did conduct a test pit study in 2005, the results of which are summarized in Section 3.9.

4.2.2 Hydrocarbon Remediation

In May 2003 KJC completed excavation and disposal of diesel and oil-range petroleum hydrocarbon contaminated soils previously identified on the northeastern side of the plant building (KJC, 2003). The petroleum hydrocarbon contamination appeared to have been a result of leaking underground piping associated with the previously removed Bunker C AST. Prior to excavation activities, petroleum hydrocarbon concentrations in soil samples that exceeded the MTCA Method A cleanup level (2,000 mg/kg) ranged between 2,470 and 10,100 mg/kg.

A total of 4,400 tons of petroleum hydrocarbon contaminated soil were excavated and transported to Rabanco's Subtitle D landfill in Roosevelt. Total diesel and oil range petroleum hydrocarbon concentrations in 31 confirmation soil samples collected from the excavation limits were generally less than 100 mg/kg. Although in one sample, both TPH-D and TPH-O concentrations were approximately 1,900 mg/kg. An analytical summary table and figure showing the sample locations is provided in **Appendix F**. Soil samples were not analyzed for metals.

The excavation was dewatered to facilitate soil removal and, in the process, approximately 107,000 gallons of water were pumped from the excavation. Only one-sixth of the water met the City of Tacoma's sewer discharge limits; the rest of the water was transported to Emerald Services in Seattle for treatment prior to disposal. The Carlile Trucking warehouse was later built over the top of this hydrocarbon remediation area.

4.2.3 Building Preload Excavation

In the Fall of 2004, following soil sampling that occurred within the proposed building footprint and prior to placement of the preload (see Section 3.8) soils within the proposed building footprint were excavated across two areas to remove soils containing arsenic concentrations greater than 87.5 mg/kg. In area "A" located at the southwest end of the proposed building, soils were excavated to 3 ft bgs. In area "B" soils were excavated to 2 ft bgs. The excavation locations are shown on **Figure 14**. A figure showing the excavation areas with corresponding analytical data from a report by Kennedy/Jenks Consultants is provided in **Appendix F**. No additional sampling was conducted following the soil excavation. Assuming the pre-excavation samples at depth are representative of the post-excavation conditions, arsenic concentrations at the base of the preload area would have ranged from non-detect to 54 mg/kg in 10 of the 11 samples, and 240 mg/kg in one 3-foot sample.

The excavated soils, totaling approximately 2,500 cubic yards, were disposed of during the B13/B23 IA and stockpile soil removal (Section 4.1.5).

4.2.4 UST Removal

In August 2005, two underground storage tanks (USTs) were discovered adjacent to the southern corner of the new warehouse building under construction (**Figure 14**). The USTs were subsequently removed. Soils encountered during the UST closure consisted of 5 to 6 feet of fill overlying layers of asphalt, concrete, and base course, followed by the tideflat sediment. The USTs were below the asphalt and concrete layers, indicating they were installed before the property was occupied by USGI.

DLH Environmental Consulting (DLH) conducted the closure assessment (DLH, 2005). One 4,000-gallon and one 5,000-gallon tank were removed. Each tank had apparently been used to store diesel fuel. All samples collected from the excavation limits were non-detect for TPH-D, TPH-O, benzene, ethylbenzene, xylenes, and PAH, with the exception of one sample that contained TPH-D at 36 mg/kg (well below the Method A cleanup level of 2,000 mg/kg). Very low concentrations of toluene (<0.08 mg/kg) were detected in all five excavation limit samples—considering the data as a whole, this may indicate lab contamination. The analytical data indicated the USTs had not leaked.

DLH analyzed for arsenic in soil samples collected at the excavation limits. Arsenic concentrations ranged between 9 and 110 mg/kg. Arsenic concentrations in two of the three stockpile samples exceeded the MTCA Method A unrestricted land use cleanup level of 20 mg/kg (22 and 47 mg/kg), so the soils that were excavated to allow for removal of the USTs, totaling approximately 500 tons, were disposed of at the Tacoma LRI landfill.

Copies of the DLH's analytical summary tables and figures showing the sample locations are provided in **Appendix F**.

Section 5

Potential Contaminants of Concern

One of the first steps in evaluating potential human health and ecological risk is the development of PCOC, whether human health or ecological-based. This is developed through comparison of the concentrations of identified contaminants to human health-based cleanup levels and terrestrial ecological screening levels (ESLs), if applicable. Cleanup levels/ESLs are concentrations of hazardous substances in soil, water, air, or sediment that are determined to be protective of human health and the environment under specified exposure conditions. The following sections present and discuss cleanup levels and ESLs under MTCA.

5.1 Cleanup Levels

MTCA provides three approaches for determining cleanup levels: Methods A, B, and C as described below.

- Method A provides a simplified approach for routine cleanup actions using tabulated cleanup levels. Method A cleanup levels are at least as stringent as applicable state and federal laws. Method A is appropriate for routine sites as defined in WAC 173-340-130, or sites that involve relatively few hazardous substances. Method A soil cleanup levels are available for both unrestricted land use and industrial sites. Remedial actions conducted using industrial cleanup levels are less stringent than those based on unrestricted land use, but have longer term implications, such as the placement of institutional controls.
- Method B allows for development of cleanup levels for specific compounds based on evaluation of applicable state and federal laws, groundwater and surface-water protection, and risk-based concentrations calculated using the risk equations specified in the regulations (WAC 173-340-750). These cleanup levels may be more or less stringent than the Method A unrestricted land use cleanup levels. Method B cleanup levels are based on unrestricted land use. Because of the likely long-term industrial use of the Site, it is unlikely that Method B cleanup levels will apply.
- Method C cleanup levels represent concentrations that are protective of human health and the environment for specific-site uses (i.e., industrial sites). Method C cleanup levels are established similarly to Method B; however, because Site-specific conditions are such that the potential for exposure is lower, Method C cleanup levels are higher than Method B. Just as for Method A industrial soil cleanup levels, institutional controls are required for remedial actions conducted using Method C cleanup levels.

The Site does meet the definition of an industrial site and therefore industrial Method A and/or Method C cleanup levels may be applicable. The following sections develop PCOC for various media, which are carried forward in later discussions in this RI.

5.1.1 Soil

5.1.1.1 Petroleum Hydrocarbons

Heavy end petroleum hydrocarbons (TPH-D, TPH-O) were confirmed in soil as a result of releases associated with the former Bunker C oil tank. Method A unrestricted land use and Method A industrial

soil cleanup levels for TPH-D and TPH-O are the same. In each case it is 2,000 mg/kg. Method B and Method C cleanup levels could be developed based on site-specific testing. However, this is not considered worthwhile, considering that IAs completed to date indicate that soils exceeding Method A cleanup levels have been removed from the Site (i.e., TPH-D and TPH-O concentrations are less than 2,000 mg/kg).

5.1.1.2 Metals

As has been stated previously, ASARCO slag contains relatively high concentrations of a variety of metals. During the early assessments, soil was analyzed for antimony, arsenic, cadmium, chromium, copper, lead, nickel, and zinc. Arsenic and lead consistently exceed one or more MTCA cleanup levels in soils contaminated by ASARCO slag and/or the byproducts related to the use of ASARCO slag in manufacturing. The concentrations of the other metals typically do not exceed MTCA cleanup levels, or if they do (i.e., cadmium), the frequency is much lower and these exceedances are only ever associated with soils containing high concentrations of arsenic and lead. For this reason, arsenic and lead were retained as PCOC and, with Ecology's agreement, the other metals were not analyzed during later investigations. During some of the supplemental RI work, only arsenic was analyzed as it became evident that lead concentrations exceed MTCA cleanup levels only when residual source material is present, in which case, arsenic concentrations are also elevated. In no instance is the opposite true, due to the relative mobility of arsenic as compared to lead.

Table 5-1 lists MTCA Method A, B, and C human health-based arsenic, lead, and TPH soil cleanup levels as obtained from Ecology's Cleanup Levels and Risk Calculations (CLARC) database. As shown in **Table 5-1**, the Method B carcinogenic, standard formula value, direct contact (ingestion only) for arsenic is less than the Puget Sound area background concentration, which Ecology considers to be 20 mg/kg. For this reason, that value would default to 20 mg/kg.

Depending upon site-specific conditions, including the depth to groundwater, soil type, the form of the metal/metalloid, and site-specific chemistry, the concentrations listed in **Table 5-1** may or may not be protective of groundwater conditions. For example, in areas of the Taylor Way Property where soils are impacted primarily by shot, very little, if any groundwater impact is indicated, even when arsenic concentrations are on the order of several thousand milligrams per kilogram. However, in areas historically impacted by baghouse dust, significant groundwater impacts have occurred. Cleanup levels based on the soil-to-groundwater pathway have not been established for the Taylor Way Property as it is considered infeasible to remediate soil to a level considered protective of groundwater throughout the site. As will be noted in Section 5.1.2, shallow groundwater in the Tacoma Tidelands area is not considered potable. With the adjacent Hylebos Waterway, surface water becomes the next most sensitive receptor and Site remedial actions would focus on protection of surface water. If a groundwater remedial action combined with a conditional point-of-compliance can result in conditions that are protective of surface water, then a soil cleanup level based on groundwater protection does not need to be developed.

The preliminary cleanup levels which apply to the Site are bolded in **Table 5-1** below.

Table 5-1 Arsenic, Lead, and Petroleum Hydrocarbon MTCA Human Health-Based Cleanup Levels for Soil

| MTCA Method | Arsenic, inorganic | Lead | TPH-D | TPH-O |
|--|-----------------------|--------------|--------------|--------------|
| | mg/kg | mg/kg | mg/kg | mg/kg |
| Method A, Industrial Land Use, Table Value ^{a)} | 20 | 1,000 | 2,000 | 2,000 |
| Method A, Unrestricted Land Use, Table Value ^{b)} | 20 | 250 | 2,000 | 2,000 |
| Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use | 0.67 ^{c)} | -- | -- | -- |
| Method B, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use | 24 | -- | -- | -- |
| Method C, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use | 87.5 | -- | -- | -- |
| Method C, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use | 1,050 | -- | -- | -- |

Notes:

a) Cleanup level based on direct contact using Equation 740-2 and protection of groundwater for drinking water use using procedures in WAC 173-340-747(4), adjusted for natural background for soil.

b) Cleanup level based on protection of groundwater for drinking water use using procedures in WAC 173-340-747(4), adjusted for natural background for soil.

c) less than background, which is 20 mg/kg.

-- Concentration not available

5.1.2 Groundwater

Groundwater in the Site vicinity does not currently serve as a source of drinking water and is extremely unlikely to serve as a future potable water source due to its proximity to surface water that is not suitable as a domestic water supply. It is therefore not considered potable per WAC 173-340-720(2)(d). As indicated in Section 5.1.1.2, with the adjacent Hylebos Waterway surface water becomes the next most sensitive receptor and Site remedial actions will need to focus on protection of surface water. Surface water cleanup levels are discussed in Section 5.1.3.

5.1.3 Surface Water

The Site lies adjacent to the Hylebos Waterway. MTCA requires that cleanup sites must be protective of surface water. Although the Site does not include a surface water body within the upland property, groundwater ultimately discharges to the Hylebos Waterway. Therefore, the surface water cleanup levels would apply to groundwater.

MTCA similarly provides for Method A, B and C cleanup levels for surface water as described below.

- Method A - Unlike soil and groundwater, the regulation does not provide a table of Method A cleanup levels for surface water. Method A cleanup levels are concentrations established under applicable state and federal laws. If there is not an applicable state or federal law for the chemical of concern, the Method A cleanup level is based on natural background or the practical quantitation limit (PQL), whichever is higher.

- Method B – Method B is similar to Method A in that for hazardous substances for which human-based and/or environmental effects-based concentrations have been established in applicable state or federal laws, the most stringent of those concentrations is used. However, for hazardous substances for which human/environmental-based concentrations have not been established, protective concentrations are determined by methods outlined in the regulation.
- Method C – Method C is only used at sites where all practical methods of treatment have been used to minimize releases, institutional controls are in place, and Method A or B cleanup levels are: a) below technically possible concentrations, b) below area background concentrations, or c) attainment of Method A or B cleanup levels has the potential to create a significantly greater overall threat to the environment than attainment of Method C.

5.1.3.1 Petroleum Hydrocarbons

Under Method A, for the individual TPH components, such as benzene or PAHs, applicable state and federal standards are used, where established. Under Method A, the cleanup level for the TPH mixture as a whole would be based on the less stringent of the natural background and PQL because there are no applicable state or federal laws applicable to TPH mixtures in surface water. Under Method B and C, cleanup levels for the individual TPH components and the petroleum mixture could be calculated based on fractionated TPH analysis using the methods outlined in the regulation. As an alternative to calculating the site-specific TPH cleanup level, the regulation allows for the use of the Method A TPH groundwater cleanup levels in Table 720-1 of MTCA for protection of surface water. Use of these values avoids the need to conduct fractionated petroleum analyses. The surface water cleanup levels for TPH-D and TPH-O are each 500 µg/L using this method.

5.1.3.2 Metals

For the metals detected at the Site, marine water standards from applicable state and federal requirements for protection of aquatic life and human health are listed in **Table 4**. The human health standards are based on consumption of aquatic organisms. Standards based on consumption of the surface water are not applicable as marine water is non potable. The surface water standards based on consumption of organisms are promulgated in the National Toxics Rule (NTR) 40 CFR §131.46. The marine surface water standards based on protection of aquatic life are promulgated in WAC 173-201A.

As shown in **Table 4**, the Method B (carcinogenic) and marine water standard for protection of human health based on consumption of marine organisms are less than the background concentration for arsenic, which Ecology considers to be 5 µg/L⁴. The Method B and marine water standards are also less than the PQL. For this reason, the human health-based surface water standard for arsenic defaults to 5 µg/L. For other metals, the cleanup level defaults to the lowest of the listed standards. The preliminary marine surface water cleanup levels for metals are summarized in **Table 5-2** below. Besides arsenic, antimony, copper, lead, nickel and zinc concentrations have, at some time, exceeded their respective standards.

⁴ Table 720-1 in MTCA, Footnote b – Cleanup level for arsenic in groundwater based on background concentrations for the State of Washington.

Table 5-2 Preliminary Marine Water Cleanup Levels for Metals

| Metal | Concentration (µg/L) |
|--------------|---------------------------------|
| Antimony | 640 |
| Arsenic | 5 |
| Cadmium | 8.8 |
| Copper | 2.4 |
| Lead | 8.1 |
| Nickel | 8.2 |
| Zinc | 81 |

5.2 Terrestrial Ecological Evaluation

MTCA requires that existing or potential threats to terrestrial plants or animals exposed to hazardous substances are evaluated. The assessment first determines whether the site is excluded from the terrestrial ecological evaluation (TEE). If not, then the next step is to determine if the site is: 1) qualified for a simplified TEE, or 2) must undergo a site-specific TEE.

The Site qualifies for primary exclusion #2 from Ecology's Terrestrial Ecological Evaluation Process – Primary Exclusions Documentation Form– all soil contaminated with hazardous substances is, or will be, covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed. The Carlile facility is completely covered with buildings and pavement, with the exception of a few small ornamental planter areas that do not provide habitat. A future restrictive covenant will be proposed to ensure that the Site cap remains in place. Therefore, ESLs are not applicable to the Site.

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Section 6

Supplemental RI

6.1 Supplemental RI Summary of Work

Following the investigations and interim actions summarized in the previous sections of this report, it was determined that additional investigations were required to fill in data gaps necessary to complete a comprehensive characterization of contamination in soil and groundwater originating from the Taylor Way Property. The RI would also need to evaluate the relationship between contamination originating on the Taylor Way Property and offsite properties, if any, and thus define the boundaries of contamination associated with the Taylor Way Property.

Supplemental RI work was conducted in three phases, plus an additional round of groundwater monitoring. The following sections outline the Supplemental RI work scope completed during each phase. Boring logs and well installation details from these subsurface explorations are provided in **Appendix G**. Monitoring well and DPT boring locations installed/sampled during this Supplemental RI are included on **Figure 13**.

6.1.1 Phase I

Phase I of the Supplemental RI was conducted in accordance with a work plan dated June 27, 2006 attached as Exhibit C to Agreed Order No. DE3405 (CDM, 2006). The field investigation and general purpose of the tasks completed under this work plan included:

- Replacing two monitoring wells (MW1 and MW13) inadvertently destroyed during the 2005 Site redevelopment into the current facility occupied by Carlile.
- Installing surface/second aquifer monitoring wells (MW24-MW30) along the northern Taylor Way Property line that abuts the Murray Pacific Property to evaluate offsite migration of the contaminant plume.
- Screening soils for arsenic and lead in the field using an XRF instrument and submitting selected soil samples for analysis by traditional wet chemistry methods to further define metals in soils.
- Collecting and analyzing groundwater samples from monitoring wells on the Taylor Way Property, and selected monitoring wells on the Murray Pacific and Arkema Properties to evaluate groundwater conditions and the nature and extent of the contaminant plume.
- Conducting a dry-weather inspection of the stormwater outfall (no discharge) and wet-weather sampling of the stormwater outfall to evaluate potential groundwater seepage into the storm drain system and metals discharges from the storm drain system.
- Surveying and conducting multiple sets of high and low tide water level monitoring for all onsite monitoring wells and selected monitoring wells on the Murray Pacific and Arkema Properties to evaluate groundwater flow directions and the influence of tidal fluctuations on groundwater flow.

- Conducting 24-hour continuous water level monitoring in three surface aquifer wells and two second aquifer wells located near the Hylebos Waterway to evaluate the effect of tidal fluctuations in both water bearing units and over time and with distance from the waterway.
- Conducting slug tests in four monitoring wells to estimate hydraulic conductivities.

Results of the last three tasks described above were previously discussed in Section 2 and will only be discussed further as it relates to the evaluation of contaminant transport.

6.1.2 Phase II

Phase II of the Supplemental RI was conducted in accordance with a work plan dated July 21, 2008 (CDM, 2008). The field investigation focused on areas of potential concern as identified during Phase I. The field investigation and general purpose of the tasks completed under this work plan included:

- Installing a total of sixteen borings around two monitoring well clusters (MW1/MW13 and MW28/MW29) and former test pit TP9 using DPT sampling methodology in an effort to identify the extent of arsenic-contaminated soils and presence of arsenic-containing source material.
- Extending additional DPT borings (three total) in the southwestern and northeastern portions of the Site to collect soil samples for analysis in an effort to fill in data gaps.
- Installing four monitoring wells (MW31-MW34) on the Murray Pacific Property with the intention of evaluating the attenuation of arsenic in groundwater originating at the Taylor Way property, as well as potential arsenic discharges to the Hylebos Waterway.

6.1.3 Supplemental Groundwater Monitoring

In June 2009 groundwater samples were collected from selected monitoring wells to substantiate prior data and for further chemical evaluation. This work was not conducted under a specific Ecology-approved work plan.

6.1.4 Phase III

Phase III of the Supplemental RI was conducted in accordance with a work plan dated December 3, 2013 (CDM Smith, 2013b). The field investigation and general purpose of the tasks completed under this work plan included:

- Installing a well (MW42) on the Murray Pacific Property at the edge of the Hylebos Waterway to fill in a large area between monitoring wells installed along the top of the waterway tide bank.
- Installing four additional wells (MW35, MW39-MW41) centrally within the Murray Pacific Property to provide more definitive information on the attenuation of arsenic migrating from the Taylor Way Property.
- Installing three additional wells (MW36-MW38) next to the Hylebos Waterway, around the Murray Pacific/Taylor Way Property boundary to further evaluate the source and attenuation of arsenic in this specific area.

6.2 Sampling and Analytical Methods

6.2.1 Soil Sampling and Analysis

An XRF was used to screen arsenic and lead concentrations in soil samples collected at all of the Supplemental RI boring locations. Prior to the Supplemental RI work, an XRF was used at the Site during the rail spur test pit investigation and also during excavation of the B13 and B23 areas with success. During all of these investigations, a subset of the samples, representing the range of arsenic concentrations observed during XRF screening, was submitted for laboratory analysis by USEPA Method 6010B to verify the accuracy and evaluate the comparability of XRF data. The laboratory analytical reports for soil samples collected during the Supplemental RI work are included in **Appendix H**.

XRF data and laboratory data from the Supplemental RI, as well as prior soils data which represent current soil conditions, are summarized in **Table 3**. XRF data are noted as “in situ” and “ex situ.” In situ samples are XRF measurements taken of a relatively undisturbed soil surface directly at an excavation sidewall/base, or from a sample core collected during drilling. Ex situ samples are jarred samples analyzed by the XRF and subsequently submitted to the analytical laboratory.

6.2.2 Groundwater Sampling and Analysis

Over the course of the Supplemental RI work, groundwater samples were collected from seven of the DPT test holes and at selected surface aquifer and second aquifer wells during multiple events. Selected wells were also sampled on the Murray Pacific Property and Arkema Property NBA. A comprehensive groundwater sampling event occurred during Phase I of the Supplemental RI immediately after the Taylor Way Property wells were installed. However, this sampling event was split between December 2006 and February 2007 due to flooded conditions in the NBA. The second sampling event occurred after the first round of well installations on the Murray Pacific Property in August-September 2008. The third sampling event occurred in June 2009. The fourth sampling event occurred in January 2014, after installation of the second set of wells on the Murray Pacific Property. For completeness, applicable groundwater analytical data collected by DOF in May 2012 during their Arkema RI work is also included in the analytical data set.

Groundwater sampling was conducted in accordance with the work plans and included analyses for one or more of the following at selected monitoring wells:

- Field measured parameters, including pH, conductivity, temperature, turbidity, dissolved oxygen, oxidation reduction potential (uncorrected to the standard hydrogen electrode), and appearance (**Tables 5 and 6**).
- Total/dissolved arsenic (**Tables 7 and 8**).
- Total/dissolved metals, including antimony, cadmium, chromium, copper, lead, nickel, and zinc (**Tables 7 and 8**).
- Arsenic speciation (Arsenic III [As⁺³]/Arsenic V [As⁺⁵]) (**Table 7**).
- Total petroleum hydrocarbons quantified as diesel and oil (**Table 9**).

Figure 16c compares the XRF and laboratory arsenic data with those soils containing greater than 1,300 ppm lead and soils containing a large amount of wood debris removed from the data set. The only exception to this was TP9-1', which was left in the data set. The slope of the line at 1.01 and intercept of the y-axis at -5.47 indicate a nearly perfect 1:1 correlation with the laboratory data. The linear correlation is slightly stronger ($r=0.968$) and the variance in the data is much less ($r^2=0.937$).

Figure 16d compares the available XRF and laboratory lead data. While the linear correlation is strong ($r=0.897$), there is definitely a larger variance in the data ($r^2=0.805$) than for arsenic. The slope of the line at 0.8228 and intercept of the y-axis at 2.657 indicate the XRF data are biased slightly lower than the laboratory data.

Per the USEPA guidance for Method 6200 (USEPA, 2007) confirmatory data with correlation coefficients between 0.7 and 0.9 indicate that the XRF data should be considered acceptable as screening level data, whereas confirmatory data with correlation coefficients greater than 0.9 and that exhibit no statistically significant difference between the XRF and laboratory groups could potentially meet definitive level data criteria (i.e., usable for remedial investigation, feasibility study, cleanup, and human/ecological risk assessment). Therefore, the results strongly support the use of the XRF arsenic data as definitive level data when lead concentrations don't exceed 1,000 mg/kg and the samples do not contain an inordinate quantity of organics that may cause some type of interference. XRF lead data are acceptable as screening level data.

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Section 7

Evaluation of Current Soil Conditions

7.1 Data Compilation/General Summary

7.1.1 Arsenic and Lead

CDM Smith compiled arsenic and lead soil analytical data generated throughout the Taylor Way Property that represent current soil metals concentrations (i.e., data on previously excavated soils are not included). Total arsenic and lead data are summarized in **Table 3**. Soil data generated on the Murray Pacific Property during the Supplemental RI are also presented at the end of **Table 3** (starting on page 11). For this reason, some of the boring numbers may seem out of order. **Figure 15** shows total arsenic concentrations by sample location and depth. The data shown on **Figure 15** are a mix of laboratory and XRF data. Analytical laboratory data were used where available; otherwise, the total arsenic data shown are from the XRF. This is considered appropriate, given the field/lab correlation established in Section 6.3.2. In one instance (presence of wood debris - 7.5 feet at MW29), both sets of data are provided due to the particularly large difference in the two analytical method results. Enlarged detail drawings were prepared for some areas, as identified and discussed in the sections below. Section 7.2 presents a discussion of arsenic concentrations throughout the Site. This discussion is broken up into areas, based on the various IAs and residual sources identified. Lead is not specifically discussed below. In reviewing the data, it is apparent that lead contamination is secondary to arsenic. In every sample where lead exceeded 1,000 mg/kg, arsenic concentrations also exceeded 1,000 mg/kg (**Figure 17**). When lead concentrations exceeded the Method A unrestricted land use cleanup level of 250 mg/kg arsenic concentrations were greater than 100 mg/kg (one minor exception is when the lead concentration was 260 mg/kg and the arsenic concentration was 56 mg/kg). In reviewing the data and comparing to boring logs, it is apparent that: 1) residual source material (i.e., shot, slag) is present where lead concentrations exceed 1,000 mg/kg, and 2) residual source material is in the immediate vicinity of samples where lead concentrations range between 250 and 1,000 mg/kg.

In instances where there are relatively higher arsenic concentrations than lead it is because of the secondary leaching that occurred from the original source material (i.e., shot, slag, baghouse dust) (**Figure 17**). Arsenic that has leached from the primary source adsorbs onto the soil surfaces and precipitates as is discussed in Section 9. Lead very simply had a very low potential to leach as will be demonstrated by the groundwater data.

7.1.2 Petroleum Hydrocarbons

During the 1996 and 2003 hydrocarbon cleanups and the 2005 UST removal, soil samples were collected from the base and sidewalls of the excavations. The analytical summary tables are included in **Appendix F**. Remedial actions targeted the removal of hydrocarbon impacted soils exceeding MTCA Method A soil cleanup levels in effect at the time. In 1996, the cleanup level for TPH-D and TPH-O was 200 mg/kg (each TPH type had the same cleanup level). By 2003, the cleanup level for both TPH-D and TPH-O was increased to 2,000 mg/kg. Section 7.3 presents a discussion of residual petroleum hydrocarbon concentrations in soil.

7.2 Discussion of Arsenic Concentrations by Area

7.2.1 Southern Corner

During the Supplemental RI this area was investigated extensively by reinstalling MW1 and MW13 (as MW1R and MW13R, respectively) and drilling several surrounding DPT borings. Soil borings were also installed in the vicinity during the NBA investigation.

Figure 18 presents a 220-foot-long cross section of the soil profile beginning at the southern corner and extending northeastward along the eastern property line. The location of this cross section is shown on **Figure 13**. The first 2.5 to 5 feet of the soil profile consists generally of gravelly silty sand fill that contains abundant debris, such as brick, firebrick, concrete, and asphalt. This fill layer is thickest at the south end and thins to 2.5 feet about 150 feet northeast of the southern corner.

Scattered bits of slag and thin lenses of black fragments with white quartzite were apparent in borings at about 2 to 3 ft bgs across a 100-foot distance between MW13R and DPT19. Below the gravelly silty sand/debris fill is a silt/silty clay fill that typically contains organics, including wood debris and charcoal. This is interpreted to be original tideflat fill, but not necessarily hydraulic fill. At the south end, occasional small, discontinuous pockets of sand were observed. The original tideflat (peat and organic silt) were observed between 8 and 9 ft bgs.

Figure 18 also illustrates arsenic soil concentrations at various depth intervals. Arsenic concentrations are typically greatest between about 2 to 3.5 feet bgs, within the surficial gravelly silty sand fill, consistent with the traces of slag-like fragments and black lenses that were observed in some of the boreholes. The greatest arsenic concentration (1,130 mg/kg) occurred at 3.5 ft bgs in DPT13, where the boring log described a “6-inch black lens contain(ing) quartzite”. The black lenses are likely ASARCO slag-related, based on the high arsenic concentrations, but the general nature of the fill is not consistent with other areas of the Site that contained USGI-related waste products, given the presence of other debris (brick, asphalt, concrete) and lack of shot. While the white quartzite observed appears to be associated with the black lens, it also has no apparent connection with USGI wastes. Debris, including ASARCO-related material was not apparent in DPT12, located approximately 30 feet northwest (in the middle of the Carlile driveway). This fill also appears to be different than that which was observed in the NBA and appears to be limited to this corner and the utility corridor that extends along the property line with the NBA for a distance of about 240 ft, beyond, which is the MW9 area excavation.

Arsenic concentrations in the silty/silty clay fill layer were comparatively lower than in the upper fill, but still variable, ranging between <8 and 320 mg/kg. Arsenic concentrations in the tideflat layer were comparatively low – ranging between <4 and 21 mg/kg.

While depth to groundwater was not well documented in all borings, the silty/silty clay fill was generally found to be wet to saturated, and water level monitoring in MW1R indicated that the water table is always at or above this fill.

7.2.2 Eastern Side of the Production Building

The MW9, B13, and B23 excavations essentially became one conjoined excavation on the eastern side of the former production building. This is because the MW9 excavation occurred before the building demolition and the B13 and B23 excavations, which occurred on either side of the MW9 excavation, took place after the building demolition. The MW9 area excavation ranged between 2 and 5 feet deep. The B13 excavation ranged between 4 and 8 feet deep and the B23 excavation ranged between 2 and

5 feet deep. The excavation limit sample data are summarized in **Table 3** and shown on **Figure 19**. Detailed information is provided in **Appendix F**.

The average arsenic concentration across the base of these three excavations is 56 mg/kg. The MW9 excavation ranged between 2 and 5 feet deep and arsenic concentrations ranged between <11 and 290 mg/kg at the base of the excavation. The B13 excavation ranged between 5 and 8 feet deep and arsenic concentrations ranged between <10 and 53 mg/kg at the base of the excavation. The B23 excavation ranged between 3 and 5 feet deep and arsenic concentrations ranged between 5 and 59 mg/kg at the base of the excavation. Except for the sidewall samples that directly bounded the Arkema property line, arsenic concentrations in the sidewall samples ranged from <8 to 430 mg/kg. Four of these samples exceeded 200 mg/kg arsenic. The arsenic concentrations at the MW9 sidewalls that abut the B13 and B23 excavations are considered to be over excavated, so they are not included on the summary table or figures. So the B13 and B23 sidewall concentration data are considered the most valid. Two of the soil samples with an arsenic concentration that exceeded 200 mg/kg were collected from the B13 and B23 excavation sidewalls that conjoined the MW9 excavation. In these two instances, it is possible there is a small residual wedge of soil between the excavations. The third and fourth sidewall samples that exceeded a concentration of 200 mg/kg arsenic were in fairly close proximity to the former baghouse.

On the easterly side that bounds the NBA, the excavation extended approximately 5 feet beyond the fence between the USG plant and the Arkema property, into the Arkema property. At this point mineral fiber and shot were no longer observed and the soil type was visibly different. Arsenic concentrations in soil samples collected from a depth of 3 ft bgs along the easterly sidewall of the excavation where it extended into the Arkema Property ranged between 120 and 640 mg/kg. USGI did not perform additional excavation on the Arkema Property, based on the belief that remaining arsenic could not clearly be associated with the USGI site because of the lack of shot and mineral fiber, which was so prevalent in the MW9 area excavation. This area abuts the deeper hot spot area identified in the NBA (**Figures 8b and 9b**).

7.2.3 Former Railroad Berm

The top and sides of the railroad berm consisted of a 2- to 4-foot layer comprised mostly of basaltic rock and other materials with a metallic or slag-like appearance (likely ASARCO slag) and USGI waste materials, as described in Section 4.2.1 and was therefore removed. The test pits and borings that were extended to explore subsurface conditions within the area of the removed railroad berm did not identify visible shot or slag, except at DPT5A at the western end and a single piece of slag at TP4, which was centrally located in the former berm area. A 4 to 6-inch thick layer of slag, consistent with the railroad berm makeup, was observed at DPT5A at a depth of approximately 3 to 3.5 ft bgs. The arsenic concentration in the source material at DPT5A (20,700 mg/kg) was the highest observed anywhere on the Taylor Way Property. The 4-foot sample beneath the visible source material at DPT5A contained 1,714 mg/kg arsenic. Due to poor sample recovery, the next sample depth (6 feet bgs) was collected from an adjacent boring and the arsenic concentration in that sample was <10 mg/kg.

Additional shot and slag were identified further west beyond the berm removal area and generally along the former railroad line at DPT4, MW26, TP9, and DPT2. Thin layers of shot (4 to 7-inches thick) were observed at TP9 and DPT2. A 3 to 6-inch interval of interspersed slag was identified at both DPT4 and MW26. The arsenic concentration in the soil sample collected from MW26 where slag was observed was not high (34 ppm), but at MW27, located adjacent to MW26, a sample collected at 2

ft bgs contained an arsenic concentration of 1,550 mg/kg. From DPT2 the former railroad spur extends another 180 feet to the property line. No borings were extended within this portion of the railroad footprint. It is possible that additional thin pockets of source material exist between DPT2 and the property line.

Black base course material with an arsenic concentration of 257 mg/kg was observed at approximately 1 ft bgs in MW30 located near the eastern end of the former railroad berm. Arsenic concentrations in the top foot throughout the eastern half of the former railroad berm typically ranged between about 140 and 300 mg/kg arsenic and typically decline to concentrations less than 100 mg/kg after about 2 ft bgs. The data indicate the berm removal was mostly complete, but that some residual slag was left near the surface.

Groundwater was not encountered in all test pits or borings, but where it was encountered, ranged between 2.2 ft bgs and 5 ft bgs. The shallowest water table (2.2 ft bgs) occurred at TP8, although depths to groundwater in explorations on either side of TP8 was slightly deeper (3.5 ft bgs in TP9 and 4 ft bgs in DPT5). The deepest groundwater occurred at the eastern end where it was encountered at 5 ft bgs in MW30. Arsenic concentrations in saturated soils below the water table are generally low (nondetect to 21 ppm). The greatest concentration of arsenic within the saturated interval was 66 mg/kg at 5.5 ft bgs in MW30 just below the groundwater interface. Arsenic concentrations in vadose soils not containing evidence of source material along the railroad spur ranged up to about 300 mg/kg.

7.2.4 Former Material Storage Area

The former raw material/waste pile storage area was assessed with borings DPT15, DPT16, B20 and B21. Arsenic concentrations in the upper two to three feet ranged from <13 to 331 mg/kg. In borings B20 and B21 “fine metallic particles,” possibly shot or slag, were indicated within the upper 2 to 3 ft. Field notes, indicated that in DPT15 the silty sand become black at a depth of 1.5 ft bgs and brown again by 3 ft bgs. These observations are consistent with the materials historically stored in this area. Below this, arsenic concentrations ranged from 7.09 to 17.4 mg/kg.

7.2.5 Southwestern Side – Near Taylor Way

Borings B8, B9, and DPT10 were drilled on the southwestern side of the property, generally between the plant building (or office building) and Taylor Way. B8, which was located between the office building and Taylor Way, showed no indication of the presence of source material and the arsenic concentration in a 0-3 ft sample, at 15.9 mg/kg, was relatively low. However, at B9 a “black shiny” material (slag and/or basalt) was observed mixed with the base course material within the upper two feet and the arsenic concentration was 187 mg/kg. At DPT10, a 5-inch thick black lens with an arsenic concentration of 960 mg/kg was observed at a depth of 6 ft bgs. Arsenic concentrations in samples above and below this were low in comparison—non-detect at 2.5 ft bgs and 44 mg/kg at 7 ft bgs.

The use of this area as an entry/parking area was consistent throughout USGI’s history. This is not an area of known or likely waste or raw material storage or disposal of this material as fill in mass quantity. Whether the material observed is shot, basalt, slag, or a mixture of materials it is not indicative of the presence of a large volume area(s) of source material. Rather, it could have resulted from the inadvertent spills of the material as it was transported into and out of the Property, filling potholes, or use as backfill material in underground utility trenches. The extent of this material is not defined.

7.2.6 Carlile Building Preload Area

Based on the pre-excitation data collected for the pre-load area and soil excavation conducted in this area, arsenic concentrations within the building footprint range up to 54 mg/kg. Much of the area underneath the Carlile building is either underneath the footprint of the former USG plant, within areas where hydrocarbon removal resulted in excavations 7 to 12 feet deep, or had soils removed based on elevated arsenic detected before the preload occurred. According to test pit data collected by the Port in 2005 (and other nearby borings), arsenic concentrations just outside the building footprint are higher. On the southeastern side of the building, arsenic concentrations in the upper 2.5 feet ranged between 315 and 690 mg/kg (B22, TP104 and TP103). These test pits were westward of the B23 excavation. On the southwestern side of the building, 3 ft deep samples contained 240 mg/kg arsenic at B-1 and B109. Borings and test pits located on the northwestern side of the building (i.e., MW10, B4) indicate relatively low arsenic concentrations, ranging up to 49 mg/kg. The northeastern side of the Carlile building merges into the former berm area (TP105), which is discussed further in Section 7.2.8.

7.2.7 Tide Bank

At the conclusion of this excavation, the upland portion of the tide bank had been excavated two to seven feet deep and the intertidal bank had been excavated from one to eight feet deep. All source material (i.e., shot) was removed. The average arsenic concentration at the base of the upland excavation was 51 mg/kg (ranging between 3.9 and 170 mg/kg). Arsenic concentrations in the upland sidewall samples ranged between 6.7 and 220 mg/kg. Arsenic concentrations in the tide bank sediment bottom and sidewall samples ranged between 5 and 19 mg/kg, well below the sediment standard of 57 mg/kg. The tide bank was reconstructed by backfilling with a thin layer of quarry spalls tamped into the silt/clay bank soils, followed by a layer of pit run and gravel, then geotextile, and a gabion revetment. The gabion revetment was covered with 6 to 8 inches of topsoil to help facilitate vegetation growth, but some of that material has since been eroded. An approximately 6-foot-wide bench was also constructed at approximately 4 ft mean sea level (MSL) to support the growth of sea grass.

7.2.8 Former Berm and Murray Pacific/Taylor Way Property Boundary

The discussion in this section focuses on the area encompassed by the former berm, the Bunker C remediation area under the berm, and the Murray Pacific/USGI property line area close to the Hylebos Waterway. Conditions in this area are very complex due to the overlapping land uses, interim actions completed, and different contaminants of concern.

The Murray Pacific Property cleanup occurred between October 1995 and January 1996, and between April and August 1996. The Taylor Way Property berm removal and hydrocarbon cleanup occurred in June-July 1996 at the same time that the Murray Pacific Phase II work was being conducted. Arsenic concentrations in soils at the surface/base of the excavation for the berm cleanup ranged between <7.5 and 210 mg/kg. During the hydrocarbon cleanup additional soils were removed across the middle of the berm footprint (deeper than berm final excavation grade), encompassing about one third the total former berm footprint. Although the hydrocarbon cleanup involved excavation down to the tideflat layer, the upper several feet of soils (from beneath the berm footprint) that were not impacted by hydrocarbons was used to backfill the excavation. Therefore, those soils from the berm footprint which contained between <7.7 and 200 mg/kg arsenic were used as backfill in the excavation. There is no direct data for soils used as backfill that were excavated from beyond the berm footprint. A portion of these soils originated from the remediated Murray Pacific property

(arsenic concentrations less than 20 mg/kg). The remaining portion of these soils originated from the area nearly entirely occupied by the 17,000-gallon above-ground Bunker C tank and the surrounding soil berm and so it was not an area used for the storage of arsenic-containing wastes or raw materials. These soils were placed in a 1- to 3-foot layer atop the quarry spalls, which were used as fill at the bottom of the excavation to a point about 1-foot above the water table.

One set of analytical data that did not compare to the soil berm excavation confirmation data was test pit TP105, which was excavated by the Port in 2005. TP105 was located in a cell of the berm footprint that had been excavated to grade and had previously been tested and found to contain 160 mg/kg arsenic. It was also located on the western (upgradient) side of the hydrocarbon excavation. In TP105 the arsenic concentration in a 1-2 ft sample was reported at 890 mg/kg.

While drilling MW28 and MW29—located at the eastern corner of the Murray Pacific Property, next to the Hylebos Waterway and the Taylor Way Property—wood fibers were observed concurrent with high arsenic concentrations. In MW28 wood fibers were observed between 7.5 and 8 ft bgs. In MW29, traces of wood fibers were observed beginning at 5 ft bgs and between 7 and 8 ft bgs there was a saturated 6-inch woody debris layer. This wood debris was situated in a sand/gravelly sand fill material. XRF field screening of the saturated 6-inch woody debris layer in MW29 indicated arsenic concentrations of approximately 3,000 mg/kg. However, arsenic concentrations in the same sample, run in triplicate by the analytical laboratory, were much less, but also variable (by 100%), ranging between 255 and 517 mg/kg. The sample collected from the same depth at MW28 also showed similar variability between the XRF and laboratory analyzed samples, but this time the laboratory analyzed sample had the higher arsenic concentration. The XRF reading for the 7.5-foot sample was 180 ppm, whereas the laboratory analyzed sample was 728 mg/kg. The wood debris and saturated conditions appear to be correlative with the variability.

DPT6 through DPT9 were step-out borings surrounding MW28/MW29 to evaluate the extent of arsenic contamination. Wood debris was not observed in the surrounding step-out borings. However, in borings DPT6 and DPT7 located on either side of MW28/MW29, parallel with the Hylebos Waterway, similarly elevated arsenic concentrations were observed at depth. In DPT7, located approximately 25 feet to the northwest of the well cluster (further away from the Taylor Way Property), the XRF reading showed a similarly elevated arsenic concentration of 3,100 ppm (XRF) at the same depth (7 ft bgs), and a still elevated arsenic concentration at 10.5 ft bgs (357 mg/kg - lab). In DPT9, approximately 25 feet northwest of DPT7, arsenic was detected at only 66 mg/kg at 2 ft bgs, and 22 mg/kg at 7 ft bgs. In DPT6, approximately 25 feet to the southeast of MW28/MW29, XRF-screened arsenic concentrations in the 6-7 ft samples ranged between 248 and 605 ppm. The laboratory-analyzed 7 ft sample was somewhat lower, at 257 mg/kg. The DPT boring further inland from MW28/MW29 (DPT8) had arsenic concentrations of 13 mg/kg or less. A large concrete structure prevented installation of additional borings further waterward without excessive and unwarranted efforts to move the structure.

MW36 through MW38 were installed to further define the extent of source material and arsenic concentrations in soils. In MW38, arsenic concentrations were low, consistent with the adjacent boring DPT8. MW36 was installed approximately adjacent to the limit of the hydrocarbon excavation and footprint of the former berm. The greatest arsenic concentration in soil (114 mg/kg) occurred at 7.5 ft bgs, the same depth as where groundwater was encountered, but no source material was observed and the arsenic concentrations were not nearly as high as observed in the borings located closer to the waterway. At MW37 a thin layer of fine-grained slag (not shot) was apparent beginning

at a depth of about 5.5 ft bgs. The arsenic concentration at 4.5 ft bgs was 29 mg/kg, whereas samples collected at 5.5, 8, and 10 ft bgs ranged between 169 and 233 mg/kg. The groundwater in this boring was encountered at about 9 ft bgs.

Appendix B contains an aerial photograph apparently taken in the winter of 1996. At that time, the cleanup for the majority of the Murray Pacific Property upland area had been completed, but the tide bank cleanup had not yet been started. This photograph shows standing water along the silt fence that divided the upland portion from the tide bank. The silt fence appeared to be installed in a small “ridge” of wood debris. **Appendix B** also contains an aerial photograph dated 1986. In it, we see a very large mound of wood debris and quite a lot of heavy equipment activity on the unpaved ground surface surrounding the mound. As was summarized in Section 1.4.1, Murray Pacific used Asarco slag between 1975 and 1980, but remedial actions did not commence until 1995. The locations of MW28 and MW29 were also overlain on this aerial photograph by lining up features that existed both in 1986 and currently. What this shows is that the two wells happen to be centered within this former wood debris mound.

Figure 20 presents a 230-foot-long cross section of the soil profile roughly parallel to the Hylebos Waterway beginning at MW6/MW8 on the Taylor Way Property and ending at MW31 on the Murray Pacific Property. The location of this cross section is shown on **Figure 13**. What is evident from the cross section, is that there is a zone of high arsenic concentrations in soils and a small amount of residual source material and wood debris along the edge of the tide bank. Considering that the water table generally fluctuates within the 7 to 8-foot range, there are some significant arsenic concentrations within the saturated zone. Referring back to the early 1996 aerial photograph in **Appendix B**, if the excavation during periods of standing water some source material could easily have been missed. Excavating material under saturated conditions would have caused some of the material to have simply slipped out of the bucket and resettled on the bottom.

Apparently fine pieces of slag were observed beginning at about 6 feet bgs just inside the Taylor Way Property (at MW37), which suggests the presence of a very limited space between where the Murray Pacific Property cleanup and USGI berm removal IA did not overlap. There never was fencing between these two properties or other hard demarcation of the property line.

The residual arsenic in soils (i.e., that which has leached from the berm and re-adsorbed to soils) and source material (e.g., residual slag observed in the subsurface), combined with a residual hydrocarbon plume as discussed in Section 9, are all likely contributing to the elevated arsenic concentrations in groundwater at this location.

7.2.9 Former Murray Pacific Property

The discussion in this section focuses on the area of the former Murray Pacific Property that lies west of the current pavement. It is the area that Carlile currently parks its long-haul trailers. Monitoring wells MW31 through MW35 and MW39 through MW42 are located in this area. As indicated in Section 1.4.1.2, remedial actions completed on the Murray Pacific Property targeted the Method A cleanup level of 20 mg/kg. Arsenic concentrations in soil samples collected from borings located within the interior portions of the property (i.e., MW34, MW35, and MW39 –MW41) were generally non-detect and ranged up to 15 mg/kg, with one exception, a 4-foot sample collected from MW34, which contained 94 mg/kg arsenic. MW34 is closest to the area that is discussed in Section 7.2.8.

Arsenic was detected more frequently and at somewhat greater concentrations in soil samples collected from borings situated along the tide bank. At MW32, MW33 and MW42, arsenic

concentrations ranged up to 24 mg/kg. As discussed in Section 7.2.8 above, arsenic concentrations in borings situated closer to the property boundary (MW31 and DPT9) increased. At MW31, arsenic concentrations in the 4 to 10 ft samples ranged from 48 to 94 mg/kg (with the greatest concentration in the 10 ft sample). The 2 ft sample collected from DPT9 had an arsenic concentration of 66 mg/kg.

7.3 Petroleum Hydrocarbons

As indicated previously, the hydrocarbon remedial actions all targeted the Method A unrestricted land use cleanup levels in effect at the time. Prior to 2000, the cleanup levels for TPH-D and TPH-O were lower, by a factor of 10, than the current levels. Therefore, hydrocarbon cleanups conducted before the year 2000 exceeded present standards.

During the 1996 Bunker C cleanup under the former AST, 11 sidewall samples were collected, and four excavation base samples were collected. TPH-D and TPH-O concentrations were less than method reporting limits in all but one sample, which contained 21 mg/kg TPH-D and 98 mg/kg, TPH-O.

During the 2003 hydrocarbon cleanup completed prior to the redevelopment, TPH concentrations in all of the excavation bottom samples and 12 of the excavation sidewall samples were less than 200 mg/kg. In three sidewall samples, TPH-D concentrations ranged between 228 mg/kg and 1,930 mg/kg and TPH-O concentrations ranged between 296 mg/kg and 1,860 mg/kg – all of which are less than the Method A cleanup level of 2,000 mg/kg.

Observations made during the UST removal and the analytical results of soil samples collected from the excavation sidewalls indicated that the USTs had not leaked. TPH-D was detected in only one soil sample, and at a low concentration of 36 mg/kg. The only other hydrocarbon-related compound detected was xylene and reported concentrations of this compound were well below the Method A cleanup level.

Based on current analytical data, interim remedial actions have successfully removed all soils that exceed current MTCA Method A hydrocarbon cleanup levels (**Appendix F**).

Section 8

Evaluation of Groundwater Conditions

8.1 Evaluation of Field Measured Parameters

During groundwater purging and sampling, various parameters (pH, specific conductance, oxidation-reduction potential, turbidity, etc.) were measured to check for stabilization prior to sampling. Specific conductance (conductivity) is useful for evaluating site geochemistry and is discussed in this section. Oxidation-reduction potential (Eh) and pH data were used to evaluate arsenic fate and transport in Section 9.

Conductivity measurements for the Site provide some insight regarding the groundwater flow regime. Conductivity values were found to vary widely across the Site. Many of the monitoring wells have a wide variation in conductivity values over time and between sampling events.⁷ While considering the Site data, it should be kept in mind that the conductivity of marine water is approximately 47,900 micromhos per centimeter ($\mu\text{mhos/cm}$) and conductivity of non-brackish groundwater is typically less than 500 $\mu\text{mhos/cm}$.

Because the shallow wells are not significantly tidally influenced, the Hylebos Waterway should have very little effect on the conductivity values in the surface aquifer. Conversely, one would expect to see conductivity values indicative of saline conditions in the second aquifer, particularly in wells that are closest to the Hylebos Waterway.

Conductivity values at the Arkema shallow aquifer well 2B1-1, which is adjacent to the salt pads, were 79,900 $\mu\text{mhos/cm}$ in February 2007 and ranged between 24,000 and 40,800 $\mu\text{mhos/cm}$ during the three sampling events conducted between August 2008 and May 2012. The initial conductivity value is nearly twice that of normal marine water and indicates that salt from the pads leached into groundwater. Current conductivity values appear to be slightly lower in the wetter months than in the drier months, likely due to a dilution effect, but the data are consistent with declining conductivity values one would expect subsequent to closure of the salt pads. Conductivity values in surface aquifer monitoring wells in the inland portion of the Taylor Way Property are typically less than 5,000 $\mu\text{mhos/cm}$, and sometimes even less than 1,000 $\mu\text{mhos/cm}$. On the Murray Pacific Property conductivity values in the inland wells are about 1,300 to 2,200 $\mu\text{mhos/cm}$. Conductivity values situated along the Hylebos Waterway are higher. MW5 and MW6 conductivity values were frequently greater than 20,000 $\mu\text{mhos/cm}$ up until about 2001. Conductivity values in these wells have declined since 2001, coincident with those at 2B1-1. Conductivity values in MW5 and MW6 are currently similar to those that line the Hylebos Waterway on the Murray Pacific Property, which range from approximately 5,000 to 12,600 $\mu\text{mhos/cm}$.

The groundwater at MW17, which is located slightly inland of MW33 on the Murray Pacific Property and next to the stormwater pond has anomalous conductivities. During the 2014 groundwater

⁷ Note: This assessment is based upon long term conductivity data for some wells and only one to two sets of conductivity data for other wells. Conductivity in groundwater at the Site is dynamic as significant variability between wells and over time has been observed. During the December 2006 sampling round it was determined that the conductivity meter was malfunctioning. Rather than include these data in Table 3 with a qualifying notation that the data were rejected and risk data being used by others, the rejected data are not presented in the table.

sampling event, the conductivity value at MW17 (42,200 $\mu\text{mhos/cm}$) was nearly the same as that which would be considered representative of sea water. In August 2008, the conductivity value was also high at 15,880 $\mu\text{mhos/cm}$, but still only about a third of that measured in January 2014. Note that MW17 is one of the post-remediation wells installed by Murray Pacific and its construction details cannot be verified.

Conductivity values for groundwater in the southern end of the Taylor Way Property have been somewhat variable. In 1994 conductivity values at MW1 started in the 1,000 to 2,000 $\mu\text{mhos/cm}$ range and then declined to under 1,000 (230 to 740) between 1999 and 2001. Since 2008, the conductivity values came back up to the 1,000 to 2,000 range. These measurements were taken at different times of the year and may represent a combination of seasonal variation in groundwater flow and other, as yet undetermined factors as discussed later in this section. Indeed, MW1 was replaced in 2006, so its location is slightly different than the original well. The area is also currently paved; it wasn't prior to 2006. However, these are not considered to be conditions that would have caused such significant changes in the conductivity values.

One would expect to observe conductivity values in the second aquifer to decline with distance from the Hylebos. The former MW8 (next to the Hylebos, but no longer exists) had conductivity values typically over 20,000 $\mu\text{mhos/cm}$ (CDM, 2002). MW14, approximately 300 feet from the Hylebos, had similarly high conductivity values at times, but showed much more variation and lower overall conductivity values. Historical data for former monitoring well MW11 (replaced with MW26) averaged around 5,000 $\mu\text{mhos/cm}$ (CDM, 2002). However, second aquifer well MW13 at the south corner of the Taylor Way Property, and farthest from the Hylebos, consistently had conductivity values on the order of 20,000 $\mu\text{mhos/cm}$.

What little second aquifer conductivity data we have for the Murray Pacific Property second aquifer wells is not consistent with what we would expect to see for wells that are influenced by the Hylebos (marine water). The conductivity value at MW28 (situated next to the Hylebos), as reported by DOF in 2012, was only 758 $\mu\text{mhos/cm}$. This is less than was reported for the adjacent surface aquifer well MW29. Similarly, at MW16 (also next to the Hylebos) the conductivity of 6,100 $\mu\text{mhos/cm}$ was not even half that of the lowest conductivity value reported for the adjacent surface aquifer well MW17. Interpretation of this could not be taken further with the limited available data.

In the case of the second aquifer wells in the NBA, conductivity values were even higher than in the surface aquifer wells, ranging up to 245,000 $\mu\text{mhos/cm}$ in 2B2-2, located adjacent to the salt pad. Conductivity values in the second aquifer wells throughout the NBA were higher overall than in the other second aquifer wells on the adjacent properties, indicating an impact by the salt pads throughout the area.

A second notable field parameter is visual appearance. Non-turbid groundwater is typically clear. But many of the groundwater samples, at least historically, had a yellow or light brown color that was not due to turbidity. Groundwater samples at all of the surface aquifer wells in the NBA had a distinct yellow color, except for 2A1-1, which contained visible suspended iron. Many of the wells on the Taylor Way property historically have shown yellow or light brown discoloration, most notably MW5, where the color during the 1990s was typically dark brown or deep yellow. In recent years the color in MW5 has become a lighter brown, coincident with the specific conductivity values having lowered. The second aquifer well MW14 also unusual in that, until 2006, the water contained black floc-like particulates (likely organic) and could never be purged until turbidity values were less than 10

nephelometric turbidity units (NTU). However, this changed in 2006 and the well purged clear and free of suspended particulates.

8.2 Petroleum Hydrocarbons

A total of 17 surface aquifer wells on all three properties were analyzed for petroleum hydrocarbons during this Supplemental RI (**Table 9** and **Figure 21**). TPH-D was reported in seven surface aquifer wells at concentrations ranging between 240 µg/L and 570 µg/L and TPH-O in two wells at concentrations of 260 and 780 µg/L. TPH-D was also reported in two of the eight second aquifer samples at concentrations of 270 and 300 µg/L. The Method A cleanup level of 500 µg/L for TPH-D and TPH-O was exceeded at only one well, MW37, which is downgradient of the 1996 Bunker C excavation.

For four of the wells where detections of petroleum hydrocarbons were reported, there are no apparent petroleum hydrocarbon sources. Surface aquifer well 2B1-1 is adjacent to a salt pad. MW4 is next to the Arkema property line. MW2 is in the general vicinity of the Bunker C remediation, but about 50 feet cross gradient of the remedial excavation limits. MW24 is not only 100 feet crossgradient of the Bunker C remedial excavation limits, it is also a second aquifer well. The NWTPH-Dx analytical method is non-specific to hydrocarbons (the analysis is based on what comes out though a range of boiling points) and results can include non-hydrocarbon compounds, including naturally occurring organic compounds. In the past, Ecology allowed the use of silica gel cleanup to remove polar organics from the TPH analysis, which would remove any naturally occurring organic interferences along with petroleum degradation products. We surmise that if a silica gel cleanup had been conducted on the groundwater samples for MW2, MW4, MW24, and 2B1-1 petroleum hydrocarbons reported as TPH-D would have been less than detection limits.

In contrast, the hydrocarbon detections downgradient of the hydrocarbon cleanup (i.e., MW29, MW36-MW38, and MW18) have some basis in reality as these wells are downgradient of the area previously impacted by the Bunker C tank. The TPH chromatographic profiles for MW29, MW36-MW38, and MW18 lack definable peaks consistent with petroleum products. However, recent research has found that, as TPH biotically degrades, polar compounds (i.e., ketones, aldehydes, alcohols, and acid/esters) are generated and the distinct peaks typically seen on a chromatogram are lost. These compounds would be removed during a silica gel cleanup, but otherwise these compounds are also quantified and reported as TPH by the NWTPH-Dx analysis. However, Ecology does not allow silica gel cleanup for groundwater samples unless there is a clear source of biogenic interferences. The residual hydrocarbon plume has implications for the arsenic plume, which are discussed further in Section 9.

8.3 Metals – Surface Aquifer

Metals concentrations in groundwater for all sampling events are summarized in **Table 7**. **Table 7** also includes DOF's 2008 and 2012 metals data as reported in the Arkema RI. The groundwater data for the Taylor Way and Murray Pacific Properties are discussed and evaluated here. The groundwater data for the NBA are discussed only as it provides some insight into the data for the Taylor Way Property. To help simplify the following discussions, concentrations are generally rounded and discussed in terms of order of magnitude, and total and dissolved metals concentrations are generally not differentiated. Because low flow sampling was consistently used, samples were typically not turbid and total (nonfiltered samples) and dissolved (filtered samples) concentrations were generally similar. In instances where there were total and dissolved data, the dissolved data were typically used

instead of the totals data. Sometimes dissolved concentrations were higher than totals which, if not significant, is usually attributed to normal variability in sampling and analysis. Occasionally, totals data were significantly lower than dissolved data and these values were flagged as estimated in the summary tables and discussed, as appropriate.

8.3.1 Arsenic

Figure 22 shows the most recent (2012/2014) arsenic concentrations in the surface aquifer at the individual monitoring wells. Some of the earlier groundwater data (2002/ 2008) from temporary (DPT) wells is also presented for discussion purposes. Arsenic concentrations throughout the Site are not suitable for contouring due to the various source control actions taken throughout the Site and interspersed nature of remaining arsenic in soils; thus no arsenic isoconcentration maps have been prepared. The following sections discuss arsenic data for groundwater by area, similarly as for the soils in Section 7.

8.3.1.1 Southern Corner

In the southern corner (MW1) arsenic concentrations during the 1990s were on the order of 1,500 µg/L. Between 1999 and 2002 arsenic concentrations appeared to be declining, consistent with the IA completed on the property. Then, in 2006 arsenic concentrations in MW1 rebounded. The arsenic concentrations in 2009 and 2012 were essentially the same as they were in the 1990s. The 2008 DPT sampling was conducted in an effort to identify additional potential sources of arsenic in soil in this area. While the investigation did identify lenses of slag-like materials and high arsenic concentrations in soils, particularly in the 2- to 3.5-foot zone, soil arsenic concentrations did not seem to correlate well with the groundwater arsenic concentrations. For example, at DPT13 (about 65 feet northeast of MW1) where a black 6-inch lens of material with an arsenic concentration of 1,130 mg/kg was identified at a depth of 3 ft bgs, the arsenic groundwater concentration was only 68.8 µg/L. However, at DPT11, about 40 feet southwest of MW1, no apparent source material (i.e. slag, shot) was observed, yet arsenic concentrations in soils were as much as 531 mg/kg in a 3.5-foot sample and 320 mg/kg in a 5.5-foot sample. Similarly, arsenic concentrations in groundwater sampled from DTP11 was relatively high at 381 µg/L. DPT11 was only about 20 feet northeast of NB-45, installed during the NBA investigation, where a trace of yellow precipitate was observed at 5 ft bgs. No groundwater sample was collected from this boring. The various parties involved with this RI differ in their interpretations as to the cause of the variability observed.

Groundwater samples collected from temporary well points in the area immediately surrounding MW1 in August 2008 indicate attenuation of arsenic with distance from MW1/MW1R occurs over a fairly short distance (**Figure 22**). At that time, the arsenic concentration was highest at MW1R (510 µg/L) and lower at all of the surrounding well points. The arsenic concentration was an order of magnitude less at both downgradient sample locations: DPT13 (68.8 µg/L) 30 feet away, and DPT14 (55 µg/L) 110 feet away. Upgradient of MW1, the arsenic concentration at DPT11 was similar, but also slightly lower (381 µg/L).

8.3.1.2 Eastern Side of the Production Building

Arsenic concentrations in the surface aquifer in the area of the MW9, B13 and B23 IAs are represented by groundwater data for MW2 and MW9. In 1998, arsenic concentrations in these two wells were 3,000 µg/L and 19,000 µg/L, respectively. Since then, arsenic concentrations have declined significantly. The arsenic concentration in MW2 (114 µg/L) is currently 26 times lower than in 1998. MW9 has shown the greatest decline—by a factor of 475 times—with only 40 µg/L arsenic in May 2012. This is further discussed in Section 8.3.1.8.

8.3.1.3 Former Railroad Berm

Arsenic concentrations in the surface aquifer along the former railroad berm are represented by the groundwater data for MW27 and MW30. The arsenic concentration at MW27 has always been relatively low, ranging between 3 and 11.7 µg/L (3 samples - 2006, 2012 and 2014). This is noteworthy as the well is approximately 25 feet northeast (downgradient) of TP9 where shot was observed and which contained elevated arsenic in soils at the 1-foot and 3-foot depths. In addition, the 2-ft sample collected from MW27 had a similar arsenic concentration (1,550 mg/kg) as the shot layer at TP9 (1,740 mg/kg).

The arsenic concentration at MW30 started out at 240 µg/L in 2006, but has declined and during the past four sampling events (2008-2014), has ranged between 13.9 and 39 µg/L. MW30 is downgradient of DPT10 (discussed in Section 8.3.1.5).

These groundwater data suggest that the residual source material along the former railroad berm is not highly leachable.

8.3.1.4 Former Material Stockpile and Tide Bank Areas

DPT15 and DPT16 were located within the former material stockpile area (**Figure 22**). Arsenic concentrations at these two locations were relatively low at less than 20 µg/L. The arsenic concentration drops by an order of magnitude between upgradient well MW2 (**Figure 22**) and DPT15/DPT16 (approx. 100 ft distance), and another one to two orders of magnitude between DPT15/DPT16 and MW5/MW6 (approx. 100 ft distance) located by the Hylebos Waterway. At MW5 and MW6, which are adjacent to the Hylebos Waterway, arsenic concentrations have been less than the Method A cleanup level since 2008 and 2006, respectively. In 2012, the arsenic concentration was less than the detection limit of 1 µg/L in both wells.

8.3.1.5 Southwestern Side – Near Taylor Way

The groundwater data collected from this area were from DPT borings—B8 and B9 sampled by KJC in 2002 and DPT10 sampled by CDM Smith in 2008. The groundwater data are consistent with the soils data for each boring. Dissolved arsenic in B8 was only 3.88 µg/L and the arsenic concentration in the 0-3 ft sample was 15.9 mg/kg. Dissolved arsenic in B9 was 32.9 µg/L and the arsenic concentration in the 0.5-2 ft sample was 187 mg/kg. Dissolved arsenic in DPT10 was 2,360 µg/L. A 5-inch thick black lens (an apparent source material) with an arsenic concentration of 960 mg/kg was observed at a depth of 6 ft bgs.

8.3.1.6 Former Berm and Murray Pacific/Taylor Way Property Boundary

This discussion focuses on wells MW25, MW29, MW36, MW37, and MW38 because, as was seen for the soils, groundwater arsenic concentrations in the boundary area next to the Hylebos Waterway are relatively higher than in the remainder of the Taylor Way and Murray Pacific Properties (with the exception of MW1R). During the 2014 sampling event, arsenic concentrations ranged between 11 µg/L in the most upgradient well (MW25) and 876 µg/L in the most downgradient well (MW37).

Arsenic concentrations at MW25 have been variable. During the three sampling events in 2006, 2008, and 2009, arsenic concentrations varied between 33 and 210 µg/L. In 2012 and 2014 arsenic concentrations declined consecutively, to the current low level of 11 µg/L. At MW29, arsenic concentrations have consistently been in the hundreds of parts per billion, ranging between 203 and 622 µg/L during four sample events between 2006 and 2014. MW36, MW 37 and MW38 have only been sampled once, in 2014, with concentrations of 276 µg/L, 876 µg/L, and 469 µg/L respectively.

8.3.1.7 Former Murray Pacific Property

This discussion focuses on wells MW17, MW31- MW35, MW39-MW42. Wells centrally located in the Murray Pacific Property (MW34, MW35, and MW39-MW41) had arsenic concentrations, ranging between 1.0 and 59 µg/L in 2014; MW34 had the highest arsenic concentration. Arsenic concentrations in the remaining three wells ranged up to 12.3 µg/L. The arsenic concentrations at MW34 have ranged between 59 and 157 µg/L and appear to be declining. It is the well that is closest to the “boundary area” discussed in Section 8.2.1.6 above and it is likely that the relatively higher arsenic concentrations are related to the conditions (i.e., residual source material) that are causing this.

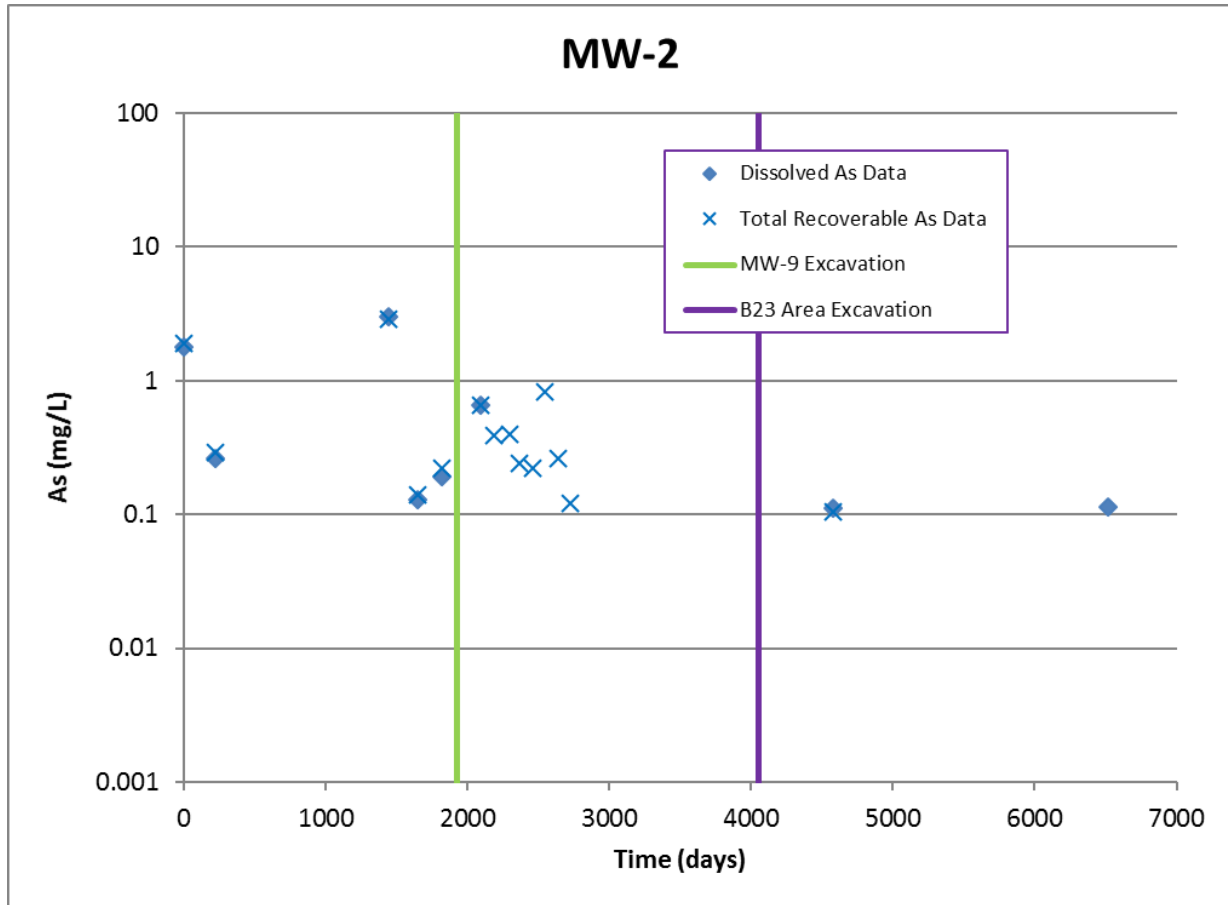
In 2014, arsenic concentrations in monitoring wells located along the edge of the Hylebos Waterway (MW31, MW32, MW33, MW17, MW42), ranged between 15 µg/L and 97 µg/L. Arsenic concentrations in these wells tend to be greater than those that are centrally located in the Murray Pacific Property. An additional source of arsenic along the edge the tide bank is suspected to be the reason for this, but significantly elevated levels were not found in soil samples collected from the borings, with the exception of 94 mg/kg at a 10 ft depth in MW31. MW33 is situated between MW17 and the Hylebos Waterway. At MW33, arsenic concentrations ranged between 107 µg/L in 2008 and 55 µg/L in 2014. MW17 was sampled twice and arsenic concentrations were less by at least half during both of the same sampling events. The difference in arsenic concentrations between these wells is unclear. Both of these wells are located near the old log dump. A railroad track used to extend from Lincoln Avenue to the log dump where logs brought in by rail were unloaded directly into the water (Hydrometrics, 1993). According to the final engineering report for the Murray Pacific site, the stormwater pond was moved 25 feet inland of the original planned location to avoid what appeared to be a piling from a former railroad trestle (Hydrometrics, 1996). If the trestle was not removed, it is possible that residual arsenic-contaminated soils in the vicinity are still in place, which could be causing the continued elevated levels of arsenic in MW33.

Beginning at MW32 (17 µg/L arsenic) and moving towards the Taylor Way Property boundary arsenic concentrations steadily increase. The cause(s) of elevated arsenic along this section of the shoreline is also uncertain. This may be due to residual source material, as suspected in the vicinity of the old trestle. Geochemical conditions specific to the shoreline may also be a contributing factor. Based on past Murray Pacific site uses, the tendency of groundwater contamination to be fairly localized around sources, and because USGI-related wastes are not likely to be in the Murray Pacific shoreline area, Ecology has agreed that USGI's commitment with respect to arsenic contamination on the Murray Pacific Property extends no further than MW31 (see **Appendix I**).

8.3.1.8 Arsenic Concentrations Over Time

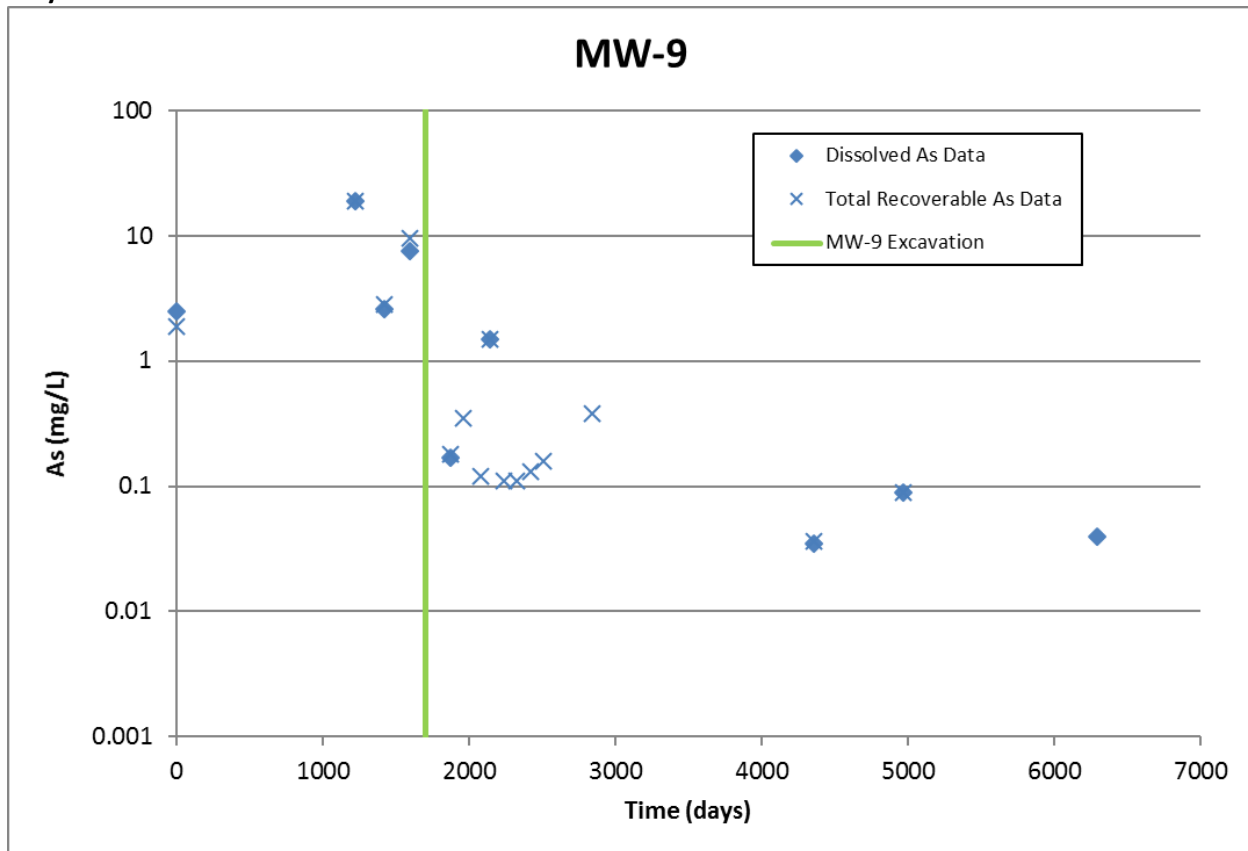
Overall, we see that arsenic concentrations in groundwater at the Taylor Way Property have declined or remained stable over time, except for MW1, which was discussed in Section 8.3.1.1. At MW2, located at the downgradient edge of the B23 excavation, and downgradient of MW9, arsenic concentrations have declined from 1,800 µg/L to about 110 µg/L. **Figure 8-1** shows the trend in arsenic data since March 1994 for well MW2. In general, concentrations have been on the decline since the peak value of 3,000 µg/L was measured in March 1998. Available data indicate much of the decline was due to the source removal activities.

Figure 8-1 – Trend in Groundwater Arsenic Concentrations in Well MW2 from March 1994 through May 2012.



Well MW9 historically had by far the highest arsenic concentrations on the Site. **Figure 8-2** shows the dramatic decrease in arsenic concentrations following the MW9 area soil excavation in the summer of 1999. Arsenic concentrations have declined three orders of magnitude subsequent to the IA. In November 1998, dissolved arsenic concentrations reached a high of 19,000 $\mu\text{g/L}$. The well was removed during the excavation and replaced following backfilling with clean soil. Following the excavation, the groundwater concentrations significantly declined. Since 2006, dissolved arsenic concentrations at MW9 have ranged between 35 and 90 $\mu\text{g/L}$.

Figure 8-2 – Trend in Groundwater Arsenic Concentrations in Well MW9 from November 1994 through May 2012.



In 1994 arsenic concentrations at MW5 and MW6, located adjacent to the Hylebos Waterway, were on the order of <math><10\ \mu\text{g/L}</math> and $130\ \mu\text{g/L}$, respectively. MW6 was close to the berm that was removed in 1996. Since 2002 (4-5 sampling events) arsenic concentrations in these two wells have ranged between 1.4 and 4 $\mu\text{g/L}$.

Over the years, arsenic concentrations at MW4, located adjacent to the Arkema property line, have ranged between 7.7 and 53 $\mu\text{g/L}$. The highest and lowest concentrations were observed between 1998 and 2000. Since August 2000, arsenic concentrations have ranged between 8.8 and 28 $\mu\text{g/L}$, averaging about 24 $\mu\text{g/L}$.

For the remaining wells on the Taylor Way and Murray Pacific Properties, there are at most 4-5 data points between 2006 and 2014, so trends are not well established. After some initial fluctuations, arsenic concentrations in MW25 and MW30, located at the edge of the Taylor Way Property adjacent to the former railroad berm, appear to have settled into the range of approximately 10 to 30 $\mu\text{g/L}$. With the exception of MW29, the arsenic concentrations on the Murray Pacific Property adjacent to the Hylebos are seemingly decreasing, and certainly they have at MW17. In 1998, the arsenic concentration in MW17 was on the order of 1,000 $\mu\text{g/L}$. Groundwater samples collected in 1999-2000 showed arsenic concentrations of 270 – 310 $\mu\text{g/L}$. Groundwater samples collected in 2008 and 2014 contained 57 and 15 $\mu\text{g/L}$, respectively. MW36, MW37, and MW38, with some of the highest arsenic concentrations, have only been sampled once, in 2014.

8.3.2 Other Metals

Concentrations of other metals analyzed at the Site were either never elevated (i.e., cadmium, mercury, silver, hexavalent chromium, lead) or were not particularly elevated in the first place and have generally declined over the years as the IAs were implemented (i.e., antimony, chromium, copper, nickel, zinc). However, concentrations of some of the metals do not necessarily appear related to arsenic concentrations, but more likely related to other environmental conditions. Below are observations with respect to the occurrence of various metals and a comparison to the preliminary marine surface water cleanup levels listed in **Table 5-2**.

The one location that antimony exceeded its cleanup level of 640 µg/L was at MW9, where it was exceeded in 1994 and in March 1998. Thereafter antimony concentrations have declined by 1 to 2 orders of magnitude in MW1, MW4, MW6, and MW9. Interestingly, antimony concentrations declined at MW9 before the source removal, which occurred in 1999. Currently, antimony concentrations across the Site are typically less than 10 µg/L. The only exceptions are at MW9 and at some of the temporary DPT test hole locations. At MW9, antimony concentrations were most recently on the order of 50 µg/L, down from a high of 4,200 µg/L (dissolved) observed in March 1998. DPT13 and DPT14, located in the MW1 area showed slightly elevated antimony concentrations of 12.1 and 28.4 µg/L, respectively. At DPT10, the antimony concentration was 105 µg/L. The antimony concentration at DPT10 is likely related to the similarly high arsenic concentration at this location.

Chromium concentrations historically were the greatest at MW5 and MW6. As was noted in Section 3.1, soil contained fairly high concentrations of chromium, which was thought to be associated with the newer raw materials stored in material stockpile area. There is no marine surface water standard for chromium. However, chromium concentrations have declined over the years and have been less than 10 µg/L in all Taylor Way and Murray Pacific Property wells since 2008.

Dissolved lead concentrations historically have been below the laboratory reporting limit (≤ 5 µg/L). The only instances when lead concentrations have been higher than this were in samples analyzed on the totals basis, indicating high bias due to the presence of particulates. Total lead concentrations in MW1 were greater than the Method A cleanup level of 8.1 µg/L in MW1 during the quarterly sampling conducted between October 2000 and October 2001 with concentrations ranging between 8.5 and 47 µg/L. Dissolved lead was analyzed in April and July 2001 and while total lead concentrations were 12 and 47 µg/L, respectively, during these two sampling events, dissolved lead was <1.1 µg/L. The only other cleanup level exceedance was in a sample collected from MW9 by KJC in 2002 where the total lead concentration was 21.3 µg/L.

Copper concentrations seem to have varied more so than most metals, and dissolved concentrations were frequently notably lower than totals concentrations. In the past, copper has been as high as 75 to 360 µg/L, but these were all samples analyzed on the totals basis with no dissolved concentrations to compare to. The highest dissolved copper concentration observed was in July 2001 when the concentration was 40 µg/L in MW4. Whereas arsenic concentrations were at their peak in the early 1990s and generally declined in association with interim actions, copper concentrations appeared to be generally at their highest in 2000 and 2001. Using MW6 as an example, in March 1994 the arsenic concentration was 140 µg/L and copper 12 µg/L. In October 2000, the arsenic concentration was down to 24 µg/L, but copper much higher at 360 µg/L. The preliminary cleanup level for copper is quite low at 2.4 µg/L. The 2008-2012 data showed that copper concentrations ranged between <1 and 4 µg/L at most wells. The only exceptions were MW9, where the dissolved copper concentrations were slightly higher at 7 µg/L in 2006 and 9 µg/L in 2012.

Nickel concentrations were on the order of 20 to 40 µg/L in MW4 and MW5 in 1994, but declined in MW5 after 1994 and in MW4 after 2001. Nickel concentrations between 2006 and 2012 were less than the preliminary cleanup level of 8.2 µg/L in all Site monitoring wells.

Zinc showed similar trends as nickel, although elevated laboratory reporting limits between 2000 and 2001 complicate the evaluation of trends. The highest zinc concentrations were observed at MW4, MW5 and MW9, where they reached approximately 60 to 100 µg/L in 1994. The 2006-2012 data show zinc concentrations less than 10 µg/L (<20 µg/L when detection limits are raised due to interference) with a few exceptions. During the 2006-2007 sampling, the zinc concentration in MW30 was 20 µg/L, but dropped to <4 µg/L in 2008 and 2009. Regardless, the preliminary cleanup level of 81 µg/L has not been exceeded since 1994.

8.4 Metals – Second Aquifer

8.4.1 Arsenic

Second aquifer arsenic concentrations are summarized on **Table 8** and **Figure 23** shows the most recent arsenic concentrations in the second aquifer at each well location. Historically (between 1994 and 2001) dissolved arsenic concentrations in MW14 ranged between 8 and 41 µg/L and in MW13, between <1 and 69 µg/L. In 2006 dissolved arsenic concentrations in all Taylor Way and Murray Pacific Property second aquifer wells ranged between <1 µg/L (MW24 and MW18) and 11 µg/L (MW13R). December 2006 data indicate nearly an order of magnitude decrease at MW13 and MW14. DOF sampled MW13R, MW14, MW24, and MW28 in 2012. The data for MW14, MW24, and MW28 were reasonably consistent with the 2006 data (≤6 µg/L arsenic); however, a dissolved arsenic concentration of 188 µg/L was reported at MW13R. This is anomalous as it is about 3 times higher than the highest totals concentration (69 µg/L/July 2001) ever reported and six times higher than any dissolved concentration ever reported at MW13. In reviewing the field monitoring data for MW13R, we note that the turbidity was at the time of sampling was 727 NTU. We do not know if this has any bearing on the arsenic data, but there is enough to warrant questioning the validity of the data.

8.4.2 Other Metals

Antimony is not frequently detected, but when it is, concentrations range from 0.2 to 8 µg/L, well below the Method A cleanup level of 640 µg/L.

Chromium concentrations during the 2006 sampling ranged from 1 to 13 µg/L. The highest concentration was observed at MW26 and the lowest at MW13R. Historical chromium concentrations have ranged from 3 to 64 µg/L at MW14 and from 5.2 to 37 µg/L at MW13. At MW14 chromium concentrations have been oddly mixed. Three times—two significantly so—dissolved chromium concentrations have exceeded total chromium concentrations. Until the most recent (2006) sampling round, groundwater sampled from this well always had a black floc-like suspended matter (likely organic), even with the low-flow sampling methods. There was no suspended matter in the 2006 sample and the chromium concentration was the lowest ever observed at 3 µg/L. Metals, particularly chromium, tend to adsorb to clay, silt, and organic matter.

As was seen for copper concentrations in the surface aquifer, concentrations vary significantly between total and dissolved concentrations, over time, and do not appear to be related to the arsenic concentrations. Copper concentrations for the 2006 sampling ranged from <1 to 5 µg/L in all samples except MW26, which had a concentration of 18 µg/L. A significant difference in total (258 µg/L) versus dissolved (18 µg/L) concentrations was noted in MW26. Total chromium, lead, nickel and zinc

were also significantly higher than dissolved concentrations at this same well. The variation and overall higher total metals concentrations as compared to dissolved metals concentrations than in other wells is explained by the presence of suspended solids in the water sample; the sample was the only one that had such a high turbidity—704 NTU—at the time of sampling. Historically, copper concentrations have ranged from 4.3 to 54 µg/L at MW14 and from 6 to 38 µg/L at MW13.

Dissolved lead was not detected during the 2006 sampling (detection limit 2 and 5 µg/L). Historical dissolved lead concentrations have always been less than the Method A cleanup level of 8.1 µg/L. Total lead concentrations are typically much higher than dissolved lead concentrations, which can be explained by the presence of lead in suspended sediments in the samples.

Dissolved nickel concentrations in the 2006 sampling ranged from < 1 to 15 µg/L. DOF's 2012 samples showed similar nickel concentrations, ranging from 2 to 10 µg/L. Historical and current nickel data are similar and consistently indicate nickel concentrations in the second aquifer are slightly greater than the Method A cleanup level. Since this is not currently true for the surface aquifer it may indicate that nickel is naturally occurring in the second aquifer.

Dissolved zinc was not detected during the 2006 sampling round. Historically zinc was rarely detected in samples analyzed on a dissolved basis and never exceeded the preliminary cleanup level of 81 µg/L. In March 1998, dissolved zinc was reported in MW14 at a concentration of 36 µg/L and total zinc at 6,100 µg/L. As noted above, this well historically contained a black floc-like suspended matter that low flow sampling methods could not eliminate and likely contributed to the overall higher metals concentrations.

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Section 9

Arsenic Fate and Transport at the Site

9.1 General Arsenic Geochemistry

The fate and transport of arsenic describes the mechanisms which control the mobility of arsenic under different groundwater conditions (pH, Eh, water chemistry, etc.). **Appendix J** contains a detailed analysis and discussion of the fate and transport of arsenic. This section provides the findings of the fate and transport evaluation in an abbreviated form and will not include the details of the calculations, or modeling efforts or the literature citations, all of which are provided in the appendix.

Arsenic at the Site originates as primary source material (i.e., shot, mineral fibers, baghouse dust, slag), which dissolves to some extent when contacted by water. Within the saturated zone, the primary source material is subject to leaching by groundwater, while in the unsaturated zone leaching by infiltrating water (particularly if the area is not or was not capped) can occur. The infiltrating water then migrates to the groundwater. Once dissolved into the groundwater, the arsenic can be transported along with the groundwater flow. However, the arsenic is subject to immobilization processes called “attenuation mechanisms” that prevent the arsenic from traveling at the same velocity as the groundwater. Arsenic attenuation mechanisms include:

- Adsorption of dissolved arsenic onto the surfaces of the aquifer matrix and vadose soils.
- Precipitation of arsenic as a pure phase arsenic mineral, such as scorodite ($\text{FeAsO}_4 \cdot 2\text{H}_2\text{O}$).
- Removal of arsenic from solution in response to the precipitation of another solid phase, usually iron-bearing. The process is referred to as “coprecipitation.” The arsenic either adsorbs to the mineral as it forms or is incorporated into the crystal structure of the forming mineral.

The extent to which these processes occur depends mainly on the Eh (reduction-oxidation or redox potential), pH, and concentrations of iron and arsenic in the groundwater. For instance, scorodite only forms when the concentrations of iron and arsenic are sufficiently high. The Eh of the groundwater determines the form of arsenic in solution, which in turn effects the mobility of arsenic. Under reducing conditions, arsenic occurs in the arsenite form (H_3AsO_3^0), whereas under more oxidizing conditions arsenic occurs in the arsenate form (HAsO_4^{-2} or H_2AsO_4^-). Arsenate is also referred to as “As⁺⁵” or “As(V)” while arsenite is referred to as “As⁺³” or “As(III)”. Arsenite is about 4-10 times more mobile than arsenate.

9.2 Arsenic Fate and Transport at the Site

The groundwater at the Taylor Way Property and adjacent properties (Arkema NBA and Murray Pacific) is characterized by a near neutral pH (6.0 – 7.5), mildly reducing redox (Eh = -68 to 245 millivolts [mv]), and relatively high dissolved organic carbon (4.0 to 42 mg/L), iron concentrations (<0.02 to 224 mg/L) and alkalinity (29.2-1030 mg/L as CaCO_3). Phosphate concentrations are also elevated in some areas, ranging from 0.19 to 3.44 mg/L. The highest iron (224 mg/L for well 2B1-1) and DOC (77.1 mg/L for well 1D1-1) concentrations were measured within wells located in the Arkema NBA. The high DOC is consistent with dissolution of wood waste which was co-disposed with brine sludge and calcium carbonate sludge within the NBA (Parametrix, 1990). The high DOC

infiltration water would then dissolve slag and/or iron-bearing minerals deeper within the soil profile resulting in higher iron (and potentially arsenic concentrations) in this area.

Arsenic speciation analyses indicated that the reduced form of arsenic predominates with 63-95% in the arsenite form. Exceptions included two wells MW41 and MW9 in which arsenate predominated (39% and 49% arsenite respectively).

The groundwater chemistry was used to evaluate arsenic fate and transport using geochemical modeling (PHREEQC), Eh-pH diagrams, and calculation of retardation factors. The modeling and Eh-pH diagrams were used to determine if arsenic-bearing minerals are forming at the site, which would act to remove arsenic from the groundwater. The retardation factor was used, along with the groundwater velocity to calculate the arsenic transport velocity. The results are presented below.

9.2.1 Eh-pH Diagrams

Eh-pH diagrams are plots of Eh on the y-axis and pH on the x-axis. The interior fields are calculated for a given system based on the stability of the various minerals and aqueous species included. Boundary lines which separate aqueous fields (such as H_3AsO_4^0 and HAsO_4^{2-}) represent the point at which 50% of the arsenic is present in each form. A boundary which separates a solid field from an aqueous field (such as Fe^{+2} from $\text{Fe}(\text{OH})_3$), represents the point at which the system is in equilibrium with that solid phase. By plotting Eh-pH data from a site on such a diagram, the speciation of arsenic and the iron phases at equilibrium can be predicted.

9.2.1.1 Arsenic Aqueous Species

The arsenic speciation diagram indicated that arsenate would predominate in about half of the wells plotted. This is in contrast to the arsenic speciation analyses, which showed that arsenite predominated in all but two of the wells. The difference between the two results indicates that the system is not in redox equilibrium. Redox disequilibrium would be expected for a system in which redox conditions are changing rapidly, such as would occur at a redox gradient where oxygenated meteoric⁸ water meets more reducing groundwater. Another way to describe the disequilibrium is that as arsenite is oxidized to arsenate, the less mobile arsenate form is removed from solution preferentially to arsenite, leaving the solution relatively enriched in arsenite. The attenuation of arsenate occurs faster than the oxidation of arsenite, creating the disequilibrium.

9.2.1.2 Iron Solid and Aqueous Species

The Eh and pH data from the Site wells (and adjacent areas) plotted on the boundary lines between iron carbonate (FeCO_3) and aqueous ferrous iron (Fe^{+2}) and between ferric hydroxide ($\text{Fe}(\text{OH})_3$) and aqueous ferrous iron. These results suggest that iron concentrations are controlled by iron carbonate and possibly ferric hydroxide. These iron-bearing phases have the potential to coprecipitate arsenic.

9.2.1.3 Sulfur Solid and Aqueous Species

The sulfur Eh-pH diagram shows that the groundwater conditions are not sulfate-reducing, which indicates that solid sulfide minerals are not likely to form. Therefore, arsenic is likely not being removed from solution by the formation of sulfide minerals.

⁸ Water that is derived from precipitation.

9.2.2 PHREEQC Modeling

PHREEQC is a geochemical equilibrium model that determines the saturation state of various minerals based on the chemistry of the groundwater used as input to the model. The model showed that most of the groundwater was either in equilibrium with or nearly in equilibrium with iron carbonate, which was consistent with the Eh-pH diagram. The model also predicted that iron phosphate minerals were in equilibrium. Ferric hydroxide was predicted to be undersaturated (not predicted to be forming).

The fact that the ferric hydroxide phase appears to be undersaturated based on the PHREEQC modeling (**Table J-4 in Appendix J**) does not necessarily mean that this phase is not forming within the aquifer. The analyses used in the PHREEQC modeling were obtained from wells sampled using low flow techniques. The sampling tube would not typically be placed near the top of the saturated zone where the oxygen concentrations would be higher. Sites which have reduced groundwater which are recharged by meteoric water tend to develop a redox gradient where the meteoric water meets the more reduced groundwater. The redox gradient where the conditions change from iron-reducing to iron oxidizing may only represent a foot of saturated thickness. Therefore, a sample collected from deeper than about a foot below the groundwater surface will consist of the iron-reducing water in which iron oxyhydroxides are predicted to be undersaturated. Further evidence that some iron oxyhydroxides are forming at the Site will be presented below when discussing the effect of hydrocarbons on arsenic mobility.

9.2.3 Effect of Hydrocarbons

The area which was impacted by the hydrocarbon release from the Bunker C tank extends into the area of wells MW29, MW36, MW37 and MW38, as discussed in Section 8.2. Arsenic transport in this area is of more concern than in other areas of the Site due to the following:

1. The hydrocarbon release occurred within an area which contained arsenic-bearing waste.
2. The surface aquifer is thicker in this area due to the presence of drainage features within the historic land surface. Groundwater appears to be funneled into this area based on the groundwater contours (**Figure 10**) and probably represents a groundwater discharge area.
3. Wood debris is also present in the vicinity of the arsenic-bearing waste materials.
4. The area is adjacent to the Murray Pacific Property, which is currently unpaved and an area of groundwater recharge.
5. MW-37 contained fine bits of slag
6. Several borings in this area contained elevated soil arsenic in contact with the water table.
7. This area was beneath the waste material berm, which contained highly leachable arsenic wastes.

The redox data (Eh) indicate that the groundwater in the hydrocarbon plume area is currently no more reducing than in other areas. Similarly, DOC concentrations in this area (**Table J-5 in Appendix J**) are not elevated relative to the other wells. The removal of the Bunker C-impacted soils should have

limited the hydrocarbon plume expansion (stage 1) and initiated stage 2 (steady state) and stage 3 (plume retreat). Indeed, the hydrocarbon data discussed in Section 8.2 show that the hydrocarbon plume has biotically degraded and currently consists of polar compounds that are degradation products of TPH (i.e., ketones, aldehydes, alcohols, and acid/esters). However, the presence of residual wood waste and weathered hydrocarbons (albeit low) in the area has likely greatly decreased the rate at which the arsenic plume underlying the area of the former berm is attenuating, because these residual wastes provide organic acids that prevent the arsenic from oxidizing. The situation is also complicated by the apparent “funneling” of groundwater through this area, which may be transporting the arsenic along with the higher groundwater flow and which could also be picking up residual arsenic from the Murray Pacific Property and similarly inhibiting its attenuation.

9.2.4 Arsenic Retardation

The degree to which the velocity of arsenic is decreased by attenuation processes is determined by the value of the retardation factor (R), which is calculated from the dry bulk density and porosity of the aquifer matrix and the partition coefficient (Kd) for arsenic. In general, the higher the Kd, the slower the arsenic will be transported for a given aquifer. Kd values estimated for the Site and adjacent properties by comparing groundwater concentrations within wells to corresponding soil concentrations from the well borings ranged from 28 to 7,000 liters per kilogram (L/kg) (See **Appendix J, Table J-6**). Because a bench scale test to calculate Site-specific Kd values was not performed for the Taylor Way property, the Kd determined for the high pH areas of the Arkema site was used to calculate a neutral pH Kd value for the Site, which was very conservatively estimated to be 3.26 L/kg. Using this very conservatively low Kd value resulted in a retardation factor of 27.9, meaning that arsenic travels about 28 times slower than the groundwater. Using the wet weather groundwater velocity between wells MW5 and MW9 from **Table 2-2** of 0.09 ft/day results in an arsenic travel velocity of 0.0012 ft/day. The distance between wells MW5 and MW9 is 437 ft which results in an arsenic travel time between these two wells of 372 years. The hydrogeological parameters used to calculate the arsenic travel time are relatively insensitive to the retardation factor within the range of possible values. For instance, replacing the effective porosity used (0.2) with a value as high as 0.5 results in a retardation factor of 11.7 ($1 + [1.65/0.5] * 3.25 = 11.7$). These variations are overshadowed by the Kd value, which varies by three orders of magnitude. For instance, a Kd value of 32.5 L/kg (one order of magnitude higher than the value used) results in a retardation factor of 269 ($1 + [1.65/0.2] * 32.5 = 269$). The data in **Table J-6** show that the Kd could be as much as three orders of magnitude higher than the value used.

9.3 Summary

The fate and transport of arsenic at the Site are summarized below:

- Arsenic in groundwater exists predominantly in the reduced arsenite (more mobile) form at the Site. However, oxidation of arsenite to arsenate is likely occurring on mineral surfaces, resulting in enhanced arsenic attenuation through reduced mobility. This process is not reflected by the arsenic speciation data for the groundwater because arsenate is preferentially removed from solution by the attenuation processes as it is created. Below the redox gradient, arsenic would be present mostly in the arsenite form.
- Redox conditions at the Site are not in equilibrium with respect to arsenic, DO or DOC, which suggests that a redox gradient is present within the groundwater. A redox gradient occurs where oxygenated meteoric water mixes with relatively reducing groundwater. Minerals can

form within this gradient (such as iron oxyhydroxides) that are not predicted to form deeper within the aquifer. No direct evidence for the formation of iron oxyhydroxides exists for the site. However, the process is so common under similar circumstances (based on voluminous literature studies) that there can be little doubt that it is occurring at the site.

- Iron and arsenic concentrations beneath the redox gradient are likely controlled by the precipitation of iron carbonates and phosphates at the Site, based on the PHREEQC modeling results and the Eh-pH diagram. In other words, the precipitation of these phases removes arsenic from solution, controlling how high groundwater arsenic concentration can go. In the upper part of the aquifer, a redox gradient likely exists where iron is oxidized from ferrous to ferric leading to precipitation of iron oxyhydroxide solids and co-precipitation of arsenic.
- Despite being in the more mobile arsenite form, arsenic has low mobility at the Site due to the formation of iron carbonate, iron phosphate, and iron oxyhydroxide phases, all of which can attenuate arsenic. The formation of these iron-bearing minerals has been shown through the use of PHREEQC modeling and Eh-pH diagrams (see **Appendix J**). Attenuation of both arsenite and arsenate by the iron carbonate mineral siderite has been demonstrated in the literature (Guo et al., 2013). The low mobility of arsenic at the site is evident in the rapid decline of arsenic concentrations from wells completed near residual arsenic sources to wells directly down-gradient.
- Arsenic transport is more of a concern down-gradient of the former Bunker C tank hydrocarbon release due to the proximity to Hylebos Waterway, the presence of arsenic-bearing waste, elevated arsenic in soils, wood waste, and residual hydrocarbons, apparent higher hydraulic conductivity of soils which seems to be causing funneling of groundwater through this area to the Hylebos Waterway
- Arsenic transport at the Site is at least 27.9 times slower than the groundwater velocity, resulting in extremely long transport times for arsenic to travel downgradient (on the order of hundreds of years). The low arsenic mobility is due to formation of arsenic-bearing iron carbonates, iron phosphates and very likely iron oxyhydroxides.

Based on the groundwater arsenic distribution at the site (**Figure 22**) and the arsenic distribution in soil (**Figure 15**) it is clear that groundwater arsenic concentrations decrease rapidly from the residual source areas at the Site. Such behavior is strong evidence that arsenic is being effectively attenuated within the aquifer at the Site. Exceptions to this rule occur where wood waste and/or residual hydrocarbons are present, such as down-gradient of the Bunker C release area (wood waste and residual hydrocarbons). The geochemical evaluation presented in **Appendix J** provides an evaluation of the most likely attenuation mechanisms which are responsible for the rapid removal of arsenic from solution over much of the Site. The most important mechanism is likely coprecipitation of arsenic with iron oxyhydroxides at the interface where the groundwater and infiltration water mix. The mixing zone is the location of a redox gradient where several chemical reactions occur, such as oxidation of arsenic from arsenite to arsenate and oxidation of iron from ferrous to ferric. The removal of arsenic from solution under such conditions as a coprecipitate is well documented in the literature both for arsenate and arsenite, although the process is enhanced for the more oxidized arsenate form.

In the area that contains residual hydrocarbons/wood waste, the attenuation of arsenic is not as effective and arsenic concentrations are higher. The area down-gradient of the former Bunker C hydrocarbon spill contains not only residual hydrocarbons, but wood waste, and residual arsenic-

bearing wastes. This area is of greater concern than for other areas of the Site, particularly because of its proximity to the Hylebos Waterway.

Section 10

Stormwater

10.1 2007 Inspections and Wet Weather Sampling

Under CDM Smith's first Supplemental RI work plan (CDM, 2006) a dry-weather inspection of the stormwater outfall and a wet-weather sampling of the stormwater outfall was conducted in 2007. While stormwater sampling had been conducted previously, as noted in Section 2.5.1, with the exception of the portion of storm drain line between the oil/water separator and the outfall and some of the manholes, USG's stormwater system was replaced during construction of the Carlile facility in 2005. Therefore, stormwater samples collected prior to construction of the Carlile facility are not necessarily representative of current conditions.

During the 2007 dry-weather Supplemental RI inspection, no discharge was observed at the stormwater outfall.

A stormwater runoff sample was collected on February 9, 2007 in general accordance with the conditions outlined in the Supplemental RI Work Plan (CDM, 2006) as follows:

1. The storm event would be preceded by at least 24 hours of no measurable precipitation.
2. Event with an intensity of at least 0.1 inches of rainfall within a 24-hour period
3. Sample collected within the first hour of discharge or as soon as practicable.

These conditions were found to be nearly impossible to achieve for several reasons. First, days of measurable precipitation can extend for weeks on end in Western Washington during the rainy season. Second, the amount and timing of rainfall during any given period of time in Bellevue (CDM Smith's office location) can vary greatly from those in Tacoma. Third, the tidal fluctuations dictate timing of sample collection because the outfall is submerged during periods of high tide and the sample must be collected long enough after low tide so that there has been sufficient time to discharge surface water that has backed up into the system. Regardless, the sample was collected close to the prescribed conditions.

The stormwater sample was analyzed for petroleum hydrocarbons and for total antimony, arsenic, chromium, copper, lead, nickel, and zinc. The analytical report from the 2007 stormwater sampling event is included in **Appendix H**. TPH-D and TPH-O were detected at concentrations of 0.38 and 0.69 mg/kg. Arsenic was detected at 50 µg/l. Chromium, copper, and zinc were detected as summarized in **Table 12**. **Table 12** also presents applicable stormwater/surface water standards. For this, we interpret that the Industrial Stormwater General Permit Benchmark Limits are applicable for detected concentrations of copper and zinc, and for petroleum hydrocarbons. There are no surface water or stormwater standards for chromium. There is no Industrial Stormwater General Permit Benchmark Limit for arsenic, so the lowest surface water standard (5 µg/L) would prevail, which as discussed in Section 5.1.3. The stormwater general permit limits for copper and zinc were not exceeded. No concentration is specified for petroleum hydrocarbons, only the presence of sheen, which was not apparent. The arsenic concentration exceeds the surface water standard by a factor of 10.

10.2 2015 Dry Weather Sampling

On May 19, 2015, CDM Smith, Ecology, and the Port of Tacoma conducted a dry weather inspection of the storm drain system. The inspection began at about 11 a.m. and a low tide of -2.61 feet MLLW was recorded at 12:29 p.m. Samples were collected between 11:40 a.m. and 1 p.m. Inspection of the outfall identified a very low flow (about 250 to 500 milliliters per minute) emanating from the outfall. Further inspections were conducted in the upstream manholes. Approximately the same flow rate was observed in the first manhole upstream of the stormwater treatment system (SDMH#1). The same low flow was also observed in the manhole immediately upgradient of SDMH#1. However, at the time, no dry weather flow was apparent in any manholes or catch basins upgradient of this. The Grading and Storm Drainage Plan in **Appendix A** shows the locations of these manholes.

The outfall and the most upgradient manhole that had dry weather flow were sampled. The samples were collected in laboratory supplied preserved poly bottles (unpreserved in the case of the sample that was later filtered), stored in a chilled cooler and transported under chain-of-custody to Analytical Resources, Inc. (ARI) in Renton, Washington. The outfall sample was analyzed for total arsenic. Because it was impossible to collect a nonturbid sample, the manhole sample was analyzed for total and dissolved arsenic. The sample analyzed for dissolved arsenic was filtered by the laboratory and then preserved. Conductivity was also measured. The results are summarized below and in **Table 12**.

| | | |
|---------|-------------------|----------------------------------|
| Outfall | Total Arsenic | 23 µg/L |
| | Conductivity | 31,000 µmhos/cm (field measured) |
| Manhole | Dissolved Arsenic | 26 µg/L |
| | Total Arsenic | 215 µg/L |
| | Conductivity | 30,700 µmhos/cm (lab measured) |

The total arsenic in the outfall sample and dissolved arsenic in the manhole sample was essentially the same, as were the conductivities. The difference in the total arsenic concentration in the manhole sample, which was higher than the dissolved concentration by an order of magnitude can be attributed to the turbidity. The arsenic concentration in the dry weather flow was greater than the cleanup level by a factor of five. The conductivity of the dry weather flow was surprisingly high as it was not too much lower than marine water and the conductivity in groundwater samples collected from the two closest monitoring wells in this area have been at least ten times lower.

10.3 2015 Taylor Way Dry Weather Sampling

On May 4, 2015, Ecology staff and the City of Tacoma conducted an evaluation of the presence of dry-weather flows in the Taylor Way storm drains lines in the vicinity of several known arsenic-contaminated sites, including the Taylor Way Property. One manhole located in Taylor Way just in front of the south driveway into the Carlile facility was inspected and sampled. The inspection and sampling occurred between 12:00 and 12:55 p.m. The low tide height was -0.69 feet at 11:58 a.m. A very low flow, nearly stagnant, was observed in the manhole coming from the upstream main line. A very slight flow was observed coming from the catch basin in the road adjacent to the manhole. Drawings indicate this first catch basin is fed by a second catch basin in the Carlile driveway, but this

was not observed. It is possible that such a catch basin exists, but that it has been overgrown by the junipers, or was paved over during the redevelopment.

Samples were collected by the City of Tacoma Source Control/Stormwater crew and Ecology staff. The samples were collected in laboratory supplied unpreserved poly bottles and kept chilled. The sample collected from the manhole in front of the Carlile entrance was numbered MH #6760672. The sample was submitted for analysis of total recoverable arsenic. It was not field filtered prior to analysis. Total arsenic was detected in this sample at a concentration of 32.6 µg/L.

While Ecology noted that they attempted to settle out the turbidity in the sample prior to transferring the water into the sample bottle, the sample was not filtered (Mercuri, 2015). It is impossible to collect a nonturbid sample when there is such low flow in the system (the sampling device scrapes bottom). As we observed for the samples collected on the Taylor Way Property the difference between analyzing a turbid sample on a totals versus dissolved basis is significant (order of magnitude). For example, if Ecology's sample had been field filtered it might have showed the same order of magnitude difference as was seen in the storm drain system sample collected by CDM Smith (see Section 10.2). An order of magnitude reduction of arsenic from 32.6 µg/L is 3.26 µg/L, which is less than the surface water standard of 5 µg/L. Further, as was noted by Ecology, the sample collected contained flow from the upstream main line and the line originating in front of the Taylor Way Property. Based on these factors, it is CDM Smith's opinion that the results of this sampling is inconclusive.

10.4 Storm Drain System Camera Survey

On September 10, 2015 CDM Smith conducted a camera survey of a portion of the Carlile facility's storm drain line. Applied Professional Services, Inc. (APS) was subcontracted to conduct the camera survey. The purpose of this investigation was to evaluate the current source(s) of dry weather flow into the system. The results of this survey are presented in a memo dated September 29, 2015, which is included in **Appendix A**. Several issues related to the incorrect construction of the most recent storm drain system were identified during this survey. Any or all of these could result in sources of infiltration of groundwater, resulting in the observed dry weather flows. These include:

1. Ground water seepage between catch basin grade risers. The mortar between the risers may be failing or improperly placed.
2. Incorrectly set gaskets at two joints.
3. Inadequately sealed or failing mortar connection at one manhole.
4. A section of the storm drain line between two manholes that was installed with a slope in the wrong direction.
5. Accumulation of water and sediments behind a bag of oyster shells installed in one catch basin.
6. A possible older line that should have been sealed.

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Section 11

Conceptual Site Model

11.1 Residual Contamination and Sources

Interim actions on the Taylor Way Property have substantially removed arsenic and lead-containing sources in soils (i.e., baghouse dust, shot, slag, and off-spec material). However, there are areas where scattered pieces of slag or thin lenses of shot or slag exist. These areas include:

- The western portion of the former railroad spur (upper 1.5 to 4 ft).
- A single boring location (DPT10) in the central-southwestern side of the property at 6 feet bgs.
- The southern portion of the Taylor Way Property along the property line with the NBA (approx. 3 ft bgs)
- The area of the Murray Pacific and Taylor Way Property line near the Hylebos Waterway (6 to 7 feet bgs).
- In various areas the shallow fill layer (e.g., the original base course gravel underlying the newer base course material in the upper 3 ft) also contains scattered slag or shot.

In addition to areas where visible source material was identified, arsenic concentrations in soils throughout the Taylor Way Property still commonly exceed the MTCA Method A unrestricted land use/industrial soil cleanup level of 20 mg/kg. Arsenic concentrations also frequently exceed the Method C carcinogenic-based cleanup level of 87.5 mg/kg, as well as the prior Method A industrial cleanup level of 200 mg/kg. Elevated arsenic concentrations in soils exist because of: a) the presence of residual source material (i.e., slag, shot), and b) leaching of arsenic from the original source materials, most particularly baghouse dust. Soils containing greater than 1,000 mg/kg arsenic, however, either contain visible residual source material or are in close proximity to residual source material. **Figure 24** illustrates the boring and excavation limit sample locations where arsenic concentrations exceed 87 mg/kg. These locations are further broken out by arsenic concentrations ranging between >87 and 200 mg/kg; >200 to 1,000 mg/kg; and >1,000 mg/kg. Locations where apparent residual source material is also present are also indicated on **Figure 24**.

Soils that contain arsenic concentrations exceeding 1,000 mg/kg occur primarily along the former railroad spur. Limited occurrences of soils containing greater than 1,000 mg/kg arsenic also occurred: 1) at the south corner of the Taylor Way Property, and 2) on the Murray Pacific Property next to the Hylebos Waterway and the Taylor Way Property boundary. Offsite, within the NBA, areas of arsenic concentrations exceeding 1,000 mg/kg also occur. However, arsenic source(s) in the NBA have not been agreed upon and are not the subject of this RI (see Section 1.4.2).

Because of the variable nature in which the source material occurs and environmental dynamics at specific locations, the depth of contamination is also quite variable. For example, relatively high arsenic concentrations occur for a distance of about 100 feet in the MW28/MW29 area adjacent to the Hylebos Waterway. In this area arsenic concentrations approaching 200 mg/kg or greater occur at depths between 5.5 and 10 feet bgs, and in a very thin layer at approximately the groundwater

interface, arsenic concentrations over 1,000 mg/kg were observed. This appears to be the result of the presence of a relatively small amount of residual slag in combination with the geochemical effects caused by a residual hydrocarbon plume and wood debris (i.e., increased leachability). Conversely, in the northeastern end of the railroad spur, 3-inch to 7-inch layers or pockets of shot and slag exist in soils at depths between 1.5 and 4 feet bgs. Arsenic concentrations in these soils range up to 20,700 mg/kg. However, even with the water table averaging about 3.5 feet bgs, without the presence of significant organics, such as wood debris or a hydrocarbon plume, arsenic migration is minimized and typically arsenic concentrations in soils at depths below 4 feet in this area are non-detect. In the south corner for a distance of about 150 feet along the property line with the Arkema site, slag fragments were observed at approximately 3 feet bgs, with arsenic concentrations ranging up to 1,130 mg/kg. Perhaps because of the higher water table in this area (seasonally as shallow as 1.75 feet bgs) and the presence of organics such as charcoal and wood debris in the underlying fill soils, elevated arsenic concentrations (i.e., 100 to 300 mg/kg) are sometimes observed at depths between 5 and 8 feet bgs.

Another area is DPT10, where a 5-inch black lens with an arsenic concentration of nearly 1,000 mg/kg was observed at a depth of 6 feet bgs. But at 7 feet bgs, the arsenic concentration declined to only 44 mg/kg. No significant organics were present at this location and groundwater data from downgradient wells suggests the arsenic concentrations attenuate quickly in groundwater.

In summary, arsenic concentrations in soils decline significantly within a very short interval of source materials unless organics are present. Other areas throughout the site where arsenic concentrations are relatively high (i.e., greater than 200 mg/kg), but where source material has not been observed, occur within the upper 3 feet of soils, with the exception of the MW9 area due to the greater overall historical impacts by baghouse dust. In every sample where lead exceeded the Method A industrial value of 1,000 mg/kg, arsenic concentrations also exceeded 1,000 mg/kg in either or both the laboratory analyzed or XRF analyzed samples. Where lead concentrations were greater than the Method A unrestricted land use value of 250 mg/kg, but less 1,000 mg/kg, arsenic concentrations were 100 mg/kg or more. Very simply, soils containing high lead concentrations occur where residual source material is present or is in the immediate vicinity.

11.2 Contaminant Migration and Attenuation

11.2.1 Dissolution of Source Material

Arsenic and metals are released from source material by partial dissolution of source materials. Slag and shot consist of iron-calcium silicates with inclusions of metal sulfide minerals such as galena (PbS). The arsenic is released when the iron-calcium silicate dissolves into the groundwater, which is undersaturated with respect to iron-calcium silicate. The dissolution of the slag/shot causes the release of arsenic and metals to the groundwater. A similar process would occur with the baghouse dust, which would consist of a ferric iron (Fe+3) oxide phase containing lead and arsenic. Baghouse dust would dissolve under the mildly reducing (iron-reducing) conditions present within the groundwater.

The dissolution of source materials is enhanced by hydrocarbons or the organic acids which can leach from wood waste. The organics can facilitate the dissolution of slag and baghouse dust by complexing the iron (forming aqueous iron fulvate and humate species) and by reducing ferric iron (Fe+3) to the more soluble ferrous iron (Fe+2) and can decrease the rate of oxidation of arsenic from the arsenite form (the form within the wastes) to the less mobile arsenate form. The net result is that the solubility

(and leachability) of the waste materials are increased in the presence of wood waste and/or hydrocarbons.

11.2.2 Attenuation of Arsenic and Metals

Attenuation of arsenic and metals in groundwater occurs in response to precipitation of iron minerals, such as iron carbonate, iron phosphates, and iron oxyhydroxides. Adsorption of arsenic and metals onto the aquifer sediments likely occurs to some extent, but is less important than coprecipitation with iron-bearing minerals. Iron oxyhydroxide occurs in the zone where oxygenated surface water mixes with groundwater. Precipitation of iron carbonates and phosphates can occur without oxidation of the iron (siderite [FeCO_3] and strengite [$\text{FePO}_4 \cdot 2\text{H}_2\text{O}$] both contain iron in the Fe^{+2} oxidation state). In effect, iron dissolves from the source materials resulting in increases in aqueous iron concentrations in the groundwater until the solubility limits of the iron carbonate and phosphate phases is reached. Precipitation of arsenic may also occur in response to mixing of high alkalinity or phosphate infiltration water with groundwater containing ferrous iron. The PHREEQC modeling results shown in **Appendix J** demonstrate that both iron carbonate (siderite) and iron phosphates are at equilibrium, which is a strong indication that these phases are forming within the aquifer at the Site. As discussed in Section 9, both iron carbonates and iron phosphates have been shown in the literature to attenuate both arsenite and arsenate.

The net result of the attenuation processes is that arsenic is transported a minimum of 28 times slower than the groundwater (see Section 9.2.4 and **Appendix J**). Using the most conservative arsenic partition coefficient and the wet weather groundwater velocity, the time for arsenic to travel from well MW9 to MW5 (437 ft.) is 372 years.

The transport of arsenic within the area at the Murray Pacific/Taylor Way Property line adjacent to the Hylebos Waterway, which is impacted by the Bunker C release and residual wood waste, appears to be slow, based on the K_d values (28 – 7,000 L/kg) (see Section 9.2.4 and **Appendix J**) calculated in this area. However, the groundwater contours indicate an area of higher hydraulic conductivity exists in this area. This, and the proximity of the relatively higher arsenic concentrations in groundwater to the adjacent Hylebos Waterway, increase the potential for impact to the surface water.

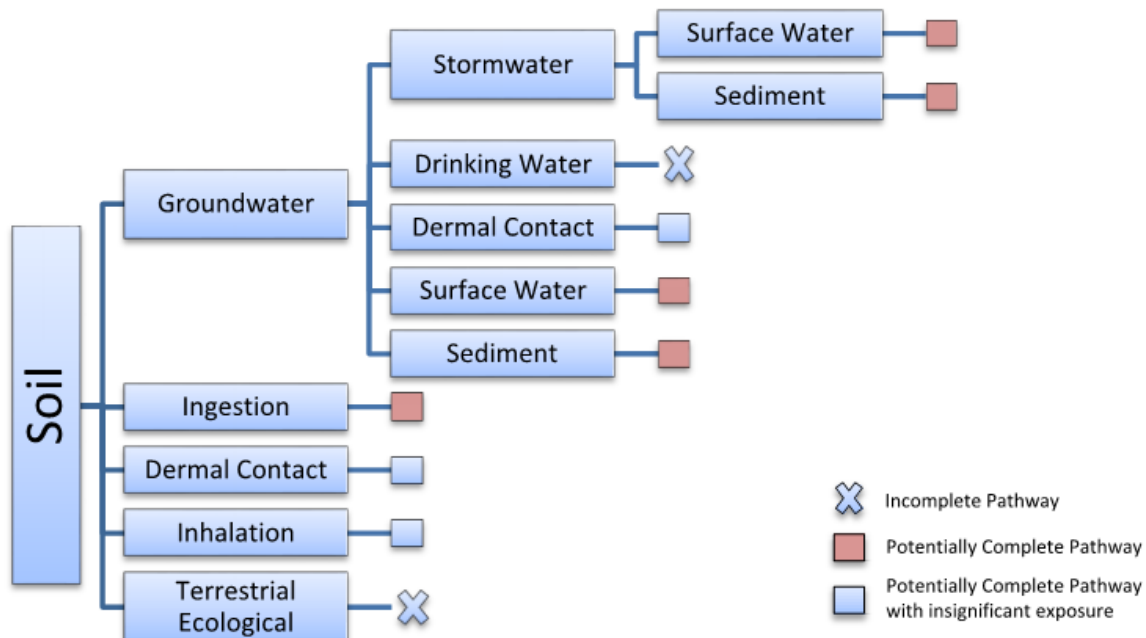
11.3 Potential Receptors and Pathways

The potential exposure receptors evaluated for this Site include:

1. Human Direct Exposure to Soil (i.e., ingestion, dermal contact, inhalation)
2. Human Direct Exposure to Groundwater (i.e., ingestion, dermal contact)
3. Surface Water (i.e., protection of marine life and sediment quality - bioaccumulation up the food chain).
4. Terrestrial Ecological (i.e., soil biota, wildlife, plants)

Figure 11-1 below summarizes the conceptual exposure model for contaminants originating on the Taylor Way property, a discussion of which follows.

Figure 11-1 Source and Exposure Medium Summary – Taylor Way Property



Based on its current use as a fully developed industrial property that is covered by buildings and pavement, direct human exposures to contaminated soil are possible, but unlikely to occur with any regularity. Examples of potential human exposures include such activities as new construction (e.g., to install a new building foundation) or to repair or install new underground utilities. Such activities are likely to be infrequent and of short duration. Potential future exposures to soils would be controlled by an environmental covenant and development and implementation of remediation levels intended to be protective of human health under specified potential exposure conditions. This will be necessary for the Site as part of any final remedial design (short of removing the existing infrastructure and excavating soils throughout the entire property to the tideflat layer)

As indicated in Section 5.2, the risk for the terrestrial ecological organisms was ended because the Site is industrial and all hazardous substances are covered by physical barriers that will prevent plants or wildlife from being exposed.

Human exposures to groundwater would only likely ever occur via direct contact and this is even less likely to occur than for contaminated soils. The surface and second aquifer groundwater at the Site are not suitable potential drinking water sources, regardless of the arsenic concentrations, based on secondary water quality criteria. For example, the secondary drinking water standard of 250 mg/L for chloride was exceeded at MW4, MW5 and MW6 (780 to 3,370 mg/L). The secondary drinking water standard of 500 mg/L for total dissolved solids was exceeded for MW1, MW5, and MW30 (643 to 5,630 mg/L) (USEPA, 2012). In addition, the salinity values are typically much greater than optimum for potable water. Typical conductivity ranges for potable water in the United States are between 30 and 1,500 $\mu\text{mhos/cm}$ (SWRCB, 2004). Except for MW9, which had a conductivity of approximately 800 $\mu\text{mhos/cm}$ in 2008/2012, the conductivity values for all surface aquifer wells on the Taylor Way property exceeded 1,500 $\mu\text{mhos/cm}$ one or more times during the past 6 years, ranging up to a high of 12,600 $\mu\text{mhos/cm}$ in MW6. The conductivity values for the second aquifer wells are higher, ranging from 5,120 to 29,000 $\mu\text{mhos/cm}$ as this aquifer is influenced by saltwater intrusion. Based on arsenic concentrations in groundwater at the conditional point of compliance (the

edge of the tide bank at the Hylebos Waterway) the groundwater to surface water pathway is a likely complete pathway that will need to be addressed in the development of remedial alternatives for the Site.

The groundwater to stormwater (and ultimately discharge to surface water) pathway remains as likely complete. There are two areas where groundwater to stormwater discharges may be occurring. The first is the Carlile storm drain system where a low dry weather flow rate (i.e., 250 to 500 ml/min) was identified. As described in Section 10.4, the system, which was reconstructed in 2005 for the Carlile facility, has several areas where groundwater infiltration can occur.

The second potential discharge is to the City-owned storm drain system in Taylor Way. An initial round of inspection/sampling conducted by Ecology indicates that there is a very low rate of infiltration into the storm drain system in front of the Carlile facility and that it contains an elevated arsenic concentration. However, CDM Smith has concluded that the data are inconclusive because: a) the sample was analyzed on a totals basis, b) the sampled water was mixed with water from the upstream flow (i.e., the main trunk), c) the line is essentially upgradient of the Site, and d) there are additional sources of arsenic contamination in the NBA and adjacent railroad right-of-way. Nevertheless, high concentrations of arsenic in groundwater in the vicinity of City of Tacoma storm and sewer lines is a pathway of concern for the Site and other nearby sites that are similarly contaminated with arsenic.

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Section 12

Conclusions

The uncertainty of all historical sources both on and off of the Taylor Way Property and complex geochemistry at the Site make it virtually impossible to precisely define all arsenic concentrations in soil and groundwater throughout the Site at any given moment in time. With that said, it is CDM Smith's opinion that soil and groundwater investigations completed to date have been sufficient to allow proceeding with the completion of a Feasibility Study. The following sections summarize the most salient conclusions of this Supplemental RI regarding the nature and extent of residual soil and groundwater contamination on the Site necessary to developing the FS.

12.1 Soils

- Interim actions on the Taylor Way Property have removed substantial amounts of arsenic-containing sources in soils (i.e., baghouse dust, shot, slag, and off-spec material). However, there are areas, generally within the upper 4 feet, where scattered pieces of slag and thin lenses of shot or slag exist. At two locations source material was identified at depths of 6-7 feet bgs. The preponderance of soil data, combined with the groundwater data, indicate the most highly leachable source material (i.e., baghouse dust) has been substantially removed throughout the Taylor Way Property.
- Arsenic concentrations in soils throughout the Taylor Way Property still commonly exceed the MTCA Method A soil cleanup level of 20 mg/kg. This is much more prevalent than residual source material as it was caused by the leaching of historic source materials and subsequent adsorption onto soils.
- Arsenic concentrations close to or exceeding 1,000 mg/kg occur in three areas on the Taylor Way Property and are associated with the presence of residual source material.
 - Arsenic concentrations exceeding 1,000 mg/kg occurs along the former railroad spur. Shot or slag were observed at depths ranging between approximately 1.5 and 4 feet below ground surface (bgs) in four borings and one test pit located within this area. The shot or slag occurred in 4 to 7-inch thick lenses
 - An area with soil exceeding 1,000 mg/kg occurs in the south corner along the property line adjacent to the NBA. Apparent slag was observed at approximately 3 feet bgs in three borings located within this area, either as a 6-inch lens or scattered pieces.
 - DPT10 contained 960 mg/kg within a 5" thick black lens of source material, at a depth of 6 feet bgs.
- Arsenic concentrations on the Murray Pacific Property were found to be low, consistent with remediation of that property with one exception. Along the edge of the tide bank next to the Murray Pacific/Taylor Way Property line arsenic concentrations, beginning at about 5.5 ft bgs (about 1.5 ft above the saturated zone) and throughout the saturated zone (to about 10 ft bgs), are typically around 200 mg/kg. In a very thin layer at approximately the groundwater

interface, arsenic concentrations over 1,000 mg/kg were observed. In one of the two boreholes where arsenic concentrations exceeded 1,000 mg/kg wood fibers were noted at the same depth.

- Arsenic concentrations in soils decline significantly within a very short interval of source materials unless organics are present, which appears to occur within the Murray Pacific/Taylor Way Property line and the south corner area. Other areas throughout the site where arsenic concentrations are relatively high (i.e., greater than 200 mg/kg), but where source material has not been observed, occur within the upper 3 feet, with the exception of the MW9 area which had greater overall historical impacts by baghouse dust.
- In the NBA, two areas with arsenic and lead concentrations greater than 1,000 mg/kg were identified. One area, which generally occurs in the 4- to 7-foot depth (with elevated arsenic concentration extending as much as 13 feet deep) occurs in a historical low spot that was frequently inundated by Waggoner's Wallow and is adjacent to the Taylor Way Property, across from the baghouse and where waste materials exited the building. The second area is shallower, generally within the 0 to 3-foot interval, and occurs next to and south of the hypochlorite pond. Three isolated boring locations with arsenic concentrations over 100 mg/kg at depths of 10 feet bgs were noted, including at two borings next to Waggoner's Wallow and one boring in the railroad right-of-way.
- Because it does not have the same propensity to leach as arsenic, elevated lead concentrations are associated with the presence of ASARCO-related source material. As such, elevated lead concentrations (i.e., exceeding industrial land use Method A standards) are typically present in the few scattered locations where residual source material still exists.
- IAs conducted by USGI and Thermafiber removed all petroleum hydrocarbon-contaminated soils on the Taylor Way Property.

12.2 Groundwater

12.2.1 Surface Aquifer

Based on the current and most complete sets of water level data, a groundwater mound located in the NBA about 225 feet northeast of the Taylor Way Property's south corner and adjacent to the property boundary causes groundwater to flow north-northwest into the Taylor Way Property and northeast across the NBA. On the Taylor Way Property, groundwater flows in a northerly direction. On the Murray Pacific Property, groundwater flows in an easterly direction. The groundwater flow on the Murray Pacific and Taylor Way Properties converges at about the property line, which appears to be the discharge to the Hylebos Waterway. The average groundwater velocity across the Taylor Way Property was calculated at 12 ft/yr. The tidal effect on the surface aquifer is very minor (0.10-0.18 ft) within distances of 30 to 60 feet of the waterway.

The average arsenic concentrations in the surface aquifer monitoring wells on the Taylor Way Property for the years 2006-2014 range between 1.6 µg/L and 1,040 µg/L (1 to 4 data points per well). Arsenic in groundwater exists predominantly in the reduced arsenite (mobile) form at the Site. However, iron and arsenic concentrations are attenuated by ferric and ferrous phosphates, ferrous carbonates and ferric oxyhydroxides, which results in arsenic transport being 27.9 times slower than the groundwater, resulting in extremely long travel times for arsenic to travel downgradient (on the order of hundreds of years).

The distribution of arsenic in groundwater is very complex. Arsenic concentrations in groundwater are not strictly correlative with arsenic concentrations in soils. Other factors such as the leachability of the residual source material, the subsurface-specific chemistry, presence of organics (i.e., wood, TPH metabolites) and seasonal gradients all factor into the arsenic concentrations at any given location.

Some of the more salient groundwater findings are summarized below:

- The success of removing source materials in reducing arsenic concentrations in groundwater is most profoundly demonstrated at MW9, which historically had the highest arsenic concentrations because it was located in the midst of substantial buried source material. Arsenic concentrations have declined by three orders of magnitude from 19,000 µg/L in 1998 to an average of 55 µg/L between 2006 and 2012.
- Arsenic concentrations inland from the Hylebos Waterway exceed 5 µg/L. However, soil and groundwater data have shown that: 1) most residual source materials are not in contact with groundwater, 2) most residual source materials are not highly leachable, 3) remaining source areas of any significance occur greater than 500 feet from the Hylebos Waterway, and 4) arsenic concentrations attenuate by an order of magnitude for every 75 to 150 feet of distance from the source.
- Except at the property line with the Murray Pacific Property, arsenic concentrations in groundwater on the Taylor Way Property where it abuts the Hylebos Waterway (MW5 and MW6) are very low (less than 4 µg/L). Using the MTCA Method A cleanup level of 5 µg/L as the concentration that is protective of surface water, these arsenic concentrations are protective of surface water.
- The leachability of arsenic in soils at the Murray Pacific and Taylor Way Property boundary adjacent to the Hylebos Waterway may have been enhanced by the presence of a residual hydrocarbon plume and wood waste, resulting in relatively higher dissolved arsenic concentrations in the surface aquifer at this location (i.e., up to ~870 µg/L). Additionally, this is one of the areas on the site where high concentrations of arsenic are present in soils within the surface aquifer.
- Arsenic concentrations generally decline between the northern Taylor Way Property boundary and wells located inland on the Murray Pacific Property. However, arsenic concentrations in groundwater at wells along the tide bank are greater than in wells located inland from the tide bank wells, which means there is an additional source of arsenic on the Murray Pacific Property adjacent to the Hylebos Waterway that is not linked to USGI's former activities. Groundwater samples collected on the Murray Pacific Property are generally consistent with – or lower than – earlier data when Ecology acknowledged that the consent decree requirements had been satisfactorily completed; however, arsenic concentrations exceed 5 µg/L.
- Arsenic concentrations in groundwater near the southern corner of the Taylor Way Property adjacent to the NBA are variable and often higher than anywhere else on the Site. Given the inland nature of the MW1 area and the ability of the Site to attenuate arsenic, there is no reason to believe that this area would directly impact the Hylebos Waterway. However, there is potential for the contaminated groundwater to enter the City of Tacoma storm drain line in Taylor Way, which discharges to the Hylebos Waterway at Lincoln Avenue.

- The other metals of potential concern (i.e., antimony, cadmium, chromium, copper, lead, nickel, and zinc) have also attenuated concurrent with IAs and do not currently exceed marine life protective surface water standards. Antimony exceeds human health-based standards at two locations (MW9 and MW4); however, these two wells are upgradient and significantly distant from the Hylebos Waterway, such that it is attenuated before reaching the Hylebos.
- Both diesel and oil-range total petroleum hydrocarbon concentrations exceed the MTCA Method A cleanup level at the USGI/Murray Pacific property line adjacent to the Hylebos Waterway, just downgradient of the historical Bunker C AST remedial excavation area. The width of the plume adjacent to the Hylebos Waterway is approximately 100 feet or less. However, as indicated above, this weathered hydrocarbon plume appears to be enhancing the solubility of residual arsenic within this area.

12.2.2 Second Aquifer

The groundwater flow direction in the second aquifer is generally northeasterly toward the Hylebos Waterway; however, during periods of low tide a reversal toward the southwest extends halfway into the Site.

With the exception of arsenic at MW13R, metals concentrations in the second aquifer have similarly declined over time, subsequent to the completion of IAs and current concentrations are below or only slightly above surface water and human health-based standards. Any exceedances are minor and occur in the upgradient wells.

At MW13R, the arsenic concentration in a sample collected by DOF in 2012 was reported at 188 µg/L. Considering that: 1) arsenic concentrations at this well in 2002 and 2006 were 5.1 and 11 µg/L, respectively, and 2) this concentration is nearly three times higher than ever reported for this well over the past 18 years, this concentration is anomalous and suspect.

12.3 Stormwater

The storm drain system on the Taylor Way Property has a low rate of flow during dry weather, indicating there is a source of groundwater infiltration into the stormwater system. A camera survey conducted on the system indicates the source of dry weather flow is related to unsealed areas in the Carlile Trucking storm drain system. Additionally, there is potential for contaminated groundwater to infiltrate the City of Tacoma storm drain system in the vicinity of the south corner of the Taylor Way Property.

12.4 Data Gaps

CDM Smith identified the following data gaps, with the recommendation for further evaluation during the FS:

- Additional sampling needs to be conducted at MW13R to verify the anomalous 2012 arsenic concentration.
- The extent of arsenic contamination in soils along the form railroad spur between DPT2 and the western corner is not defined.
- The extent of arsenic around the DPT10 boring is not defined.

Section 13

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Tables

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Table 1

Groundwater Elevation Data

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Well | Depth | Water | Time | High Tide ^b | | Low Tide ^b | |
|----------------------------------|----------|------------------------|----------|-----------|------------|------------------------|-----------|-----------------------|-----------|
| | | Elevation ^a | to Water | Elevation | | Time | Elevation | Time | Elevation |
| | | feet | ft TOC | feet | Measured | | feet | | feet |
| Surface Aquifer | | | | | | | | | |
| Taylor Way Property Wells | | | | | | | | | |
| MW1R | 01/30/07 | 16.92 | 2.36 | 14.56 | 1:47 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 2.44 | 14.48 | 10:44 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 2.35 | 14.57 | 8:39 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 2.38 | 14.54 | 12:21 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 2.31 | 14.61 | 4:00 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 1.75 | 15.17 | 12:28 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 4.97 | 11.95 | 5:07 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 4.81 | 12.11 | 11:19 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 3.25 | 13.67 | 4:10 p.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 14.25 ^c | 1.87 | 12.38 | 12:00 p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW2 | 01/30/07 | 16.22 | 5.03 | 11.19 | 1:50 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 5.01 | 11.21 | 10:53 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 5.10 | 11.12 | 9:20 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 5.09 | 11.13 | 12:27 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 5.08 | 11.14 | 4:13 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 4.96 | 11.26 | 12:33 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 5.15 | 11.07 | 5:10 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 5.23 | 10.99 | 11:28 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 13.55 ^c | 5.44 | 8.11 | 12:07p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW4 | 01/30/07 | 19.04 | 7.28 | 11.76 | 2:27 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 7.31 | 11.73 | 11:25 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 7.37 | 11.67 | 8:45 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.40 | 11.64 | 12:35 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.39 | 11.65 | 4:26 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.20 | 11.84 | 12:12 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 7.97 | 11.07 | 5:04 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 8.13 | 10.91 | 10:46 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 16.37 ^c | 7.66 | 8.71 | 11:38 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW5 | 01/30/07 | 21.22 | 10.02 | 11.20 | 2:18 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 10.04 | 11.18 | 11:23 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 10.10 | 11.12 | 8:47 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 10.08 | 11.14 | 12:40 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 10.06 | 11.16 | 4:30 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 9.95 | 11.27 | 12:10 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 10.41 | 10.81 | 5:02 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 10.44 | 10.78 | 10:44 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 10.16 | 11.06 | 8:48 a.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 18.55 ^c | 10.27 | 8.28 | 11:43 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW6 | 01/30/07 | 17.73 | 7.23 | 10.50 | 2:16 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 7.19 | 10.54 | 11:20 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 7.50 | 10.23 | 8:51 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.39 | 10.34 | 12:43 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.39 | 10.34 | 4:34 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.09 | 10.64 | 12:07 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 6.85 | 10.88 | 5:00 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 6.88 | 10.85 | 10:42 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 15.06 ^c | 7.54 | 7.52 | 11:52 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |

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Groundwater Elevation Data

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Well | Depth | Water | Time | High Tide ^b | | Low Tide ^b | |
|----------------------------------|--------------------|------------------------|----------|------------|------------|------------------------|------------|-----------------------|-----------|
| | | Elevation ^a | to Water | Elevation | | Time | Elevation | Time | Elevation |
| | | feet | ft TOC | feet | Measured | | feet | | feet |
| Surface Aquifer | | | | | | | | | |
| Taylor Way Property Wells | | | | | | | | | |
| MW9 | 01/30/07 | 16.46 | 2.87 | 13.59 | 2:40 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 2.96 | 13.50 | 10:48 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 3.12 | 13.34 | 8:40 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 3.10 | 13.36 | 12:24 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 3.10 | 13.36 | 4:05 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 2.27 | 14.19 | 12:31 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 5.22 | 11.24 | 2:27 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 5.21 | 11.25 | 11:23 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 13.79 ^c | 2.47 | 11.32 | 12:04 p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW25 | 01/30/07 | 17.43 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 6.71 | 10.72 | 11:10 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 6.68 | 10.75 | 9:03 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 6.63 | 10.80 | 12:51 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 6.64 | 10.79 | 4:47 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 6.55 | 10.88 | 11:59 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 6.57 | 10.86 | 4:53 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 6.45 | 10.98 | 10:53 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 6.24 | 11.19 | 11:21 a.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| 01/16/14 | 14.76 ^c | 6.90 | 7.86 | 11:05 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 | |
| MW27 | 01/30/07 | 17.64 | 3.43 | 14.21 | 1:57 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 3.47 | 14.17 | 10:58 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 3.44 | 14.20 | 9:12 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 3.44 | 14.20 | 12:59 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 3.46 | 14.18 | 5:10 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 2.94 | 14.70 | 12:20 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 3.87 | 13.77 | 4:44 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 3.81 | 13.83 | 11:09 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 14.97 ^c | 4.70 | 10.27 | 10:40 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW30 | 01/30/07 | 17.72 | 5.15 | 12.57 | 2:03 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 5.17 | 12.55 | 11:04 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 5.11 | 12.61 | 9:08 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 5.10 | 12.62 | 12:57 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 5.11 | 12.61 | 5:07 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 4.85 | 12.87 | 12:18 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 5.30 | 12.42 | 4:46 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 5.17 | 12.55 | 10:59 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 5.07 | 12.65 | 12:36 a.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| 01/16/14 | 15.05 ^c | 5.93 | 9.12 | 11:15 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 | |
| MW36 | 01/16/14 | 14.71 ^c | 7.27 | 7.44 | 12:16 p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW37 | 01/16/14 | 16.10 ^c | 8.78 | 7.32 | 12:13 p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |

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Table 1

Groundwater Elevation Data

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Well | Depth | Water | Time | High Tide ^b | | Low Tide ^b | |
|--------------------------------------|----------|------------------------|----------|-----------|------------|------------------------|-----------|-----------------------|-----------|
| | | Elevation ^a | to Water | Elevation | | Time | Elevation | Time | Elevation |
| | | feet | ft TOC | feet | Measured | | feet | | feet |
| Surface Aquifer | | | | | | | | | |
| Murray Pacific Property Wells | | | | | | | | | |
| MW17 | 08/27/08 | 17.88 | 6.73 | 11.15 | 5:22 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 6.79 | 11.09 | 10:10 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 15.21 ^c | 6.75 | 8.46 | 11:53 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW29 | 01/30/07 | 18.10 | 7.70 | 10.40 | 2:11 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 7.71 | 10.39 | 11:14 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 7.84 | 10.26 | 8:59 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.76 | 10.34 | 12:49 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.80 | 10.30 | 4:44 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.53 | 10.57 | 12:02 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 7.35 | 10.75 | 4:58 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 7.34 | 10.76 | 10:31 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 15.43 ^c | 7.87 | 7.56 | 11:20 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW31 | 08/27/08 | 17.46 | 7.25 | 10.21 | 5:29 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 7.13 | 10.33 | 10:28 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 7.06 | 10.40 | 9:33 a.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 14.79 ^c | 7.12 | 7.67 | 11:58 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW32 | 08/27/08 | 15.23 | 3.86 | 11.37 | 5:18 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 4.03 | 11.20 | 10:22 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 3.98 | 11.25 | 1:49 p.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 12.56 ^c | 3.72 | 8.84 | 11:45 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW33 | 08/27/08 | 15.04 | 4.00 | 11.04 | 5:20 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 4.68 | 10.36 | 9:48 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 4.82 | 10.22 | 3:05 p.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 12.37 ^c | 4.78 | 7.59 | 11:50 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW34 | 08/27/08 | 17.32 | 6.14 | 11.18 | 5:27 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 6.14 | 11.18 | 10:50 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 5.90 | 11.42 | 8:51 a.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 14.65 ^c | 6.45 | 8.20 | 12:20 p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW35 | 08/27/08 | 16.86 | 5.37 | 11.49 | 4:52 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 5.16 | 11.70 | 11:04 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 4.74 | 12.12 | 10:31 a.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 14.19 ^c | 5.44 | 8.75 | 11:00 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW38 | 01/16/14 | 15.09 ^c | 7.49 | 7.60 | 12:05 p.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW39 | 01/16/14 | 13.95 ^c | 3.06 | 10.89 | 10:50 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW40 | 01/16/14 | 12.53 ^c | 3.22 | 9.31 | 11:25 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW41 | 01/16/14 | 13.15 ^c | 4.37 | 8.78 | 11:30 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| MW42 | 01/16/14 | 13.27 ^c | 6.10 | 7.17 | 11:40 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |

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Table 1

Groundwater Elevation Data

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Well | Depth | Water | Time | High Tide ^b | | Low Tide ^b | |
|------------------------------|----------|------------------------|----------|-----------|------------|------------------------|-----------|-----------------------|-----------|
| | | Elevation ^a | to Water | Elevation | | Time | Elevation | Time | Elevation |
| | | feet | ft TOC | feet | Measured | | feet | | feet |
| Surface Aquifer | | | | | | | | | |
| Arkema Property Wells | | | | | | | | | |
| 1C3-1 | 01/30/07 | 17.96 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | -- | -- | -- | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 2.67 | 15.29 | 9:40 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 2.55 | 15.41 | 1:18 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 2.61 | 15.35 | 3:42 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 2.04 | 15.92 | 11:37 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 6.45 | 11.51 | 4:26 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 5.48 | 12.48 | 11:40 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 06/02/09 | | 3.52 | 14.44 | 2:39 p.m. | 2:42 p.m. | 9.34 | 8:00 a.m. | 1.63 |
| | 01/16/14 | 15.29 ^c | 2.37 | 12.92 | 11:01 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| 2A1-1 | 01/30/07 | 20.21 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 8.07 | 12.14 | 10:30 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 8.31 | 11.90 | 9:31 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 8.21 | 12.00 | 1:10 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 8.22 | 11.99 | 3:34 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.85 | 12.36 | 11:29 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 9.31 | 10.90 | 4:30 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 9.29 | 10.92 | 11:55 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| | 01/16/14 | 17.54 ^c | 8.45 | 9.09 | 11:14 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| | 2B1-1 | 01/30/07 | 20.31 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. |
| 01/31/07 | | | 7.54 | 12.77 | 10:26 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| 02/09/07 | | | 7.68 | 12.63 | 9:36 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| 02/09/07 | | | 7.67 | 12.64 | 1:16 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| 02/09/07 | | | 7.65 | 12.66 | 3:39 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| 02/26/07 | | | 7.27 | 13.04 | 11:32 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| 08/27/08 | | | 9.35 | 10.96 | 4:35 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| 08/29/08 | | | 9.23 | 11.08 | 11:50 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| 01/16/14 | | 17.64 ^c | 7.85 | 9.79 | 11:10 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| 1D1-1 ^d | | 01/30/07 | 20.67 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. |
| | 01/31/07 | | 4.97 | 15.70 | 10:36 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 4.68 | 15.99 | 9:44 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 4.57 | 16.10 | 1:23 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 4.54 | 16.13 | 3:48 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 4.15 | 16.52 | 11:42 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 01/16/14 | 18.00 ^c | 4.45 | 13.55 | 10:51 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| 2C1-1 | 01/16/14 | 16.68 ^c | 3.63 | 13.05 | 10:57 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| 3A3-1R | 01/16/14 | 18.72 ^c | 9.69 | 9.03 | 11:17 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |
| 1B4-1 | 01/16/14 | 16.23 ^c | 1.56 | 14.67 | 11:06 a.m. | 5:56 a.m. | 12.26 | 11:36 a.m. | 6.53 |

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Table 1

Groundwater Elevation Data

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Well | Depth | Water | Time Measured | High Tide ^b | | Low Tide ^b | |
|--------------------------------------|----------|--------------------------------|--------------------|-------------------|---------------|------------------------|-------------------|-----------------------|-------------------|
| | | Elevation ^a feet | to Water ft TOC | Elevation feet | | Time | Elevation feet | Time | Elevation feet |
| Second Aquifer | | | | | | | | | |
| Taylor Way Property Wells | | | | | | | | | |
| MW13R | 01/30/07 | 17.12 | 5.79 | 11.33 | 1:44 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 5.80 | 11.32 | 10:46 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 5.96 | 11.16 | 8:36 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 6.04 | 11.08 | 12:20 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 6.03 | 11.09 | 3:58 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 5.88 | 11.24 | 12:27 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 6.54 | 10.58 | 5:08 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 7.65 | 9.47 | 11:18 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| MW14 | 01/30/07 | 16.74 | 8.37 | 8.37 | 1:54 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 8.73 | 8.01 | 10:54 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 8.56 | 8.18 | 9:19 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.68 | 9.06 | 12:29 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 8.61 | 8.13 | 4:10 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.91 | 8.83 | 12:35 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 9.68 | 7.06 | 5:11 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 8.73 | 8.01 | 11:30 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| MW24 | 01/30/07 | 17.47 | 8.06 | 9.41 | 2:06 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 8.29 | 9.18 | 11:07 p.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 8.20 | 9.27 | 9:07 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 8.01 | 9.46 | 12:54 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 8.61 | 8.86 | 4:56 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.72 | 9.75 | 12:16 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 8.94 | 8.53 | 4:48 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 8.46 | 9.01 | 10:57 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| MW26 | 01/30/07 | 17.59 | 8.76 | 8.83 | 1:59 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 7.70 | 9.89 | 11:00 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 7.79 | 9.80 | 9:14 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.75 | 9.84 | 1:00 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.76 | 9.83 | 5:14 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.50 | 10.09 | 12:22 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 8.04 | 9.55 | 4:45 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 9.06 | 8.53 | 11:10 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| Murray Pacific Property Wells | | | | | | | | | |
| MW16 | 08/27/08 | 18.12 | 7.13 | 10.99 | 5:23 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 17.18 | 0.94 | 10:18 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| MW18 | 01/30/07 | 17.48 | 7.48 | 10.00 | 2:15 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 8.91 | 8.57 | 11:18 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 7.30 | 10.18 | 8:55 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 7.75 | 9.73 | 12:45 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 12.33 | 5.15 | 4:37 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.50 | 9.98 | 12:05 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 7.45 | 10.03 | 5:15 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 14.29 | 3.19 | 10:38 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| MW28 | 01/30/07 | 18.21 | 7.78 | 10.43 | 2:12 p.m. | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 9.72 | 8.49 | 11:15 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 7.10 | 11.11 | 8:57 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 10.58 | 7.63 | 12:47 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 14.34 | 3.87 | 4:41 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 7.98 | 10.23 | 12:00 p.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 7.27 | 10.94 | 4:57 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 17.23 | 0.98 | 10:33 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |

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Table 1

Groundwater Elevation Data

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Well Elevation ^a feet | Depth to Water ft TOC | Water Elevation feet | Time Measured | High Tide ^b | | Low Tide ^b | |
|------------------------------|----------|-------------------------------------|--------------------------|-------------------------|---------------|------------------------|-------------------|-----------------------|-------------------|
| | | | | | | Time | Elevation feet | Time | Elevation feet |
| Second Aquifer | | | | | | | | | |
| Arkema Property Wells | | | | | | | | | |
| 1C2-2 | 01/30/07 | 16.98 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 8.95 | 8.03 | 10:14 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 5.69 | 11.29 | 9:41 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 5.65 | 11.33 | 1:20 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 5.75 | 11.23 | 3:45 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 5.44 | 11.54 | 11:39 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 6.23 | 10.75 | 4:25 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 7.78 | 9.20 | 11:45 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |
| 2B2-2 | 01/30/07 | 18.99 | -- | -- | -- | 1:54 p.m. | 10.48 | 9:06 p.m. | -2.21 |
| | 01/31/07 | | 11.14 | 7.85 | 10:24 a.m. | 5:06 a.m. | 12.04 | 10:30 a.m. | 7.73 |
| | 02/09/07 | | 11.15 | 7.84 | 9:34 a.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 10.99 | 8.00 | 1:14 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/09/07 | | 11.04 | 7.95 | 3:37 p.m. | 8:48 a.m. | 11.44 | 4:00 p.m. | 1.98 |
| | 02/26/07 | | 10.85 | 8.14 | 11:34 a.m. | 11:12 a.m. | 9.97 | 7:00 p.m. | 0.08 |
| | 08/27/08 | | 11.79 | 7.20 | 4:37 p.m. | 4:12 p.m. | 11.68 | 8:42 a.m. | -1.09 |
| | 08/29/08 | | 11.74 | 7.25 | 11:48 a.m. | 5:36 p.m. | 12.24 | 10:30 a.m. | -1.52 |

Notes:

- a) Surveys by Apex Engineering. Horizontal Datum NAD 1983/91. Vertical Datum - MLLW. Basis of Bearing Held - S47° 57' 03" E between Port of Tacoma monuments 178 and 180.
 - b) Verified tide elevations are from NOAA Co-ops web site <http://co-ops.nos.noaa.gov>.
 - c) All well elevations converted from MLLW to NAVD 88 by subtracting 2.67 feet and all water table elevation data from 2014 onward based on NAVD88.
 - d) Mislabeled as 2D1-1 in earlier reports.
- ft TOC - feet from top of casing.
MLLW - mean low low water.
-- not measured.

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Table 2
Summary of Interim Actions

Taylor Way Property Supplemental Remedial Investigation
 Tacoma, Washington

| Year | Action | Summary | Soil Removed (tons) |
|--|--|--|-------------------------------------|
| 1996 | Soil Berm Removal | Removal of the soil berm at the USG/Murray Pacific property line, which protected workers from potential collapse of log piles. Subsurface soils excavated in limited sections to achieve a cleanup level of 200 mg/kg. | 4,420 |
| 1996 | AST Petroleum Hydrocarbon Cleanup | Excavation of petroleum-contaminated soil associated with the above ground Bunker C oil tank. Excavation extended northward under the removed berm and approximately 30 feet into the Murray Pacific Property. Soil excavated down to the tideflat layer. | 5,000 |
| 1997 | Intertidal Bank Excavation | Excavation of shot used as fill to extend the intertidal bank with removal of 1,072 tons of upland soils and 2,062 tons of intertidal bank sediment. | 2,062 |
| | | | 1,072 |
| 1998 | Additional Bank Top Cleanup | Excavation of additional source material from the bank top to the north of the intertidal bank excavation. | 87 |
| 1998/1999 | Stormwater System Replacement and Paving | Replacement of the entire stormwater system over two phases. Areas where process by-products and raw products were temporarily stored or handled were paved with asphalt. | - |
| 1999 | MW9 Area Excavation | Excavated soils from around monitoring well MW9 located on the easterly side of the production building. Laterally, the excavation was limited by the buildings on the westerly side and the Arkema Property on the easterly side. | 4,144 |
| 2003 | Rail Berm Removal | Removal of an approximately 265-foot stretch of railroad spur berm soils down to pre-existing grade. | 2,500 |
| 2003 | Hydrocarbon Remediation | Removal of petroleum hydrocarbon-contaminated soils on the northeastern side of the plant building apparently from a leaking underground piping associated with the previously removed Bunker C AST. | 4,400 |
| 2004 | Building Preload Excavation | Removal of soils containing arsenic concentrations greater than 87.5 mg/kg under the area where the new Carlile warehouse building was to be constructed. Two areas excavated at either end of the proposed building, one to 2 feet bgs and the other to 3 feet bgs. | Included in totals for 2005 actions |
| 2005 | UST Removal | Soil disposed of in association with the removal of one 4,000-gallon and one 5,000-gallon tank discovered during construction activities. No petroleum release was discovered, but soils removed to allow for the tank removal that contained greater than 20 mg/kg were disposed of at a landfill. | 500 |
| 2005 | B13 and B23 Soil Excavations | Excavation of arsenic-contaminated soils under the former baghouse (B13) and from under a former concrete pad used for material storage (B23). The B13 excavation ranged between 4 and 8 ft deep and the B23 excavation ranged between 2 and 5 ft deep. These excavations abutted the MW9 excavation. Soils removed during the preload excavation were also disposed of at the time. | 8,176 |
| Total Tons Removed from the Taylor Way Property | | | 32,361 |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|-----------------|-------------------|---------|-------------------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Taylor Way Property | | | | | | |
| Monitoring Wells (October 31 - November 2, 1994) EPA Method 7060 | | | | | | |
| MW7 | 3 | | 170 | -- | 190 | -- |
| | 8 | | 12 | -- | 3.9 | -- |
| MW8 | 3 | | 1.3 | -- | <1.5 | -- |
| | 8 | | 3.1 | -- | <1.5 | -- |
| MW9 | 8 | | 300 | -- | 190 | -- |
| MW10 | 2.5 | | 48.8 | -- | 4.5 | -- |
| | 6 | | 15 | -- | 3.9 | -- |
| MW12 | 3 | | 8 | -- | 9.8 | -- |
| | 8 | | 0.81 | -- | <1.5 | -- |
| MW13 | 2.5 | | 45 | -- | 8.5 | -- |
| | 10 | | 4.8 | -- | 5.3 | -- |
| MW14 | 5 | | 123 ^a | -- | 110 ^a | -- |
| | 6 | | 9.8 ^{aJ} | -- | 2.5 ^{aJ} | -- |
| | 7 | | 13 | -- | 10 | -- |
| KJC - Direct Push Test Holes (October/November 2002) EPA Method 6020 | | | | | | |
| B2 | 0.5-2.5 | | 62.7 | -- | 1.7 | -- |
| B3 | 1.5-3 | | 55.7 | -- | 49.2 | -- |
| B4 | 0.5-1.5 | | 7.96 | -- | 5.24 | -- |
| B5 | 0-1.5 | | 19.7 | -- | 25.5 | -- |
| B6 | 0.5-2.5 | | 240 | -- | 432 | -- |
| B7 | 0.5-3 | | 85.1 | -- | 142 | -- |
| B8 | 0-3 | | 15.9 | -- | 23 | -- |
| B9 | 0.5-2 | | 187 | -- | 251 | -- |
| B10 | 7-9 | | 55.3 | -- | -- | -- |
| B11 | 0.5-2.5 | | 233 | -- | 268 | -- |
| B12 | 1.2-2.8 | | 37 | -- | 5.18 | -- |
| B14 | 0-1.5 | | 161 | -- | 36.2 | -- |
| | 3-5 | | 32.1 | -- | -- | -- |
| B15 | 3.5-5.5 | | 114 | -- | 1.21 | -- |
| B16 | 0.5-2.8 | | 120 | -- | 215 | -- |
| | 3-7 | | 1.37 | -- | 1.2 | -- |
| B17 | 0.5-2.7 | | 65.4 | -- | 64.7 | -- |
| | 3-7 | | 1.78 | -- | 1.32 | -- |
| B19 | 1.8-3 | | 174 | -- | 1.66 | -- |
| | 4-6 | | 21.1 | -- | -- | -- |
| B20 | 1-3 | | 59.7 | -- | 101 | -- |
| | 3-5 | | 17.4 | -- | -- | -- |
| B21 | 0.8-1.8 | | 331 | -- | 456 | -- |
| | 2-5 | | 7.09 | -- | 1.98 | -- |
| B22 | 1.3-2.5 | | 315 | -- | 159 | -- |
| | 2.5-4.5 | | 56.7 | -- | -- | -- |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|---------------------------|---------|-------|-------|-------|
| | | | Lab | XRF | Lab | XRF |
| | | | mg/kg | ppm | mg/kg | ppm |
| Under Former Railroad Berm (July 2005) EPA 6010B | | | | | | |
| TP1 | 1 | in situ | -- | 140 | -- | 108 |
| | 2 | in situ | -- | 123 | -- | 12 J |
| | 3 | in situ | -- | 90 | -- | <7 |
| | 4 | in situ | -- | 105 | -- | 11 J |
| | | ex situ | 185 | 96 | -- | <7 |
| TP2 | 0.5 | in situ | -- | 172 | -- | 96 |
| | | ex situ | 307 | 177 | -- | 156 |
| | 1 | in situ | -- | 7 J | -- | 10 J |
| | 1.5 | in situ | -- | 126 | -- | 11 J |
| | 3 | in situ | -- | 80 | -- | <7 |
| TP3 | 0.75 | in situ | -- | 12 J | -- | 14 J |
| | 2 | in situ | -- | 66 | -- | 8 J |
| | 3 | in situ | -- | 74 | -- | 9 J |
| TP4 | 1 | in situ | -- | 196 | -- | 154 |
| | | ex situ | 249 | 206 | -- | 195 |
| | 2 | in situ | -- | 137 | -- | 10 J |
| | 3 | in situ | -- | 34 | -- | <8 |
| | | ex situ | 35 | 40 | -- | 11 J |
| TP5 | 0.5 | in situ | -- | 8 J | -- | <7 |
| | 1 | in situ | -- | 25 | -- | 12 J |
| | 2 | in situ | -- | 44 | -- | <8 |
| | | ex situ | 61 | 83 | -- | <8 |
| | 3 | in situ | -- | 118 | -- | 224 |
| TP6 | 0.5 | in situ | -- | 33 | -- | 16 J |
| | 2 | in situ | -- | 59 | -- | <7 |
| | 3 | in situ | -- | 9 | -- | <8 |
| TP7 | 0.5 | in situ | -- | <5 | -- | <8 |
| | 2 | in situ | -- | 7 J | -- | <7 |
| | 3 | in situ | -- | 5 J | -- | <7 |
| TP8 | 1 | in situ | -- | 101 | -- | 17 J |
| | 2 | in situ | -- | 5 J | -- | <7 |
| TP9 | 1 | in situ (bc) ^d | -- | 94 | -- | 19 J |
| | | in situ (s) ^c | -- | 1,553 | -- | 2,800 |
| | | ex situ (s) ^c | 1,740 | 1,751 | -- | 3,657 |
| | 2 | in situ | -- | 7 J | -- | 8 J |
| | | ex situ | <3 | <5 | -- | 11 J |
| | 3 | in situ | -- | 485 | -- | 609 |
| | | ex situ | 294 | 109 | -- | 185 |
| TP10 | 0.5 | in situ | -- | 222 | -- | 234 |
| | 1 | in situ | -- | 22 | -- | <8 |
| | 2 | in situ | -- | 6 | -- | <7 |
| | 3 | in situ | -- | <5 | -- | <7 |
| F-1 | 2.3 | in situ | -- | 76 | -- | <8 |
| F-2 | 2.3 | in situ | -- | 177 | -- | 20 J |
| F-3 | 2.3 | in situ | -- | 42 | -- | 14 J |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|-----------------|-----------|---------|-----------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Berm Footprint (depth in feet below initial USG grade) (May - June 1996) EPA Method 6010 | | | | | | |
| FP-1 | 4 | | 190 | -- | 8.3 | -- |
| FP-2 | 0 | | 120 | -- | <1.7 | -- |
| FP-3 | 4 | | 150 | -- | 3.5 | -- |
| FP-4 | 3 | | 160 | -- | <1.8 | -- |
| FP-5 | 4 | | 26 | -- | <2.1 | -- |
| FP-6 | 7 | | <7.7 | -- | <2.3 | -- |
| FP-10 | 7 | | 11 | -- | 2.3 | -- |
| FP-11 | 7 | | <7.5 | -- | 3.9 | -- |
| FP-12 | 7 | | 200 | -- | <1.8 | -- |
| FP-13 | 0 | | 180 | -- | 22 | -- |
| FP-14 | 0 | | 160 | -- | 150 | -- |
| FP-15 | 0 | | 210 | -- | 220 | -- |
| FP-16 | 0 | | 150 | -- | 29 | -- |
| FP-17 | 0 | | 64 | -- | 28 | -- |
| FP-18 | 0 | | 80 | -- | 27 | -- |
| FP-19 | 0 | | 140 | -- | 160 | -- |
| MW9 Area Excavation (August 1999) EPA Method 6010B | | | | | | |
| Bottom | | | | | | |
| B1 | 3 | | 90 | -- | 45 | -- |
| B2 | 2-3 | | 140 | -- | <7.0 | -- |
| B3 | 1-2 | | 140 | -- | 6 | -- |
| B4 | 2 | | 66 | -- | <5.4 | -- |
| B5 | 3 | | 11 | -- | 11 | -- |
| B6 | 5 | | 90 | -- | 8 | -- |
| B7 | 5.5 | | <16 | -- | 9 | -- |
| B8 | 5 | | <16 | -- | 12 | -- |
| B9 | 4 | | 21 | -- | <7.7 | -- |
| B10 | 3-4 | | 240 J | -- | 110 | -- |
| B12 | 3.5-4 | | 170 | -- | 9 | -- |
| B13 | 2 | | 290 | -- | <6.3 | -- |
| B14 | 2 | | <12 | -- | <6.0 | -- |
| B15 | 3 | | 52 | -- | <6.0 | -- |
| B16 | 3 | | 21 | -- | <6.3 | -- |
| B17 | 3 | | 170 | -- | <6.6 | -- |
| B18 | 4 | | <14 | -- | <7.0 | -- |
| B19 | 4 | | 14 | -- | <6.7 | -- |
| B20 | 4 | | 60 | -- | <7.1 | -- |
| B21 | 5 | | <16 | -- | 11 | -- |
| B22 | 3 | | 29 J | -- | <5.4 | -- |
| B23 | 2 | | 54 J | -- | 9 | -- |
| B24 | 4 | | 71 J | -- | <7.6 | -- |
| B25 | 3-4 | | 140 J | -- | <6.7 | -- |
| B26 | 3 | | <11 J | -- | <5.6 | -- |
| B27 | 2 | | 40 | -- | <5.3 | -- |
| <i>Average Bottom</i> | 3.4 | | 75 | | 11 | |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|-----------------|-----------|---------|-----------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Sidewalls | | | | | | |
| SW1 | 0-2.5 | | 190 | -- | 40 | -- |
| SW2 | 1-1.5 | | 180 | -- | 9 | -- |
| SW9 | 3 | | 120 | -- | 10 | -- |
| SW10 | 3 | | 120 | -- | <7.2 | -- |
| SW11 | 1-2 | | 74 | -- | <5.6 | -- |
| SW12 | 1-2 | | <15 | -- | 13 | -- |
| SW13 | 1-2 | | 33 | -- | 8 | -- |
| SW14 | 1-2 | | 34 | -- | <6.0 | -- |
| SW15 | 1-2 | | 43 | -- | <5.9 | -- |
| SW16 | 1-2 | | 37 | -- | <6.0 | -- |
| SW17 | 2-3 | | 81 | -- | 16 | -- |
| SW19 | 3-4 | | 170 | -- | 9 | -- |
| SW21 | 2-3 | | 28 J | -- | 27 | -- |
| SW22 | 3-4 | | 36 J | -- | <6.0 | -- |
| SW23 | 3-4 | | 70 J | -- | 8 | -- |
| SW24 | 2-3 | | 420 | -- | <7.1 | -- |
| SW25 | 1-2 | | 430 | -- | <6.1 | -- |
| SW26 | 1-2 | | 380 | -- | 13 | -- |
| SW27 | 2-3 | | 250 | -- | <6.4 | -- |
| SW28 | 2-3 | | 530 | -- | 15 | -- |
| SW29 | 2-3 | | 490 | -- | 32 | -- |
| SW30 | 2-3 | | 640 | -- | 14 | -- |
| Berm (Atochem) | | | 330 | -- | 190 | -- |
| B13 Excavation (June 15 - 21, 2005) EPA Method 6010B | | | | | | |
| Excavation Bottom | | | | | | |
| B13F-1 | 6 | ex situ | 53 | 40 | 10 | 7 J |
| B13F-2 | 6 | ex situ | 30 | 15 J | 24 | 11 J |
| B13F3A ^d | 8 | ex situ | 16 | 11 J | -- | 9 J |
| B13F-4 | 6 | ex situ | 9 | 8 J | 12 | 16 J |
| B13F-5 | 6 | ex situ | <10 | 8 J | 15 | 12 J |
| B13F-9 | 5 | ex situ | 10 | 9 J | 16 | 13 J |
| B13F-10 | 5 | ex situ | 49 | 51 | 10 | 14 J |
| B13F-11 | 5 | ex situ | 40 | 30 | 30 | 15 J |
| <i>Average Bottom</i> | 5.9 | | 26.5 | 22 | 17 | 12 |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|-----------------|----------------------|---------|-----------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Sidewalls | | | | | | |
| B13W-6 | 4 | ex situ | 34 | 32 | 4 | 10 J |
| B13W7A | 5 | ex situ | 21 | 17 | -- | <7 |
| B13W-8 | 5 | ex situ | 23 | 15 | 9 | <6 |
| B13W-12 | 1 | ex situ | 260 | 200 | 11 | <7 |
| B13W-13 | 3 | ex situ | <8 | 6 J | 8 | 8 J |
| B13W-14 | 4 | ex situ | 30 | 22 J | 13 | 13 J |
| B13W-15 | 3 | ex situ | 60 | 41 | 9 | 11 J |
| B13W-16 | 3 | ex situ | <9 | 12 J | 7 | 9 J |
| B13W-17 | 3 | ex situ | 106 | 87 | 3 | 9 J |
| B13W-18 | 3 | ex situ | 21 | 23 | 4 | <7 |
| B13W-19 | 3 | ex situ | 27 | 24 | 2 | 9 J |
| B13W-20 | 2 | ex situ | 280 | 182 | 419 | 335 |
| B13W-21 | 2 | ex situ | 110 | 142 | 653 | 127 |
| B23 Excavation (June 17-28, 2005) EPA Method 6010B | | | | | | |
| Exavation Bottom | | | | | | |
| B23-F-1 | 4 | ex situ | 59 | 39 | 20 | 14 J |
| B23-F-2 | 5 | ex situ | <3 | <5 | 2 | <7 |
| B23-F-3 | 4 | ex situ | 54 | 39 | 7 | 7 J |
| B23F4 | 4 | ex situ | 5 | 9 J | 5 | 8 J |
| B23F5 | 3 | ex situ | 7 | <5 | 2 | <7 |
| B23F6A | 4 | ex situ | <9 | 9 | -- | <6 |
| B23F7A | 4 | ex situ | 10 | 5 | -- | <6 |
| B23F8 | 3 | ex situ | 46 | 31 | 4 | 7 |
| <i>Average Bottom</i> | 3.9 | | 23 | 17 | 6.7 | 6.1 |
| Sidewalls | | | | | | |
| B23W1 | 2.5 | ex situ | 190 | 139 | 5 | 13 J |
| B23W2 | 2.5 | ex situ | 131 | 72 | 2 | 10 J |
| B23W3 | 2.5 | ex situ | 16 | 21 J | 2 | <8 |
| B23W4 | 1 | ex situ | <7 | 6 J | -- | <7 |
| B23W5 | 1 | ex situ | 103 | 71 | -- | 103 |
| B23W6 | 1 | ex situ | 47 | 28 | -- | 32 |
| B23W7 | 1 | ex situ | 10 | 22 | -- | 8 J |
| B23W8 | 1 | ex situ | 87 | 92 | -- | 8 J |
| B23W9A | 1.5 | ex situ | 290 | 125 | -- | <7 |
| B23W10A | 1.5 | ex situ | 86 | 59 | -- | <6 |
| Intertidal Bank (July 1997) EPA Method 6010 | | | | | | |
| Upland Sidewalls | | | | | | |
| UP-SW-1Rb | 6 | | 6.7 | -- | 5.4 (3.1) | -- |
| UP-SW-2 | 6 | | 29 (82) ^e | -- | 260 | -- |
| UP-SW-3Rb | 7 | | 8.1 | -- | 9.2 | -- |
| UP-SW-4 | 6 | | 220 | -- | 280 | -- |
| UP-SW-5 | 5 | | 31 | -- | 11 | -- |
| UP-SW-6 | 4 | | 110 | -- | 30 | -- |
| UP-SW-7 | 3 | | 54 | -- | 32 | -- |
| UP-1-Gray Sand | 6 | | 84 ^e | -- | 30 | -- |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---------------------------|-----------------------|-----------------|------------------|---------|-----------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Upland Bottom | | | | | | |
| UP-B-1R | 6 | | 170 | -- | 130 | -- |
| UP-B-1/2 | 6 | | 100 | -- | 100 | -- |
| UP-B-2 | 6 | | 3.9 ^e | -- | 4.0 | -- |
| UP-B-3R | 7 | | 72 | -- | 120 | -- |
| UP-B-4 | 6 | | 35 ^e | -- | 10 | -- |
| UP-B-5 | 5 | | 43 | -- | 67 | -- |
| UP-B-6 | 4 | | 52 ^e | -- | 19 | -- |
| UP-B-7 | 3 | | 7.4 ^e | -- | 79 | -- |
| UP-B-8 | 2 | | 13 ^e | -- | 4.5 | -- |
| UP-B-9 | 2 | | <30 | -- | <8.9 | -- |
| <i>Average Bottom</i> | 4.7 | | 51 | | 54 | |
| Sediment Sidewalls | | | | | | |
| S4-SW | 3 | | <7.4 | -- | 3.0 | -- |
| S11-SW | 3 | | <9.7 | -- | 7.8 | -- |
| Sediment Bottom | | | | | | |
| S1 | 8 | | 6.5 | -- | <3.0 | -- |
| S2 | 8 | | 5.0 | -- | 3.1 | -- |
| S3 | 6 | | <8.5 | -- | 3.8 | -- |
| S4-B | 3 | | 17 ^e | -- | <4.2 | -- |
| S5 | 1 | | <6.3 | -- | 3.0 | -- |
| S6 | 6 | | <16 | -- | <4.8 | -- |
| S7 | 4 | | 19 | -- | 15 | -- |
| S8 | 6 | | 14 | -- | 13 | -- |
| S9 | 2 | | <14 | -- | <4.2 | -- |
| S10 | 2 | | 16 | -- | 8.9 (3.7) | -- |
| S11 R | 3 | | 9.6 | -- | 3.6 | -- |
| S12 | 2 | | <7.3 | -- | <2.2 | -- |
| S13 | 4 | | <9.6 | -- | 3.5 | -- |
| S14 | 4 | | <7.3 | -- | 3.3 | -- |
| S15 | 2 | | 9.1 | -- | 3.1 | -- |
| S16 | 2 | | <6.8 | -- | <2.1 | -- |
| S17 | 2 | | <7.4 | -- | 2.8 | -- |
| <i>Average Bottom</i> | | | 8.1 | -- | 4.2 | -- |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|-----------------|-----------|---------|-----------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Port of Tacoma Test Pits (April 7, 2005) EPA Method 6010B | | | | | | |
| TP-102 | 3-5 | | 8 | -- | -- | -- |
| TP-103 | 0-1 | | 690 | -- | -- | -- |
| TP-103 | 3-4 | | 8 | -- | -- | -- |
| TP-104 | 2-2.5 | | 490 | -- | -- | -- |
| TP-104 | 3-5 | | 170 | -- | -- | -- |
| TP-104 | 5-6 | | 170 | -- | -- | -- |
| TP-105 | 1-2 | | 890 | -- | -- | -- |
| TP-105 | 3-5 | | 100 | -- | -- | -- |
| TP-105 | 5-6 | | 10 | -- | -- | -- |
| TP-106 | 1.5-3 | | 12 | -- | -- | -- |
| Building Footprint Sampling (September 10 - November 15, 2004) EPA 6010B | | | | | | |
| B-100 | 1 | | <5 | -- | -- | -- |
| B-101 | 1 | | <10 | -- | -- | -- |
| B-104 | 1 | | 20 | -- | -- | -- |
| B-105 | 1 | | 54 | -- | -- | -- |
| B-107 | 1 | | <11 | -- | -- | -- |
| B-102 | 2 | | 13 | -- | -- | -- |
| B-103 | 2 | | <5 | -- | -- | -- |
| B-106a | 2 | | 150 | -- | -- | -- |
| B-109 | 3 | | 240 | -- | -- | -- |
| B-1 | 3 | | 240 | -- | -- | -- |
| B-2 | 3 | | <5 | -- | -- | -- |
| B-3 | 3 | | <5 | -- | -- | -- |
| B-4 | 3 | | <5 | -- | -- | -- |
| UST Excavation (August 31, 2005) EPA 6010B | | | | | | |
| S-1 | 7 | | 15 | -- | <4 | -- |
| W-1 | 7 | | 27 | -- | 74 | -- |
| E-1 | 7 | | 13 | -- | <4 | -- |
| N-1 | 7 | | 110 | -- | 25 | -- |
| T1-B | 14 | | 9 | -- | <4 | -- |
| T2-B | 14 | | 20 | -- | <4 | -- |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|--|-----------------------------|-----------------------|---------|-------|-------|-------|
| | | | Lab | XRF | Lab | XRF |
| | | | mg/kg | ppm | mg/kg | ppm |
| Monitoring Well Installation (December 12-14, 2006) EPA 6010B^f | | | | | | |
| MW1R | 2 | in situ | -- | 14 | -- | 9 |
| | 2.5 | in situ | -- | 150 | -- | 60 |
| | 3 | ex situ | 276 J | 282 | 258 | 184 |
| | 5.5 | in situ | -- | 17 | -- | 13 |
| | 8.5 | in situ | -- | 53 | -- | <6 |
| MW13R | 2 | in situ | -- | 72 | -- | 93 |
| | 3.5 | in situ | -- | 20 | -- | 15 |
| | 5 | in situ | -- | 19 | -- | 6 |
| | | ex situ | 29 | 20 | 9 | 15 |
| | 8 | in situ | -- | 24 | -- | 9 |
| | 11 | in situ | -- | 21 | -- | <5 |
| | 13 | in situ | -- | <5 | -- | 8 |
| 16 | in situ | -- | 16 | -- | <6 | |
| 21 | in situ | -- | <5 | -- | <6 | |
| MW24 | 1.5 | in situ | -- | 116 | -- | 81 |
| | 2 | ex situ | 189 | 202 | 17 | 27 |
| | 5.5 | in situ | -- | 45 | -- | 10 |
| | 11 | in situ | -- | 16 | -- | 26 |
| | 14 | in situ | -- | <5 | -- | 6 |
| | 16 | in situ | -- | <5 | -- | <6 |
| MW25 | 1.2 | in situ | -- | 9 | -- | <6 |
| | 2.5 | in situ | -- | 6 | -- | <6 |
| MW26 | 3 | ex situ | -- | 25 | -- | 29 |
| | 3.5 | in situ | -- | 34 | -- | 61 |
| | 5 | ex situ | <8 | <5 | 8 | 7 |
| MW27 | 1 | in situ | -- | 824 | -- | 571 |
| | 2 | ex situ | 1,550 | 1,601 | 1,060 | 1,058 |
| | 4 | in situ | -- | <5 | -- | <5 |
| | 6 | in situ | -- | <18 | -- | <23 |
| MW30 | 1 | in situ | -- | 419 | -- | |
| | | ex situ | 257 | 434 | 340 | 540 |
| | 4 | in situ | -- | 58 | -- | 12 |
| | 5.5 | in situ | -- | 69 | -- | 58 |
| | | ex situ | 66 | <5 | 11 | 9 |
| | 6 | in situ | -- | <4 | -- | <5 |
| 7.5 | in situ | -- | <5 | -- | 8 | |
| 8.5 | in situ | -- | 21 | -- | 15 | |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------------|-----------------------|---------|--------|-------|-------|
| | | | Lab | XRF | Lab | XRF |
| | | | mg/kg | ppm | mg/kg | ppm |
| Direct Push Test Holes (August 20-21, 2008) EPA Method 6010B | | | | | | |
| DPT1 | 1.5 | in situ | -- | 242 | -- | 395 |
| | | ex situ | 330 | 1,244 | -- | 1,339 |
| | 4 | in situ | -- | <6 | -- | <6 |
| | 6 | in situ | -- | <6 | -- | <6 |
| DPT2 | 2 | in situ | -- | 6,274 | -- | 3,398 |
| | | ex situ | 2,740 | 6,150 | -- | 3,377 |
| DPT3 | 1 | in situ | -- | 51 | -- | 49 |
| | | ex situ | 120 | 140 | -- | 101 |
| DPT4 | 3 | in situ | -- | 1,487 | -- | 946 |
| | | ex situ | 940 | 3,785 | -- | 2,009 |
| DPT5 | 2 | in situ | -- | 60 | -- | 80 |
| | 3 | in situ | -- | 6,538 | -- | 2,055 |
| | | ex situ | 20,700 | 15,071 | -- | 3,904 |
| | 4 | in situ | -- | 1,714 | -- | 353 |
| DPT5b | 6 | in situ | -- | <10 | -- | <11 |
| DPT10 | 2.5 | in situ | -- | <8 | -- | <8 |
| | 6 | in situ | -- | 2,588 | -- | 1,791 |
| | | ex situ | 960 | 2,094 | -- | 1,494 |
| | 7 | in situ | -- | 44 | -- | 18 |
| DPT11 | 1.5 | in situ | -- | 40 | -- | 24 |
| | 3.5 | in situ | -- | 531 | -- | 928 |
| | 5.5 | in situ | -- | 187 | -- | 16 |
| | | ex situ | 320 | 177 | -- | 114 |
| | 7 | in situ | -- | 141 | -- | 11 |
| DPT12 | 1 | in situ | -- | 79 | -- | 37 |
| | 4 | in situ | -- | 150 | -- | 217 |
| | | ex situ | 173 | 243 | -- | 305 |
| | 5 | in situ | -- | 72 | -- | 59 |
| | 6.5 | in situ | -- | <8 | -- | 10 |
| DPT13 | 3.5 | in situ | -- | 3,380 | -- | 2,524 |
| | | ex situ | 1,130 | 3,335 | -- | 2,389 |
| | 5.5 | in situ | -- | 30 | -- | 11 |
| | 8 | in situ | -- | 155 | -- | <11 |
| DPT14 | 1.5 | in situ | -- | 58 | -- | 35 |
| | 3.5 | in situ | -- | <11 | -- | 13 |
| | | ex situ | <10 | 12 | -- | <11 |
| DPT15 | 2 | in situ | -- | 407 | -- | 403 |
| | | ex situ | 270 | 325 | -- | 465 |
| | 6 | in situ | -- | <11 | -- | <12 |
| DPT16 | 3.5 | in situ | -- | <13 | -- | <14 |
| | 5.5 | in situ | -- | <12 | -- | <12 |
| | | ex situ | 7 | 13 | -- | 11 |
| | 11 | in situ | -- | <10 | -- | <10 |
| DPT17 | 3 | in situ | -- | <9 | -- | 14 |
| | | ex situ | <6 | <13 | -- | 17 |
| | 7.5 | in situ | -- | <10 | -- | <11 |
| DPT18 | 1 | in situ | -- | 140 | -- | 255 |
| | | ex situ | 112 | 181 | -- | 261 |
| DPT19 | 3 | in situ | -- | 967 | -- | 814 |
| | | ex situ | 580 | 976 | -- | 903 |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|---|-----------------------|-----------------|-----------|---------|-----------|---------|
| | | | Lab mg/kg | XRF ppm | Lab mg/kg | XRF ppm |
| Monitoring Well Installation (January 6-7, 2014) EPA Method 6010C | | | | | | |
| MW36 | 2 | in situ | -- | <5 | -- | <6 |
| | 6 | in situ | 30 | 12 | 22 | <8 |
| | 7.5 | in situ | 114 | 193 | 16 | 23 |
| | 10 | in situ | -- | 5 | -- | 6 |
| MW37 | 2 | in situ | -- | 11 | -- | 20 |
| | 4.5 | in situ | 29 | 33 | 20 | 25 |
| | 5.5 | in situ | 168 | 200 | 178 | 174 |
| | 8 | in situ | 233 | 211 | 5 | 24 |
| | 10 | in situ | 191 | 199 | <2 | 12 |
| | 12.5 | in situ | -- | <4 | -- | 10 |
| North Boundary Area Investigation (July 2012) EPA Method 6010C^g | | | | | | |
| NB-02 | 0 | ex situ | -- | 13 | -- | 16 |
| | 1.5 | ex situ | -- | -- | -- | -- |
| | 2 | ex situ | -- | <4 | -- | 10 |
| | 5 | ex situ | -- | 82 | -- | 6 |
| | 6.5 | ex situ | -- | 31 | -- | 5 |
| | 8 | ex situ | -- | -- | -- | -- |
| NB-12 | 9 | ex situ | -- | <4 | -- | 11 |
| | 0 | ex situ | -- | 11 | -- | 19 |
| | 1 | ex situ | -- | -- | -- | -- |
| | 2 | ex situ | -- | 10 | -- | 11 |
| | 5.5 | ex situ | -- | 9 | -- | 15 |
| | 6.5 | ex situ | -- | 8 | -- | 15 |
| NB-27 | 7.5 | ex situ | -- | <4 | -- | 6 |
| | 1 | ex situ | -- | 168 | -- | 157 |
| | 2 | ex situ | -- | 22 | -- | 8 |
| | 5 | ex situ | -- | 300 | -- | 16 |
| | 6.5 | ex situ | -- | -- | -- | -- |
| | 8 | ex situ | -- | 7 | -- | 10 |
| NB-29 | 9 | ex situ | -- | 14 | -- | 11 |
| | 1 | ex situ | -- | 22 | -- | 29 |
| | 2 | ex situ | -- | -- | -- | -- |
| | 2.5 | ex situ | -- | 280 | -- | 11 |
| | 3 | ex situ | -- | 147 | -- | 13 |
| | 5 | ex situ | -- | 59 | -- | 12 |
| | 6.5 | ex situ | -- | -- | -- | -- |
| 8.5 | ex situ | -- | 7 | -- | 14 | |
| NB-40 | 11 | ex situ | -- | <4 | -- | 13 |
| | 1 | ex situ | -- | 18 | -- | 25 |
| | 2 | ex situ | 400 | 403 | 694 | 446 |
| | 2.5 | ex situ | -- | -- | -- | -- |
| | 3 | ex situ | -- | 65 | -- | 41 |
| | 5 | ex situ | -- | 21 | -- | 21 |
| | 6.5 | ex situ | -- | -- | -- | -- |
| | 8.5 | ex situ | -- | <4 | -- | 12 |
| 10.5 | ex situ | -- | -- | -- | -- | |
| | 11 | ex situ | -- | <4 | -- | 11 |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|--|-----------------------|-----------------|--------------------------|--------------------|--------------------|--------------------|
| | | | Lab | XRF | Lab | XRF |
| | | | mg/kg | ppm | mg/kg | ppm |
| NB-41 | 1 | ex situ | -- | 15 | -- | 17 |
| | 2 | ex situ | 720 | 522 | 566 | 421 |
| | 2.5 | ex situ | -- | 315 | -- | 221 |
| | 5 | ex situ | -- | 9 | -- | 12 |
| | 6.5 | ex situ | -- | 9 | -- | 14 |
| | 8 | ex situ | -- | 47 | -- | 7 |
| NB-45 | 0 | ex situ | -- | 11 | -- | 12 |
| | 1 | ex situ | -- | 19 | -- | 16 |
| | 2 | ex situ | -- | 178 | -- | 156 |
| | 5 | ex situ | -- | 98 | -- | 23 |
| | 7 | ex situ | -- | 111 | -- | 11 |
| Murray Pacific Property | | | | | | |
| Monitoring Well Installation (December 12-14, 2007) EPA Method 6010^f | | | | | | |
| MW28 | 1 | in situ | -- | 54 | -- | 75 |
| | | ex situ | 59/52 ^h | 60/67 ^h | 83/99 ^h | 81/89 ^h |
| | 3 | in situ | -- | 6 | -- | <6 |
| | | ex situ | <5 | 5 | 3 | <6 |
| | 5.5 | in situ | -- | 246 | -- | 154 |
| | | ex situ | 185 | 119 | 97 | 64 |
| | 7.5 | in situ | -- | 172 | -- | 12 |
| | | ex situ | 728 | 180 | 13 | 11 |
| | 8.5 | in situ | -- | 137 | -- | 7 |
| | ex situ | 205 | 154 | 3 | 6 | |
| | 11 | in situ | -- | 13 | -- | <5 |
| | 13 | in situ | -- | 7 | -- | <5 |
| | 16 | in situ | -- | 7 | -- | <5 |
| MW29 | 1.5 | in situ | -- | 87 | -- | 146 |
| | 2.5 | in situ | -- | 24 | -- | 38 |
| | 4 | in situ | -- | 104 | -- | 71 |
| | 5 | in situ | -- | 355 | -- | 119 |
| | | ex situ | 84 | 142 | 56 | 91 |
| | 6.5 | in situ | -- | 185 | -- | 25 |
| | 7 | in situ | -- | 2,708 | -- | 7 |
| | 7.5 | in situ | -- | 3,325 | -- | 9 |
| | | ex situ | 255/358/517 ⁱ | 2,881 | 6/7/7 ⁱ | <8 |
| | 8 | in situ | -- | 40 | -- | 12 |
| | 10 | in situ | -- | 6 | -- | <5 |
| Monitoring Well Installation (August 18 - 19, 2008) EPA Method 6010B | | | | | | |
| MW31 | 4 | in situ | -- | 53 | -- | 49 |
| | | ex situ | -- | 48 | -- | 37 |
| | 6 | in situ | -- | 35 | -- | 39 |
| | 9 | in situ | -- | 23 | -- | 16 |
| | 10 | in situ | -- | 125 | -- | <11 |
| | ex situ | 94 | 36 | -- | <8 | |
| MW32 | 4 | in situ | -- | 15 | -- | 40 |
| | | ex situ | 14 | 21 | -- | 43 |
| | 6.5 | in situ | -- | 15 | -- | <7 |
| | 10 | in situ | -- | 17 | -- | 10 |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|--|-----------------------|-----------------|---------|-------|-------|-----|
| | | | Lab | XRF | Lab | XRF |
| | | | mg/kg | ppm | mg/kg | ppm |
| MW33 | cuttings | in situ | -- | 32 | -- | 88 |
| | 3.5 | in situ | -- | 21 | -- | 36 |
| | 6.5 | in situ | -- | 28 | -- | 103 |
| | | ex situ | 24 | 25 | -- | 58 |
| | 9 | in situ | -- | <6 | -- | <6 |
| MW34 | 4 | in situ | -- | 179 | -- | <14 |
| | | ex situ | 91 | 184 | -- | <14 |
| | 6.5 | in situ | -- | 9 | -- | <7 |
| | 9 | in situ | -- | <6 | -- | <6 |
| MW35 | 10.5 | in situ | -- | <9 | -- | <9 |
| | 4 | in situ | -- | <6 | -- | 12 |
| | 5.5 | in situ | -- | <11 | -- | 12 |
| | 6.5 | in situ | -- | <6 | -- | <6 |
| | 9 | in situ | -- | <6 | -- | 9 |
| | ex situ | -- | 6 | -- | 6 | |
| | | | <7 | 8 | -- | <5 |
| Direct Push Test Holes (August 20-21, 2008) EPA Method 6010B | | | | | | |
| DPT6 | 1.5 | in situ | -- | 61 | -- | 74 |
| | 6 | in situ | -- | 248 | -- | 148 |
| | 7 | in situ | -- | 605 | -- | <12 |
| | | ex situ | 257 | 372 | -- | 38 |
| | 11 | in situ | -- | 30 | -- | <7 |
| DPT7 | 4 | in situ | -- | <11 | -- | <12 |
| | 7 | in situ | -- | 3,106 | -- | <10 |
| | 10.5 | in situ | -- | 334 | -- | <11 |
| | | ex situ | 357 | 289 | -- | <10 |
| | 11.5 | in situ | -- | <8 | -- | <9 |
| DPT8 | 3 | in situ | -- | <6 | -- | 11 |
| | 7 | in situ | 13 | 25 | -- | <12 |
| DPT9 | 2 | in situ | -- | 104 | -- | 93 |
| | | ex situ | 66 | 70 | -- | 68 |
| | 7 | in situ | -- | 22 | -- | 12 |
| Monitoring Well Installation (January 6-7, 2014) EPA Method 6010C | | | | | | |
| MW38 | 2 | in situ | -- | 10 | -- | 17 |
| | 5.5 | in situ | 11 | <6 | <2 | 12 |
| | 8 | in situ | 13 | 10 | <2 | <6 |
| | 10 | in situ | -- | 10 | -- | 9 |
| | 11 | in situ | -- | <4 | -- | 7 |
| MW39 | 1.5 | in situ | -- | <5 | -- | 7 |
| | 4.5 | in situ | 15 | 8 | 4 | <6 |
| | 7.5 | in situ | 7 | 6 | <2 | 8 |
| | 9.5 | in situ | -- | <6 | -- | 7 |
| MW40 | 1.5 | in situ | -- | <6 | -- | 10 |
| | 2 | in situ | -- | <6 | -- | 7 |
| | 5 | in situ | 6 | <5 | 2 | <6 |
| | 8 | in situ | -- | <5 | -- | 8 |

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Table 3
Total Arsenic and Lead in Soil
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Sample I.D./ Location | Sample Depth (ft bgs) | XRF Sample Type | Arsenic | | Lead | |
|-----------------------|-----------------------|-----------------|---------|-----|-------|-----|
| | | | Lab | XRF | Lab | XRF |
| | | | mg/kg | ppm | mg/kg | ppm |
| MW41 | 2 | in situ | -- | <6 | -- | 7 |
| | 5 | in situ | 6 | <5 | <2 | 9 |
| | 7.5 | in situ | -- | <5 | -- | 7 |
| | 8 | in situ | -- | <5 | -- | 8 |
| MW42 | 1.5 | in situ | -- | <6 | -- | <6 |
| | 5 | in situ | 17 | 14 | 2 | <5 |
| | 7.5 | in situ | 22 | 17 | 7 | 8 |
| | 9.5 | in situ | -- | 6 | -- | 6 |

Notes:

Values in parentheses are laboratory duplicate results.

- a) EPA Method 206.2.
- b) Basecourse from eastern sidewall.
- c) Shot in western sidewall.
- d) Sample ID (B23F3A-6/21/05) on the chain of custody is in error.
- e) EPA Method 7060.
- f) XRF data on logs and this table for same sample interval may not correlate.
XRF data shown here were taken out of the actual jarred sample.
- g) XRF samples run in CDM Smith's Denver laboratory.
- h) Duplicate sample.
- i) Samples rerun.

XRF - x-ray fluorescence spectrometer.

J - Data is qualified as estimated

EPA Methods:

7060 - Atomic Absorption - Graphite Furnace.

6010/6010B/6010C - Inductively Coupled Plasma - Atomic Emission Spectrometry.

6020 - Inductively Coupled Plasma - Mass Spectrometry.

206.2 - Atomic Absorption - Graphite Furnace.

ft bgs - feet below ground surface.

ppm - parts per million as reported by X-Ray Fluorescence Spectrometer.

mg/kg - milligrams per kilogram - dry weight as reported by the laboratory.

-- not analyzed.

< - analyte not detected at or greater than the listed concentration.

in situ - sample analyzed by XRF either at the excavation sidewall/base or intact sample core collected while drilling.

ex situ - jarred sample analyzed by XRF, the same as submitted to analytical laboratory.

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Table 4
State and Federal Surface Water Standards
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| | Human Health - Method B | | Aquatic Life - Marine/Acute | | | Aquatic Life - Marine /Chronic | | | Human Health - Marine Waters | |
|---|-------------------------|-------------|-----------------------------|-------------------|----------------|--------------------------------|-------------------|----------------|------------------------------|----------------|
| | Non cancer | Cancer | 173-201A WAC | CWA 40 CFR 304(a) | NTR 40 CFR 131 | 173-201A WAC | CWA 40 CFR 304(a) | NTR 40 CFR 131 | CWA 40 CFR 304(a) | NTR 40 CFR 131 |
| | 173-340 WAC | 173-340 WAC | µg/L | | | µg/L | | | µg/L | |
| Antimony | 1,037 | -- | -- | -- | -- | -- | -- | -- | 640 | 4,300 |
| Arsenic, inorganic | 18 | 0.10 | 69 | 69 | 69 | 36 | 36 | 36 | 0.14 | 0.14 |
| Cadmium (soil and nonpotable surface water) | 41 | -- | 42 | 40 | 42 | 9.3 | 8.8 | 9.3 | -- | -- |
| Copper | 2,880 | -- | 4.8 | 4.80 | 2.4 | 3.1 | 3.1 | 2.4 | -- | -- |
| Lead | -- | -- | 210 | 210 | 210 | 8.1 | 8.1 | 8.1 | -- | -- |
| Nickel soluble salts | 1,103 | -- | 74 | 74 | 74 | 8.2 | 8.2 | 8.2 | 4,600 | 4,600 |
| Zinc | 16,548 | -- | 90 | 90 | 90 | 81 | 81 | 81 | 26,000 | -- |

Notes
Bolded values constitute the lowest concentration of all the standards presented.
µg/L - micrograms per liter
WAC - Washington Administrative Code
NTR - National Toxics Rule
CWA - Clean Water Act
CFR - Code of Federal Regulations

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Sample I.D. | | | | | | | | | | |
|---------------------------------|--------------------------|-----------------------------|-------|-------|---------|---------|-------|-------|-------|-------|-------|-------|
| | | Taylor Way Property Wells | | | | | | | | | | |
| | | MW1/MW1R | MW2 | MW4 | MW5 | MW6 | MW9 | MW25 | MW27 | MW30 | MW36 | MW37 |
| pH | 03/28/94 | 6.4 | 6.5 | 6.7 | 6.5 | 6.5 | N/A | -- | -- | -- | -- | -- |
| | 11/09/94 | 8.2 | 6.9 | 6.4 | 6.5 | 7.7 | 8.0 | -- | -- | -- | -- | -- |
| | 03/31/98 | 6.8 | 6.9 | 6.9 | 7.1 | 6.7 | 6.8 | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 6.5 | 6.7 | 6.6 | 6.7 | 6.5 | 6.6 | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 7.1 | 7.0 | 6.9 | 7.0 | 6.7 | 6.8 | -- | -- | -- | -- | -- |
| | 1/19-20/00 | 6.8 | 5.3 | 6.6 | 6.6 | 6.3 | 5.4 | -- | -- | -- | -- | -- |
| | 04/21/00 | 7.3 | 7.0 | 7.0 | 6.8 | 6.7 | 6.8 | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 7.6 | 7.1 | 7.2 | 7.0 | 6.8 | 7.0 | -- | -- | -- | -- | -- |
| | 10/25/00 | 6.9 | 6.9 | 7.0 | 6.8 | 6.5 | 6.2 | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 7.5 | 7.2 | 7.2 | 7.2 | 6.8 | 7.2 | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 7.4 | 7.4 | 7.4 | 7.2 | 7.0 | 7.1 | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 7.7 | 8.2 | 7.6 | 7.3 | 7.2 | 7.4 | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 6.8 | 6.6 | 6.7 | 6.8 | 6.8 | 6.9 | -- | -- | -- | -- | -- |
| | 12/18-20/06 | 7.4 | 6.7 | 6.7 | 6.8 | 6.6 | 7.2 | 6.7 | 7.0 | 6.5 | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 6.8 | -- | -- | 6.5 | 6.4 | 7.0 | 6.3 | -- | 6.2 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 7.0 | -- | -- | 6.8 | -- | -- | 6.5 | -- | 6.3 | -- | -- |
| | 05/12 ^a | 6.7 | 6.6 | 7.0 | 7.1 | 6.9 | 6.7 | 7.4 | 6.9 | 6.5 | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | 6.4 | 6.7 | 6.3 | 6.4 | 6.5 |
| Specific Conductance (µmhos/cm) | 03/28/94 | 1,820 | 6,500 | 7,700 | 28,500 | 30,000 | N/A | -- | -- | -- | -- | -- |
| | 11/09/94 | 2,460 | 3,450 | 6,920 | 17,100 | 29,800 | 870 | -- | -- | -- | -- | -- |
| | 03/31/98 | 1,531 | 2,140 | 1,907 | 19,900 | 15,990 | 1,767 | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 740 | 5,720 | 6,370 | 18,290 | 15,190 | 3,480 | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 530 | 1,600 | 4,400 | 8,480 | 17,170 | 2,780 | -- | -- | -- | -- | -- |
| | 1/19-20/00 | 440 | 2,890 | 4,020 | 16,170 | >20,000 | 1,420 | -- | -- | -- | -- | -- |
| | 04/21/00 | 330 | 3,170 | 4,660 | 15,750 | >20,000 | 2,440 | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 320 | 5,970 | 4,250 | >20,000 | >20,000 | 1,950 | -- | -- | -- | -- | -- |
| | 10/25/00 | 300 | 4,980 | 3,120 | >20,000 | >20,000 | 2,530 | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 480 | 2,510 | 2,500 | 5,110 | >20,000 | 2,060 | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 230 | 369 | 2,360 | 17,000 | 30,100 | 2,500 | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 272 | 310 | 1,263 | 462 | 442 | 1,400 | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 610 | 130 | 3,140 | 8,020 | 15,480 | 1,910 | -- | -- | -- | -- | -- |
| | 12/18-20/06 | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 1,325 | -- | -- | 9180 | 5948 | 808 | 482 | -- | 721 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 2,015 | -- | -- | 12130 | -- | -- | 915 | -- | 1,230 | -- | -- |
| | 05/12 ^a | 962 | 2,580 | 1,905 | 10,100 | 12,600 | 751 | 685 | 987 | 943 | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | 2,167 | 5,898 | 3,143 | 4,120 | 4,070 |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Sample I.D. | | | | | | | | | | |
|-----------------|--------------------------|-----------------------------|------|------|-------|------|------|------|-------------------|------|------|------|
| | | Taylor Way Property Wells | | | | | | | | | | |
| | | MW1/MW1R | MW2 | MW4 | MW5 | MW6 | MW9 | MW25 | MW27 | MW30 | MW36 | MW37 |
| Temp. (°C) | 03/31/98 | 10.8 | 12 | 11.2 | 11.5 | 11.3 | 12.3 | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 16.2 | 15 | 15.8 | 17.8 | 18.8 | 18.4 | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 15.4 | 14 | 15.2 | 17.9 | 16.9 | 15.7 | -- | -- | -- | -- | -- |
| | 1/19-20/00 | 10.4 | 11 | 11.4 | 13.1 | 12.9 | 9.0 | -- | -- | -- | -- | -- |
| | 04/21/00 | 14.0 | 13.5 | 16.1 | 15.3 | 13.4 | 18.2 | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 18.8 | 21.6 | 18.3 | 18.3 | 17.3 | 23.7 | -- | -- | -- | -- | -- |
| | 10/25/00 | 14.5 | 15.2 | 15.0 | 15.8 | 16.1 | 16.6 | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 8.5 | 11 | 12.2 | 13.4 | 13.8 | 11.6 | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 15.5 | 15.7 | 15.2 | 15.0 | 16.6 | 17.7 | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 15.2 | 15.0 | 13.8 | 15.0 | 14.0 | 15.6 | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 13.6 | 13.8 | 15.5 | 16.7 | 16.6 | 16.9 | -- | -- | -- | -- | -- |
| | 12/18-20/06 | 11.6 | 14.8 | 12.0 | 13.7 | 14.1 | 10.3 | 11.8 | 13.0 | 13.7 | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 20.3 | -- | -- | 14.99 | 17.2 | 20.3 | 16.2 | -- | 19.6 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 16.2 | -- | -- | 13.20 | -- | -- | 13.0 | -- | 15.3 | -- | -- |
| | 05/12 ^a | 13.0 | 14.1 | 10.7 | 14.9 | 17.3 | 15.8 | 16.3 | 20.3 [*] | 18.6 | -- | -- |
| 01/10-15/2014 | -- | -- | -- | -- | -- | -- | 10.7 | 12.3 | 12.0 | 11.7 | 12.3 | |
| Turbidity (NTU) | 03/31/98 | 6 | 4 | 2 | 4 | 1 | 7 | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 1.7 | 2.6 | 1.3 | 22.3 | 1.2 | 2.7 | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 5.3 | 5.8 | 5.5 | 11.5 | 3.7 | 1.6 | -- | -- | -- | -- | -- |
| | 1/19-20/00 | 1.5 | 1.0 | 2.4 | 4.3 | 2.8 | 5.2 | -- | -- | -- | -- | -- |
| | 04/21/00 | 9.1 | 0.9 | 3.2 | 5.1 | 1.4 | 7.5 | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 6.5 | 4.0 | 8.8 | 9.9 | 2.0 | 7.7 | -- | -- | -- | -- | -- |
| | 10/25/00 | 9.1 | 5.3 | 7.6 | 9.0 | 5.2 | 99.7 | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 7.9 | 6.4 | 8.1 | 8.0 | 8.2 | 8.7 | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 9.0 | 8.3 | 10.1 | 8.6 | 9.2 | 9.8 | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 18 | 9.1 | 18.4 | 9.8 | 4.4 | 9.1 | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 5.9 | 9.9 | 22 | 9.89 | 3.7 | 10 | -- | -- | -- | -- | -- |
| | 12/18-20/06 | 6.3 | 2.4 | 2.3 | 10.9 | 1.9 | 9.0 | 6.2 | 193 | 95.5 | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 3.0 | -- | -- | 3.40 | -- | 8.4 | 2.4 | -- | 1.80 | -- | -- |
| | 05/12 ^a | 2.4 | 3.5 | -- | 4.30 | 2.3 | 6.7 | 21.2 | 12.2 | 10.8 | -- | -- |
| 01/10-15/2014 | -- | -- | -- | -- | -- | -- | 6.3 | 2.9 | 15 | 12.0 | 8.5 | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Sample I.D. | | | | | | | | | | |
|--|--------------------------|-----------------------------|--------------|-----------------|--------------|-------------------|-----------------|-------|--------------|----------------------|------------------|------|
| | | Taylor Way Property Wells | | | | | | | | | | |
| | | MW1/MW1R | MW2 | MW4 | MW5 | MW6 | MW9 | MW25 | MW27 | MW30 | MW36 | MW37 |
| Color/Appearance | 10/22-23/98 | Clear | Light Yellow | Clear | Dark Brown | Yellow | Yellow | -- | -- | -- | -- | -- |
| | 04/15-16/99 | Yellow | Clear | Clear | Dark Brown | Light Brown | Yellow | -- | -- | -- | -- | -- |
| | 1/19-20/00 | Clear | Clear | Yellow | Brown/coffee | Yellow/brown | Clear | -- | -- | -- | -- | -- |
| | 04/21/00 | Light Brown | Light Yellow | Light Yellow | Yellow | Light Yellow | Gray | -- | -- | -- | -- | -- |
| | 08/15-16/00 | Clear | Clear | Clear | Brown/clear | Lt. Brown/clear | Clear | -- | -- | -- | -- | -- |
| | 10/25/00 | Clear | Clear | Clear | Brown/clear | Lt. Brown/clear | Clear | -- | -- | -- | -- | -- |
| | 01/25-26/01 | Yellowish/clear | Clear | Yellowish/clear | Brown/clear | Lt. Brown/clear | Clear | -- | -- | -- | -- | -- |
| | 04/26-27/01 | Yellowish/clear | Clear | Lt. Brown/clear | Brown/clear | Lt. Brown/clear | Clear | -- | -- | -- | -- | -- |
| | 07/26-27/01 | Clear | Clear | -- | -- | Clear | Clear | -- | -- | -- | -- | -- |
| | 10/25-26/01 | Clear | Clear | Yellow/clear | Yellow/clear | Yellow/clear | Sl. Gray | -- | -- | -- | -- | -- |
| | 12/18-20/06 | Clear | Clear | Clear | Yellow | Yellow | Clear | -- | -- | Clear/Very Sl. Sheen | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | Clear | -- | -- | -- | -- |
| | 8/27-9/3/08 | Lt. Yellow/ Clear | -- | -- | Yellow | Lt. Yellow/ Clear | Clear | Clear | -- | Lt. Yellow/ Clear | -- | -- |
| 6/2-3/09 | Clear | -- | -- | Yellow | -- | -- | Clear | -- | Light Yellow | -- | -- | |
| 01/10-15/2014 | -- | -- | -- | -- | -- | -- | Clear/ sl sheen | Clear | -- | Clear | Clear/ Sl. Sheen | |
| Dissolved Oxygen (mg/L) | 12/18-20/06 | 0.2 | 0.4 | 0.3 | 0.2 | 0.3 | 0.5 | 1.7 | 0.3 | 0.2 | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 0.5 | -- | -- | 0.9 | 0.6 | 0.5 | 0.6 | -- | 0.6 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 1.8 | -- | -- | 6.0 | -- | -- | 2.3 | -- | 2.0 | -- | -- |
| | 05/12 ^a | 0.8 | 0.8 | 0.9 | 0.3 | 0.3 | 1.0 | 0.2 | 0.2 | 0.2 | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | 1.1 | 1.9 | 1.2 | 0.7 | 1.0 |
| Oxidation Reduction Potential (ORP) (mV) | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -152 | -- | -- | -88 | -77.3 | -26.0 | -124 | -- | -96 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -276 | -- | -- | -201 | -- | -- | -208 | -- | -190 | -- | -- |
| | 05/12 ^a | -94 | -95 | -51 | -148 | -157 | 9.0 | -143 | -151 | -135 | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -86 | -105 | -52 | -99 | -74 |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Sample I.D. | | | | | | | | | | | |
|--------------------------|--------------------------|-----------------------------|-----|-----|-----|-----|-----|------|------|------|------|------|----|
| | | Taylor Way Property Wells | | | | | | | | | | | |
| | | MW1/MW1R | MW2 | MW4 | MW5 | MW6 | MW9 | MW25 | MW27 | MW30 | MW36 | MW37 | |
| Eh-SHE (mV) ^b | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 52 | -- | -- | 121 | 130 | 178 | 84 | -- | 108 | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | -68 | -- | -- | 10 | -- | -- | 3 | -- | 19 | -- | -- | |
| | 05/12 ^a | 118 | 115 | 162 | 61 | 50 | 217 | 64 | 52 | 70 | -- | -- | |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | 127 | 107 | 160 | 113 | 138 | |
| Ferrous Iron (mg/L) | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 05/12 ^a | 2.2 | 4.0 | -- | 5.4 | 4.2 | 0 | 4.4 | 5.2 | 5.6 | -- | -- | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | |
|---------------------------------|--------------------------|-------------------------------|-------|--------|-------|-------|-------|-------|-------|------|
| | | Murray Pacific Property Wells | | | | | | | | |
| | | MW17 | MW29 | MW31 | MW32 | MW33 | MW34 | MW35 | MW38 | MW39 |
| pH | 03/28/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | 6.6 | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 6.3 | 6.3 | 6.2 | 6.3 | 6.4 | 6.3 | 5.9 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 06/2-3/09 | -- | -- | 6.4 | 6.5 | 6.8 | 6.4 | 6.2 | -- | -- | |
| 05/12 ^a | -- | 6.6 | -- | 6.8 | 7.2 | 6.3 | 5.9 | -- | -- | |
| 01/10-15/2014 | 6.9 | 6.5 | 6.3 | 6.7 | 6.7 | 6.6 | 6.1 | 6.8 | 5.98 | |
| Specific Conductance (µmhos/cm) | 03/28/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | MF | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 15,850 | 715 | 698 | 2,255 | 5,027 | 703 | 468 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 06/2-3/09 | -- | -- | 1,370 | 1,435 | 2,785 | 1,124 | 844 | -- | -- | |
| 05/12 ^a | -- | 5,306 | -- | 2,490 | 3,450 | 603 | 372 | -- | -- | |
| 01/10-15/2014 | 42,165 | 3,799 | 8,562 | 12,623 | 7,547 | 2,207 | 1,827 | 6,760 | 1,374 | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | |
|--------------------|--------------------------|-------------------------------|-------|------|------|------|------|------|------|------|
| | | Murray Pacific Property Wells | | | | | | | | |
| | | MW17 | MW29 | MW31 | MW32 | MW33 | MW34 | MW35 | MW38 | MW39 |
| Temp. (°C) | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | 13.0 | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 18.5 | 18.2 | 18.0 | 20.6 | 19.0 | 19.9 | 15.9 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 14.4 | 16.3 | 14.5 | 15.3 | 12.5 | -- | -- |
| 05/12 ^a | -- | 13.3 | -- | 19.2 | 12.1 | 12.6 | 10.6 | -- | -- | |
| 01/10-15/2014 | 8.9 | 11.2 | 10.12 | 9.5 | 9.7 | 10.8 | 10.1 | 12.2 | 9.8 | |
| Turbidity (NTU) | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | 160 | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 0.6 | -- | 19 | 9.1 | 13 | 1.5 | 39 | -- | -- |
| 05/12 ^a | -- | 8.6 | -- | 22.6 | 10.6 | 84.8 | 42.8 | -- | -- | |
| 01/10-15/2014 | 8.4 | 5.4 | 5.9 | 5.2 | 11.0 | 8.3 | 15.0 | 4.4 | 12.0 | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | |
|--|--------------------------|---------------------------------|-------------------------|-------------------------|-------------------------|---------------------------------|---|-----------|-------|------|
| | | Murray Pacific Property Wells | | | | | | | | |
| | | MW17 | MW29 | MW31 | MW32 | MW33 | MW34 | MW35 | MW38 | MW39 |
| Color/Appearance | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | Sl. Sheen | -- | -- | -- | -- | -- | -- | -- |
| 8/27-9/3/08 | Clear | Lt. Yellow/ Clear Organic Sheen | Lt. Yellow/ Clear | Clear | Lt. Yellow/ Clear | Lt. Yellow/ Clear Organic Sheen | Clear | -- | -- | |
| 6/2-3/09 | -- | -- | Clear/Lt. Organic sheen | Clear/Lt. Organic sheen | Clear/Lt. Organic sheen | Clear/Lt. Organic Sheen | Colorless w/biofloc & Lt. Organic sheen | -- | -- | |
| 01/10-15/2014 | Clear | Clr./Sl. Sheen | Sl. Sheen, wht. Bugs | Clear | Clear | -- | Clear | Sl. Sheen | Clear | |
| Dissolved Oxygen (mg/L) | 12/18-20/06 | -- | 0.2 | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 0.5 | 0.6 | 0.5 | 0.7 | 0.6 | 0.5 | 0.5 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 1.1 | 1.1 | 1.4 | 4.1 | 1.4 | -- | -- |
| | 05/12 ^a | -- | 0.9 | -- | 0.2 | 9.3 | 1.2 | 0.7 | -- | -- |
| | 01/10-15/2014 | 1.2 | 1.1 | 1.7 | 1.6 | 1.3 | 0.9 | 1.3 | 0.9 | 1.1 |
| Oxidation Reduction Potential (ORP) (mV) | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -86 | -135 | -83 | -113 | -118 | -129 | -34 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | -180 | -205 | -189 | -176 | -163 | -- | -- |
| | 05/12 ^a | -- | -73 | -- | -175 | -238 | -103 | -40 | -- | -- |
| | 01/10-15/2014 | -88 | -83 | -84 | -94 | -106 | -103 | -39 | -100 | 24 |

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Table 5**Field Measured Parameters - Surface Aquifer**

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | |
|--------------------------|--------------------------|-------------------------------|------|------|------|------|------|------|------|------|
| | | Murray Pacific Property Wells | | | | | | | | |
| | | MW17 | MW29 | MW31 | MW32 | MW33 | MW34 | MW35 | MW38 | MW39 |
| Eh-SHE (mV) ^b | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | 120 | 71 | 123 | 90 | 87 | 75 | 174 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 30 | 3 | 20 | 33 | 49 | -- | -- |
| | 05/12 ^a | -- | 138 | -- | 30 | -26 | 109 | 174 | -- | -- |
| | 01/10-15/2014 | 127 | 130 | 130 | 121 | 108 | 110 | 175 | 112 | 238 |
| Ferrous Iron (mg/L) | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | 5.8 | -- | 4.6 | 4.2 | 4.6 | 3.0 | -- | -- |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | | |
|---------------------------------|--------------|-------------------------------|-------|-------|-----------------------|-------|-------|--------|--------|--------|--------|
| | | Murray Pacific Property Wells | | | Arkema Property Wells | | | | | | |
| | | MW40 | MW41 | MW42 | 1B4-1 | 1C3-1 | 1D1-1 | 2A1-1 | 2B1-1 | 2C1-1R | 3A3-1R |
| pH | 03/28/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | 8.4 | 8.6 | 8.1 | 8.3 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 7.0 | -- | -- | 6.5 | -- | -- |
| 11/14-23/08 ^a | -- | -- | -- | 6.9 | 7.2 | 9.8 | -- | 6.4 | 6.8 | 6.8 | |
| 06/2-3/09 | -- | -- | -- | -- | 7.3 | -- | -- | -- | -- | -- | |
| 05/12 ^a | -- | -- | -- | 7.3 | 7.2 | 10.0 | 7.6 | 7.0 | 7.5 | 7.2 | |
| 01/10/14 | 6.2 | 6.2 | 6.1 | -- | -- | -- | -- | -- | -- | -- | |
| Specific Conductance (µmhos/cm) | 03/28/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | 5,111 | 5,517 | 5,069 | 79,920 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 2,585 | -- | -- | 40,810 | -- | -- |
| 11/14-23/08 ^a | -- | -- | -- | 1,670 | 2,930 | 6,330 | -- | 24,045 | 2,666 | 5,946 | |
| 06/2-3/09 | -- | -- | -- | -- | 4,793 | -- | -- | -- | -- | -- | |
| 05/12 ^a | -- | -- | -- | 940 | 2,370 | 2,470 | 3,090 | 33,200 | 2,530 | 7 R | |
| 01/10-15/2014 | 1,782 | 1,579 | 4,939 | -- | -- | -- | -- | -- | -- | -- | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | | |
|--------------------|--------------------------|-------------------------------|------|------|-----------------------|-------|-------|-------|-------|--------|--------|
| | | Murray Pacific Property Wells | | | Arkema Property Wells | | | | | | |
| | | MW40 | MW41 | MW42 | 1B4-1 | 1C3-1 | 1D1-1 | 2A1-1 | 2B1-1 | 2C1-1R | 3A3-1R |
| Temp. (°C) | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | 9.8 | 9.9 | 11.4 | 12.2 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 16.7 | -- | -- | 17.2 | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | 14.1 | 15.0 | 14.5 | -- | 14.6 | 14.3 | 14 |
| | 06/2-3/09 | -- | -- | -- | -- | 14.0 | -- | -- | -- | -- | -- |
| 05/12 ^a | -- | -- | -- | 15.6 | 15.8 | 10.7 | 13.6 | 16.0 | 21.2 | 13.8 | |
| 01/10-15/2014 | 9.1 | 9.7 | 9.5 | -- | -- | -- | -- | -- | -- | -- | |
| Turbidity (NTU) | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | 133 | 6.1 | 40.2 | 2.8 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | 6.3 | 3.4 | 2.3 | -- | 1.4 | 18.9 | 0.7 |
| | 06/2-3/09 | -- | -- | -- | -- | 20 | -- | -- | -- | -- | -- |
| 05/12 ^a | -- | -- | -- | 13.0 | 16.0 | 9.9 | 18 | 19.0 | 102 | 1.3 | |
| 01/10-15/2014 | 18.0 | 7.8 | 18.1 | -- | -- | -- | -- | -- | -- | -- | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | | | |
|--|--------------------------|-------------------------------|-------|------|-----------------------|--------------|--------|------------------------------|------------------------|--------|--------|----|
| | | Murray Pacific Property Wells | | | Arkema Property Wells | | | | | | | |
| | | MW40 | MW41 | MW42 | 1B4-1 | 1C3-1 | 1D1-1 | 2A1-1 | 2B1-1 | 2C1-1R | 3A3-1R | |
| Color/Appearance | 10/22-23/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | Yellow | Yellow | Clear with Suspended Iron | Yellow/ Odor/ Sheen | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | Yellow/Clear | -- | -- | Yellow | -- | -- | -- |
| | 6/2-3/09 | -- | -- | -- | -- | Yellow | -- | -- | -- | -- | -- | -- |
| 01/10-15/2014 | Clear | Clear | Clear | -- | -- | -- | -- | -- | -- | -- | -- | |
| Dissolved Oxygen (mg/L) | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | 0.7 | 0.7 | 2.7 | 0.5 | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 1.0 | -- | 0.7 | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | 1.4 | 1.0 | 0.8 | -- | 0.6 | 0.4 | 1.9 | -- |
| | 06/2-3/09 | -- | -- | -- | -- | 1.0 | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | 0.2 | 0.3 | 0.4 | 0.4 | 0.1 | 0.0 | 0.2 | -- |
| 01/10-15/2014 | 0.4 | 0.4 | 0.7 | -- | -- | -- | -- | -- | -- | -- | -- | |
| Oxidation Reduction Potential (ORP) (mV) | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | -177 | -- | -148 | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -19.4 | -141 | -209 | -- | -68 | -58 | -56 | -- |
| | 06/2-3/09 | -- | -- | -- | -- | -166 | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | -119 | -117 | -171 | -171 | -145 | -175 | -106 | -- |
| 01/10-15/2014 | -18 | -47 | 30 | -- | -- | -- | -- | -- | -- | -- | -- | |

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Table 5

Field Measured Parameters - Surface Aquifer

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Parameter | Date Sampled | Surface Aquifer Well I.D. | | | | | | | | | |
|--------------------------|--------------------------|-------------------------------|------|------|-----------------------|-------|-------|-------|-------|--------|--------|
| | | Murray Pacific Property Wells | | | Arkema Property Wells | | | | | | |
| | | MW40 | MW41 | MW42 | 1B4-1 | 1C3-1 | 1D1-1 | 2A1-1 | 2B1-1 | 2C1-1R | 3A3-1R |
| Eh-SHE (mV) ^b | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 30 | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | 191 | 68 | 1 | -- | 141 | 152 | 155 |
| | 06/2-3/09 | -- | -- | -- | -- | 44 | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | 89 | 91 | 42 | 40 | 63 | 28 | 104 |
| | 01/10-15/2014 | 196 | 167 | 245 | -- | -- | -- | -- | -- | -- | -- |
| Ferrous Iron (mg/L) | 11/14-23/08 | -- | -- | -- | 0.7 | 3.8 | 0 | -- | 6 | 3.2 | 3.8 |
| | 05/12 ^a | -- | -- | -- | 2.0 | 3.8 | 0 | 5.4 | 2.8 | NA | 3.4 |

Notes:

a) Data from Dalton Olmsted Fuglevand. 2013. Final Remedial Investigation Report, Former Arkema Manufacturing Plant, Tacoma, Washington. September.

b) ORP converted to Eh by adding 224 and subtracting the temperature value (Celsius), Eh-SHE = Eh with respect to the standard hydrogen electrode

*Temperature was 20300.0 on original table; changed to 20.3.

-- not sampled/analyzed

° C - degrees Celsius

µmhos/cm -micromhos per centimeter

mg/L - milligrams per liter

mV - millivolt

NTU - Nephelometric Turbidity Units

R - data rejected. The value provided is likely a typographical error.

MF - meter malfunction; values not presented to avoid misinterpretation.

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Table 6

Field Measured Parameters - Second Aquifer

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Parameter | Date Sampled | Second Aquifer Well I.D. | | | | | | | | | | | |
|---------------------------------|--------------|---------------------------|---------|------|------|-------------------------------|------|--------|-----------------------|--------|--------|--------|----|
| | | Taylor Way Property Wells | | | | Murray Pacific Property Wells | | | Arkema Property Wells | | | | |
| | | MW13/MW13R | MW14 | MW24 | MW26 | MW16 | MW18 | MW28 | 1C2-2 | 2B2-2 | 2C2-2 | 3A2-2R | |
| pH | 03/28/94 | N/A | N/A | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/09/94 | N/A | 7.28 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/28/98 | 6.9 | 7.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 7.1 | 7.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 7.3 | 7.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/19-20/00 | 7.1 | 5.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | 7.3 | 7.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 7.4 | 7.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | 7.0 | 7.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 7.4 | 7.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 7.5 | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 7.4 | NS | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 7.1 | 6.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | 7.2 | 6.9 | 7.1 | 7.5 | -- | 6.7 | 6.8 | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | 8.7 | 8.3 | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 6.3 | -- | -- | -- | -- | -- | -- | -- |
| 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 6.1 | 5.4 | -- | 5.7 | -- | |
| 05/12 ^a | 7.2 | 7.1 | 6.3 | -- | -- | -- | 6.6 | 6.5 | 6.2 | 6.1 | 6.5 | -- | |
| Specific Conductance (µmhos/cm) | 03/28/94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/09/94 | 15,830 | 10,660 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/28/98 | 9,240 | 10,350 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | >20,000 | >20,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 20,000 | 231 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/19-20/00 | >20,000 | 19,040 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | >20,000 | >20,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | >20,000 | 4,090 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | 19,930 | 8,380 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 19,610 | 12,340 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 23,300 | 16,200 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 1,010 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 17,680 | 14,350 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | MF | MF | MF | MF | -- | MF | MF | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | 38,480 | 56,540 | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 6,095 | -- | -- | -- | -- | -- | -- | -- |
| 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 38,300 | 245,495 | -- | 73,400 | -- | |
| 05/12 ^a | 5,120 | 29,000 | 15,834 | -- | -- | -- | 758 | 20,503 | 160,872 | 33,439 | 50,900 | -- | |

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Table 6

Field Measured Parameters - Second Aquifer

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Parameter | Date Sampled | Second Aquifer Well I.D. | | | | | | | | | | |
|--------------------------|--------------|---------------------------|--------------|------|------|-------------------------------|------|------|-----------------------|-------|-------|--------|
| | | Taylor Way Property Wells | | | | Murray Pacific Property Wells | | | Arkema Property Wells | | | |
| | | MW13/MW13R | MW14 | MW24 | MW26 | MW16 | MW18 | MW28 | 1C2-2 | 2B2-2 | 2C2-2 | 3A2-2R |
| Temp. (°C) | 04/28/98 | 14.9 | 12 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 13.2 | 13.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 17.3 | 13.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/19-20/00 | 13.3 | 13.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | 16.0 | 15.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 16.5 | 18.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | 13.8 | 14.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 11.6 | 11.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 16.8 | 16.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 13.9 | NS | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 13.2 | 13.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | 13.5 | 15.0 | 14.3 | 13.9 | -- | 13.7 | 13.6 | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | 13.3 | 15.5 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 15.01 | -- | -- | -- | -- | -- | -- |
| 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 15.9 | 13.8 | -- | 12.7 | |
| 05/12 ^a | 15.3 | 15.7 | 14.2 | -- | -- | -- | 11.0 | 13.0 | 14.7 | 12.6 | 12.6 | |
| Turbidity (NTU) | 04/28/98 | 32 | 972 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | 6.3 | >1,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | 4.1 | 231 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/19-20/00 | 3.3 | 75.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | 41.2 | 60.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | 4.5 | 89.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | 6.9 | 633 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/25-26/01 | 8.3 | 88.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | 8.7 | 67.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | 4.6 | NS | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | 4.3 | 87.4 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 12/18-20/06 | 9.3 | 9.8 | 5.5 | 704 | -- | 1.3 | 9.3 | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | 6.3 | 2.3 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 1.3 | 0.4 | -- | 3.3 | |
| 05/12 ^a | 727 | 26 | 10.8 | -- | -- | -- | 27.9 | 6.4 | 21 | 4.2 | 160 | |
| Color/Appearance | 03/31/98 | Yellow | Gray/cloudy | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/22-23/98 | Clear | Cloudy | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/15-16/99 | Yellow | Gray/cloudy | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 01/19-20/00 | Yellow | Clear/yellow | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/21/00 | Light Brown | Gray | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/15-16/00 | Light Yellow | Cloudy/gray | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25/00 | Clear | Cloudy/gray | -- | -- | -- | -- | -- | -- | -- | -- | -- |

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Table 6

Field Measured Parameters - Second Aquifer

Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Parameter | Date Sampled | Second Aquifer Well I.D. | | | | | | | | | | |
|--|--------------------------|---------------------------|-------------|-----------|----------|-------------------------------|------------|-----------------|-----------------------|-------|-------|--------|
| | | Taylor Way Property Wells | | | | Murray Pacific Property Wells | | | Arkema Property Wells | | | |
| | | MW13/MW13R | MW14 | MW24 | MW26 | MW16 | MW18 | MW28 | 1C2-2 | 2B2-2 | 2C2-2 | 3A2-2R |
| Color/Appearance (cont.) | 01/25-26/01 | Lt. Yellow/clear | Cloudy/gray | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 04/26-27/01 | Lt. Yellow/clear | Cloudy/gray | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 07/26-27/01 | Lt. Gray | NS | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/25-26/01 | Clear | Cloudy/gray | Sl. Brown | Lt. Gray | -- | Clear | Clear/Sl. Sheen | -- | -- | -- | -- |
| | 12/18-20/06 | Clear | Clear | -- | -- | -- | Sl. Yellow | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | Clear | Clear | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | Clear | -- | -- | -- | -- | -- | -- |
| Dissolved Oxygen (mg/L) | 12/18-20/06 | 2.1 | 0.3 | 0.6 | -- | -- | 0.3 | 0.2 | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | 0.2 | -- | -- | -- | 0.6 | 0.4 | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 0.9 | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 0.7 | 0.0 | -- | 0.6 |
| | 05/12 ^a | 0.3 | 0.2 | 0.8 | -- | -- | -- | 1.1 | 1.3 | 0.1 | 0.5 | 0.2 |
| Oxidation Reduction Potential (ORP) (mV) | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | -60 | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -74 | -16.9 | -- | -541 |
| | 05/12 ^a | -115 | -94 | -64.8 | -- | -- | -- | -33 | -85 | -92 | -66 | -159 |
| Eh-SHE (mV) | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8/27-9/3/08 | -- | -- | -- | -- | 149 | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 134 | 193 | -- | -330 |
| | 05/12 ^a | 94 | 114 | 145 | -- | -- | -- | 181 | 126 | 117 | 146 | 52 |
| Ferrous Iron (mg/L) | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | 6.4 | 10 | -- | 6 |
| | 05/12 ^a | 3.4 | 5.2 | 3 | -- | -- | -- | 3.6 | 6.0 | 4.8 | 5.6 | 5.2 |

Notes:

a) Data from Dalton Olmsted Fuglevand. 2013. Final Remedial Investigation Report, Former Arkema Manufacturing Plant, Tacoma, Washington. September.

MF - meter malfunctioned.

-- not sampled/not analyzed.

NTU - nephelometric turbidity units.

µmhos/cm - micromhos per centimeter.

°C - degrees Celsius

mV = millivolt

Eh-SHE = Eh with respect to the standard hydrogen electrode

mg/L = milligrams per liter

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | | | | | | | | | | |
|---|--|--------------------------|--|----------------------|-------|-------|------------------|------------------|-----------------------------------|-------------------|----------------------|----------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|----|
| | | | MW1/MW1R | | MW2 | | MW3/MW3B | | MW4 | | MW5 | | MW6 | | MW9 | | MW10 | | MW12 | | |
| | | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | |
| Antimony 640 | 50 | 03/28/94 | ND | ND | ND | ND | 19 | 18 | 280 | 290 | ND | ND | 79 | 76 | -- | -- | -- | -- | -- | -- | |
| | | 11/09/94 | ND | ND | ND | ND | ND | ND | 95 | 84 | ND | ND | ND | ND | 520 | 750 | ND | ND | ND | ND | |
| | | 03/31/98 | 77 | 66 | ND | ND | ND | ND | 150 | 160 | ND | ND | 63 | 79 | 4,500 | 4,200 | ND | ND | ND | ND | |
| | | 10/23/98 | 200 | 220 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| | | 04/15-16/99 | 190 | 92 | ND | ND | ND | ND | <200 ^c _J | <100 ^c | <250 ^c | <250 ^c | <250 ^c | <250 ^c | 1.9 | 1.7 | ND | ND | ND | ND | |
| | | 01/19-20/00 | ND | ND | ND | ND | 250 | 250 | 98 | 98 | ND | ND | ND | ND | 58 ^J | 69 ^J | ND | ND | ND | ND | |
| | | 04/21/00 | 45 ^J | -- | ND | -- | ND | -- | 100/150 ^d _J | -- | ND | UJ | -- | ND | -- | 200 ^J | -- | ND | ND | ND | UJ |
| | | 08/16/00 | 53 | -- | ND | -- | 5.90 | -- | 40 | -- | ND | -- | ND | -- | 78 | -- | ND | -- | ND | ND | |
| | | 10/25/00 | 33 | -- | ND | -- | ND | -- | 48 | -- | ND | -- | 8.3 | -- | 73 | 71 | ND | -- | ND | -- | |
| | | 01/25-26/01 | 29 | -- | ND | -- | ND | -- | 34 | -- | ND | -- | ND | -- | 56 | -- | ND | -- | ND | -- | |
| | | 04/26-27/01 | 18 | -- | ND | -- | ND | -- | 47 | -- | ND | -- | ND | -- | 100 | -- | ND | -- | ND | -- | |
| | | 07/26-27/01 | 120 | -- | ND | -- | -- | -- | -- | 50 | ND | -- | ND | -- | 120 | -- | ND | -- | -- | -- | |
| | | 10/25-26/01 | 43 | -- | ND | -- | ND | -- | 100 | 90 | ND | -- | 6.2 | -- | 84 | -- | ND | -- | -- | -- | |
| | | 10/02-11/02 ^e | 23 | -- | -- | -- | <3 | -- | 39 | -- | 3 | -- | 3.5 | -- | 58 | -- | -- | -- | -- | -- | |
| | | 12/18-20/06 | 7.1/6.9 ^d | 6/6 ^d | 6.5 | 5.6 | Well Abandoned | | 14 | 10.8 | 1.8/1.9 ^d | 1.8/1.8 ^d | 1.5 | 2 | 47.3 | 46.8 | Well Abandoned | | Well Abandoned | | |
| 08/27-9/3/08 | 3.7 | 3.3 | -- | -- | -- | -- | -- | -- | 2.4 | 2.4 | 1.8 | 1.8 | 52.7 | 55.4 | -- | -- | -- | -- | | | |
| 06/2-3/09 | 4.8 | 4.4 | -- | -- | -- | -- | -- | -- | 2.5 | 2.3 | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Arsenic 5 | 5 | 03/28/94 | 1,600 | 1,600 | 1,900 | 1,800 | 430 | 350 | 39 | 36 | <10 ^c | <10 ^c | 140 | 130 | -- | -- | -- | -- | -- | -- | |
| | | 11/09/94 | 1,400 | 1,500 | 290 | 260 | 170 | 220 | 12 | 17 | ND | ND | 13 | 12 | 1,900 | 2,500 | ND | ND | 7.9 | ND | |
| | | 03/31/98 | 520 | 480 | 2,900 | 3,000 | 120 | 110 | 29 | 27 | ND | ND | 130 | 130 | 19,000 | 19,000 | ND | ND | ND | ND | |
| | | 10/23/98 | 1,200 | 1,300 | 140 | 130 | 100 | 92 | 7.7 | 7.7 | ND | ND | ND | ND | 2,800 | 2,600 | ND | ND | ND | ND | |
| | | 04/15-16/99 | 400 | 370 | 220 | 190 | 21 | 19 | 35 | 28 | <10 ^c | <10 ^c | <10 ^c | <10 ^c | 9,600 | 7,600 | <10 ^c | <10 ^c | <10 ^c | <10 ^c | |
| | | 01/19-20/00 | 610 | 620 | 650 | 660 | 110 ^J | 180 ^J | 26 ^J | 53 ^J | ND | ND | 12 | 13 | 180 | 170 | ND | ND | ND | ND | |
| | | 04/21/00 | 520 ^J | -- | 390 | -- | 140 | -- | 46/140 ^d _J | -- | 7.1 ^J | -- | 15 | -- | 350 ^J | -- | 7.7 | 4.7 | ND | UJ | |
| | | 08/16/00 | 480 | -- | 400 | -- | 52 | -- | 8.8 | -- | 6.7 | -- | 15 | -- | 120 | -- | ND | -- | 5.2 | 5.9 | |
| | | 10/25/00 | 490 | -- | 240 | -- | 34 | -- | 25 | -- | 20 | -- | 24 | -- | 1,500 | 1,500 | 5.2 | -- | ND | -- | |
| | | 01/25-26/01 | 520 | -- | 220 | -- | 34 | -- | 19 | -- | 6.9 | -- | 28 | -- | 110 | -- | 4.4 | -- | ND | -- | |
| | | 04/26-27/01 | 630 | -- | 830 | -- | 22 | -- | 28 | -- | 7.6 | -- | 17 | -- | 110 | -- | ND | -- | ND | -- | |
| | | 07/26-27/01 | 650 | -- | 260 | -- | -- | -- | -- | 22 | 6 | -- | 20 | -- | 130 | -- | 13 | -- | -- | -- | |
| | | 10/25-26/01 | 520 | -- | 120 | -- | 85 | -- | 21 | 22 | ND | -- | 6.5 | -- | 160 | -- | ND | -- | -- | -- | |
| | | 10/02-11/02 ^e | 356 | -- | -- | -- | 26.5 | -- | 22.2 | -- | 1.5 | -- | 1.9 | -- | 382 | -- | -- | -- | -- | -- | |
| | | 12/18-20/06 | 786/771 ^d | 737/768 ^d | 105 | 112 | Well Abandoned | | 26 | 23.2 | 1.6/1.7 ^d | 1.8/1.9 ^d | 3.1 | 4 | 36.2 | 35 | Well Abandoned | | Well Abandoned | | |
| 08/27-9/3/08 | 523 | 510 | -- | -- | -- | -- | -- | -- | 1.9 | 1.5 | 2.8 | 1.5 | 89.5 | 90 | -- | -- | -- | -- | | | |
| 06/2-3/09 | 1,750 | 1,790 | -- | -- | -- | -- | -- | -- | 3 | 1.4 | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| 05/2012 ^f | -- | 1,100 | -- | 114 | -- | -- | -- | 16 | -- | 1.7 | -- | 3.5 | -- | 40 | -- | -- | -- | -- | -- | | |
| Arsenic (III) | | 08/29-9/2/08 | 474 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 27 | -- | -- | -- | -- | -- | | |
| Arsenic (V) | | 08/29-9/2/08 | 25 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 42.7 | -- | -- | -- | -- | -- | | |

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | | | | | | | | | |
|---|--|---------------------------|--|--------------------|------|----|----------------|----|--------------------|------------------|---------------------|---------------------|------------------|------------------|------|------|----------------|----------------|----------------|----------------|
| | | | MW1/MW1R | | MW2 | | MW3/MW3B | | MW4 | | MW5 | | MW6 | | MW9 | | MW10 | | MW12 | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| Cadmium 8.8 | 5 | 03/28/94 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- |
| | | 10/02-11/02 ^d | <1 | -- | -- | -- | <1 | -- | <1 | -- | <1 | -- | <1 | -- | <1 | -- | -- | -- | -- | -- |
| | | 08/27-9/3/08 06/2-3/09 | -- | <0.2 | -- | -- | Well Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | <0.2 | Well Abandoned | Well Abandoned | Well Abandoned | Well Abandoned |
| Chromium NE | 10 | 03/28/94 | ND | ND | ND | ND | ND | ND | 13 | ND | 85 | 75 | ND | ND | -- | -- | -- | -- | -- | -- |
| | | 11/09/94 | ND | ND | ND | ND | 26 | ND | 27 | 25 | 17 | 13 | ND | ND | 17 | ND | ND | ND | 19 | ND |
| | | 03/31/98 | ND | ND | ND | ND | ND | ND | ND | ND | 54 | 47 | ND | ND | ND | ND | 11 | ND | ND | ND |
| | 11 | 10/23/98 | ND | ND | ND | ND | ND | ND | ND | ND | 57 | 57 | 12 | ND | ND | 11 | ND | ND | ND | ND |
| | | 04/15-16/99 | ND | ND | ND | ND | ND | ND | <20 ^c | <20 ^c | 75 | 64 | <50 ^c | <50 ^c | ND | ND | ND | ND | ND | ND |
| | | 01/19-20/00 | ND | ND | ND | ND | ND | ND | ND | ND | 66 | 67 | 21 | 16 | ND | ND | 11 | ND | ND | ND |
| | | 04/21/00 | ND | -- | ND | -- | ND | -- | ND/ND ^d | -- | 22 | -- | 16 | -- | ND | -- | ND | 29 | ND | -- |
| | | 08/16/00 | ND | -- | ND | -- | ND | -- | ND | -- | 46 | -- | 28 | -- | ND | -- | ND | -- | 42 | ND |
| | | 10/25/00 | ND | -- | ND | -- | ND | -- | ND | -- | 62 | -- | 53 | -- | 13 | 14 | ND | -- | ND | -- |
| | | 01/25-26/01 | ND | -- | ND | -- | ND | -- | 15 | -- | 44 | -- | 46 | -- | ND | -- | ND | -- | ND | -- |
| | | 04/26-27/01 | ND | -- | ND | -- | ND | -- | 26 | -- | 59 | -- | 37 | -- | 12 | -- | 13 | -- | ND | -- |
| | | 07/26-27/01 | ND | -- | ND | -- | -- | -- | -- | 55 | 39 | -- | 45 | -- | ND | -- | 44 | -- | -- | -- |
| | | 10/25-26/01 | 21 | -- | 16 | -- | 12 | -- | 47 | 43 | 41 | -- | 36 | -- | 12 | -- | 17 | -- | -- | -- |
| | | 10/02-11/02 ^e | 13 | -- | -- | -- | 3.45 | -- | 25 | -- | 36 | -- | 34 | -- | 17 | -- | -- | -- | -- | -- |
| | | 12/18-20/06 | 1.2/1.3 ^d | <2/<2 ^d | 4 | 5 | Well Abandoned | -- | 3.9 | 3.5 | 18/19 ^{dJ} | 18/19 ^{dJ} | 18 | 19 | 6 | 6 | Well Abandoned | Well Abandoned | Well Abandoned | Well Abandoned |
| 08/27-9/3/08 | 2 | 2 | -- | -- | -- | -- | -- | -- | 10 | 9 | 8 | 9 | <2 | <2 | -- | -- | -- | -- | | |
| 06/2-3/09 | <5 | <5 | -- | -- | -- | -- | -- | -- | 18 | 5.6 | -- | -- | -- | -- | -- | -- | -- | -- | | |
| 05/2012 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8 | -- | 6 | -- | -- | -- | -- | -- | -- | | |

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | | | | | | | | | | |
|---|--|--------------|--|----------------------|--------------------|-----------------|-------------------|----------------|-------------------|---------------------|------------------|-----------------------|----------------------|------------------|------------------|-----------------|------|-------------------|------|-------------------|-------|
| | | | MW1/MW1R | | MW2 | | MW3/MW3B | | MW4 | | MW5 | | MW6 | | MW9 | | MW10 | | MW12 | | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | |
| Copper | 2.9 | 03/28/94 | 14 BJ | 6.1 | ND | ND | ND | ND | 21 | 9 | 29 | 22 | 12 | ND | -- | -- | -- | -- | -- | -- | |
| | 2.7 | 11/09/94 | 24 | 8.2 | ND | ND | 3.8 B | ND | 12 | 8.5 | 6.1 | 11 | 3.1 | ND | 14 | 14 | ND | ND | 36 | 12 | |
| | 2.4 | 10 | 03/31/98 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12 | ND | ND | ND |
| | | 10 | 10/23/98 | ND | ND | 35 | ND | 160 | ND | ND | ND | 16 | ND | ND | ND | 57 | ND | ND | ND | 22 | 17 J |
| | 11 | 10 | 04/15-16/99 | 10 | ND | ND | ND | 14 | ND | <20 ^c | <20 ^c | <50 ^c | <50 ^c | <50 ^c | <50 ^c | ND | ND | 40 | ND | 35 | ND |
| | | 11 | 01/19-20/00 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| | | 11 | 04/21/00 | ND | -- | ND | -- | ND | -- | ND/ND ^d | -- | 27 | -- | 39 | -- | ND | -- | ND | ND | ND | -- |
| | | 11 | 08/16/00 | 17 | -- | 16 | -- | ND | -- | 14 | -- | 45 | -- | 77 | -- | 11 | -- | ND | -- | ND | ND |
| | | 11 | 10/25/00 | 18 | -- | 23 | -- | ND | -- | 15 | -- | 150 | -- | 360 | -- | 43 | ND | ND | -- | ND | -- |
| | | 11 | 01/25-26/01 | 17 | -- | ND | -- | ND | -- | 13 | -- | 26 | -- | 120 | -- | ND | -- | ND | -- | ND | -- |
| | | 11 | 04/26-27/01 | 14 | -- | 17 | -- | ND | -- | 59 | -- | 47 | -- | 91 | -- | ND | -- | ND | -- | ND | -- |
| | | 11 | 07/26-27/01 | 75 | -- | ND | -- | -- | -- | -- | 40 | 44 | -- | 120 | -- | ND | -- | ND | -- | -- | -- |
| | | 11 | 10/25-26/01 | 21 | -- | ND | -- | 73 | -- | 50 | 19 | 36 | -- | 63 | -- | 12 | -- | ND | -- | -- | -- |
| | | 11 | 10/02-11/02 ^e | 10 | -- | -- | -- | <1 | -- | 15 | -- | 8 | -- | 6 | -- | 34 | -- | -- | -- | -- | -- |
| | | 11 | 12/18-20/06 | 4.9/4.7 ^d | <2/3 ^d | 2.8 | <1 | Well Abandoned | | 3.9 | 2.8 | 05.9/6.7 ^d | 6.3/6.3 ^d | 4.8 | 4 | 7.8 | 7 | Well Abandoned | | Well Abandoned | |
| 11 | | 08/27-9/3/08 | 1 | 0.9 | -- | -- | -- | -- | -- | -- | 3 | 2 | 2 | 2 | 12 | 7 | -- | -- | -- | -- | |
| 11 | 06/2-3/09 | 1.8 | 1.1 | -- | -- | -- | -- | -- | -- | 4.2 | 3.4 | -- | -- | -- | -- | -- | -- | -- | -- | | |
| 11 | 05/2012 ^f | -- | 2 | -- | 1 | -- | -- | -- | <1 | -- | <1 | -- | <1 | -- | 9 | -- | -- | -- | -- | | |
| Lead | 3 | 03/28/94 | 4 | ND | ND | ND | <6.0 ^c | ND | 4 | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| | 3 | 11/09/94 | ND | ND | ND | ND | ND | ND | ND | ND | <12 ^c | <15 ^c | <15 ^c | <15 ^c | 3.4 | ND | ND | ND | 8.9 | ND | |
| | 8.1 | 1.1 | 03/31/98 | ND UJ | ND UJ | ND | ND | ND UJ | ND UJ | ND UJ | ND UJ | <6 ^c | <6 ^c | <6 ^c | ND UJ | ND | ND | 89 | ND | ND UJ | ND UJ |
| | | 1.1 | 10/23/98 | ND | ND | 2.7 | ND | ND | ND | 1.4 | ND | 4.6 | 2.7 | 4.6 | ND | 2.2 | ND | 2.1 | ND | 6.8 | ND |
| | 8.1 | 2 | 04/15-16/99 | <4 ^c | <4 ^c | <4 ^c | <4 ^c | 15 | <4.0 ^c | <4 ^c | <4 ^c | 6.4 | <4 ^c | <4 ^c | <4 ^c | <4 ^c | 49 | <4.0 ^c | 10 | <4.0 ^c | |
| | 8.1 | 3 | 01/19-20/00 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 4.7 | ND | 4.8 | ND | |
| | 8.1 | 1.1 | 04/21/00 | 4.2 | -- | ND | -- | ND | -- | ND/1.8 ^d | -- | ND | -- | 2.1 | -- | 3.6 | -- | 5.7 | ND | 1.3 | -- |
| | 8.1 | 2.2 | 08/16/00 | 5.2 | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | ND |
| | 8.1 | 2.2 | 10/25/00 | 8.5 | -- | 2.5 | -- | ND | -- | 1.7 | -- | 1.6 | -- | 3.2 | -- | 43 | 1.4 | 1.8 | -- | 2.3 | -- |
| | 8.1 | 1.1 | 01/25-26/01 | 9.6 | -- | 1.4 | -- | ND | -- | 1.6 | -- | 1.5 | -- | ND | -- | ND | -- | ND | -- | 2.9 | -- |
| | 8.1 | 1.1 | 04/26-27/01 | 12 | ND | ND | -- | ND | -- | 2.4 | -- | ND | -- | ND | -- | ND | -- | 1.6 | -- | ND | -- |
| | 8.1 | 1.1 | 07/26-27/01 | 47 | ND | 1.8 | -- | -- | -- | 4.6 | ND | -- | ND | -- | ND | -- | 6.5 | -- | -- | -- | |
| | 8.1 | 1.1 | 10/25-26/01 | 14 | -- | 2.6 | -- | 1.3 | -- | 7.6 | 1.9 | 1.2 | -- | ND | -- | 2.7 | -- | ND | -- | -- | -- |
| | 8.1 | 1.1 | 10/02-11/02 ^e | 5 | -- | -- | -- | <1 | -- | 3 | -- | <1 | -- | <1 | -- | 21.3 | -- | -- | -- | -- | |
| | 8.1 | 1.1 | 12/18-20/06 | <1/<1 ^d | <5/<5 ^d | <1 | <2 | Well Abandoned | | <1 | <1 | <1/<1 ^d | <1/<1 ^d | <1 | <5 | <1 | <2 | Well Abandoned | | Well Abandoned | |
| 8.1 | 1.1 | 08/27-9/3/08 | <1 | <1 | -- | -- | -- | -- | -- | <2 | <2 | <2 | <2 | <1 | <1 | <1 | <1 | <1 | <1 | | |
| 8.1 | 1.1 | 06/2-3/09 | <1 | <1 | -- | -- | -- | -- | -- | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- | | |

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | | | | | | | | | |
|---|--|--------------------------|--|------------------|------|----------------|----------------|-----|--------------------|----------------------|----------------------|----------------------|------------------|------------------|------|----------------|----------------|----------------|----------------|-----|
| | | | MW1/MW1R | | MW2 | | MW3/MW3B | | MW4 | | MW5 | | MW6 | | MW9 | | MW10 | | MW12 | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| Mercury | 0.2 | 03/28/94 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- |
| | | 10/02-11/02 ^e | <1 | -- | -- | -- | <1 | -- | <1 | -- | <1 | -- | <1 | -- | <1 | -- | -- | -- | -- | -- |
| Nickel 8.2 | 8.3 | 03/28/94 | ND | ND | ND | ND | 11 | ND | 25 | 19 | 28 | 24 | ND | ND | -- | -- | -- | -- | -- | -- |
| | 2.8 | 11/09/94 | ND | 4.4 J | ND | 2.8 J | 20 | 12 | 28 | 27 | 40 | 36 | ND | ND | 15 | 9 J | 5.5 B | 4.8 B | 23 | 11 |
| | 22 | 08/16/00 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | ND |
| | | 10/25/00 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | ND | ND | -- | ND | -- |
| | | 01/25-26/01 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- |
| | | 04/26-27/01 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- |
| | | 07/26-27/01 | ND | -- | ND | -- | -- | -- | -- | 21 | ND | -- | ND | -- | ND | -- | ND | -- | -- | -- |
| | | 10/25-26/01 | ND | -- | ND | -- | ND | -- | 25 | 20 | ND | -- | ND | -- | ND | -- | ND | -- | -- | -- |
| | | 12/18-20/06 | 3.1/3 ^d | 3/3 ^d | 8.1 | 7 | Well Abandoned | | 7.1 | 7.2 | 3.2/3.6 ^d | 3.2/3.3 ^d | 2.7 | 3 | 2.9 | 3 | Well Abandoned | | Well Abandoned | |
| | | 08/27-9/3/08 | <1 | 1.3 | -- | -- | -- | -- | -- | -- | 3 | 3 | 2 | 2 | 4 | 4 | -- | -- | -- | -- |
| | 06/2-3/09 | 2.8 | 2.5 | -- | -- | -- | -- | -- | -- | 2.4 | 2.3 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 05/2012 ^f | -- | <1 | -- | 6 | -- | -- | -- | 2 | -- | <1 | -- | <1 | -- | 5 | -- | -- | -- | -- | |
| Silver | 2.3 | 03/28/94 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- |
| | 1 | 10/02-11/02 ^e | <1 | -- | -- | -- | <1 | -- | <1 | -- | <1 | -- | <1 | -- | <1 | -- | -- | -- | -- | -- |
| Zinc 81 | 10 | 03/28/94 | 23 | 15 | ND | ND | 14 | ND | 66 | 58 | 100 | 92 | ND | ND | -- | -- | -- | -- | -- | -- |
| | | 11/09/94 | 13 | ND | ND | ND | 13 | 14 | 74 | 70 | 57 | 61 | ND | ND | 110 | 96 | 11 | 11 | 78 | 17 |
| | | 03/31/98 | 21 | 25 | 20 | ND | ND | ND | 32 | 39 | ND | 14 | ND | ND | ND | ND | 42 | ND | ND | ND |
| | | 10/23/98 | ND | ND | 22 | ND | 73 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 29 | 42 |
| | | 04/15-16/99 | 11 | ND | ND | 20 | 28 | 14 | 33 | 31 | <50 ^c | <50 ^c | <50 ^c | <50 ^c | 22 | 15 | 60 | 25 | 58 | 54 |
| | | 01/19-20/00 | ND | ND | ND | ND | 570 | 600 | 13 | 15 | ND | ND | ND | ND | ND | -- | ND | ND | ND | ND |
| | 56 | 04/21/00 | ND | -- | ND | -- | ND | -- | ND/ND ^d | | ND | -- | ND | -- | ND | -- | ND | ND | ND | -- |
| | | 08/16/00 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | 56 | -- | 120 | 190 |
| | | 10/25/00 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | 60 | ND | ND | -- | ND | -- |
| | | 01/25-26/01 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- |
| | | 04/26-27/01 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- |
| | 50-56 | 07/26-27/01 | ND | -- | ND | -- | -- | -- | NA | ND | ND | -- | ND | -- | ND | -- | ND | -- | -- | -- |
| | | 10/25-26/01 | ND | -- | ND | -- | ND | -- | ND | ND | ND | -- | ND | -- | ND | -- | ND | -- | -- | -- |
| | 12/18-20/06 | 5/6 ^d | <20/<20 ^d | 6 | <10 | Well Abandoned | | 5 | 4 | <10/<10 ^d | <10/<10 ^d | 5 | <20 | 12 | <10 | Well Abandoned | | Well Abandoned | | |
| | 08/27-9/3/08 | <4 | <4 | -- | -- | -- | -- | -- | -- | <10 | <10 | <10 | <10 | 30 | <4 | -- | -- | -- | -- | |
| | 06/2-3/09 | <4 | <4 | -- | -- | -- | -- | -- | -- | <4 | <4 | -- | -- | -- | -- | -- | -- | -- | -- | |
| Chromium, Hexavalent | 2 | 03/28/94 | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | ND | -- | -- | -- | -- | -- | -- | -- |
| | | 10/02-11/02 ^e | 7.1 | -- | -- | -- | -- | -- | <5 | -- | 11.9 | -- | <10 | -- | <5 | -- | -- | -- | -- | -- |
| | | 05/2012 ^f | -- | -- | -- | -- | Well Abandoned | | -- | -- | -- | <10 | -- | <10 | -- | -- | Well Abandoned | | Well Abandoned | |

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | |
|---|--|----------------------|--|-----------|-------|-----------|-------|-----------|-------|-----------|-------|--------------------------|
| | | | MW25 | | MW27 | | MW30 | | MW36 | | MW37 | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Antimony 640 | 0.2 | 12/18-20/06 | 2.5 | 2.2 | 2.7 | 3.5 | 2 | 1.9 | -- | -- | -- | -- |
| | 0.2-0.5 | 08/27-9/3/08 | 0.5 | 0.5 | -- | -- | 0.5 | 0.5 | -- | -- | -- | -- |
| | 0.5 | 06/2-3/09 | -- | -- | -- | -- | 0.7 | 0.7 | -- | -- | -- | -- |
| Arsenic 5 | 0.2 0.5-1 | 12/18-20/06 | 29.5 | 33.2 | 10 | 11.7 | 252 | 244 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | 126 | 141 | -- | -- | 12.7 | 13.9 | -- | -- | -- | -- |
| | | 06/2-3/2009 | 191 | 210 | -- | -- | 29 | 39 | -- | -- | -- | -- |
| | | 05/2012 ^f | -- | 36 | -- | 4.8 | -- | 15.8 | -- | -- | -- | -- |
| | | 01/10-15/2014 | -- | 11 | -- | 3 | -- | 29 | -- | 276 | -- | 865/876 ^d |
| Arsenic (III) | | 08/27-9/3/08 | -- | -- | -- | -- | 6.35 | -- | -- | -- | -- | -- |
| | | 01/10-15/2014 | -- | 6.15 | -- | -- | -- | 31.7 | -- | 222 | -- | 719/689 ^d |
| Arsenic (V) | | 08/27-9/3/08 | 14.6 | -- | -- | -- | 2.99 | -- | -- | -- | -- | -- |
| | | 01/10-15/2014 | -- | 4.71 | -- | -- | -- | 13.3 | -- | 38.2 | -- | 256/230 ^d |
| MMAAs | | 01/10-15/2014 | -- | <0.14 | -- | -- | -- | <0.14 | -- | <0.69 | -- | <0.69/<0.69 ^d |
| DMAAs | | 01/10-15/2014 | -- | <0.075 | -- | -- | -- | <0.075 | -- | <0.38 | -- | <0.38/<0.38 ^d |
| Cadmium 8.8 | | 08/27-9/3/08 | -- | <0.2 | -- | -- | -- | <0.2 | -- | -- | -- | -- |
| | | 06/2-3/2009 | -- | -- | -- | -- | -- | <0.2 | -- | -- | -- | -- |
| Chromium NE | | 12/18-20/06 | <1 | <1 | 2 | <1 | 4 | 2 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | 1 | 1 | -- | -- | 2 | 1 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | -- | -- | <5 | <5 | -- | -- | -- | -- |
| Copper 2.4 | | 12/18-20/06 | 2 | <1 | 5.3 | 1 | 7 | <1 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | <0.5 | <0.5 | -- | -- | 1.7 | 0.8 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | -- | -- | 2.8 | <0.5 | -- | -- | -- | -- |
| | | 05/2012 ^f | -- | <1 | -- | <1 | -- | <1 | -- | -- | -- | -- |
| Lead 8.1 | | 12/18-20/06 | <2 | <2 | 1 | <2 | <2 | <2 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | <1 | <1 | -- | -- | <1 | <1 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | -- | -- | <1 | <1 | -- | -- | -- | -- |
| Nickel 8.2 | | 12/18-20/06 | 4 | 4 | 2.2 | 3 | 4 | 3 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | 0.8 | 1 | -- | -- | 0.8 | 0.6 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | -- | -- | 1.6 | 0.6 | -- | -- | -- | -- |
| | | 05/2012 ^f | -- | 2 | -- | 2 | -- | 2 | -- | -- | -- | -- |
| Zinc 81 | | 12/18-20/06 | <10 | <10 | 5 | <10 | 20 | 20 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | <4 | <4 | -- | -- | 5 | <4 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | -- | -- | <4 | <4 | -- | -- | -- | -- |

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Murray Pacific Property Wells | | | | | | | | | | | |
|---|--|----------------------|--|-----------|-------|-----------|-------|-----------|-------|--------------------|----------------------|----------------------|-------|-----------|
| | | | MW17 | | MW29 | | MW31 | | MW32 | | MW33 | | MW34 | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Antimony 640 | | 12/18-20/06 | -- | -- | 1.7 | 0.6 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/27-9/3/08 | <1 | <1 | 0.7 | 0.9 | 2.6 | 2.2 | 1.2 | 1.1 | 1.6/1.5 ^d | 2.3/2.4 ^d | 0.5 | 0.5 |
| | | 06/2-3/09 | -- | -- | -- | -- | <0.5 | <5 | -- | -- | 3 | 2.1 | -- | -- |
| Arsenic 5 | | 12/18-20/06 | -- | -- | 698 | 285 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/27-9/3/08 | 60 | 57 | 516 | 622 | 160 | 165 | 132 | 135 | 124/120 ^d | 107/102 ^d | 144 | 138 |
| | | 06/2-3/09 | -- | -- | -- | -- | 159 | 150 | 172 | 161 | 89 | 84 | 148 | 157 |
| | | 05/2012 ^f | -- | -- | -- | 319 | -- | -- | -- | 61/65 ^d | -- | 47 | -- | 72 |
| Arsenic (III) | | 01/10-15/2014 | -- | 15 | -- | 203 | -- | 97 | -- | 17 | -- | 55 | -- | 59 |
| | | 08/27-9/3/08 | -- | -- | 488 | -- | -- | -- | -- | -- | 79.4 | -- | -- | -- |
| Arsenic (V) | | 01/10-15/2014 | -- | -- | -- | 149 | -- | -- | -- | -- | -- | 35.1 | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 142 | -- | -- | -- | -- | -- | 23.1 | -- | -- | -- |
| MMAs | | 01/10-15/2014 | -- | -- | -- | 66.5 | -- | -- | -- | -- | -- | 20.6 | -- | -- |
| | | 01/10-15/2014 | -- | -- | -- | <0.69 | -- | -- | -- | -- | -- | <0.14 | -- | -- |
| DMAs | | 01/10-15/2014 | -- | -- | -- | <0.38 | -- | -- | -- | -- | -- | <0.075 | -- | -- |
| | | 08/27-9/3/08 | -- | -- | -- | <0.2 | -- | -- | -- | -- | -- | <2/<0.2 ^d | -- | -- |
| Cadmium 8.8 | | 06/2-3/09 | -- | -- | -- | -- | <0.5 | -- | -- | -- | -- | <0.5 | -- | -- |
| | | 12/18-20/06 | -- | -- | 11 | 2 | -- | -- | -- | -- | -- | -- | -- | -- |
| Chromium NE | | 08/27-9/3/08 | <2 | <2 | 4 | 3 | <1 | 0.7 | 0.5 | <0.5 | <1/<1 ^d | 0.6/0.6 ^d | <1 | <0.5 |
| | | 06/2-3/09 | -- | -- | -- | -- | <5 | <5 | -- | -- | 3 | 3 | -- | -- |
| | | 12/18-20/06 | -- | -- | 16 | <1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper 2.4 | | 08/27-9/3/08 | 6 | 4 | 0.6 | <0.5 | <1 | <0.5 | 1.6 | 0.9 | 2/2 ^d | 1.4/1.4 ^d | 0.5 | 2 |
| | | 06/2-3/09 | -- | -- | -- | -- | 2 | <1 | -- | -- | 4 | <1 | -- | -- |
| | | 05/2012 ^f | -- | -- | -- | <1 | -- | -- | -- | 1/<1 ^c | -- | <1 | -- | 1 |
| Lead 8.1 | | 12/18-20/06 | -- | -- | 7 | <2 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/27-9/3/08 | <5 | <5 | <1 | <1 | <1 | <1 | <1 | <1 | <2/<2 ^d | <1/<1 ^d | <1 | 5 |
| | | 06/2-3/09 | -- | -- | -- | -- | <2 | <2 | -- | -- | 5 | <2 | -- | -- |
| Nickel 8.2 | | 12/18-20/06 | -- | -- | 17 | 2 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/27-9/3/08 | 8 | 8 | 3.6 | 5 | 3.9 | 3.6 | 4.6 | 4.8 | 7/6 ^d | 7.4/7.5 ^d | 2.1 | 2.1 |
| | | 06/2-3/09 | -- | -- | -- | -- | 2 | <1 | -- | -- | 3 | 2 | -- | -- |
| Zinc 81 | | 05/2012 ^f | -- | -- | -- | 3 | -- | -- | -- | 1/<1 ^d | -- | <1 | -- | 1 |
| | | 12/18-20/06 | -- | -- | 40 | <10 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/27-9/3/08 | <20 | <20 | <4 | <4 | 7 | 6 | 14 | 4.8 | 20/10 ^d | 11/12 ^d | <4 | 7 |
| 06/2-3/09 | -- | -- | -- | -- | <10 | <10 | -- | -- | 10 | <10 | -- | -- | | |
| 05/2012 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |

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Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Murray Pacific Property Wells | | | | | | | | | | | | | | |
|---|--|----------------------|--|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|----|----|----|
| | | | MW35 | | MW38 | | MW39 | | MW40 | | MW41 | | MW42 | | | | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | | | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | | | |
| Antimony | 2 | 12/18-20/06 | -- | -- | | | | | | | | | | | | | |
| | | 02/08/07 | -- | -- | | | | | | | | | | | | | |
| | 0.2-0.5 | 8/20-21/2008 | -- | -- | | | | | | | | | | | | | |
| Antimony (640) | | 08/27-9/3/08 | 0.4 | 0.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Arsenic | | 08/27-9/3/08 | 3.2 | 2.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 06/2-3/09 | 2.4 | 1.6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5 | | 05/2012 ^f | -- | 17.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 01/10-15/2014 | -- | 1.0 | -- | 469 | -- | 1.0 | -- | 12.3 | -- | 2.6 | -- | 32.6 | | | |
| Arsenic (III) | | 01/10-15/2014 | -- | -- | -- | 410 | -- | 0.65 J | -- | 8.1 | -- | 1.17 | -- | 26.6 | | | |
| Arsenic (V) | | 01/10-15/2014 | -- | -- | -- | 101 | -- | <0.19 | -- | 2.47 | -- | 1.23 | -- | 3.93 | | | |
| MMAAs | | 01/10-15/2014 | -- | -- | -- | <0.69 | -- | <0.14 | -- | <0.14 | -- | <0.14 | -- | <0.14 | | | |
| DMAAs | | 01/10-15/2014 | -- | -- | -- | <0.38 | -- | <0.075 | -- | <0.075 | -- | <0.075 | -- | <0.075 | | | |
| Chromium (NE) | | 08/27-9/3/08 | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Copper | | 08/27-9/3/08 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| 2.4 | | 05/2012 ^f | -- | <1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Lead (8.1) | | 08/27-9/3/08 | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Nickel | | 08/27-9/3/08 | 4.6 | 4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| 8.2 | | 05/2012 ^f | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Zinc (81) | | 08/27-9/3/08 | 7 | 9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |

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Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Arkema Property Wells | | | | | | | | | | | | | |
|--|---|--------------------------|--|-----------|-------|-----------|--------------------|-----------|-------|-----------|-------|-----------|--------|-----------|--------|-----------|
| | | | 1B4-1 | | 1C3-1 | | 1D1-1 ^f | | 2A1-1 | | 2B1-1 | | 2C1-1R | | 3A3-1R | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Antimony 640 | | 02/08/07 | -- | -- | 11.3 | 9.5 | 3.4 | 3 | 56.2 | 55.6 | 3.3 | 4.5 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 12 | 9.6 | -- | -- | -- | -- | <4 | <4 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | 11.3 | 10.6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Arsenic 5 | | 02/08/07 | -- | -- | 430 | 204 | 38.6 | 36.6 | 54 | 22.2 | 150 | 130 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 1,280 | 1,060 | -- | -- | -- | -- | 180 | 190 | -- | -- | -- | -- |
| | | 11/14-19/08 ^f | -- | 120 | -- | 568 | -- | 32 | -- | -- | -- | 79 | -- | 99 | -- | 28 |
| | | 06/2-3/09 | -- | -- | 1,510 | 1,240 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 05/12 ^f | -- | 84 | -- | 470 | -- | 22 | -- | 170 | -- | 112 | -- | 463 | -- | 30 |
| Arsenic (III) | | 08/29-9/2/08 | -- | -- | 803 | -- | -- | -- | -- | 121 | -- | -- | -- | -- | -- | |
| Arsenic (V) | | 08/29-9/2/08 | -- | -- | 263 | -- | -- | -- | -- | 70.6 | -- | -- | -- | -- | -- | |
| Chromium NE | | 02/08/07 | -- | -- | 6 | 5 | 20 | 17 | 2 | 2 | 18 | 16 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 6 | 6 | -- | -- | -- | -- | 20 | 20 | -- | -- | -- | -- |
| | | 11/14-19/08 ^f | -- | <10 | -- | <10 | -- | 30 | -- | -- | -- | 19 | -- | 30 | -- | <5 |
| | | 06/2-3/09 | -- | -- | 13 | 12 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 05/12 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8 | |
| Copper 2.4 | | 02/08/07 | -- | -- | 3 | 2 | 61 | 41 | 69 | 51 | 7 | 6 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 8 | 1.3 | -- | -- | -- | -- | <10 | <10 | -- | -- | -- | -- |
| | | 11/14-19/08 ^f | -- | 70 | -- | <5 | -- | 36 | -- | -- | -- | 8 | -- | 11 | -- | 8 |
| | | 06/2-3/09 | -- | -- | 4.6 | 3.4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 05/12 ^f | -- | 4 | -- | <1 | -- | 42 | -- | <5 | -- | 33 | -- | 190 | -- | 4 |
| Lead 8.1 | | 02/08/07 | -- | -- | <2 | <2 | 8 | 6 | 10 | <2 | <2 | <2 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | <1 | <1 | -- | -- | -- | -- | <20 | <20 | -- | -- | -- | -- |
| | | 06/2-3/09 | -- | -- | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 11/14-19/08 ^f | -- | <10 | -- | <10 | -- | <10 | -- | -- | -- | <10 | -- | 20 | -- | <10 |
| Nickel 8.2 | | 02/08/07 | -- | -- | 4 | 4 | 32 | 30 | 12 | 12 | 12 | 12 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 4 | 3.5 | -- | -- | -- | -- | <10 | <10 | -- | -- | -- | -- |
| | | 11/14-19/08 ^f | -- | 16 | -- | <5 | -- | 59 | -- | -- | -- | 14 | -- | <5 | -- | 6 |
| | | 06/2-3/09 | -- | -- | 7.4 | 7.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 05/12 ^f | -- | 9 | -- | 2 | -- | 33 | -- | 8 | -- | 14 | -- | 54 | -- | 4 |
| Zinc 81 | | 02/08/07 | -- | -- | <10 | <10 | 10 | 10 | 40 | 30 | <10 | <10 | -- | -- | -- | -- |
| | | 08/27-9/3/08 | -- | -- | 20 | <4 | -- | -- | -- | -- | <80 | <80 | -- | -- | -- | -- |
| | | 11/14-19/08 ^f | -- | <40 | -- | <40 | -- | <40 | -- | -- | -- | <40 | -- | <40 | -- | <40 |
| | | 06/2-3/09 | -- | -- | 7 | <4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| Chromium, Hexavalent | | 05/12 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <10 | |

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Table 7

Surface Aquifer Metals Concentrations

Taylor Way Property Supplemental Remedial Investigation

Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a (µg/L) | Method Reporting Limit ^b (µg/L) | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property | | | | | | | | | | | | | |
|---|--|--------------|--|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | | DPT10 | | DPT11 | | DPT12 | | DPT13 | | DPT14 | | DPT15 | | DPT16 | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Antimony (640) | | 8/20-21/2008 | -- | 105 | -- | 10.1 | -- | 3.7 | -- | 12.1 | -- | 28.4 | -- | 5 | -- | 3.2 |
| Arsenic (5) | | 8/20-21/2008 | -- | 2,360 | -- | 381 | -- | 134 | -- | 68.8 | -- | 55.4 | -- | 17.2 | -- | 15.2 |
| Cadmium (8.8) | | 8/20-21/2008 | -- | <0.2 | -- | <0.2 | -- | <0.2 | -- | <0.2 | -- | <0.2 | -- | <0.2 | -- | <0.5 |
| Chromium (NE) | | 8/20-21/2008 | -- | <1 | -- | 8.9 | -- | 5.7 | -- | 41 | -- | 7 | -- | 2.7 | -- | 2.9 |
| Copper (2.4) | | 8/20-21/2008 | -- | 1.4 | -- | 3.2 | -- | 2.3 | -- | 7.8 | -- | 1.8 | -- | 3.8 | -- | 3.9 |
| Lead (8.1) | | 8/20-21/2008 | -- | 1 | -- | 3 | -- | <1 | -- | 3 | -- | <1 | -- | <1 | -- | <2 |
| Nickel (8.2) | | 8/20-21/2008 | -- | 4 | -- | 5.7 | -- | 3.9 | -- | 7.6 | -- | 9.2 | -- | 6.3 | -- | 8.2 |
| Zinc (81) | | 8/20-21/2008 | -- | 7 | -- | 7 | -- | 6 | -- | 10 | -- | 5 | -- | 8 | -- | 8 |

Notes:

- a) Preliminary groundwater cleanup level established in the RI for protection of marine water.
- b) After 2001 all non-detects are reported in the results column as "less than" with the specific reporting limit.
- c) Method reporting limit raised due to matrix interference (specific to data reported for the years 1994-2001 where the Method Reporting Limit is specified in the column)
- d) The number after the "/" is a duplicate sample result.
- e) Data from Kennedy Jenks Chilton. 2002. Phase I and Limited Phase II Environmental Site Assessment. Thermafiber Site, 2301 Taylor Way, Tacoma, Washington.
- f) Data from Dalton Olmsted Fuglevand. 2013. Final Remedial Investigation Report, Former Arkema Manufacturing Plant, Tacoma, Washington. September.
- g) In 2007, well 1D1-1 was erroneously labelled as 2D1-1.

J - qualified as estimated.

UJ - Undetected at the reporting limit, but qualified as estimated

µg/L - microgram per liter.

ND - not detected.

NE - not established

-- not sampled or not analyzed

< - analyte not detected at or greater than the listed concentration.

MMA - monomethylarsonic acid

DMA - dimethylarsinic acids

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | | | | | | | | | | | |
|--|---|--------------------------|----------------------------|-----------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|-------------------|-------------------|-------------------------------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | | Taylor Way Property Wells | | | | | | | | | | Murray Pacific Property Wells | | | | | | | |
| | | | MW7 | | MW8 | | MW11 | | MW13/MW13R | | MW14 | | MW24 | | MW26 | | MW18 | | MW28 | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Antimony 640 | 50 5.6 | 11/09/94 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 03/31/98 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 10/23/98 | | | ND | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 04/15-16/99 | Abandoned 9/3/98 | | <250 ^a | <250 ^a | <100 ^a | <100 ^a | ND/ND ^c | ND/ND ^c | <250 ^d | <250 ^d | -- | -- | -- | -- | -- | -- | | |
| | | 01/19-20/00 | | | ND | ND | ND | ND | ND/ND ^c | ND/ND ^c | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 04/21/00 | | | ND | -- | ND UJ | -- | ND UJ | ND | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 08/16/00 | | | ND | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 10/25/00 | | | ND | -- | ND | -- | ND | -- | 7.7 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 01/25-26/00 | | | ND | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 04/26-27/01 | | | ND | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 07/26-27/01 | | | ND | -- | -- | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | | 10/25-26/01 | | | 76 | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | -- | | |
| | | 10/02-11/02 ^e | | | <3 | -- | <3 | -- | <3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | | 12/18-20/06 | | | Well Abandoned | | Well Abandoned | | 3 | 3 | <1 | <1 | <0.5 | <0.5 | 0.2 J | 3 J | 4 | <0.5 | <0.5 | <0.5 |
| 02/08/07 | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | | |
| Arsenic 5 | 5 1 1 3.3 3.3-6 | 11/09/94 | 8.2 | 8.1 | ND | ND | ND | ND | 19 | 22 | 25 | 8 | -- | -- | -- | -- | -- | | | |
| | | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | | 03/31/98 | ND | ND | ND | ND | 5.6 | ND | ND | ND | ND | 100 | 26 | -- | -- | -- | -- | | | |
| | | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | | 10/23/98 | -- | -- | ND | ND | ND | ND | 14 | 12 | 26 | 15 | -- | -- | -- | -- | -- | | | |
| | | 04/15-16/99 | Abandoned 9/3/98 | | <10 ^a | <10 ^a | <10 ^a | <10 ^a | ND/ND ^c | ND/ND ^c | 30 | 6.2 | -- | -- | -- | -- | -- | | | |
| | | 01/19-20/00 | | | ND | ND | ND | ND | ND/ND ^c | ND/ND ^c | 9.8 | ND | -- | -- | -- | -- | -- | | | |
| | | 04/21/00 | | | 30 | -- | 16 J | -- | 63 J | 33 | 41 | 29 | -- | -- | -- | -- | -- | | | |
| | | 08/16/00 | | | 17 | -- | 10 | -- | 23 | -- | 40 | 31 | -- | -- | -- | -- | -- | | | |
| | | 10/25/00 | | | 19 | -- | 19 | -- | 39 | -- | 50 | 41 | -- | -- | -- | -- | -- | | | |
| | | 01/25-26/00 | | | 35 | -- | 37 | -- | 66 | -- | 37 | 25 | -- | -- | -- | -- | -- | | | |
| | | 04/26-27/01 | | | 18 | -- | 10 | -- | 34 | -- | 28 | 21 | -- | -- | -- | -- | -- | | | |
| 07/26-27/01 | | | 40 | -- | -- | 9.8 | 69 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | |
| 10/25-26/01 | | | 19 | -- | 28 | -- | 55 | -- | 30 | 21 | -- | -- | -- | -- | -- | | | | | |
| 10/02-11/02 ^e | | | <1 | -- | 2.89 | -- | 5.14 | -- | -- | -- | -- | -- | -- | -- | -- | | | | | |
| 12/18-20/06 | | | Well Abandoned | | Well Abandoned | | 13 | 11 | 7 | 7 | <1 | <1 | 13.9 | 9 | <1 | <1 | 4 | 4.2 | | |
| 02/08/07 | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | | |
| 11/14-23/08 ^f | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | | |
| 05/12 ^f | | | | | | | -- | 188 | -- | 4 | -- | 6 | -- | -- | -- | -- | 1 | | | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | | | | | | | | | | | |
|--|--|----------------|----------------------------|------------------|------------------|------------------|------------------|--------------------|--------------------|-----------|------------------|-----------|-------------------------------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | | Taylor Way Property Wells | | | | | | | | | | Murray Pacific Property Wells | | | | | | | |
| | | | MW7 | | MW8 | | MW11 | | MW13/MW13R | | MW14 | | MW24 | | MW26 | | MW18 | | MW28 | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Chromium NE | 10 | 11/09/94 | 18 | 13 | ND | ND | 15 | 12 | 13 | ND | 230 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 03/31/98 | 24 | 14 | ND | ND | 16 | 10 | ND | ND | 710 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | 11 | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/23/98 | Abandoned 9/3/98 | ND | ND | 13 | 15 | ND | ND | 100 | ND | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/15-16/99 | Abandoned 9/3/98 | <50 ^a | <50 ^a | <20 ^a | <20 ^a | ND/ND ^c | ND/ND ^c | 210 | <50 ^d | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/19-20/00 | Abandoned 9/3/98 | ND | ND | 23 | 17 | ND/ND ^c | ND/ND ^c | 22 | ND | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/21/00 | Abandoned 9/3/98 | ND | -- | 14 | -- | ND | 37 | 12 J | 42 J | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 08/16/00 | Abandoned 9/3/98 | ND | -- | 18 | -- | ND | -- | 63 | ND | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25/00 | Abandoned 9/3/98 | ND | -- | 20 | -- | ND | -- | 120 | 29 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/25-26/00 | Abandoned 9/3/98 | ND | -- | 34 | -- | 12 | -- | 68 | 29 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/26-27/01 | Abandoned 9/3/98 | 22 | -- | 45 | -- | 28 | -- | 48 | 56 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/26-27/01 | Abandoned 9/3/98 | 26 | -- | -- | 79 | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10-111 | 10/25-26/01 | 12 | -- | 40 | -- | 17 | -- | 34 J | 64 J | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 1 | 10/02-11/02 ^e | <5 | -- | <5 | -- | 5.23 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 12/18-20/06 | Well Abandoned | Well Abandoned | Well Abandoned | 1.3 | <2 | 3.1 | 3 | 5 | 7 | 54 | 13 | 9 | 10 | 8 | 7 | -- | -- | |
| 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| 11/14-23/08 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| 05/12 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Copper 2.4 | 2.7 | 11/09/94 | 5.6 B | 4.7 B | ND | 8.1 B | 3.9 B | 6.0 B | 3.1 J | 5.7 J | 280 | 4.3 J | -- | -- | -- | -- | -- | -- | | |
| | | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | 10 | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | | 03/31/98 | ND | ND | ND | ND | ND | ND | ND | ND | 380 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | | 10/23/98 | -- | -- | ND | ND | ND | ND | 44 | 11 J | 78 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 04/15-16/99 | Abandoned 9/3/98 | 56 | <50 ^a | <20 ^a | <20 ^a | ND/ND ^c | ND/ND ^c | 180 | <50 ^d | -- | -- | -- | -- | -- | -- | -- | | |
| | | 01/19-20/00 | Abandoned 9/3/98 | ND | ND | ND | ND | ND/ND ^c | ND/ND ^c | ND | ND | -- | -- | -- | -- | -- | -- | -- | | |
| | | 04/21/00 | Abandoned 9/3/98 | 40 | -- | ND | -- | 37 | 38 | 37 | 37 | -- | -- | -- | -- | -- | -- | -- | | |
| | | 08/16/00 | Abandoned 9/3/98 | 74 | -- | 15 | -- | 64 | -- | 56 | ND | -- | -- | -- | -- | -- | -- | -- | | |
| | | 10/25/00 | Abandoned 9/3/98 | 130 | -- | 44 | -- | 110 | -- | 140 | 18 | -- | -- | -- | -- | -- | -- | -- | | |
| | | 01/25-26/00 | Abandoned 9/3/98 | 84 | -- | 22 | -- | 61 | -- | 73 | 27 | -- | -- | -- | -- | -- | -- | -- | | |
| | | 04/26-27/01 | Abandoned 9/3/98 | 110 | -- | 33 | -- | 72 | -- | 67 | 37 | -- | -- | -- | -- | -- | -- | -- | | |
| | | 07/26-27/01 | Abandoned 9/3/98 | 59 | -- | -- | 29 | 92 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| 10-11 | 10/25-26/01 | ND | -- | 25 | -- | 81 | -- | 64 | 54 | -- | -- | -- | -- | -- | -- | -- | | | | |
| 1 | 10/02-11/02 ^e | 4.44 | -- | 2.9 | -- | 3.82 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | | |
| 12/18-20/06 | Well Abandoned | Well Abandoned | Well Abandoned | 5 | 4 | 4 | 3 | 4 | 3 | 258 | 18 | 1.8 | 1 | <1 | <1 | -- | | | | |
| 02/08/07 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | | |
| 11/14-23/08 ^f | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | | |
| 05/12 ^f | -- | -- | -- | -- | -- | 2 | -- | -- | 3 | -- | <2 | -- | -- | -- | -- | -- | | | | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | | | | | | | | | | | |
|--|--|--------------------------|----------------------------|----------------|-----------------|-----------------|------------------|-----------------|----------------------|----------------------|--------------------|-----------------|-------------------------------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | | Taylor Way Property Wells | | | | | | | | | | Murray Pacific Property Wells | | | | | | | |
| | | | MW7 | | MW8 | | MW11 | | MW13/MW13R | | MW14 | | MW24 | | MW26 | | MW18 | | MW28 | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Lead 8.1 | 3 | 11/09/94 | <15 ^a | ND | ND | ND | ND | ND | ND | 41 | <6 ^b | -- | -- | -- | -- | -- | -- | -- | | |
| | 20 | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <20 | -- | | |
| | 0.5 | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <0.5 | -- | | |
| | 0.5 | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <0.5 | -- | | |
| | | 03/31/98 | ND | ND | ND | ND | ND | ND | ND | ND | 6,200 ^J | ND | -- | -- | -- | -- | -- | -- | | |
| | 0.5 | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | <0.5 | -- | | |
| | | 10/23/98 | -- | -- | 9.8 | ND | 2.6 | ND | 7.5 | 7.6 | 210 | 1.9 | -- | -- | -- | -- | -- | -- | | |
| | 2 | 04/15-16/99 | Abandoned 9/3/98 | | <4 ^a | <4 ^a | 4.9 | <4 ^a | <4/<4 ^{c,d} | <4/<4 ^{c,d} | 75 | <4 ^d | -- | -- | -- | -- | -- | -- | | |
| | 3 | 01/19-20/00 | | | ND | ND | ND | ND | ND/ND ^c | ND/ND ^b | 11 | ND | -- | -- | -- | -- | -- | -- | | |
| | 1.1 | 04/21/00 | | | ND | -- | ND | -- | 5.6 | ND | 5.2 | 7.8 | -- | -- | -- | -- | -- | -- | | |
| | | 08/16/00 | | | ND | -- | ND | -- | 27 | -- | 42 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 10/25/00 | | | ND | -- | 3 | -- | ND | -- | 83 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 01/25-26/00 | | | ND | -- | 1.8 | -- | 1.7 | -- | 63 | 1.6 | -- | -- | -- | -- | -- | -- | | |
| | | 04/26-27/01 | | | ND | -- | ND | -- | 1.6 | -- | 24 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 07/26-27/01 | | | ND | -- | NA | 1.3 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | 1-1.1 | 10/25-26/01 | | | ND | -- | 1.8 | -- | 3.1 | -- | 16 | ND | -- | -- | -- | -- | -- | -- | | |
| | | 10/02-11/02 ^e | | | <1 | -- | <1 | -- | <1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | 12/18-20/06 | | | Well Abandoned | | Well Abandoned | | <5 | <5 | <5 | <5 | <2 | <2 | 21 | <5 | <1 | <2 | | | |
| | 02/08/07 | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | 11/14-23/08 ^f | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | 05/12 ^f | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Nickel 8.2 | 2.8 | 11/09/94 | 3 ^B | ND | ND | 7 ^B | 9.3 ^B | 10 | 6 ^J | 17 | 7 ^J | -- | -- | -- | -- | -- | -- | | | |
| | | 08/16/00 | Abandoned 9/3/98 | | ND | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | | | |
| | | 10/25/00 | | | ND | -- | ND | -- | ND | -- | 29 | ND | -- | -- | -- | -- | -- | | | |
| | 22 | 01/25-26/00 | | | ND | -- | ND | -- | ND | -- | 17 | ND | -- | -- | -- | -- | -- | | | |
| | | 04/26-27/01 | | | ND | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | | | |
| | | 07/26-27/01 | | | ND | -- | -- | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| | 20-22 | 10/25-26/01 | | | ND | -- | ND | -- | ND | -- | ND | ND | -- | -- | -- | -- | -- | | | |
| | | 12/18-20/06 | | | Well Abandoned | | Well Abandoned | | 15 | 15 | 11 | 11 | 3 | 2 | 75.9 | 13 | 1.2 | 1 | | |
| | | 02/08/07 | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | | 11/14-23/08 ^f | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | 05/12 ^f | | | | | | | -- | 4 | NA | 10 | -- | 6 | -- | -- | -- | 2 | | | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | | | | | | | | | | | |
|--|--|--------------------------|----------------------------|-----------|------------------|------------------|------------------|------------------|--------------------|--------------------|-------|------------------|-------------------------------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | | Taylor Way Property Wells | | | | | | | | | | Murray Pacific Property Wells | | | | | | | |
| | | | MW7 | | MW8 | | MW11 | | MW13/MW13R | | MW14 | | MW24 | | MW26 | | MW18 | | MW28 | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Zinc | 10 | 11/09/94 | ND | ND | 12 | ND | 11 | ND | 10 | ND | 280 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | 2 | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| 81 | | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 2 | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 03/31/98 | ND | ND | ND | ND | ND | 10 | ND | ND | 6,100 | 36 | -- | -- | -- | -- | -- | -- | -- | |
| | 2 | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/23/98 | -- | -- | ND | ND | ND | ND | ND | ND | 1,300 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/15-16/99 | Abandoned 9/3/98 | | <50 ^a | <50 ^a | <20 ^a | <20 ^a | ND/ND ^c | 16/13 ^c | 1,300 | <50 ^d | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/19-20/00 | | | ND | ND | ND | ND | ND/ND ^c | ND/ND ^c | 110 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | 56 | 04/21/00 | | | ND | -- | ND | -- | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 08/16/00 | | | ND | -- | ND | -- | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25/00 | | | ND | -- | ND | -- | ND | -- | 630 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/25-26/00 | | | ND | -- | ND | -- | ND | -- | 410 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/26-27/01 | | | ND | -- | ND | -- | ND | -- | 170 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/26-27/01 | | | ND | -- | -- | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 50-56 | 10/25-26/01 | | | ND | -- | ND | -- | ND | -- | 130 | ND | -- | -- | -- | -- | -- | -- | -- | |
| | | 12/18-20/06 | | | Well Abandoned | | Well Abandoned | | <20 | <20 | <20 | <20 | <10 | <10 | 156 | <20 | <4 | <10 | <10 | |
| | | 02/08/07 | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 11/14-23/08 ^f | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 05/12 ^f | | | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | |
|--|--|--------------------------|----------------------------|-----------------------|-------|-----------|--------------------|-----------|--------|-----------|
| | | | Arkema Property Wells | | | | | | | |
| | | | 1C2-2 | | 2B2-2 | | 2C2-2 | | 3A2-2R | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Antimony 640 | 50 5.6 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/23/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 01/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/02-11/02 ^e | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- |
| 02/08/07 | <0.5 | <0.5 | 0.7/0.8 ^c | 0.5/<0.5 ^c | -- | -- | -- | -- | | |
| Arsenic 5 | 5 1 1 3.3 3.3-6 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | |
| | | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | |
| | | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/23/98 | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/19-20/00 | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | |
| 10/02-11/02 ^e | -- | -- | -- | -- | -- | -- | -- | | | |
| 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | | | |
| 02/08/07 | <5 | <5 | <5/<5 ^c | <5/<5 ^c | -- | -- | -- | | | |
| 11/14-23/08 ^f | -- | 6 | -- | <10 | -- | -- | 6 | | | |
| 05/12 ^f | -- | 7 | -- | <20 | -- | 14 | 15/12 ^c | | | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | | |
|--|--|--------------------------|----------------------------|------------------|-------------------|-----------|-------|-----------|----------------------|-----------|----|
| | | | Arkema Property Wells | | | | | | | | |
| | | | 1C2-2 | | 2B2-2 | | 2C2-2 | | 3A2-2R | | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | | |
| | | | | | | | | | | | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | |
| Chromium N/A | 10 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/23/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 11 | 01/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10-111 | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 1 | 10/02-11/02 ^e | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/18-20/06 | -- | | -- | -- | -- | -- | -- | -- | -- | | |
| 02/08/07 | 6 | | 6 | 2/3 ^c | 2/3 ^c | -- | -- | -- | -- | | |
| 11/14-23/08 ^f | -- | | 6 | -- | <20 | -- | -- | -- | <10 | | |
| 05/12 ^f | -- | | -- | -- | -- | -- | -- | -- | 10/20 ^c | | |
| Copper 2.4 | 2.7 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 20 | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/23/98 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 10 | 01/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 1 | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | | 10-11 | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | |
| | | 10/02-11/02 ^e | -- | -- | -- | -- | -- | -- | -- | -- | |
| 12/18-20/06 | | -- | -- | -- | -- | -- | -- | -- | -- | | |
| 02/08/07 | | 3 | 2 | 5/6 ^c | 4/<4 ^c | -- | -- | -- | -- | | |
| 11/14-23/08 ^f | | -- | <5 | -- | <20 | -- | -- | -- | <10 | | |
| 05/12 ^f | | -- | <2 | -- | <50 | -- | <10 | -- | <10/<10 ^c | | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | |
|--|--|--------------|----------------------------|--------------------|--------------------|--------------------|-------|-----------|--------------------|-----------|
| | | | Arkema Property Wells | | | | | | | |
| | | | 1C2-2 | | 2B2-2 | | 2C2-2 | | 3A2-2R | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Lead 8.1 | 3 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 20 | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 0.5 | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 0.5 | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 0.5 | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/23/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 2 | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 3 | 01/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 1.1 | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 10/02-11/02 ^e | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 02/08/07 | <2 | <2 | <2/<2 ^c | <2/<2 ^c | -- | -- | -- | -- | |
| | 11/14-23/08 ^f | -- | <10 | -- | <50 | -- | -- | -- | <20 | |
| | 05/12 ^f | -- | -- | -- | -- | -- | -- | -- | -- | |
| Nickel 8.2 | 2.8 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 22 | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 20-22 | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 12/18/06 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 12/18-20/06 | 8 | 8 | 15/17 ^c | 16/17 ^c | -- | -- | -- | -- |
| | 11/14-23/08 ^f | -- | 9 | -- | 30 | -- | -- | -- | 20 | |
| | 05/12 ^f | -- | 7 | -- | <50 | -- | 20 | -- | 20/20 ^c | |

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Table 8
Second Aquifer Metals Concentrations
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal and Preliminary Cleanup Level ^a | Method Reporting Limit ^b (µg/L) | Date Sampled | Second Aquifer Sample I.D. | | | | | | | |
|--|--|--------------|----------------------------|--------------------|--------------------|-----------|-------|-----------|--------|-----------|
| | | | Arkema Property Wells | | | | | | | |
| | | | 1C2-2 | | 2B2-2 | | 2C2-2 | | 3A2-2R | |
| | | | µg/L | | µg/L | | µg/L | | µg/L | |
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Zinc 81 | 10 | 11/09/94 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 2 | 01/15/97 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 2 | 07/23/97 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 02/03/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 2 | 03/31/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 07/17/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/23/98 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 56 | 04/15-16/99 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 01/19-20/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/21/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 08/16/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 01/25-26/00 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 04/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 50-56 | 07/26-27/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10/25-26/01 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 12/18-20/06 | -- | -- | -- | -- | -- | -- | -- | -- |
| 02/08/07 | | <10 | <10 | 50/40 ^c | 40/40 ^c | -- | -- | -- | -- | |
| 11/14-23/08 ^f | | -- | <40 | -- | <200 | -- | -- | -- | <100 | |
| | 05/12 ^f | -- | -- | -- | -- | -- | -- | -- | -- | |

Notes:

- a) Preliminary groundwater cleanup level established in the RI for protection of marine water.
 - b) After 2001 all non-detects are reported in the results column as "less than" with the specific reporting limit.
 - c) The number after the "/" is a duplicate sample result.
 - d) Method reporting limit raised due to matrix interference (specific to data reported for the years 1994-2001 where the Method Reporting Limit is specified in the column)
 - e) Data from Kennedy Jenks Chilton. 2002. Phase I and Limited Phase II Environmental Site Assessment. Washington. Thermafiber Site, 2301 Taylor Way, Tacoma, Washington
 - f) Data from Dalton Olmsted Fuglevand. 2013. Final Remedial Investigation Report, Former Arkema Manufacturing Plant, Tacoma, Washington. September.
- J - Data qualified as estimated.
UJ - Undetected at the reporting limit, but qualified as estimated
µg/L - microgram per liter.
ND - not detected.
NE - not established
-- not sampled or not analyzed
< - analyte not detected at or greater than the listed concentration.

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Table 9
Total Petroleum Hydrocarbons in Groundwater
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Well I.D. | Date | Total Petroleum Hydrocarbons | |
|---|----------|------------------------------|-----------------------------|
| | | NWTPH-Dx | |
| | | Diesel | Oil |
| µg/L | | | |
| Surface Aquifer | | | |
| Taylor Way Property Wells | | | |
| MW1R | 12/19/06 | <250/<250 ^a | <500/<500 ^a |
| MW2 | 12/18/06 | 280 | <500 |
| MW4 | 12/18/06 | 260 | <500 |
| MW5 | 12/18/06 | <250 | <500 |
| MW6 | 12/18/06 | <250 | <500 |
| MW9 | 12/19/06 | <250 | <500 |
| MW25 | 12/20/06 | <250 | <500 |
| MW27 | 12/19/06 | <250 | <500 |
| MW30 | 12/20/06 | <250 | <500 |
| MW36 | 01/15/14 | 500 | <200 |
| MW37 | 01/14/14 | 560/570 ^a | 700/780 ^a |
| Murray Pacific Property Wells | | | |
| MW29 | 12/20/06 | 490 | <500 |
| MW38 | 01/14/14 | 240 | 260 |
| Arkema Property Wells | | | |
| 1C3-1 | 02/08/07 | <250 | <500 |
| 2A1-1 | 02/08/07 | <250 | <500 |
| 2B1-1 | 02/08/07 | 290 | <500 |
| 1D1-1 | 02/08/07 | <250 | <500 |
| Second Aquifer | | | |
| Taylor Way Property Wells | | | |
| MW13R | 12/19/06 | <250 | <500 |
| MW14 | 12/18/06 | <250 | <500 |
| MW24 | 12/20/06 | 300 | <500 |
| MW26 | 12/19/06 | <250 ^J | <500 ^J |
| Murray Pacific Property Wells | | | |
| MW18 | 12/18/06 | 270 | <500 |
| MW28 | 12/20/06 | <250 | <500 |
| Arkema Property Wells | | | |
| 1C2-2 | 02/08/07 | <250 | <500 |
| 2B2-2 | 02/08/07 | <250/<250 ^a | <500/<500 ^a |
| Method A Cleanup Level^c | | 500 | 500 |

Notes:

Bolded values are detections.

Shaded Values Exceed the MTCA Method A Cleanup Level

a) The number after the "/" is a duplicate sample result.

b) in 2007 well 1D1-1 was erroneously labeled 2D1-1

c) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested groundwater cleanup level.

µg/L - micrograms per liter.

J - data is qualified as estimated.

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Table 10
Surface Aquifer Conventional, Inorganics, and Secondary Metals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | | | | | | | | | | | | | |
|-----------|--------------------------|--|-----------|-------|-----------|-------|-----------|--------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|------------------------|-----------|
| | | MW1/MW1R | | MW-2 | | MW-4 | | MW5 | | MW6 | | MW9 | | MW25 | | MW27 | | MW30 | | MW36 | | MW37 | |
| | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Barium | 08/29-9/2/08 | 0.0125 | -- | -- | -- | -- | -- | -- | -- | -- | 0.047 | -- | 0.0073 | -- | -- | -- | 0.0096 | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 0.0099 | -- | -- | -- | -- | -- | 0.0058 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0102 | -- | -- | -- | -- | -- | |
| Calcium | 08/29-9/2/08 | 67.9 | -- | -- | -- | -- | -- | -- | -- | -- | 80.0 | -- | 73.1 | -- | -- | -- | 57.7 | -- | -- | -- | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 76.8 | -- | -- | -- | -- | -- | 5.7 | -- | -- | -- | -- | -- | -- | -- | -- | 56.9 | -- | -- | -- | -- | -- | |
| | 05/12 ^a | -- | 67.6 | -- | 51.2 | -- | 34.2 | -- | 13.2 | -- | 16.8 | -- | 65.9 | -- | 68.3 | -- | 52.9 | -- | 53.3 | -- | -- | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 68.2 | -- | 50.2 | -- | 54.8 | -- | 75.0 | -- | -- | -- | 116/115 ^b | |
| Iron | 08/29-9/2/08 | -- | 3.18 | -- | -- | -- | -- | -- | -- | -- | -- | 0.08 | -- | 18.1 | -- | -- | 12 | -- | -- | -- | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | -- | 2.45 | -- | -- | -- | -- | 6.18 | -- | -- | -- | -- | -- | -- | -- | -- | 11.2 | -- | -- | -- | -- | -- | |
| | 05/12 ^a | -- | 1.27 | -- | 4.74 | -- | 7.31 | -- | 9.61 | -- | 2.45 | -- | <0.050 | -- | 18.5 | -- | 18.7 | -- | 12.4 | -- | -- | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19.9 | -- | 16.3 | -- | 9.58 | -- | 11.3 | -- | -- | 36.2/36.6 ^b | |
| Magnesium | 08/29-9/2/08 | 81.8 | -- | -- | -- | -- | -- | -- | -- | -- | 48.2 | -- | 21.2 | -- | -- | -- | 46.2 | -- | -- | -- | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 93.9 | -- | -- | -- | -- | -- | 7.38 | -- | -- | -- | -- | -- | -- | -- | -- | 48.8 | -- | -- | -- | -- | -- | |
| | 05/12 ^a | -- | 64.2 | -- | 101 | -- | 75.0 | -- | 48.9 | -- | 22.1 | -- | 43.5 | -- | 19.8 | -- | 47.4 | -- | 44.9 | -- | -- | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 17.7 | -- | 52 | -- | 46.3 | -- | 30.5 | -- | -- | 31.4/31.1 ^b | |
| Manganese | 08/29-9/2/08 | -- | 1.93 | -- | -- | -- | -- | -- | -- | -- | -- | 0.321 | -- | 0.632 | -- | -- | 0.654 | -- | -- | -- | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | -- | 1.67 | -- | -- | -- | -- | -- | 0.121 | -- | -- | -- | -- | -- | -- | -- | 0.654 | -- | -- | -- | -- | -- | |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| Potassium | 08/29-9/2/08 | 12.2 | -- | -- | -- | -- | -- | -- | -- | -- | 10.0 | -- | 31.4 | -- | -- | -- | 36.4 | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 9.35 | -- | -- | -- | -- | -- | 8.3 | -- | -- | -- | -- | -- | -- | -- | -- | 33.5 | -- | -- | -- | -- | -- | |
| Selenium | 08/29-9/2/08 | <0.002 | -- | -- | -- | -- | -- | -- | -- | -- | 0.0041 | -- | 0.001 | -- | -- | -- | <0.002 | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | <0.005 | -- | -- | -- | -- | -- | 0.008 | -- | -- | -- | -- | -- | -- | -- | -- | 0.006 | -- | -- | -- | -- | -- | |
| Silicon | 08/29-9/2/08 | -- | 16.1 | -- | -- | -- | -- | -- | -- | -- | -- | 20.9 | -- | 29.1 | -- | -- | 33.3 | -- | -- | -- | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | -- | 15.5 | -- | -- | -- | -- | -- | 18.2 | -- | -- | -- | -- | -- | -- | -- | 33.8 | -- | -- | -- | -- | -- | |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| Sodium | 08/29-9/2/08 | 234 | -- | -- | -- | -- | -- | -- | -- | -- | 125 | -- | 39.9 | -- | -- | -- | 91.3 | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 189 | -- | -- | -- | -- | -- | 1,860 | -- | -- | -- | -- | -- | -- | -- | -- | 94.8 | -- | -- | -- | -- | -- | |
| Strontium | 08/29-9/2/08 | 1.14 | -- | -- | -- | -- | -- | -- | -- | -- | 0.492 | -- | 0.251 | -- | -- | -- | 0.526 | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 2.1 | -- | -- | -- | -- | -- | 0.067 | -- | -- | -- | -- | -- | -- | -- | -- | 0.559 | -- | -- | -- | -- | -- | |
| Fluoride | 08/27/08 | 3.84 | -- | -- | -- | -- | -- | -- | -- | -- | 5.75 | -- | 3.94 | -- | -- | -- | 0.83 | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 2.4 | -- | -- | -- | -- | -- | 5.2 | -- | -- | -- | -- | -- | -- | -- | -- | 0.4 | -- | -- | -- | -- | -- | |
| Chloride | 08/29-9/2/08 | 239 | -- | -- | -- | -- | -- | -- | -- | -- | 49.4 | -- | 58.4 | -- | -- | -- | 55.3 | -- | -- | -- | -- | -- | |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| | 06/2-3/09 | 122 | -- | -- | -- | -- | -- | 2,890 | -- | -- | -- | -- | -- | -- | -- | -- | 51.5 | -- | -- | -- | -- | -- | |
| | 05/12 ^a | 82.4 | -- | 780 | -- | 414 | -- | 3,370 | -- | 2,130 | -- | 24.0 | -- | 46.5 | -- | 43.9 | -- | 43.5 | -- | -- | -- | -- | |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30.2 | -- | 42.4 | -- | 37.5 | -- | 118 | -- | -- | 180/182 ^b | |

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Table 10
Surface Aquifer Conventional, Inorganics, and Secondary Metals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Date Sampled | Surface Aquifer Sample I.D. Taylor Way Property Wells | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|--------------------------|--|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|--------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|------------------------|
| | | MW1/MW1R | | MW-2 | | MW-4 | | MW5 | | MW6 | | MW9 | | MW25 | | MW27 | | MW30 | | MW36 | | MW37 | |
| | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| N-Ammonia (mg-N/L) | 08/27/08 | 0.858 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 0.718 | -- | -- | -- | -- | -- | 2.76 | -- | -- | -- | -- | -- | 1.95 | -- | -- | -- | 4.35 | -- | -- | -- | -- | -- |
| Nitrate +Nitrite (mg-N/L) | 08/27/08 | 0.048 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.196 | -- | <0.010 | -- | -- | 0.121 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 0.018 | -- | -- | -- | -- | -- | 0.047 | -- | -- | -- | -- | -- | -- | -- | -- | -- | <0.01 | -- | -- | -- | -- | -- |
| N-Nitrate | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Phosphorus (mg-P/L) | 08/27/08 | 1.43 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.190 | -- | 2.33 | -- | -- | -- | 3.44 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | 1.1 | -- | -- | -- | -- | -- | 1.31 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.42 | -- | -- | -- | -- | -- |
| Dissolved Organic Carbon | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | 18.3 | -- | -- | -- | -- | -- | 19.2 | -- | -- | -- | -- | 8.73 | -- | -- | -- | 17.9 | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | 14.2 | -- | 40.4 | -- | 25.6 | -- | 3.61 | -- | 2.93 | -- | 10.8 | -- | 8.82 | -- | 42.5 | -- | 16.0 | -- | -- | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.55 | -- | 44.8 | -- | 14.2 | -- | 9.08 | -- | -- | 13.8/13.0 ^b |
| Total Organic Carbon | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulfate | 06/2-3/09 | 16.1 | -- | -- | -- | -- | -- | 126 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.2 | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 13.2 | -- | 71.1 | -- | 172 | -- | 154 | -- | 129 | -- | 44.6 | -- | 7.3 | -- | 39.7 | -- | 9.8 | -- | -- | -- | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 26.5 | -- | <0.01 | -- | -- | 4.6 | -- | 8.4 | -- | -- | 1.7/1.7 ^b |
| Sulfide | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 0.773 | -- | 0.126 | -- | 0.795 | -- | 0.106 | -- | 0.154 | -- | <0.050 | -- | 0.087 | -- | 0.079 | -- | 0.059 | -- | -- | -- | -- | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.29 | -- | <0.05 | -- | <0.05 | -- | <0.05 | -- | -- | -- | <0.5/<0.5 ^b |
| Total Dissolved Solids | 06/2-3/09 | 1,010 | NA | -- | -- | -- | -- | 5,630 | -- | -- | -- | -- | -- | -- | -- | -- | 643 | -- | -- | -- | -- | -- | -- |
| Total Suspended Solids | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | <1.1 | -- | 6.7 | -- | 24.4 | -- | 1.3 | -- | 2.0 | -- | <1.1 | -- | 45.8 | -- | 79.5 | -- | 56.5 | -- | -- | -- | -- | -- |
| Alkalinity (mg/L CaCO3) | 06/2-3/09 | 776 | -- | -- | -- | -- | -- | 689 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 503 | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 594 | -- | 273 | -- | 711 | -- | 789 | -- | 885 | -- | 444 | -- | 329 | -- | 246 | -- | 468 | -- | -- | -- | -- | -- |
| Hardness (mg/L CaCO3) | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 240 | -- | 340 | -- | 330 | -- | 310 | -- | -- | -- | 420/410 ^b |
| Carbonate (mg/L CaCO3) | 06/2-3/09 | <1.0 | -- | -- | -- | -- | -- | <1.0 | -- | -- | -- | -- | -- | -- | -- | -- | <1.0 | -- | -- | -- | -- | -- | -- |
| Bicarbonate (mg/L CaCO3) | 06/2-3/09 | 776 | -- | -- | -- | -- | -- | 689 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 503 | -- | -- | -- | -- | -- |
| Hydroxide (mg/L CaCO3) | 06/2-3/09 | <1.0 | -- | -- | -- | -- | -- | <1.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | <1.0 | -- | -- | -- | -- | -- |

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Table 10
Surface Aquifer Conventionals, Inorganics, and Secondary Metals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Date Sampled | Surface Aquifer Sample I.D. Murray Pacific Property Wells | | | | | | | | | | | | | | | | | | | | | | | |
|-----------|--|--|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | MW17 | | MW29 | | MW31 | | MW32 | | MW33 | | MW34 | | MW35 | | MW38 | | MW39 | | MW40 | | MW41 | | MW42 | |
| | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Barium | 08/29-9/2/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Calcium | 08/29-9/2/08 11/14-23/08 ^a 06/2-3/09 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Iron | 08/29-9/2/08 11/14-23/08 ^a 06/2-3/09 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Magnesium | 08/29-9/2/08 11/14-23/08 ^a 06/2-3/09 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Manganese | 08/29-9/2/08 11/14-23/08 ^a 06/2-3/09 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Potassium | 08/29-9/2/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Selenium | 08/29-9/2/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Silicon | 08/29-9/2/08 11/14-23/08 ^a 06/2-3/09 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sodium | 08/29-9/2/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Strontium | 08/29-9/2/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoride | 08/27/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloride | 08/29-9/2/08 11/14-23/08 ^a 06/2-3/09 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 1,900 | -- | 121 | -- | 265 | -- | 550 | -- | 812 | -- | 33.5 | -- | 26.5 | -- | 426 | -- | 21.3 | -- | 15.5 | -- | 12.4 | -- | 441 | -- |

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Table 10
Surface Aquifer Conventional, Inorganics, and Secondary Metals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Date Sampled | Surface Aquifer Sample I.D. Murray Pacific Property Wells | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|--|--|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | | MW17 | | MW29 | | MW31 | | MW32 | | MW33 | | MW34 | | MW35 | | MW38 | | MW39 | | MW40 | | MW41 | | MW42 | |
| | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| N-Ammonia (mg-N/L) | 08/27/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrate +Nitrite (mg-N/L) | 08/27/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrate | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Phosphorus (mg-P/L) | 08/27/08 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dissolved Organic Carbon | 11/14-23/08 ^a 06/2-3/09 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulfate | 06/2-3/09 11/14-23/08 ^a 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulfide | 11/14-23/08 ^a 05/12 ^a 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Dissolved Solids | 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Suspended Solids | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Alkalinity (mg/L CaCO3) | 06/2-3/09 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hardness (mg/L CaCO3) | 01/10-15/2014 | 690 | -- | 410 | -- | 490 | -- | 140 | -- | 420 | -- | 210 | -- | 220 | -- | 700 | -- | 120 | -- | 220 | -- | 160 | -- | 180 | -- |
| Carbonate (mg/L CaCO3) | 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bicarbonate (mg/L CaCO3) | 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hydroxide (mg/L CaCO3) | 06/2-3/09 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

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Table 10
Surface Aquifer Conventional, Inorganics, and Secondary Metals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Date Sampled | Surface Aquifer Sample I.D. | | | | | | | | | | | | | |
|---------------|--------------------------|-----------------------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|----------------|-----------|----------------|------|
| | | Arkema Property Wells | | | | | | | | | | | | | |
| | | 1B4-1 mg/L | | 1C3-1 mg/L | | 1D1-1 mg/L | | 2A1-1 mg/L | | 2B1-1 mg/L | | 2C1-1R mg/L | | 3A3-1R mg/L | |
| Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | | |
| Barium | 08/29-9/2/08 | -- | -- | 0.034 | -- | -- | -- | -- | -- | 0.04 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 0.0237 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Calcium | 08/29-9/2/08 | -- | -- | 56.7 | -- | -- | -- | -- | -- | 120 | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | 84.7 | -- | -- | 41.2 | -- | 3.3 | -- | -- | -- | 162 | -- | 14.7 | -- | 83.7 |
| | 06/2-3/09 | -- | -- | 48.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 85.2 | -- | -- | 33.8 | -- | 1.7 | -- | 113 | -- | 84.0 | -- | 21.6 | -- | 47.8 |
| Iron | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/29-9/2/08 | -- | -- | -- | 19.9 | -- | -- | -- | -- | -- | 224 | -- | -- | -- | -- |
| | 11/14-23/08 ^a | 0.4 | -- | -- | 17.2 | -- | 0.6 | -- | -- | -- | 40.3 | -- | 5 | -- | 19 |
| | 06/2-3/09 | -- | -- | -- | 13.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Magnesium | 05/12 ^a | 1.04 | -- | -- | 13.4 | -- | 0.94 | -- | 12.3 | -- | 42.8 | -- | 57.1 | -- | 12.5 |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/29-9/2/08 | -- | -- | 63.8 | -- | -- | -- | -- | -- | 99.6 | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | 84.8 | -- | -- | 54.4 | -- | 0.1 | -- | -- | -- | 106 | -- | 4.8 | -- | 146 |
| Manganese | 06/2-3/09 | -- | -- | 53.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 64.5 | -- | -- | 39.5 | -- | 0.16 | -- | 74.4 | -- | 44.4 | -- | 14.5 | -- | 117 |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/29-9/2/08 | -- | -- | -- | 1.2 | -- | -- | -- | -- | -- | 2.10 | -- | -- | -- | -- |
| Potassium | 11/14-23/08 ^a | 0.211 | -- | -- | 0.843 | -- | 0.007 | -- | -- | -- | 0.5 | -- | 0.22 | -- | 0.68 |
| | 06/2-3/09 | -- | -- | -- | 1.02 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/29-9/2/08 | -- | -- | 16.7 | -- | -- | -- | -- | -- | 50 | -- | -- | -- | -- | -- |
| Selenium | 06/2-3/09 | -- | -- | 14.4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/29-9/2/08 | -- | -- | 0.003 | -- | -- | -- | -- | -- | <0.04 | -- | -- | -- | -- | -- |
| Silicon | 06/2-3/09 | -- | -- | 0.007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 08/29-9/2/08 | -- | -- | -- | 19.0 | -- | -- | -- | -- | -- | 12.7 | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | 18.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sodium | 08/29-9/2/08 | -- | -- | 904 | -- | -- | -- | -- | -- | 15,800 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 881 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Strontium | 08/29-9/2/08 | -- | -- | 1.01 | -- | -- | -- | -- | -- | 1.29 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 0.686 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoride | 08/27/08 | -- | -- | 4.83 | -- | -- | -- | -- | -- | 1.77 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 3.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloride | 08/29-9/2/08 | -- | -- | 639 | -- | -- | -- | -- | -- | 27,500 | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | 1,110 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 448 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 9.5 | NA | 407 | -- | 575 | -- | 7,780 | -- | 261 | -- | 650 | -- | 695 | -- |
| 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | |

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Table 10
Surface Aquifer Conventional, Inorganics, and Secondary Metals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Date Sampled | Surface Aquifer Sample I.D. | | | | | | | | | | | | | |
|---------------------------|--------------------------|-----------------------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|----------------|-----------|----------------|------|
| | | Arkema Property Wells | | | | | | | | | | | | | |
| | | 1B4-1 mg/L | | 1C3-1 mg/L | | 1D1-1 mg/L | | 2A1-1 mg/L | | 2B1-1 mg/L | | 2C1-1R mg/L | | 3A3-1R mg/L | |
| Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved | | |
| N-Ammonia (mg-N/L) | 08/27/08 | -- | -- | 2.39 | -- | -- | -- | -- | -- | 9.17 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 1.56 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrate +Nitrite (mg-N/L) | 08/27/08 | -- | -- | 0.036 | -- | -- | -- | -- | -- | <1.00 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 0.068 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrate | 11/14-23/08 ^a | -- | -- | -- | -- | <2.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Phosphorus (mg-P/L) | 08/27/08 | -- | -- | 3.34 | -- | -- | -- | -- | -- | 2.53 | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | 1.44 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dissolved Organic Carbon | 11/14-23/08 ^a | -- | -- | -- | -- | -- | 77.1 | -- | -- | -- | -- | -- | -- | -- | -- |
| | 06/2-3/09 | -- | -- | -- | 42 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | 16.6 | -- | 41 | -- | 47.5 | -- | 17.5 | -- | 16.6 | -- | 50.5 | -- | 21.0 |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulfate | 06/2-3/09 | -- | -- | 87.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | 52.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 17.7 | -- | 68.2 | -- | 71.9 | -- | 109 | -- | 353 | -- | 185 | -- | 88.9 | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulfide | 11/14-23/08 ^a | -- | -- | -- | -- | 0.061 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | <0.050 | -- | <0.050 | -- | 0.643 | -- | 0.059 | -- | <0.050 | -- | <0.050 | -- | <0.05 | -- |
| | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Dissolved Solids | 06/2-3/09 | -- | -- | 2,550 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Suspended Solids | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 2.7 | -- | 9.6 | -- | 13.3 | -- | 16.6 | -- | 1.7 | -- | 40.6 | -- | 4.6 | -- |
| Alkalinity (mg/L CaCO3) | 06/2-3/09 | -- | -- | 1,480 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11/14-23/08 ^a | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 05/12 ^a | 547 | -- | 1,290 | -- | 1,030 | -- | 779 | -- | 642 | -- | 967 | -- | 731 | -- |
| Hardness (mg/L CaCO3) | 01/10-15/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbonate (mg/L CaCO3) | 06/2-3/09 | -- | -- | <1.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bicarbonate (mg/L CaCO3) | 06/2-3/09 | -- | -- | 1,480 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hydroxide (mg/L CaCO3) | 06/2-3/09 | -- | -- | <1.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Notes:
a) Data from Dalton Olmsted Fuglevand. 2013. Final Remedial Investigation, Former Arkema Manufacturing Plant, Tacoma, Washington. September.
b) The number after the "/" is a duplicate sample result.
mg/L - milligram per liter.
-- not sampled/analyzed
< - analyte not detected at or greater than the listed concentration.

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Table 11
Second Aquifer Conventionals
Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Metal | Date Sampled | Second Aquifer Sample I.D. | | | | | | | |
|--------------------------|--|----------------------------|-----------|-------|-----------|-------|-----------|----------------------------|------------------------|
| | | Arkema Property Wells | | | | | | | |
| | | 1C2-2 | | 2B2-2 | | 2C2-2 | | 3A2-2R | |
| | | mg/L | | mg/L | | mg/L | | mg/L | |
| | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Calcium | 11/14-23/08 ^a 05/12 ^a | -- | 260 | -- | 237 | -- | -- | -- | 346 |
| | | -- | -- | -- | -- | -- | -- | -- | 356/369 ^b |
| Iron | 11/14-23/08 ^a 05/12 ^a | -- | 178 | -- | 32 | -- | -- | -- | 15.1 |
| | | -- | -- | -- | -- | -- | -- | -- | 11.6/11.2 ^b |
| Magnesium | 11/14-23/08 ^a 05/12 ^a | -- | 441 | -- | 221 | -- | -- | -- | 724 |
| | | -- | -- | -- | -- | -- | -- | -- | 672/698 ^b |
| Manganese | 11/14-23/08 ^a 05/12 ^a | -- | 1.44 | -- | 2.57 | -- | -- | -- | 1.55 |
| | | -- | -- | -- | -- | -- | -- | -- | -- |
| Silicon | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloride | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | 31,000/34,700 ^b | -- |
| N-Nitrate | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | -- | -- |
| Dissolved Organic Carbon | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | -- | 4.44/4.54 ^b |
| Total Organic Carbon | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | -- | -- |
| Sulfate | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | 451/523 ^b | -- |
| Sulfide | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | <0.050/<0.050 ^b | -- |
| Total Suspended Solids | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | 90.0/862 ^b | -- |
| Alkalinity (mg/L CaCO3) | 11/14-23/08 ^a 05/12 ^a | -- | -- | -- | -- | -- | -- | -- | -- |
| | | -- | -- | -- | -- | -- | -- | 1.580/1,590 ^b | -- |

Notes:

- a) Data from Dalton Olmsted & Fuglevand. 2013. Final Remedial Investigation, Former Arkema Manufacturing Plant, Tacoma, Washington. September.
- b) The number after the "/" is a duplicate sample result.
- J - qualified as estimated.
- mg/L - milligram per liter.
- not sampled.
- < - analyte not detected at or greater than the listed concentration.

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Table 12**Metal and Petroleum Hydrocarbon Concentrations in Stormwater and Dry Weather Flow**Taylor Way Property Supplemental Remedial Investigation
Tacoma, Washington

| Analyte | Wet Weather Flow | Dry Weather Flow | | | Lowest Surface Water Standard |
|--------------------------------------|------------------|------------------|----------------------|------------------|-------------------------------|
| | | Outfall | Manhole ^a | | |
| | <u>Total</u> | <u>Total</u> | <u>Total</u> | <u>Dissolved</u> | |
| | 02/09/07 | 05/19/15 | 05/19/15 | 05/19/15 | |
| Metals (µg/L) | | | | | |
| Antimony | <50 | -- | -- | -- | 640 ^b |
| Arsenic | 50 | 23 | 215 | 26 | 5 ^c |
| Chromium | 7 | -- | -- | -- | N/A |
| Copper | 15 | -- | -- | -- | 2.4 ^d |
| Lead | <20 | -- | -- | -- | 8.1 ^e |
| Nickel | <10 | -- | -- | -- | 8.2 ^e |
| Zinc | 83 | -- | -- | -- | 81 ^e |
| Petroleum Hydrocarbons (mg/L) | | | | | |
| Gasoline | <0.25 | -- | -- | -- | -- ^f |
| Diesel | 0.38 | -- | -- | -- | -- ^f |
| Motor Oil | 0.69 | -- | -- | -- | -- ^f |

Notes:

- a) Second manhole upgradient of the oil water separator
- b) Clean Water Act 40CFR 304(a)
- c) Area Background (MTCA Method A)
- d) National Toxics Rule 40 CFR 131
- e) WAC 173-201A
- f) No sheen

µg/L - micrograms per liter.

mg/L - milligram per liter.

N/A - not available

ND - not detected.

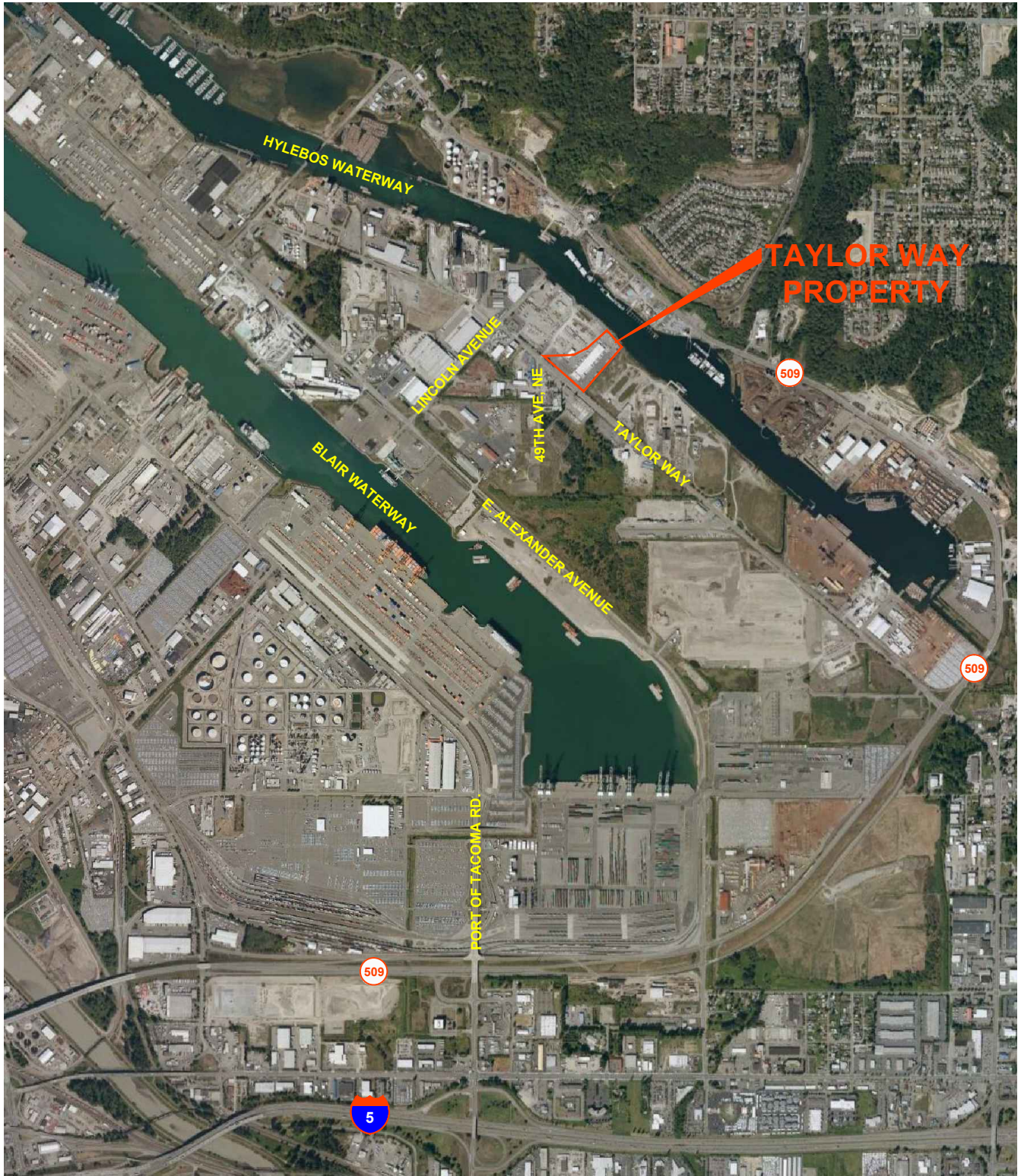
*Water Quality Standards for Surface Waters of the State of Washington, Washington Administrative Code Chapter 173-201A.

- a) A 1-hour average not to be exceeded more than once every three years on average.
- b) A 4-day average not to be exceeded more than once every three years on average.
- < - not detected at greater than the listed concentration

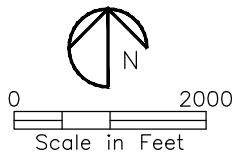
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Figures

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Source: GOOGLE EARTH PRO, 2009

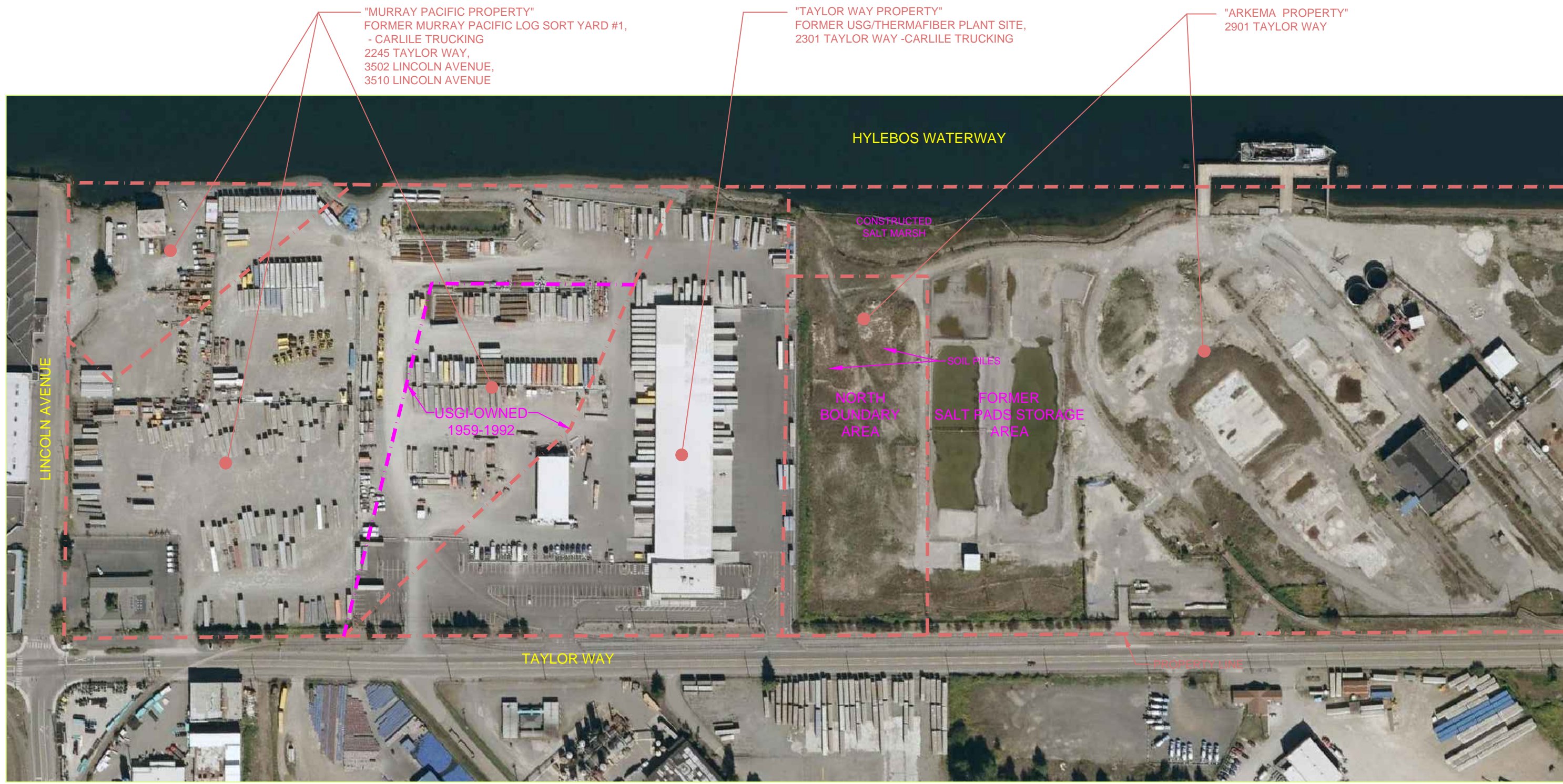


SUPPLEMENTAL REMEDIAL INVESTIGATION
2301 TAYLOR WAY
TACOMA, WASHINGTON

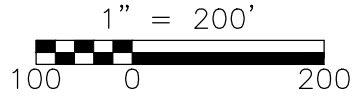
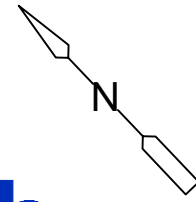
Figure No. 1
Vicinity Map

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SOURCE: GOOGLE EARTH PRO, 2009

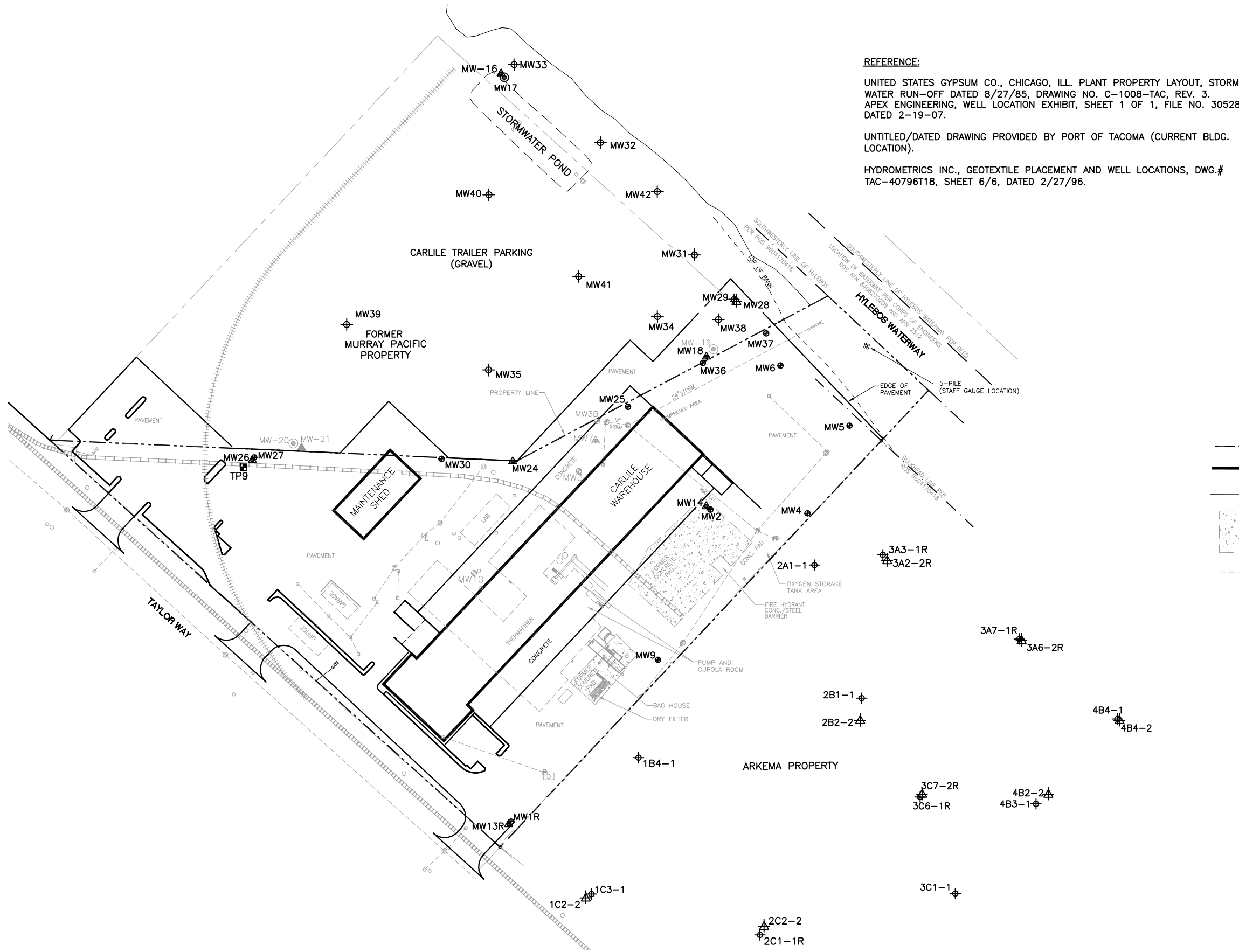


SUPPLEMENTAL REMEDIAL INVESTIGATION
2301 TAYLOR WAY
TACOMA, WASHINGTON

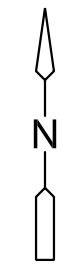
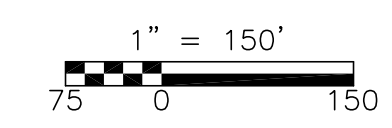
Figure No. 2
Taylor Way, Murray Pacific and Arkema
Property Parcels

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REFERENCE:
 UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED 2-19-07.
 UNTITLED/DATED DRAWING PROVIDED BY PORT OF TACOMA (CURRENT BLDG. LOCATION).
 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.# TAC-40796T18, SHEET 6/6, DATED 2/27/96.



- LEGEND:**
- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
(ABANDONED WELLS SHADED BACK)
 - MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
(ABANDONED WELLS SHADED BACK)
 - 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
 - 2B2-2 ▲ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
 - MW-20 ⊙ ORIGINAL MURRAY PACIFIC PROPERTY SURFACE AQUIFER WELL LOCATION AND DESIGNATION
(ABANDONED WELLS SHADED BACK)
 - MW-21 ▲ ORIGINAL MURRAY PACIFIC PROPERTY SECOND AQUIFER WELL LOCATION AND DESIGNATION
(ABANDONED WELLS SHADED BACK)
 - TAYLOR WAY PROPERTY BOUNDARY
 - EXISTING BUILDING
 - NEW ASPHALT PAVED AREA
 - ▨ FORMER CONCRETE PAD
 - - - FORMER BUILDING LOCATION
 - ◇ ⊕ STORM DRAIN SYSTEM (PREVIOUS LAYOUT)

NOTE:
 ORIGINAL (NOW ABANDONED) MONITORING WELL LOCATIONS ON THE MURRAY PACIFIC PROPERTY ARE SCANNED IN FROM A HARD COPY 1996 DRAWING. THE PRECISION OF THE FEATURES AS THEY RELATE TO THE USG SITE FEATURES CANNOT BE DETERMINED.

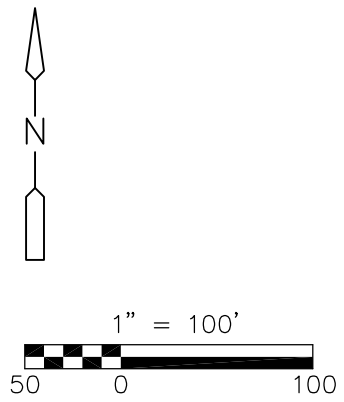
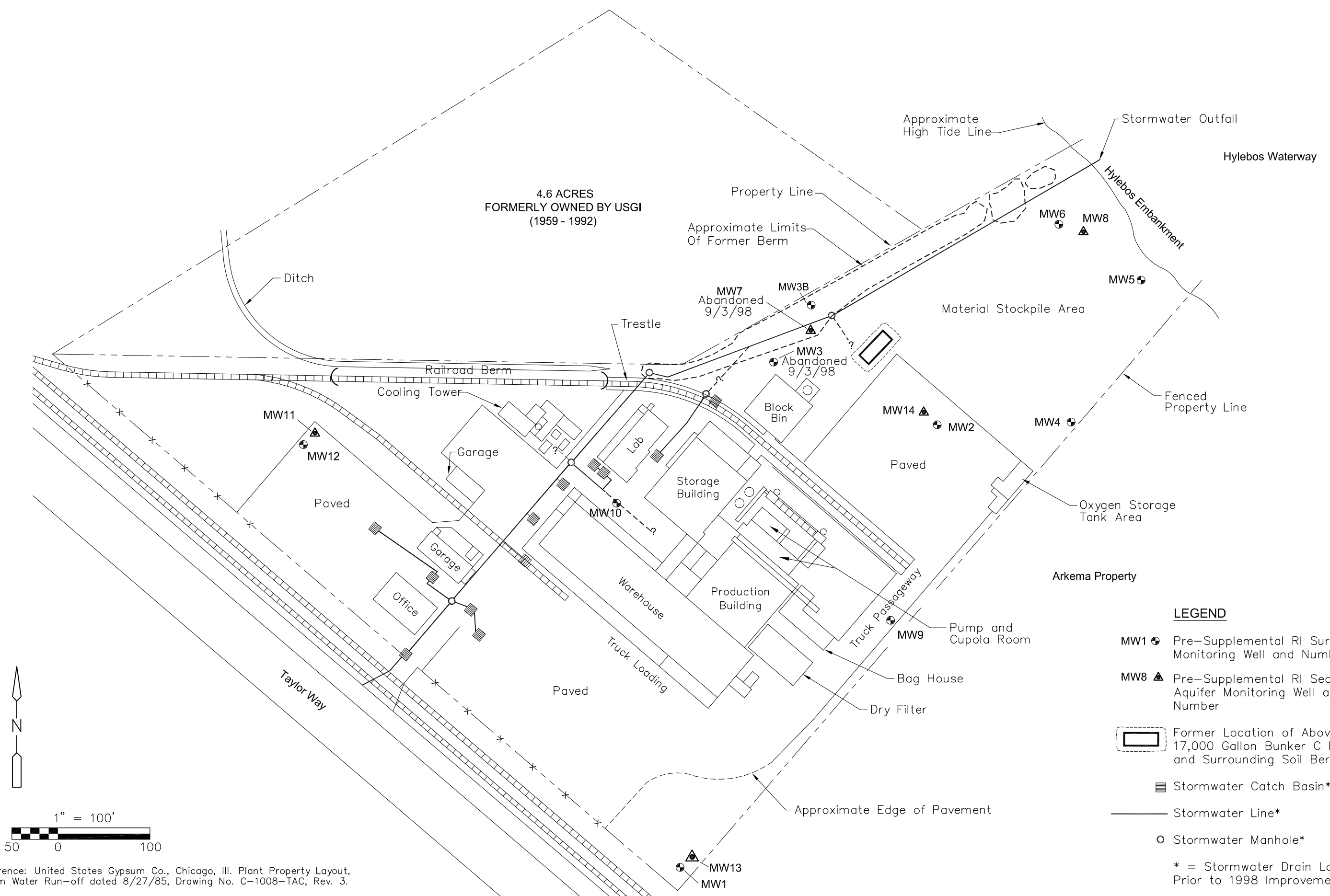
SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON



Figure No. 3
 Current/Historical Site Plan

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- LEGEND**
- MW1 ● Pre-Supplemental RI Surface Aquifer Monitoring Well and Number
 - MW8 ▲ Pre-Supplemental RI Second Aquifer Monitoring Well and Number
 - Former Location of Aboveground 17,000 Gallon Bunker C Fuel Tank and Surrounding Soil Berm
 - Stormwater Catch Basin*
 - Stormwater Line*
 - Stormwater Manhole*
 - * = Stormwater Drain Layout Prior to 1998 Improvements

Reference: United States Gypsum Co., Chicago, Ill. Plant Property Layout, Storm Water Run-off dated 8/27/85, Drawing No. C-1008-TAC, Rev. 3.



SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 4
 Taylor Way Property Historical Features
 (Prior to 2002)




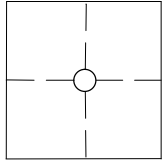
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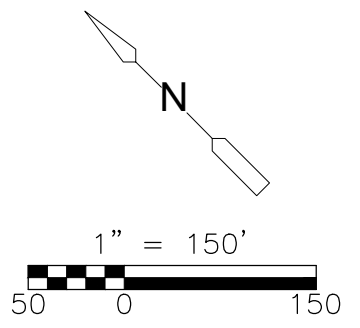
REFERENCE: HYDROMETRICS INC. 1996.
 FINAL ENGINEERING REPORT MURRAY
 PACIFIC LOG SORT YARD NO 1 REMEDIATION

LEGEND:

-  GEOTEXTILE
-  MW-20 ▲ SECOND AQUIFER MONITORING WELL
-  MW-21 ● SURFACE AQUIFER MONITORING WELL
-  SAMPLE GRID AREA

NOTES:

MW-18 AND MW-19 SHOWN AS INCORRECT WELL TYPE ON ORIGINAL DRAWINGS.



SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 5
 Murray Pacific
 Grid Sampling Plan Post Remediation

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LEGEND:

MALCOM PIRNIE 2006 INVESTIGATION RESULTS

SPA10 ● GEOPROBE BORING LOCATION AND ID WITH:

| |
|-----|
| 21 |
| 57 |
| 880 |

— SOIL ARSENIC CONCENTRATION IN mg/Kg, 0–3" INTERVAL

— SOIL ARSENIC CONCENTRATION IN mg/Kg, 3"–6' INTERVAL

— GROUNDWATER ARSENIC CONCENTRATION IN $\mu\text{g/L}$

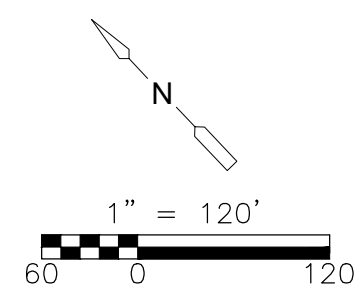
mg/Kg MILLIGRAMS PER KILOGRAM

$\mu\text{g/L}$ MICROGRAMS PER LITER

— PARCEL LINE

— BARK SLUDGE APPLICATION AREA

— NORTH BOUNDARY AREA (NBA)



SOURCE: GOOGLE EARTH PRO, 2009
 REFERENCE: MALCOLM PIRNIE, 2007
 SOILS DATA SUMMARY REPORT

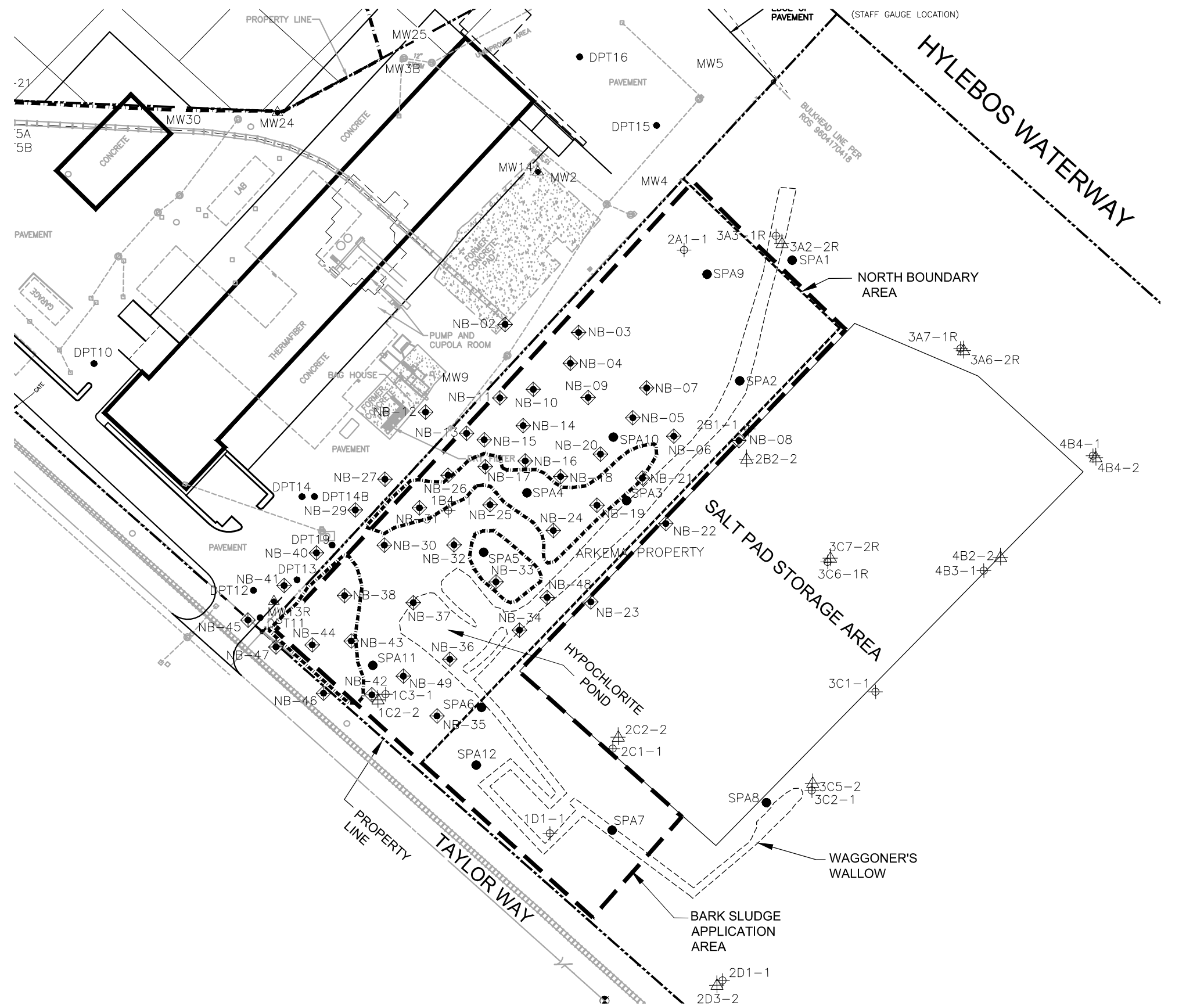


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 6
 Arkema Property North Boundary Area
 and Salt Pad Layout

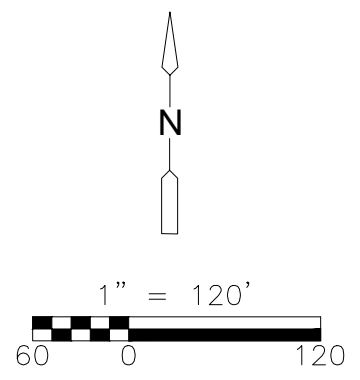
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LEGEND:

- NB-02 NORTH BOUNDARY BORING SAMPLE LOCATIONS AND DESIGNATION (2012)
- SPA6 GEOPROBE BORING SAMPLE APPROXIMATE LOCATION AND DESIGNATION (MALCOM PIRNIE 2007)
- MW29 SURFACE AQUIFER WELL AND DESIGNATION
- MW18 SECOND AQUIFER WELL AND DESIGNATION
- DPT7 DPT LOCATION AND DESIGNATION
- 2C1-1 OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2C2-2 OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- ONE OR MORE AREAS OF SUBSTANTIAL STANDING WATER DURING CERTAIN YEARS, (1965, 1978, 1985, 1986)
- BARK SLUDGE APPLICATION AREA
- NORTH BOUNDARY AREA
- PARCEL BOUNDARY



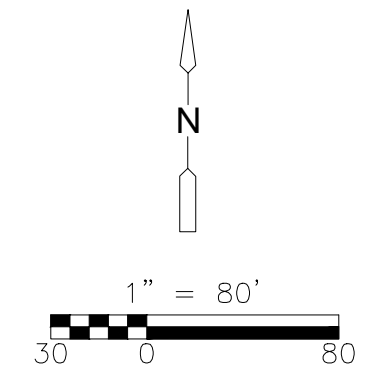
SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON



Figure No. 7
 North Boundary Area – Boring Locations

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- LEGEND:**
- NB-XX BORING ID WITH SAMPLE DEPTH (FEET BELOW GROUND SURFACE) AND ARSENIC CONCENTRATION IN PARTS PER MILLION *
 - 2ft - 40
 - BORING LOCATION WITH ARSENIC CONCENTRATION:**
 - ◆ LESS THAN THE METHOD A CLEANUP LEVEL (20 MILLIGRAMS PER KILOGRAM/PARTS PER MILLION)
 - ◆ GREATER THAN THE METHOD A CLEANUP LEVEL, BUT WITHIN THE SAME ORDER OF MAGNITUDE
 - ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY ONE ORDER OF MAGNITUDE
 - ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY TWO ORDERS OF MAGNITUDE
 - * SAMPLE ANALYZED BY XRF ON A DRY WEIGHT BASIS EXCEPT WHERE DENOTED BY "L" (LABORATORY ANALYSIS) OR "W" (XRF FIELD DATA, WET WEIGHT BASIS)
 - AREAS OF SUBSTANTIAL STANDING WATER DURING CERTAIN YEARS, (1965, 1978, 1985 AND/OR 1986)
 - BARK SLUDGE APPLICATION AREA
 - NORTH BOUNDARY AREA
 - PARCEL BOUNDARY

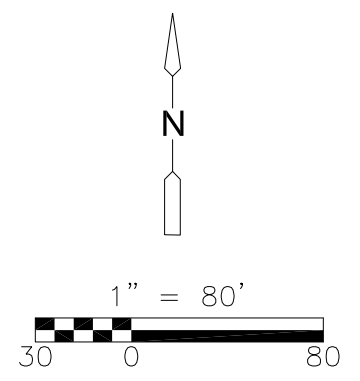


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 8a
 Arsenic Concentrations at 0-3 Foot Depths

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LEGEND:

NB-XX BORING ID WITH SAMPLE DEPTH (FEET BELOW GROUND SURFACE) AND ARSENIC CONCENTRATION IN PARTS PER MILLION *

BORING LOCATION WITH ARSENIC CONCENTRATION:

- ◆ LESS THAN THE METHOD A CLEANUP LEVEL (20 MILLIGRAMS PER KILOGRAM/PARTS PER MILLION)
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL, BUT WITHIN THE SAME ORDER OF MAGNITUDE
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY ONE ORDER OF MAGNITUDE
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY TWO ORDERS OF MAGNITUDE
- ◆ NO DATA

* SAMPLE ANALYZED BY XRF ON A DRY WEIGHT BASIS EXCEPT WHERE DENOTED BY "L" (LABORATORY ANALYSIS) OR "W" (XRF FIELD DATA, WET WEIGHT BASIS)

 AREAS OF SUBSTANTIAL STANDING WATER DURING CERTAIN YEARS, (1965, 1978, 1985 AND/OR 1986)

BARK SLUDGE APPLICATION AREA

NORTH BOUNDARY AREA

PARCEL BOUNDARY



SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 8b
 Arsenic Concentrations at 4-7 Foot Depths

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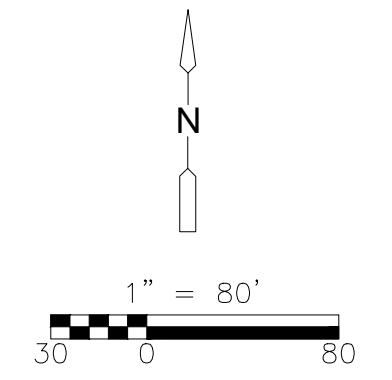


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 8c
 Arsenic Concentrations at 8-12 Foot Depths

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- LEGEND:**
- NB-XX BORING ID WITH SAMPLE DEPTH (FEET BELOW GROUND SURFACE) AND LEAD CONCENTRATION IN PARTS PER MILLION *
 - 2ft - 65
 - BORING LOCATION WITH LEAD CONCENTRATION:**
 - ◆ LESS THAN THE METHOD A CLEANUP LEVEL (250 MILLIGRAMS PER KILOGRAM/PARTS PER MILLION)
 - ◆ GREATER THAN THE METHOD A CLEANUP LEVEL, BUT WITHIN THE SAME ORDER OF MAGNITUDE
 - ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY ONE ORDER OF MAGNITUDE
 - ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY TWO ORDERS OF MAGNITUDE
 - * SAMPLE ANALYZED BY XRF ON A DRY WEIGHT BASIS EXCEPT WHERE DENOTED BY "L" (LABORATORY ANALYSIS) OR "W" (XRF FIELD DATA, WET WEIGHT BASIS)
 - AREAS OF SUBSTANTIAL STANDING WATER DURING CERTAIN YEARS, (1965, 1978, 1985 AND/OR 1986)
 - BARK SLUDGE APPLICATION AREA
 - NORTH BOUNDARY AREA
 - PARCEL BOUNDARY

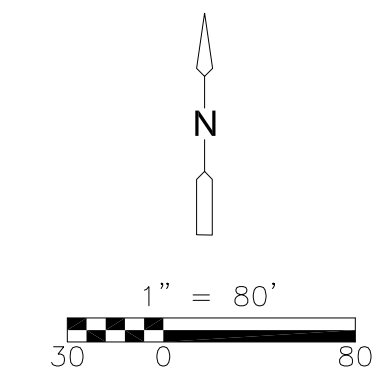


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 9a
 Lead Concentrations at 0-3 Foot Depths

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LEGEND:

NB-XX BORING ID WITH SAMPLE DEPTH (FEET BELOW GROUND SURFACE) AND LEAD CONCENTRATION IN PARTS PER MILLION

5ft - 24

BORING LOCATION WITH LEAD CONCENTRATION:

- ◆ LESS THAN THE METHOD A CLEANUP LEVEL (250 MILLIGRAMS PER KILOGRAM/PARTS PER MILLION)
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL, BUT WITHIN THE SAME ORDER OF MAGNITUDE
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY ONE ORDER OF MAGNITUDE
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY TWO ORDERS OF MAGNITUDE
- ◆ NO DATA

* SAMPLE ANALYZED BY XRF ON A DRY WEIGHT BASIS EXCEPT WHERE DENOTED BY "L" (LABORATORY ANALYSIS) OR "W" (XRF FIELD DATA, WET WEIGHT BASIS)

AREAS OF SUBSTANTIAL STANDING WATER DURING CERTAIN YEARS, (1965, 1978, 1985 AND/OR 1986)

--- BARK SLUDGE APPLICATION AREA

--- NORTH BOUNDARY AREA

--- PARCEL BOUNDARY

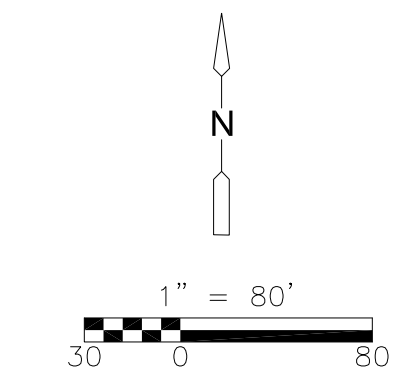
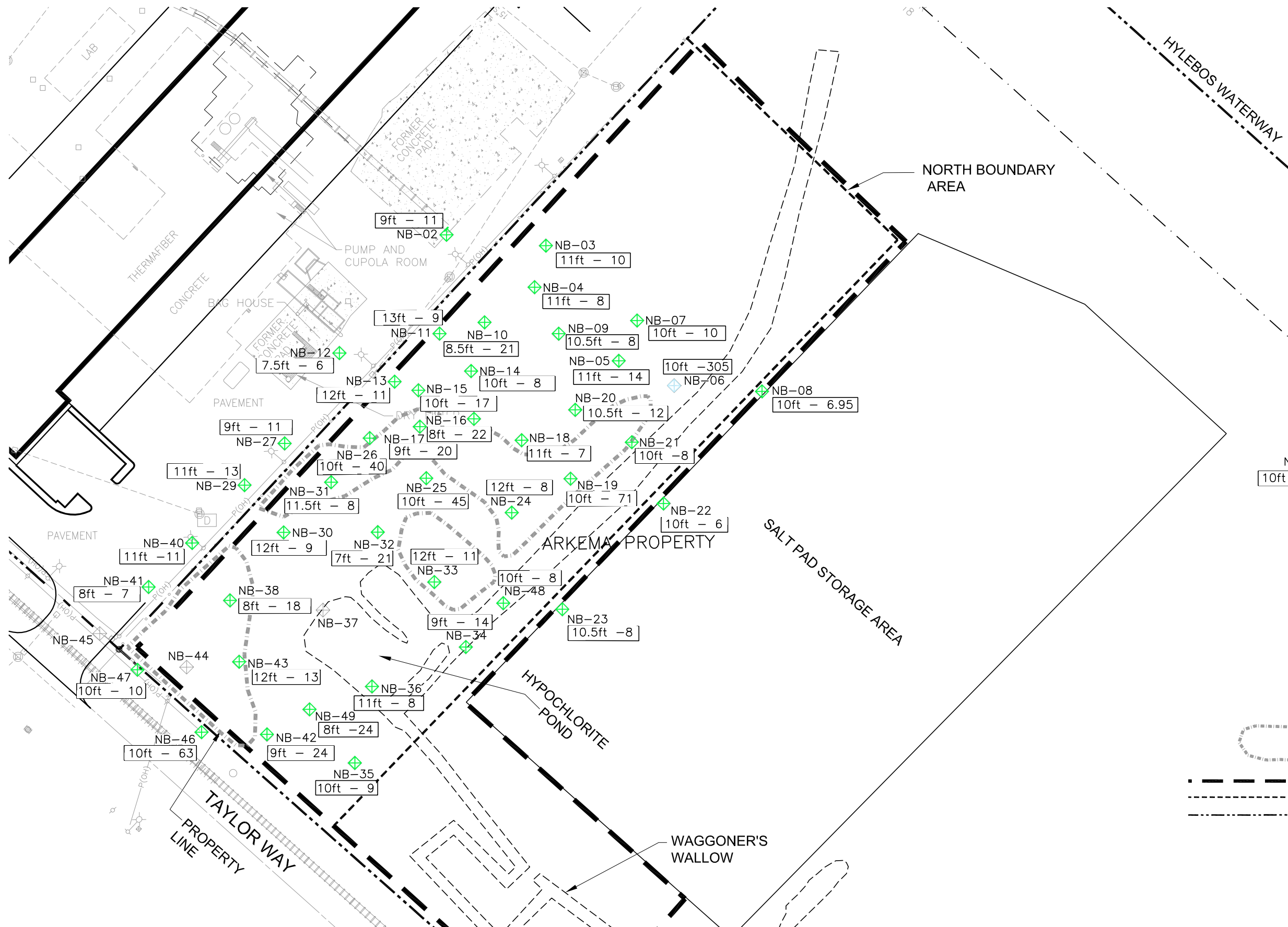


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 9b
 Lead Concentrations at 4-7 Foot Depths

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LEGEND:

NB-XX BORING ID WITH SAMPLE DEPTH (FEET BELOW GROUND SURFACE) AND LEAD CONCENTRATION IN PARTS PER MILLION *

10ft - 6

BORING LOCATION WITH LEAD CONCENTRATION:

- ◆ LESS THAN THE METHOD A CLEANUP LEVEL (250 MILLIGRAMS PER KILOGRAM/PARTS PER MILLION)
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL, BUT WITHIN THE SAME ORDER OF MAGNITUDE
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY ONE ORDER OF MAGNITUDE
- ◆ GREATER THAN THE METHOD A CLEANUP LEVEL BY TWO ORDERS OF MAGNITUDE
- ◆ NO DATA

* SAMPLE ANALYZED BY XRF ON A DRY WEIGHT BASIS EXCEPT WHERE DENOTED BY "L" (LABORATORY ANALYSIS) OR "W" (XRF FIELD DATA, WET WEIGHT BASIS)

NOTE: SAMPLES NB-11 AND NB-32 ARE DEPTH OUTLIERS

 AREAS OF SUBSTANTIAL STANDING WATER DURING CERTAIN YEARS, (1965, 1978, 1985 AND/OR 1986)

BARK SLUDGE APPLICATION AREA

NORTH BOUNDARY AREA

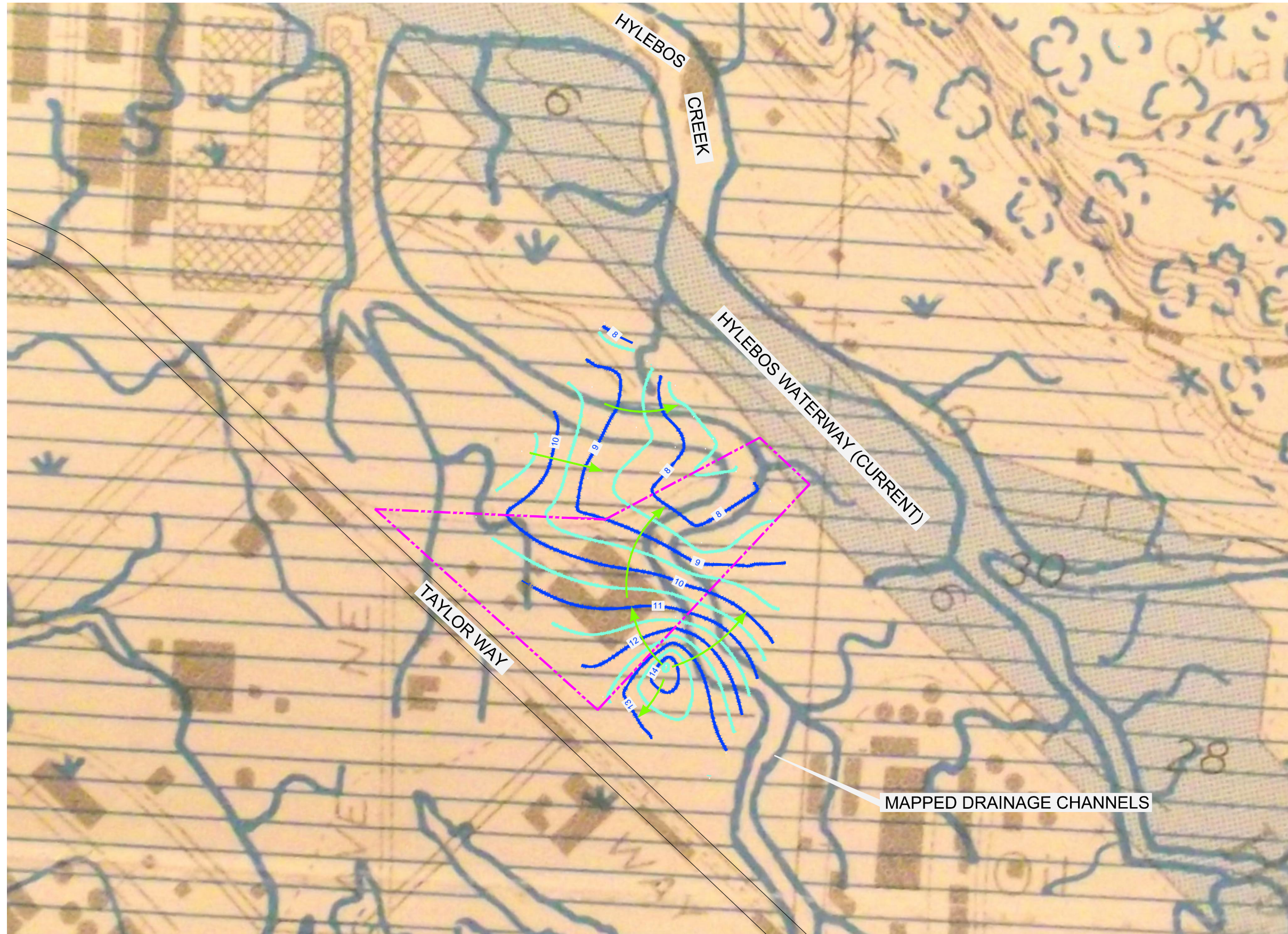
PARCEL BOUNDARY



SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

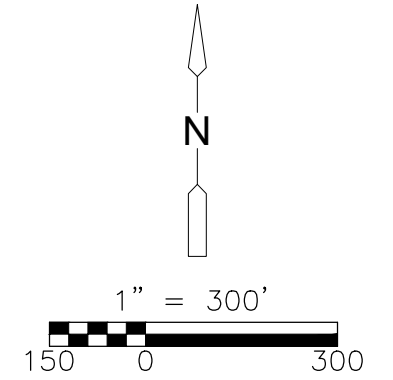
Figure No. 9c
 Lead Concentrations at 8-12 Foot Depths

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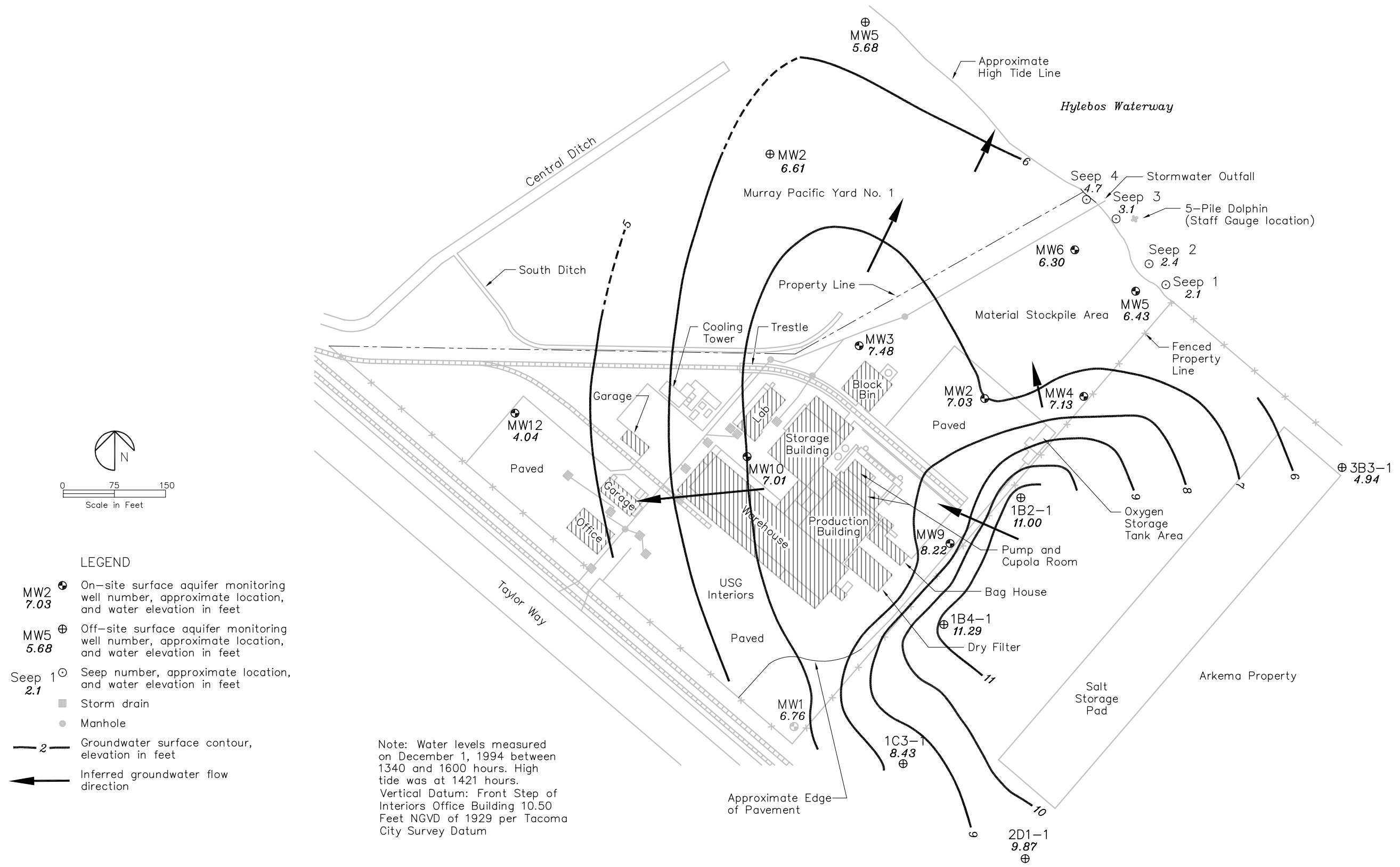
REFERENCE:

BORTLESON, G.C., M.J. CHRZASTOWSKI AND A.K. HELGERSON. 1980 HISTORICAL CHANGES OF SHORELINE AND WETLAND AT PUYALLUP RIVER AND COMMENCEMENT BAY, WASHINGTON. IN: HISTORICAL CHANGES OF SHORELINE AND WETLAND AT ELEVEN MAJOR DELTAS IN THE PUGET SOUND REGION, WASHINGTON USGS HYDROLOGIC INVESTIGATION ATLAS HA 617



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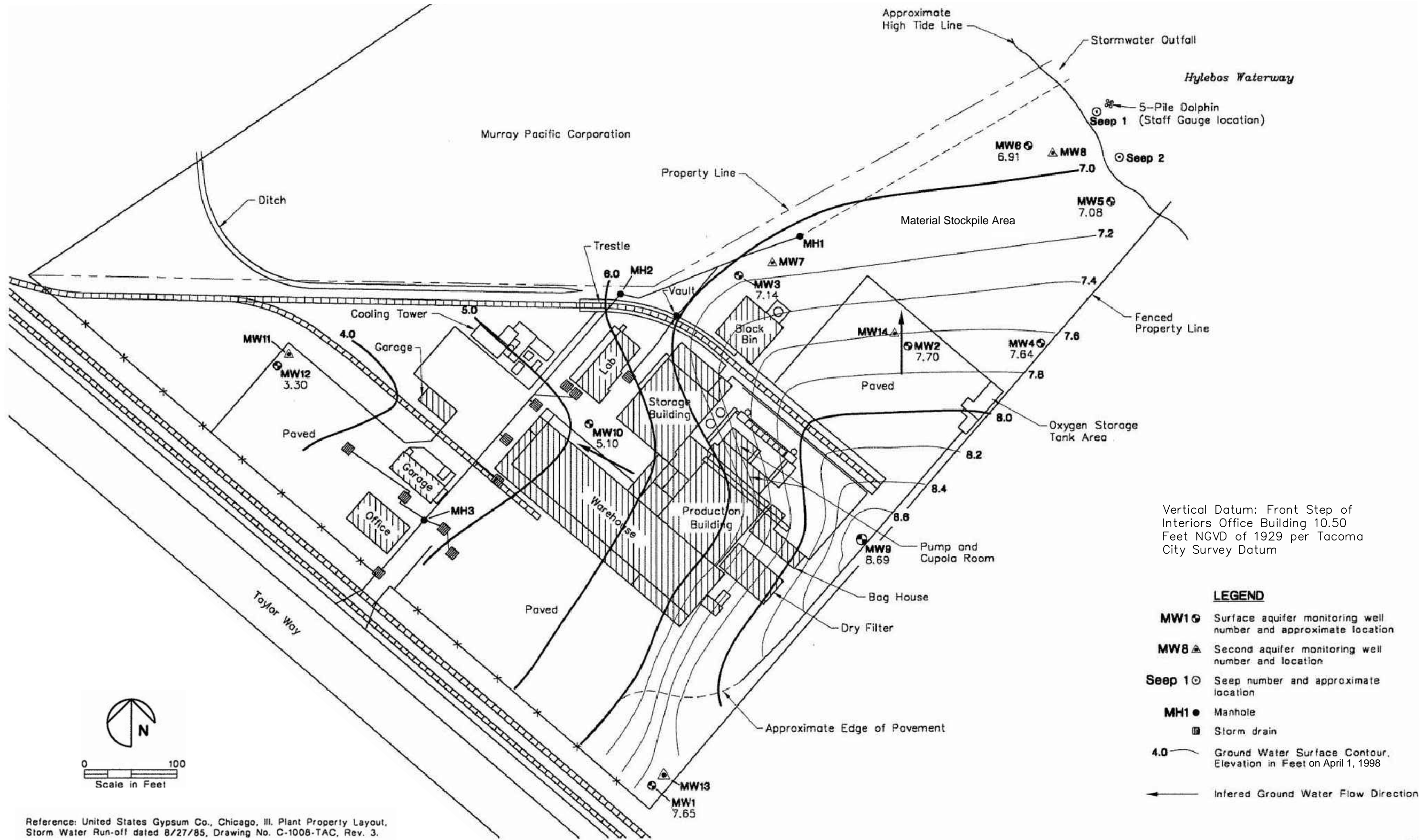
Reference: United States Gypsum Co., Chicago, Ill. Plant Property Layout, Storm Water Run-off dated 8/27/85, Drawing No. C-1008-TAC, Rev. 3.



SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

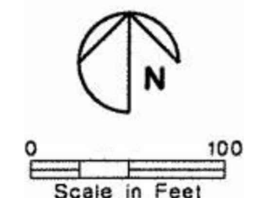
Figure No. 11a
 High Tide Potentiometric Surface Map
 December 1, 1994
 Surface Aquifer

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Vertical Datum: Front Step of Interiors Office Building 10.50 Feet NGVD of 1929 per Tacoma City Survey Datum

- LEGEND**
- MW1 ⊕ Surface aquifer monitoring well number and approximate location
 - MW8 ▲ Second aquifer monitoring well number and location
 - Seep 1 ⊕ Seep number and approximate location
 - MH1 ● Manhole
 - Storm drain
 - 4.0 — Ground Water Surface Contour, Elevation in Feet on April 1, 1998
 - ← Inferred Ground Water Flow Direction



Reference: United States Gypsum Co., Chicago, Ill. Plant Property Layout, Storm Water Run-off dated 8/27/85, Drawing No. C-1008-TAC, Rev. 3.

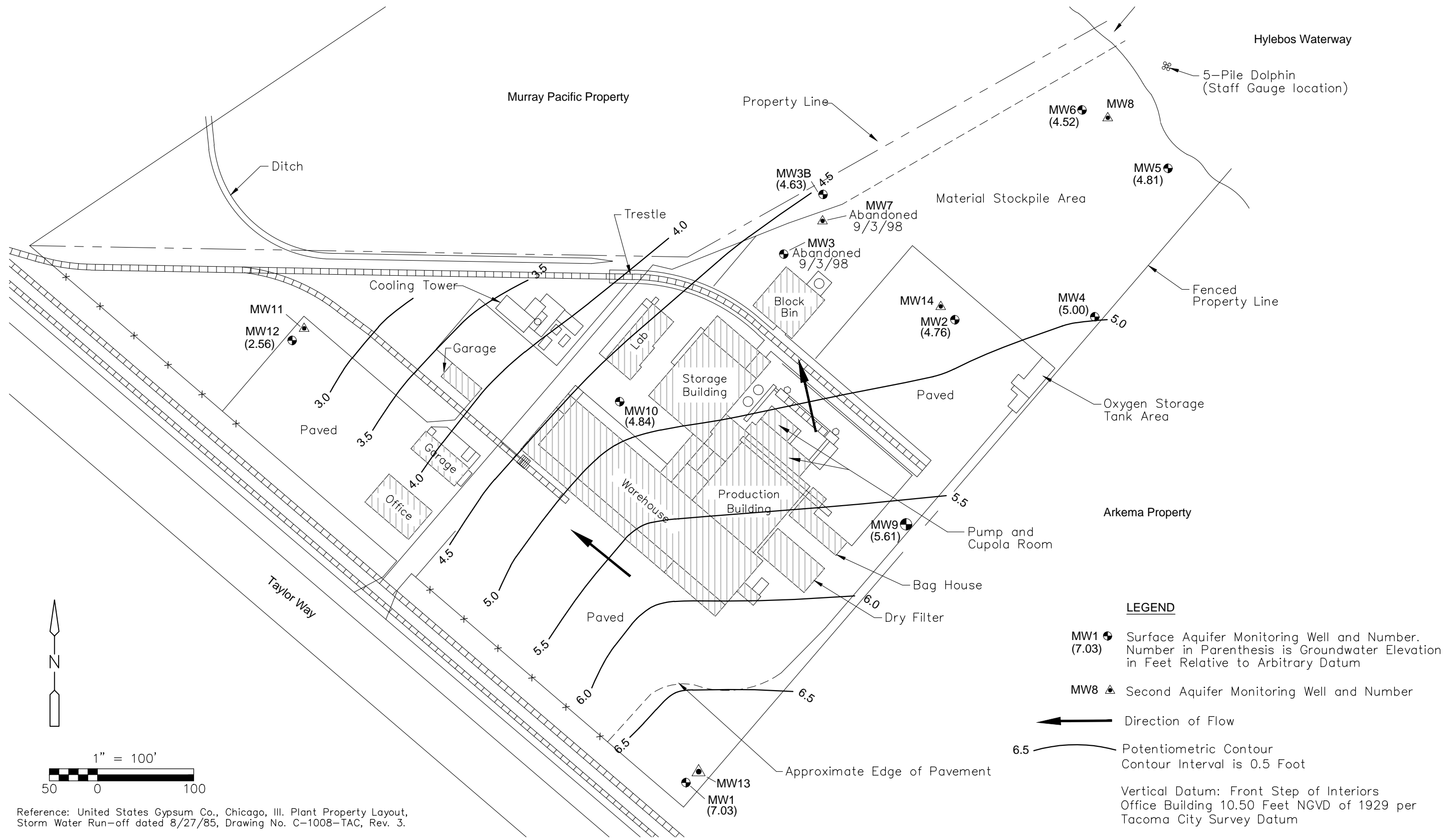


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 11b
 Potentiometric Surface Map April 1, 1998
 Surface Aquifer

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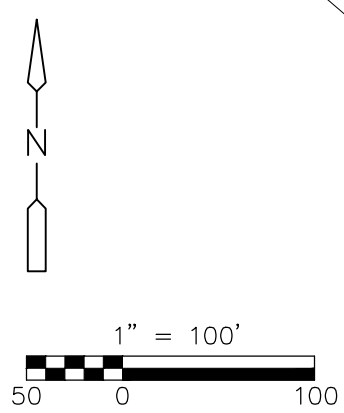
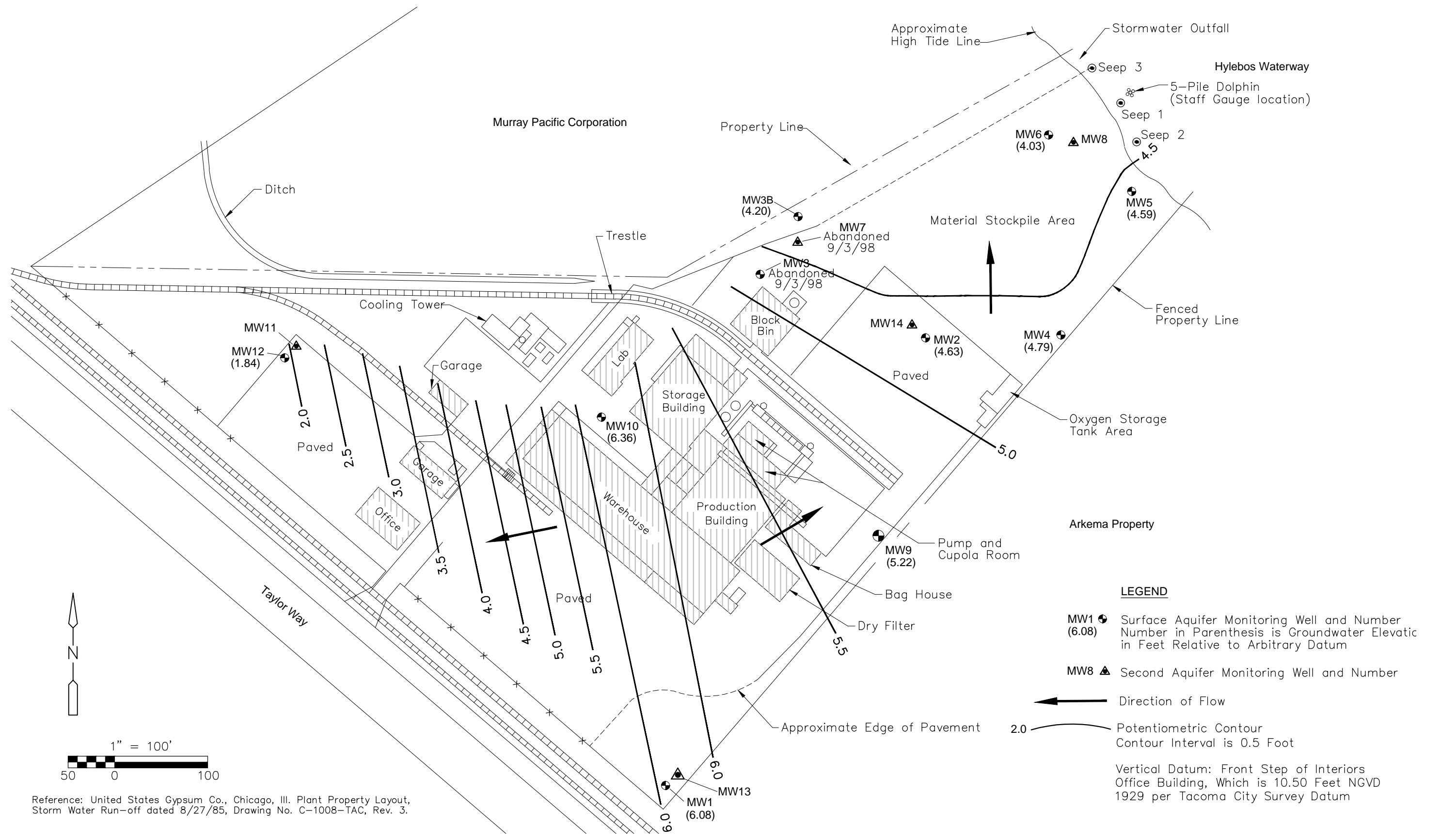


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 11c
 Potentiometric Surface Map October 25,
 2000 Surface Aquifer

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Reference: United States Gypsum Co., Chicago, Ill. Plant Property Layout, Storm Water Run-off dated 8/27/85, Drawing No. C-1008-TAC, Rev. 3.

LEGEND

- MW1 (6.08) ● Surface Aquifer Monitoring Well and Number
Number in Parenthesis is Groundwater Elevatic
in Feet Relative to Arbitrary Datum
- MW8 ▲ Second Aquifer Monitoring Well and Number
- ← Direction of Flow
- 2.0 — Potentiometric Contour
Contour Interval is 0.5 Foot

Vertical Datum: Front Step of Interiors
Office Building, Which is 10.50 Feet NGVD
1929 per Tacoma City Survey Datum

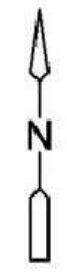
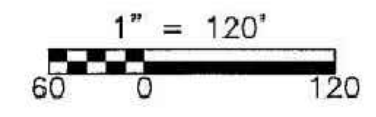
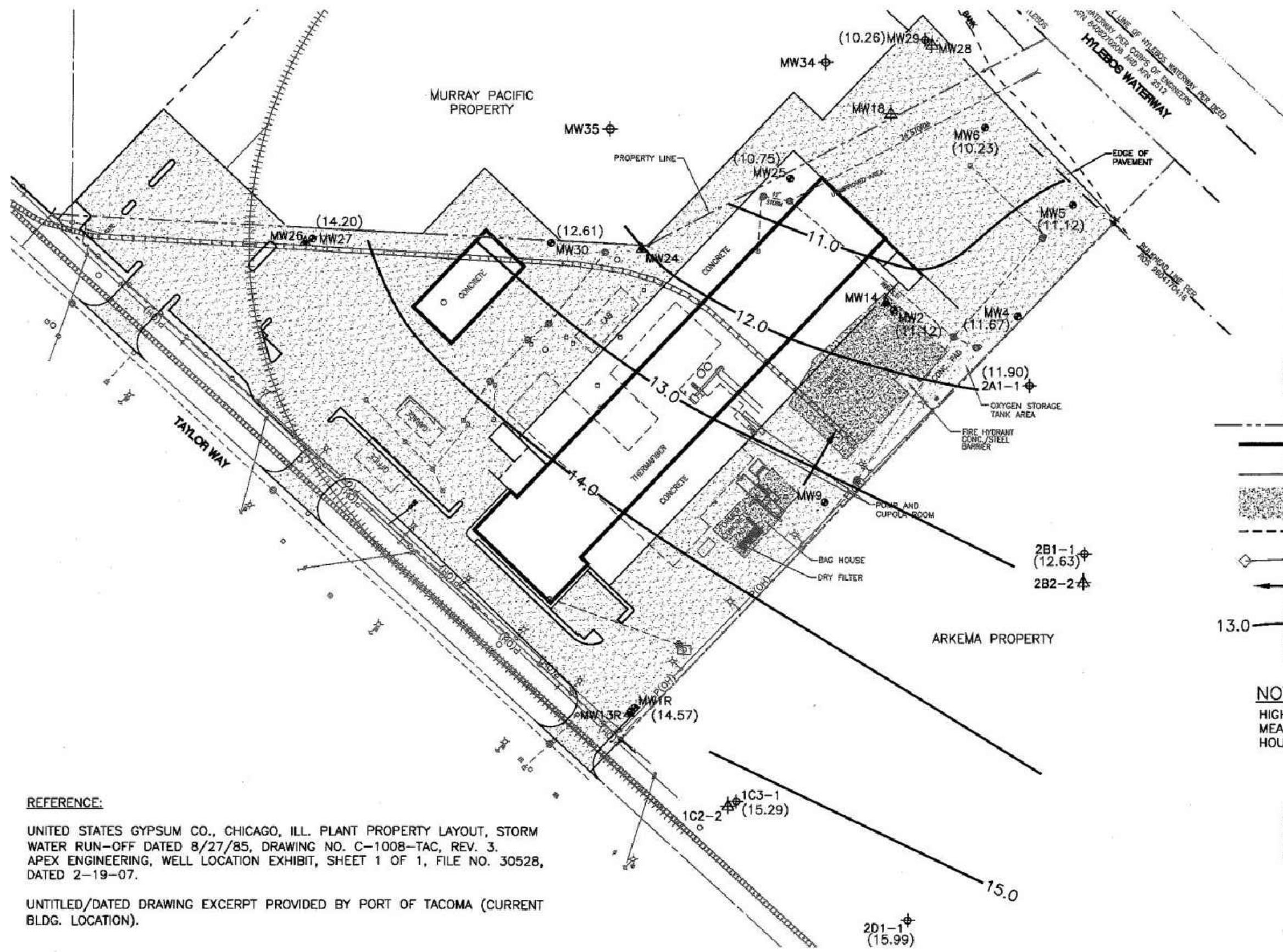
SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 11d
 Potentiometric Surface Map October 26, 2001
 Surface Aquifer



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C:\pw_pi1\riehlep\0195280\Figure-11e (2014 DRAFT REPORT) 03/04/15 12:07 riehllep XREES:aylor00-RI-SITE, S_1117 (2014 draft report)
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LEGEND:

- MW6 ● (10.23) SURFACE AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
- 1C3-1 ⚡ (15.29) OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION
- 2B2-2 ⚡ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- TAYLOR WAY PROPERTY BOUNDARY
- EXISTING BUILDING
- - - EDGE OF NEW ASPHALT PAVED AREA
- ▨ FORMER CONCRETE PAD
- - - FORMER BUILDING LOCATION
- ⊕ STORM DRAIN SYSTEM
- GROUNDWATER FLOW DIRECTION
- 13.0 — GROUNDWATER CONTOUR AND ELEVATION (DASHED LINED INFERRED)

NOTE:

HIGH TIDE AT 8:48 AM.
 MEASUREMENTS TAKEN WITHIN APPROXIMATELY ONE HOUR OF PREDICTED HIGH TIDE.

REFERENCE:

UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED 2-19-07.

UNTITLED/DATED DRAWING EXCERPT PROVIDED BY PORT OF TACOMA (CURRENT BLDG. LOCATION).

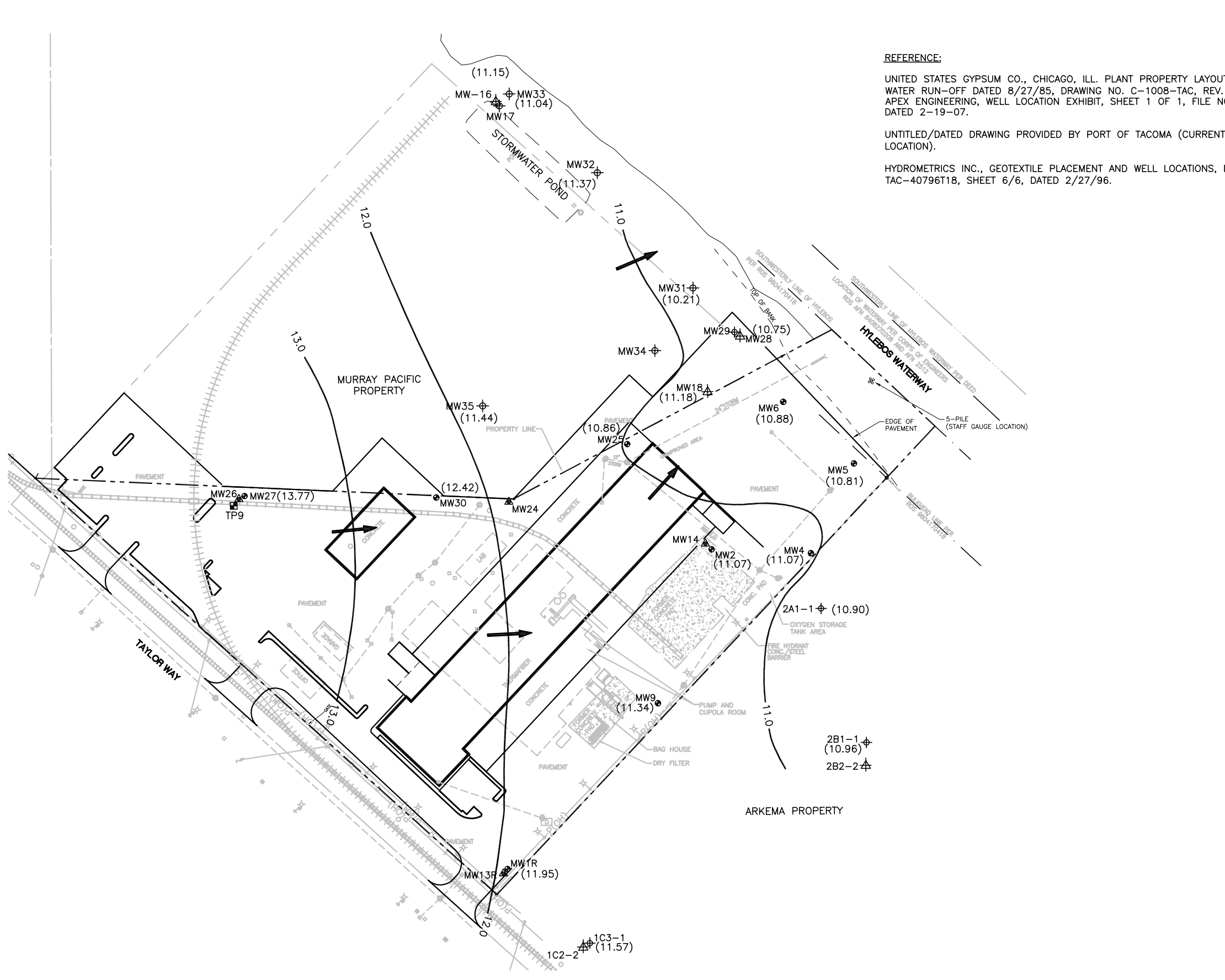
SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 11e
 High Tide Potentiometric Surface Map
 February 9, 2007
 Surface Aquifer

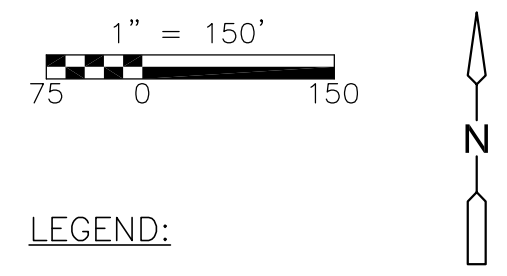


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REFERENCE:
 UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED 2-19-07.
 UNTITLED/DATED DRAWING PROVIDED BY PORT OF TACOMA (CURRENT BLDG. LOCATION).
 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.# TAC-40796T18, SHEET 6/6, DATED 2/27/96.



- LEGEND:**
- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION
 - MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
 - 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION
 - 2B2-2 ⊕ ON-SITE SECOND AQUIFER WELL AND DESIGNATION
 - TAYLOR WAY PROPERTY BOUNDARY
 - ← GROUNDWATER FLOW DIRECTION
 - 11.0 — GROUNDWATER CONTOUR AND ELEVATION
 - EXISTING BUILDING
 - EDGE OF NEW ASPHALT PAVED AREA
 - ▨ FORMER CONCRETE PAD
 - - - FORMER BUILDING LOCATION
 - ⊕ ⊕ STORM DRAIN SYSTEM

NOTE:
 ORIGINAL MONITORING WELL LOCATIONS ON THE MURRAY PACIFIC PROPERTY ARE SCANNED IN FROM A HARD COPY 1996 DRAWING. THE PRECISION OF THE FEATURES AS THEY RELATE TO THE USG SITE FEATURES CANNOT BE DETERMINED. BOTH MW18 WELLS SHOWN SHOULD THEORETICALLY ALIGN.
 VERTICAL DATUM: FEET-MEAN LOWER LOW WATER

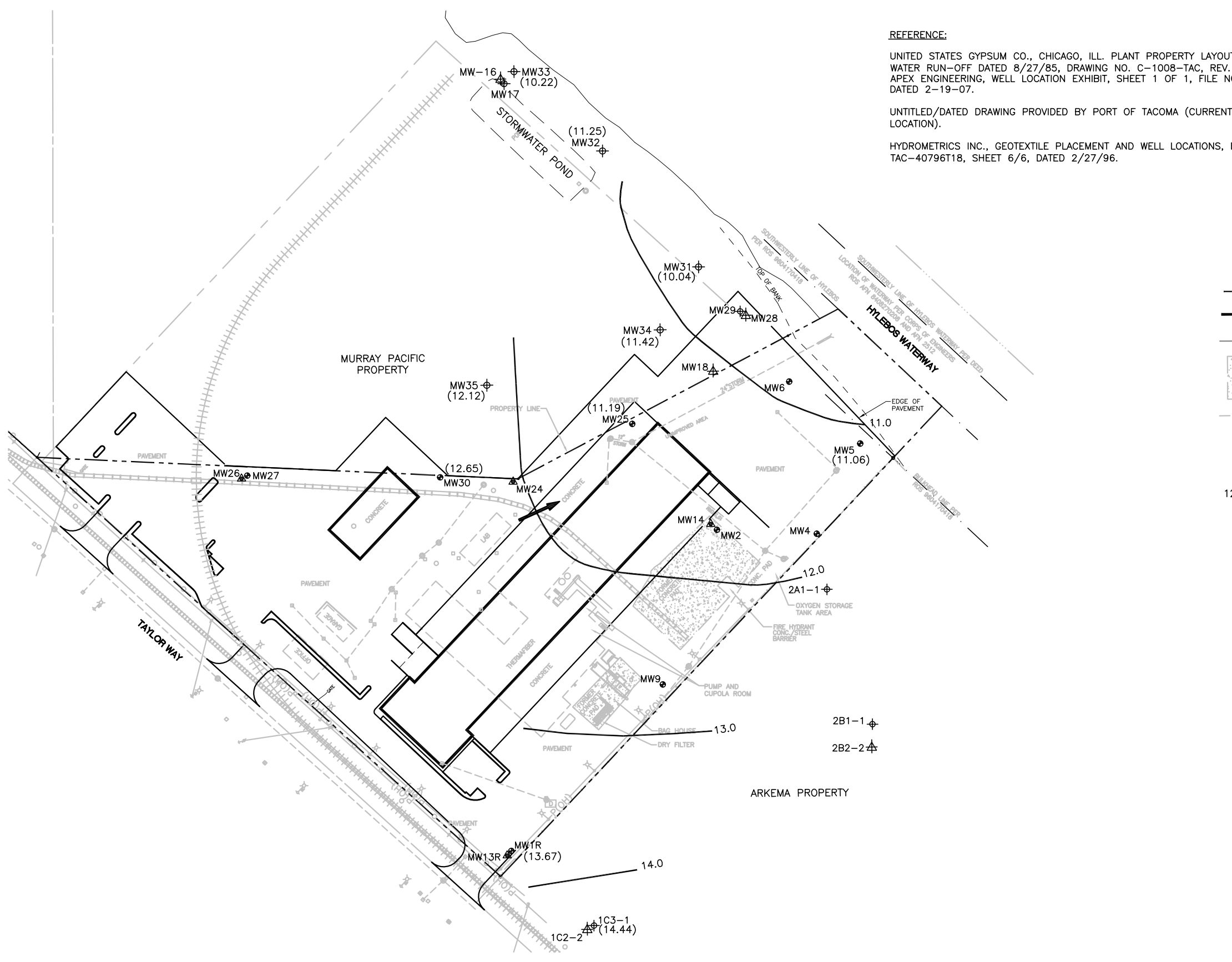


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

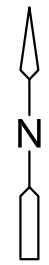
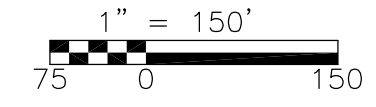
Figure No. 11f
 High Tide Potentiometric Surface Map
 August 27, 2008
 Surface Aquifer

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p:\DACPWAPP2\PW_PL1\Documents\19921\96914\03 Reports and Studies\71462-96914-106749 USG Tacoma\0-CADD\2015-DRAFT REPORT\Figure-11g (2015 DRAFT RE
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REFERENCE:
 UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM
 WATER RUN-OFF DATED 8/27/85, DRAWING NO. G-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528,
 DATED 2-19-07.
 UNTITLED/DATED DRAWING PROVIDED BY PORT OF TACOMA (CURRENT BLDG.
 LOCATION).
 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.#
 TAC-40796T18, SHEET 6/6, DATED 2/27/96.



LEGEND:

- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION (10.85)
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION (14.44)
- 2B2-2 ▲ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- TAYLOR WAY PROPERTY BOUNDARY
- EXISTING BUILDING
- NEW ASPHALT PAVED AREA
- ▨ FORMER CONCRETE PAD
- - - FORMER BUILDING LOCATION
- ◇ ⊕ STORM DRAIN SYSTEM
- ← GROUNDWATER FLOW DIRECTION
- 12.0 — GROUNDWATER CONTOUR AND ELEVATION

NOTE:

ORIGINAL MONITORING WELL LOCATIONS ON THE MURRAY PACIFIC PROPERTY ARE SCANNED IN FROM A HARD COPY 1996 DRAWING. THE PRECISION OF THE FEATURES AS THEY RELATE TO THE USG SITE FEATURES CANNOT BE DETERMINED. BOTH MW18 WELLS SHOWN SHOULD THEORETICALLY ALIGN.

VERTICAL DATUM: FEET-MEAN LOWER LOW WATER

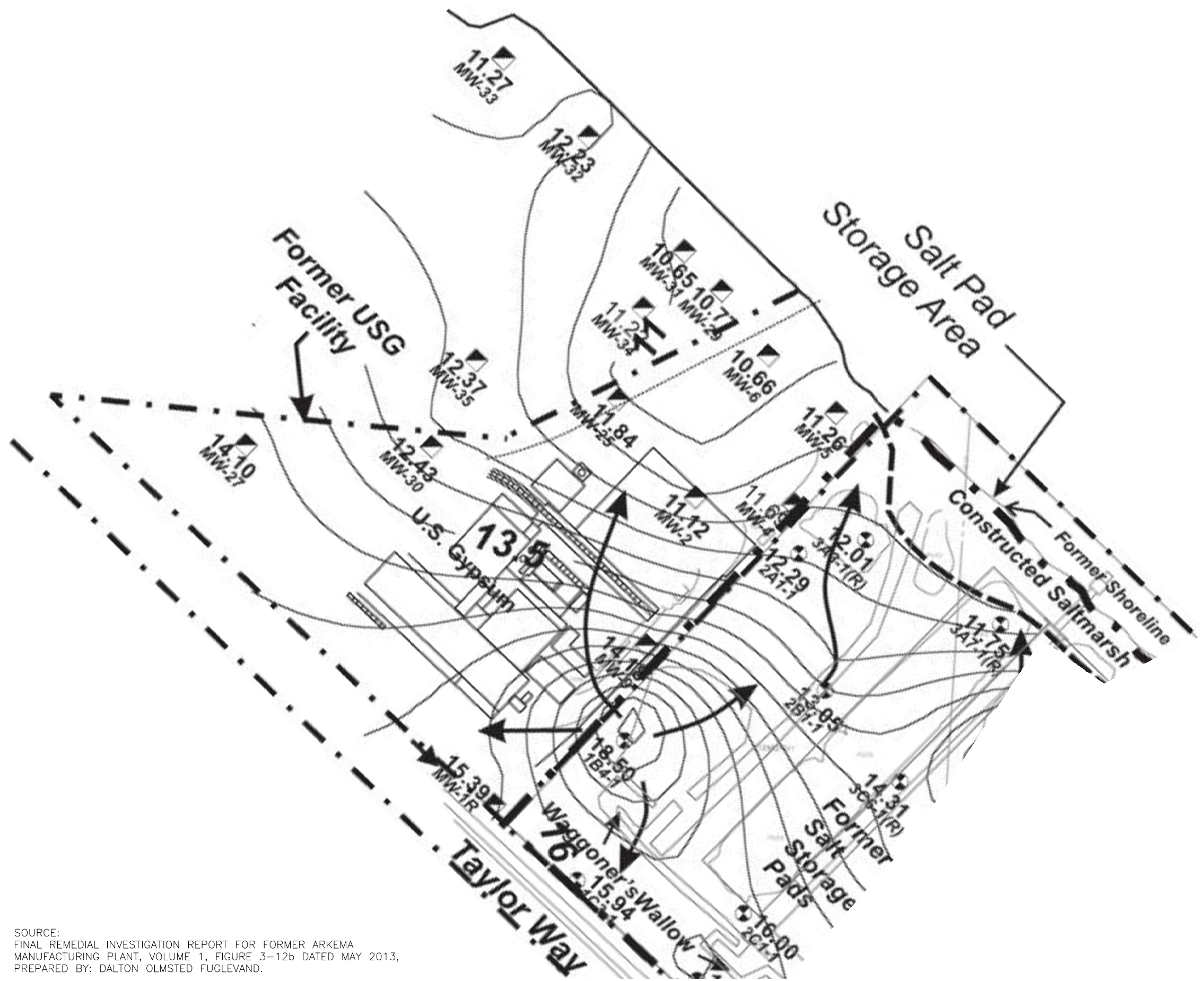


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 11g
 Potentiometric Surface Map
 June 2-3, 2009
 Surface Aquifer

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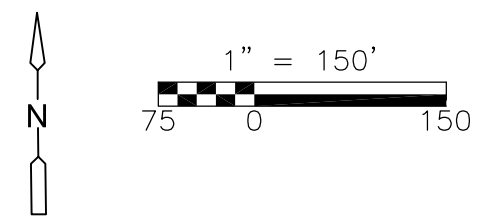
LEGEND:

- Existing Monitoring Well Sept. 2012
- Existing Off-Site Monitoring Well Sept. 2012
- Elevation Contour

Note: Base map shows plant facilities prior to demolition

Est. Horizontal Groundwater Flow Gradient Direction

VERTICAL DATUM: FEET-MEAN LOWER LOW WATER



SOURCE:
 FINAL REMEDIAL INVESTIGATION REPORT FOR FORMER ARKEMA
 MANUFACTURING PLANT, VOLUME 1, FIGURE 3-12b DATED MAY 2013,
 PREPARED BY: DALTON OLMSTED FUGLEVAND.

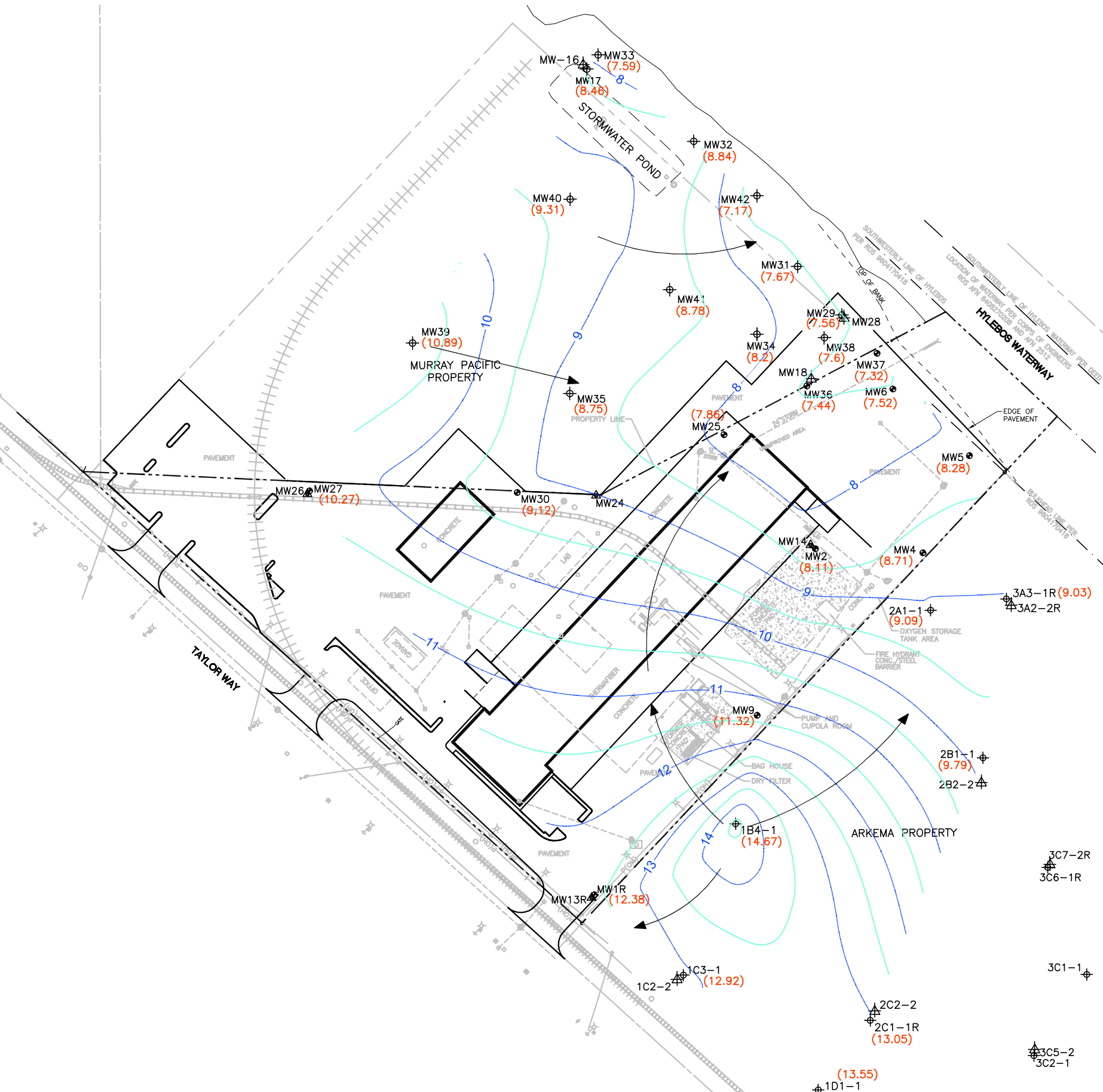


SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
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Figure No. 11h
 Surface Aquifer – Horizontal Groundwater Flow
 Gradient Direction High Tide – March 2012

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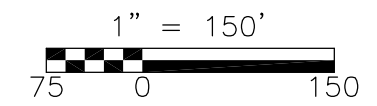
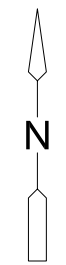
LEGEND:

- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2B2-2 ⊕ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- TAYLOR WAY PROPERTY BOUNDARY
- EXISTING BUILDING
- NEW ASPHALT PAVED AREA
- ▨ FORMER CONCRETE PAD
- - - FORMER BUILDING LOCATION
- ⊕ STORM DRAIN SYSTEM (FORMER)
- (7.75) MONITORING WELL WATER ELEVATION IN FEET (NAVD88)
- 14 1 FT GROUNDWATER CONTOURS
- 1/2 1/2 FT GROUNDWATER CONTOURS
- GROUNDWATER FLOW DIRECTION

VERTICAL DATUM: FEET-NORTH AMERICAN VERTICAL DATUM 1988

REFERENCE:

UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED 2/12/14.
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 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.# TAC-40796T18, SHEET 6/6, DATED 2/27/96.



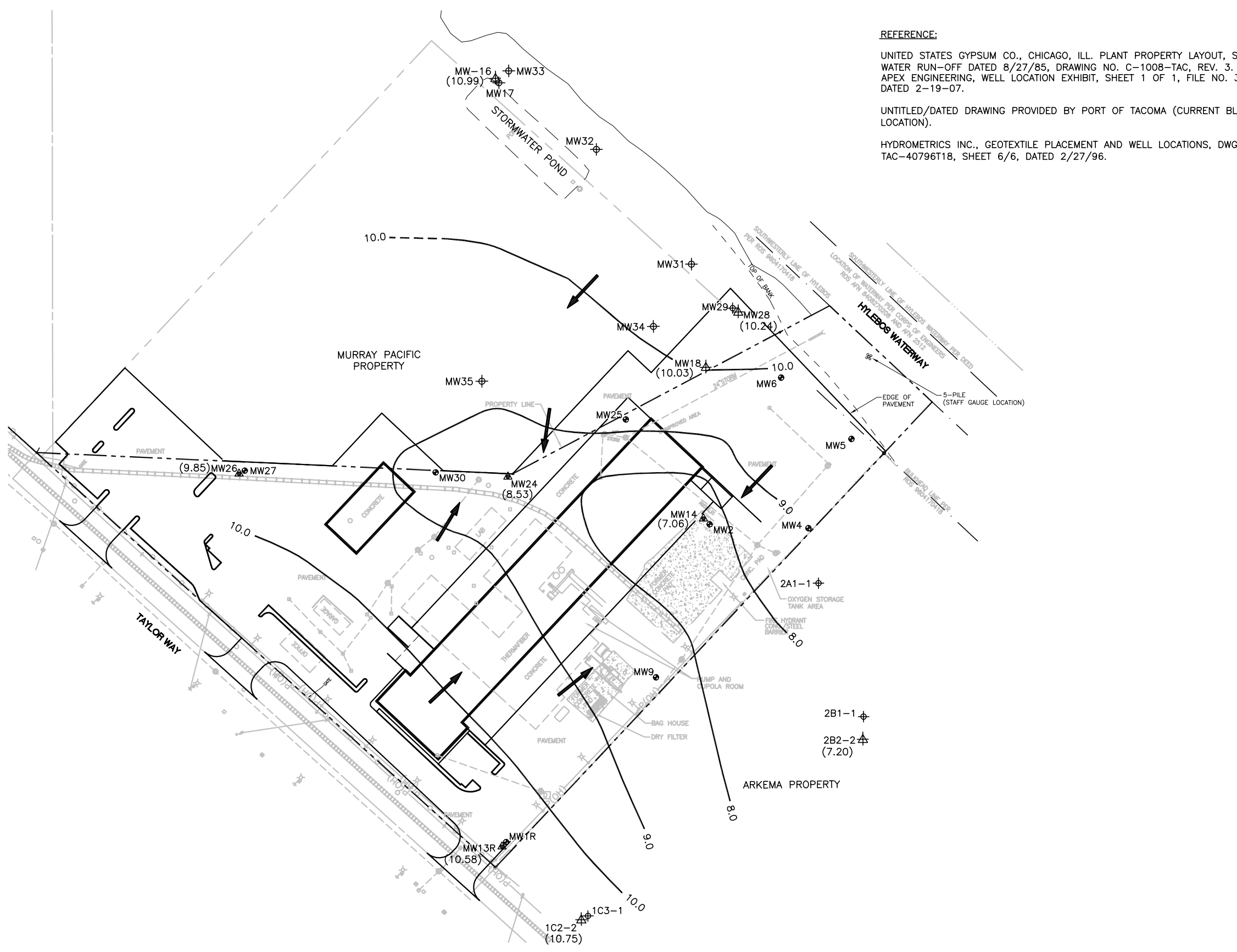
SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No.11i
 Low Tide Potentiometric Surface Map,
 January 16, 2014, Surface Aquifer



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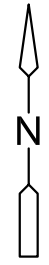
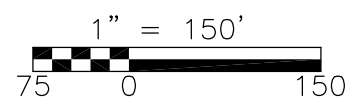


REFERENCE:

UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM
 WATER RUN-OFF DATED 8/27/85, DRAWING NO. G-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528,
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 LOCATION).

 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.#
 TAC-40796T18, SHEET 6/6, DATED 2/27/96.



LEGEND:

- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
- MW26 ▲ (9.85) SECOND AQUIFER WELL AND DESIGNATION WITH WATR LEVEL ELEVATION
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2B2-2 ▲ (7.20) OFF-SITE SECOND AQUIFER WELL AND DESIGNATION WITH WATR LEVEL ELEVATION
- TAYLOR WAY PROPERTY BOUNDARY
- ===== EXISTING BUILDING
- ===== NEW ASPHALT PAVED AREA
- ===== FORMER CONCRETE PAD
- FORMER BUILDING LOCATION
- ◇-----○ STORM DRAIN SYSTEM
- ← GROUNDWATER FLOW DIRECTION
- 8.0 ----- GROUNDWATER CONTOUR AND ELEVATION

NOTE:

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 THEORETICALLY ALIGN.

VERTICAL DATUM: FEET-MEAN LOWER LOW WATER

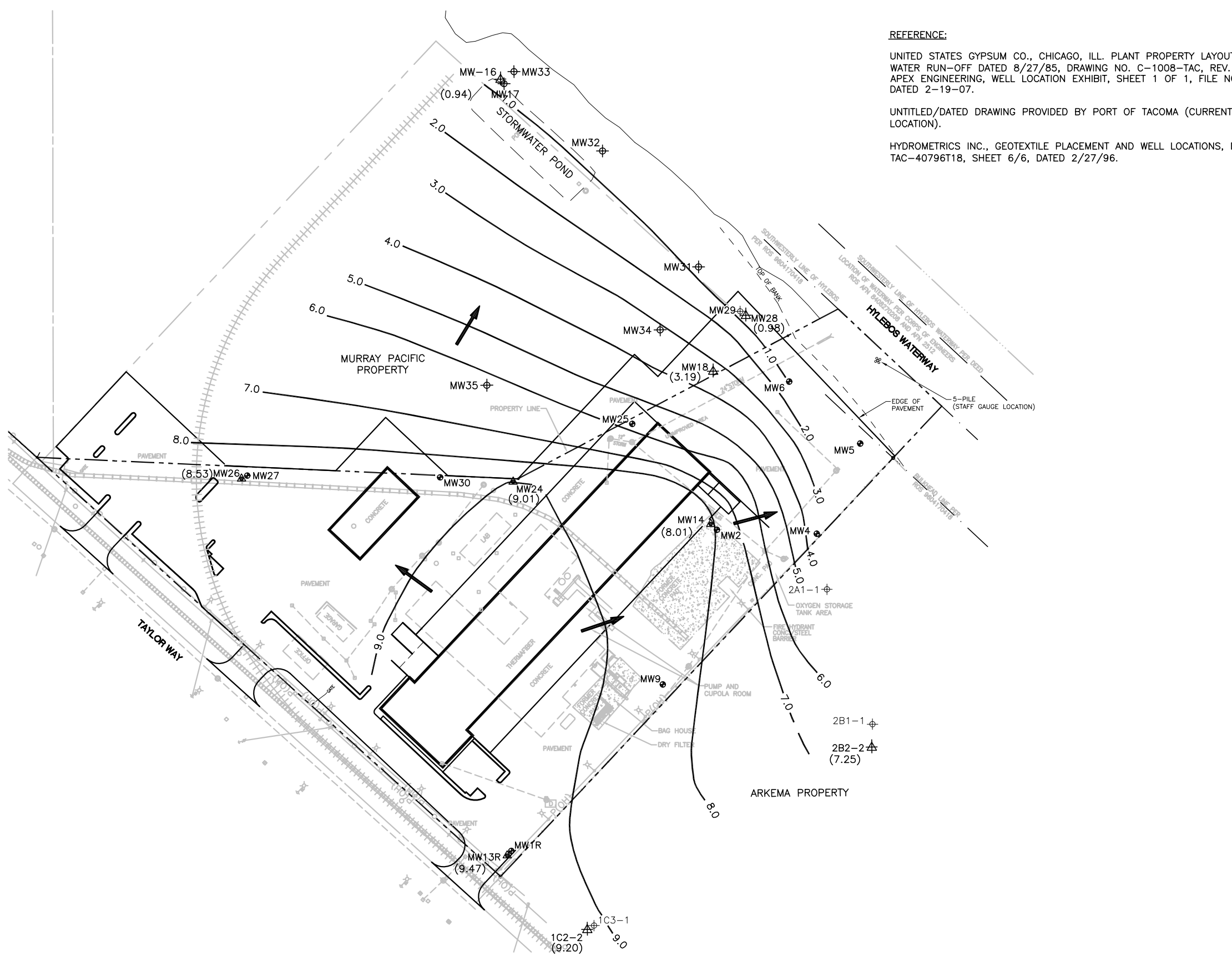


SUPPLEMENTAL REMEDIAL INVESTIGATION
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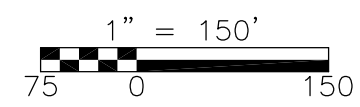
Figure No. 12a
 High Tide Potentiometric Surface Map
 August 27, 2008
 Second Aquifer

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REFERENCE:
 UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM
 WATER RUN-OFF DATED 8/27/85, DRAWING NO. G-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528,
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 LOCATION).
 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.#
 TAC-40796T18, SHEET 6/6, DATED 2/27/96.



LEGEND:

- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION WITH GROUNDWATER ELEVATION (8.53)
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2B2-2 ▲ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION WITH WATER LEVEL ELEVATION (7.25)
- TAYLOR WAY PROPERTY BOUNDARY
- EXISTING BUILDING
- NEW ASPHALT PAVED AREA
- ▨ FORMER CONCRETE PAD
- - - FORMER BUILDING LOCATION
- ◇—◇ STORM DRAIN SYSTEM
- ← GROUNDWATER FLOW DIRECTION
- 7.0 — GROUNDWATER CONTOUR AND ELEVATION

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VERTICAL DATUM: FEET-MEAN LOWER LOW WATER



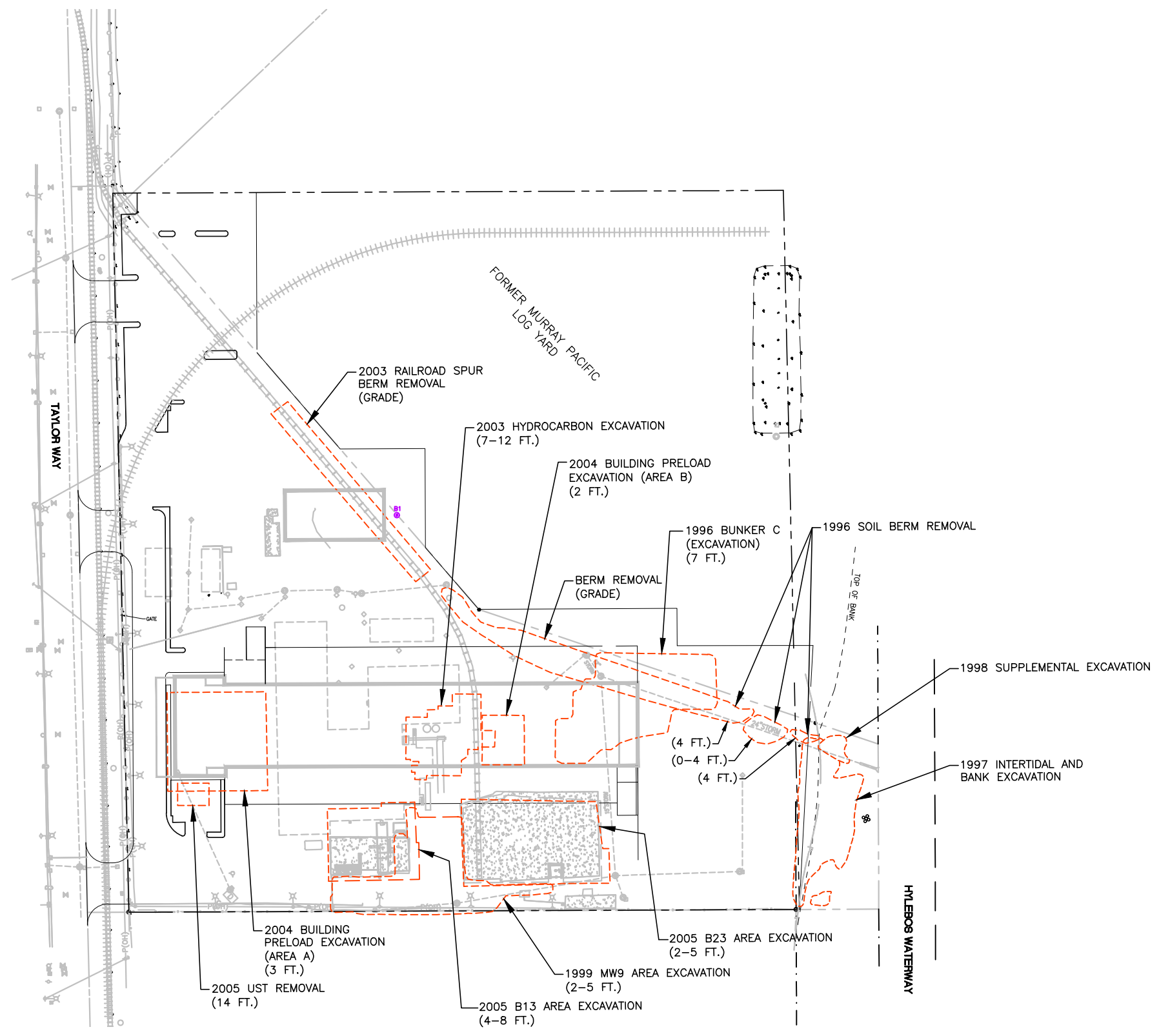
SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 12b
 Low Tide Potentiometric Surface Map
 August 29, 2008
 Second Aquifer

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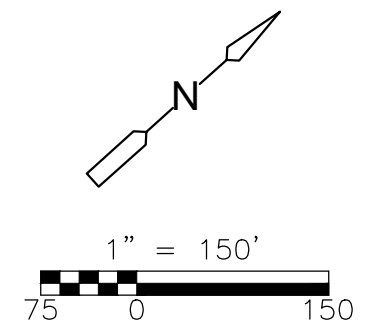
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- LEGEND:**
- - - REMEDIAL EXCAVATION BOUNDARY WITH DATE, NAME OF EXCAVATION AND DEPTH INTERVALS. SOIL BERMS EXCAVATED TO EXISTING GRADE EXCEPT WHERE NOTED. AREAS OF APPARENTLY OVERLAPPING EXCAVATION DUE TO EXCAVATIONS OCCURRING DURING DIFFERENT PERIODS OF TIME
 - NEW BUILDING
 - EDGE OF NEW ASPHALT PAVED AREA
 - FORMER CONCRETE PAD
 - FORMER BUILDING LOCATION
 - STORM DRAIN SYSTEM

- REFERENCES:**
- UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 - KENNEDY/JENKS CONSULTANTS, NOV. 2003.
 - KENNEDY/JENKS CONSULTANTS, MARCH 2005.
 - DLH ENVIRONMENTAL CONSULTING, 2005.
 - VARIOUS CDM/AGI TECHNOLOGIES REPORTS.
 - UNTITLED/DATED DRAWINGS PROVIDED BY PORT OF TACOMA (CURRENT BLDG. LOCATION)



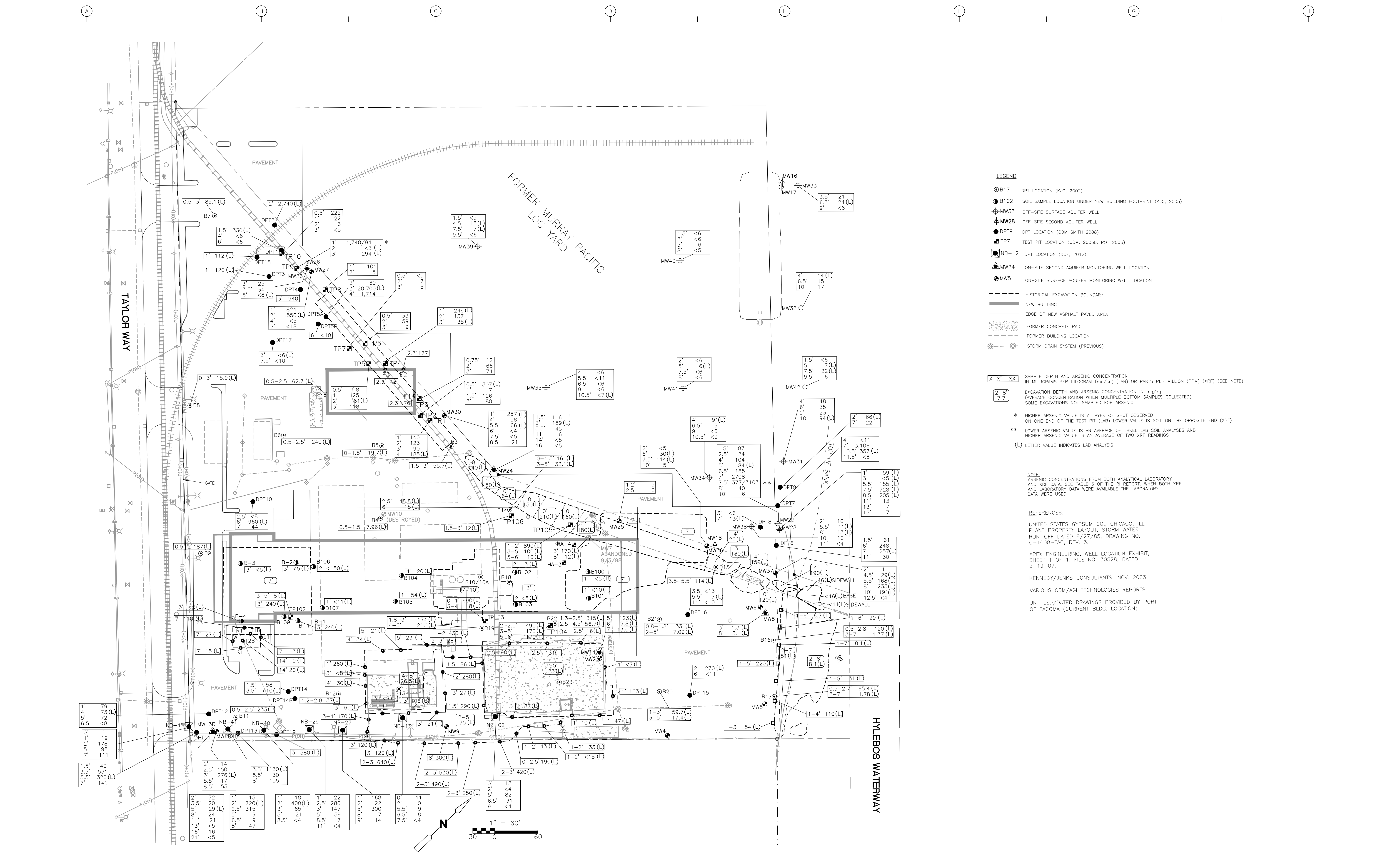
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Figure No. 14
 Interim Action Excavations: 1996-2005

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LEGEND

- ⊙ B17 DPT LOCATION (KJC, 2002)
- B102 SOIL SAMPLE LOCATION UNDER NEW BUILDING FOOTPRINT (KJC, 2005)
- ⊕ MW33 OFF-SITE SURFACE AQUIFER WELL
- ⊕ MW28 OFF-SITE SECOND AQUIFER WELL
- DPT9 DPT LOCATION (CDM SMITH 2008)
- ⊕ TP7 TEST PIT LOCATION (CDM, 2005b; POT 2005)
- ⊕ NB-12 DPT LOCATION (DOF, 2012)
- ▲ MW24 ON-SITE SECOND AQUIFER MONITORING WELL LOCATION
- MW5 ON-SITE SURFACE AQUIFER MONITORING WELL LOCATION
- - - HISTORICAL EXCAVATION BOUNDARY
- ▭ NEW BUILDING
- EDGE OF NEW ASPHALT PAVED AREA
- ▨ FORMER CONCRETE PAD
- - - FORMER BUILDING LOCATION
- ⊕ - - - ⊕ STORM DRAIN SYSTEM (PREVIOUS)

X'-X' XX SAMPLE DEPTH AND ARSENIC CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg) (LAB) OR PARTS PER MILLION (PPM) (XRF) (SEE NOTE)

(2-8' / 7.7) EXCAVATION DEPTH AND ARSENIC CONCENTRATION IN mg/kg (AVERAGE CONCENTRATION WHEN MULTIPLE BOTTOM SAMPLES COLLECTED) SOME EXCAVATIONS NOT SAMPLED FOR ARSENIC

* HIGHER ARSENIC VALUE IS A LAYER OF SHOT OBSERVED ON ONE END OF THE TEST PIT (LAB) LOWER VALUE IS SOIL ON THE OPPOSITE END (XRF)

** LOWER ARSENIC VALUE IS AN AVERAGE OF THREE LAB SOIL ANALYSES AND HIGHER ARSENIC VALUE IS AN AVERAGE OF TWO XRF READINGS

(L) LETTER VALUE INDICATES LAB ANALYSIS

NOTE:
 ARSENIC CONCENTRATIONS FROM BOTH ANALYTICAL LABORATORY AND XRF DATA. SEE TABLE 3 OF THE RI REPORT. WHEN BOTH XRF AND LABORATORY DATA WERE AVAILABLE THE LABORATORY DATA WERE USED.

REFERENCES:
 UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED 2-19-07.
 KENNEDY/JENKS CONSULTANTS, NOV. 2003.
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| REV. NO. | DATE | DRWN | CHKD | REMARKS |
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| | | | | |

DESIGNED BY: PJM
 DRAWN BY: PJR
 SHEET CHK'D BY: PJM
 CROSS CHK'D BY:
 APPROVED BY:
 DATE: NOVEMBER 2014

CDM Smith
 50 Hampshire Street
 Cambridge, MA 02139
 Tel: (617) 452-6000

VERIFY SCALE

 THIS BAR IS ONE INCH LONG AT FULL SCALE

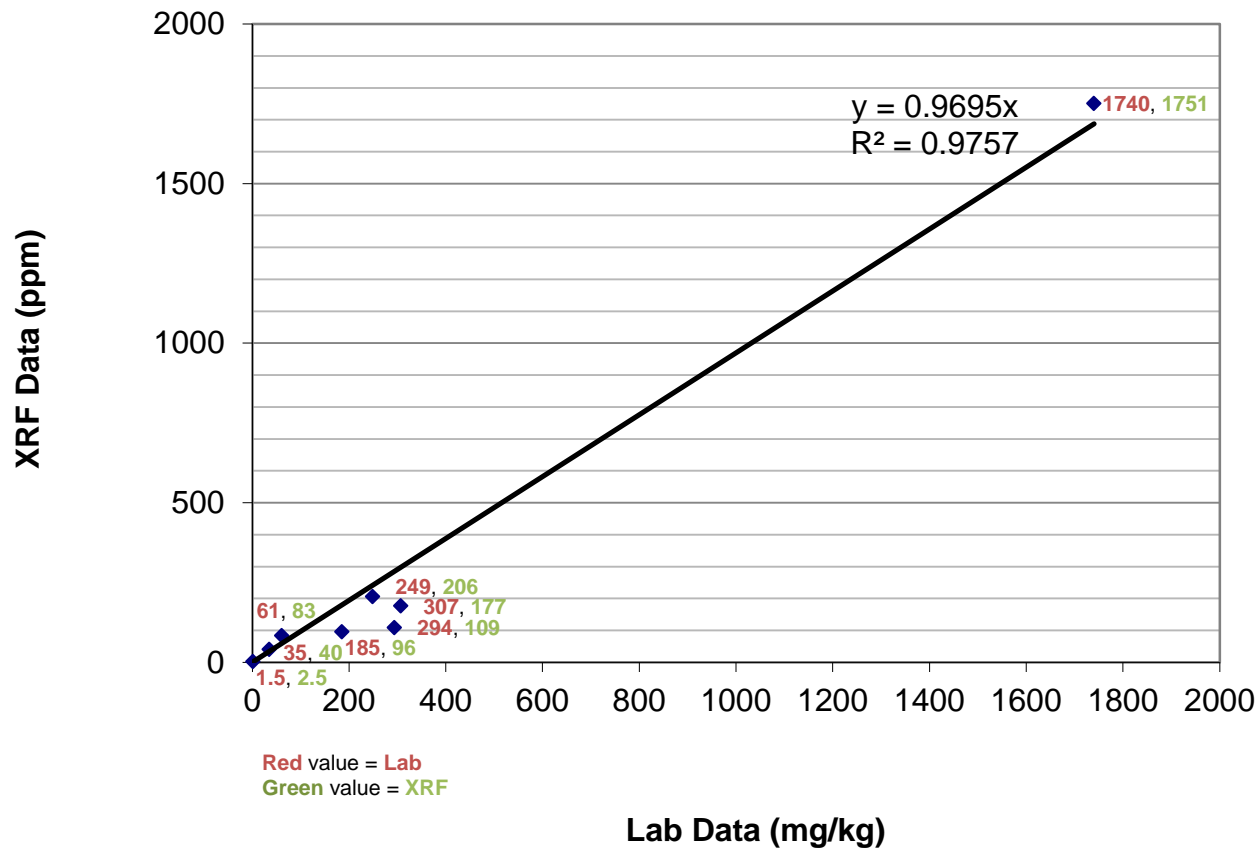
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 TACOMA, WASHINGTON

PROJECT NO. 19921-96914
 FILE NAME: Figure 15

SUMMARY OF RESIDUAL ARSENIC CONCENTRATIONS IN SOIL

Figure 15

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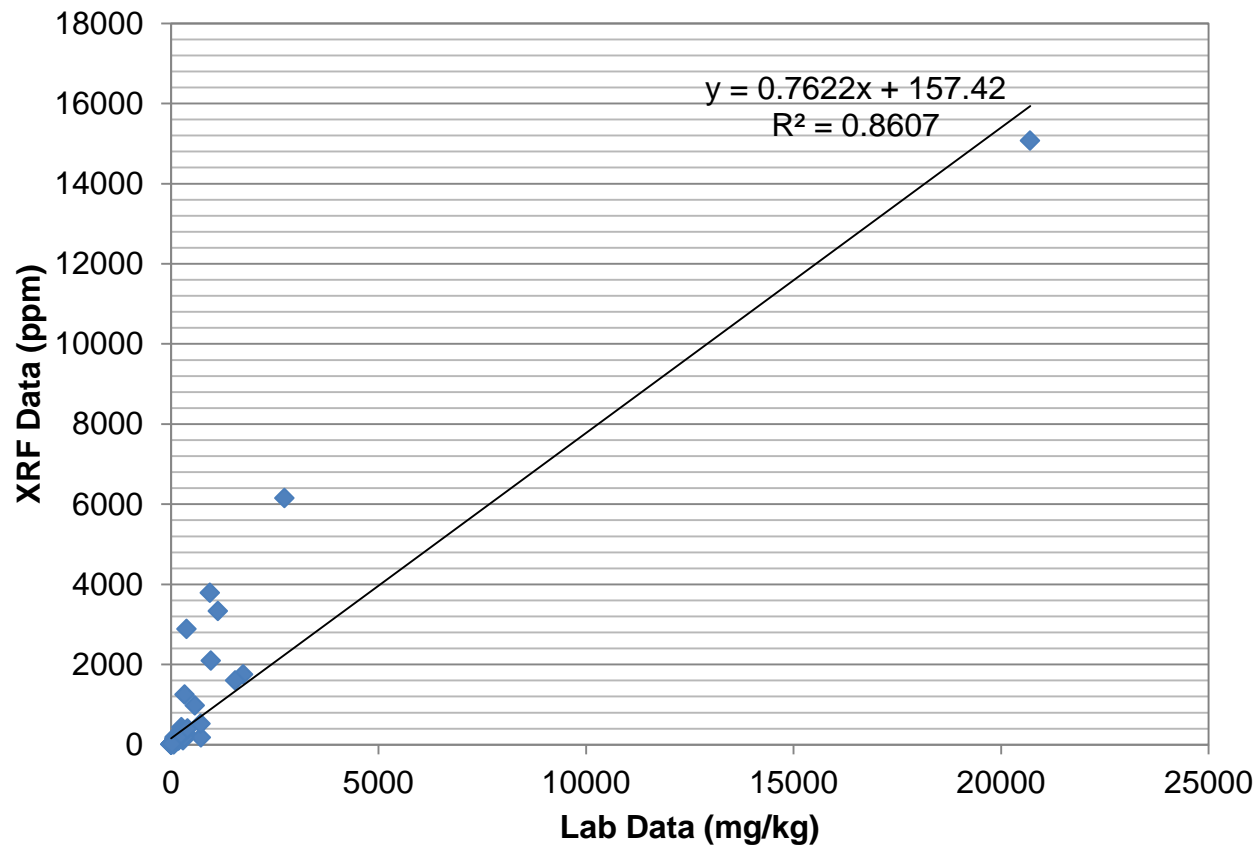


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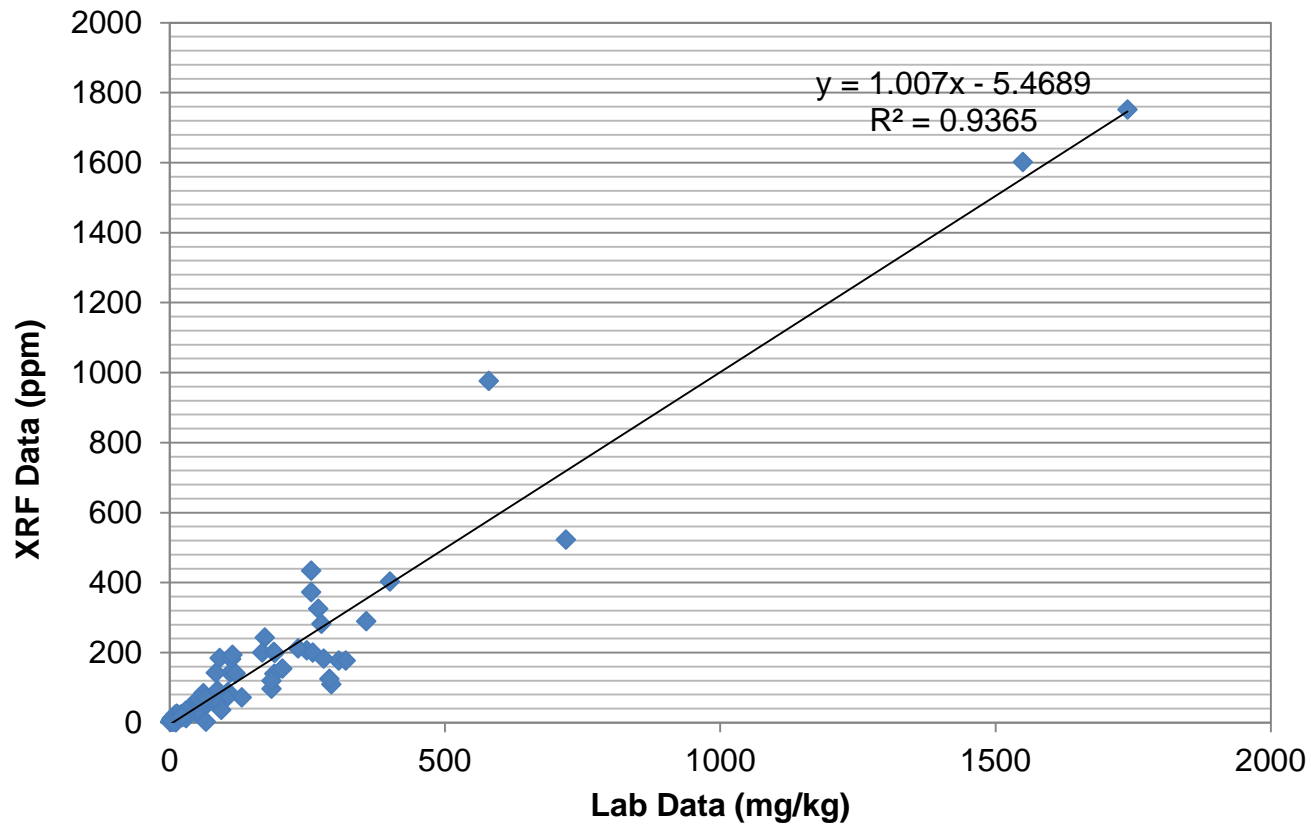
Figure 16a
 Comparison of XRF to Lab Data for Arsenic - Railroad Spur Test Pit Study

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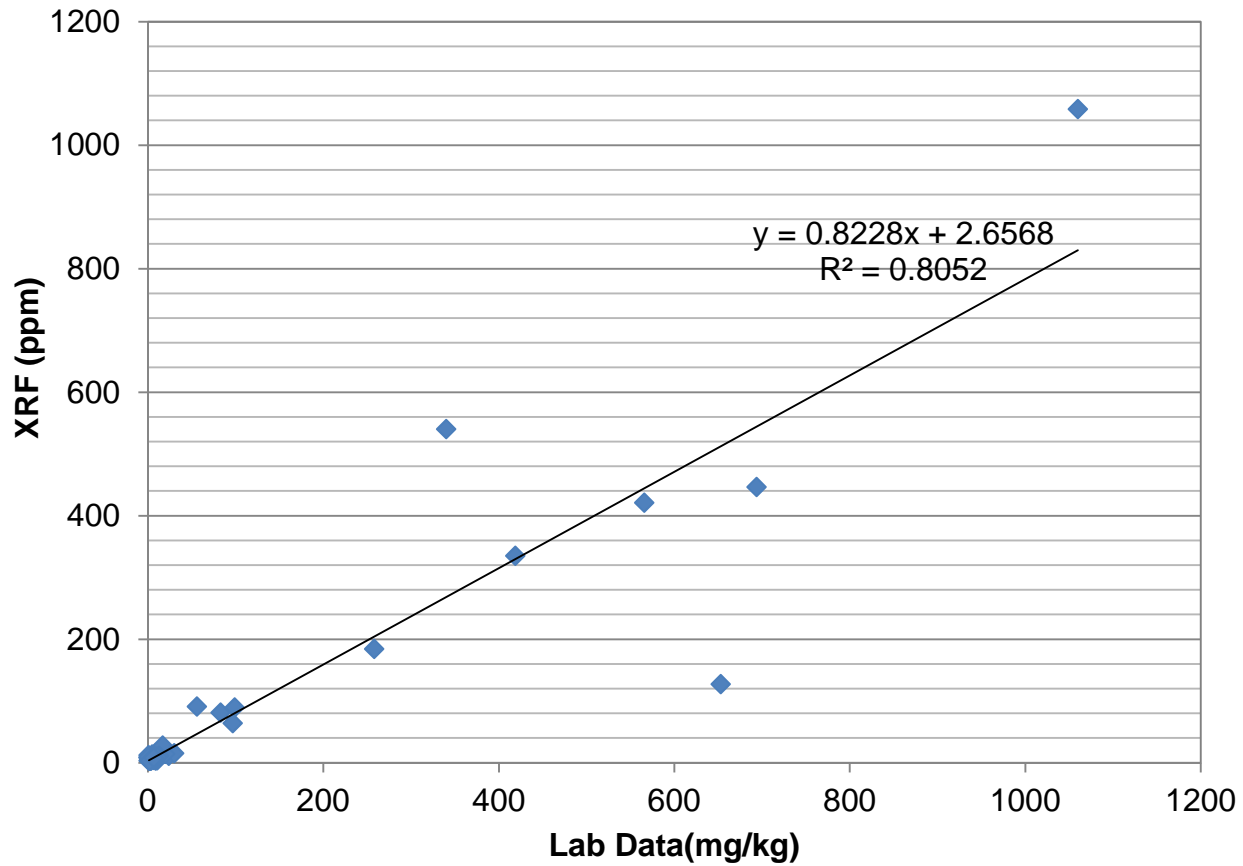
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Figure 16c

Comparison of XRF to Lab Data for Arsenic - Soils Containing >1,300 ppm Lead
 and Wood Debris Removed from Data Set

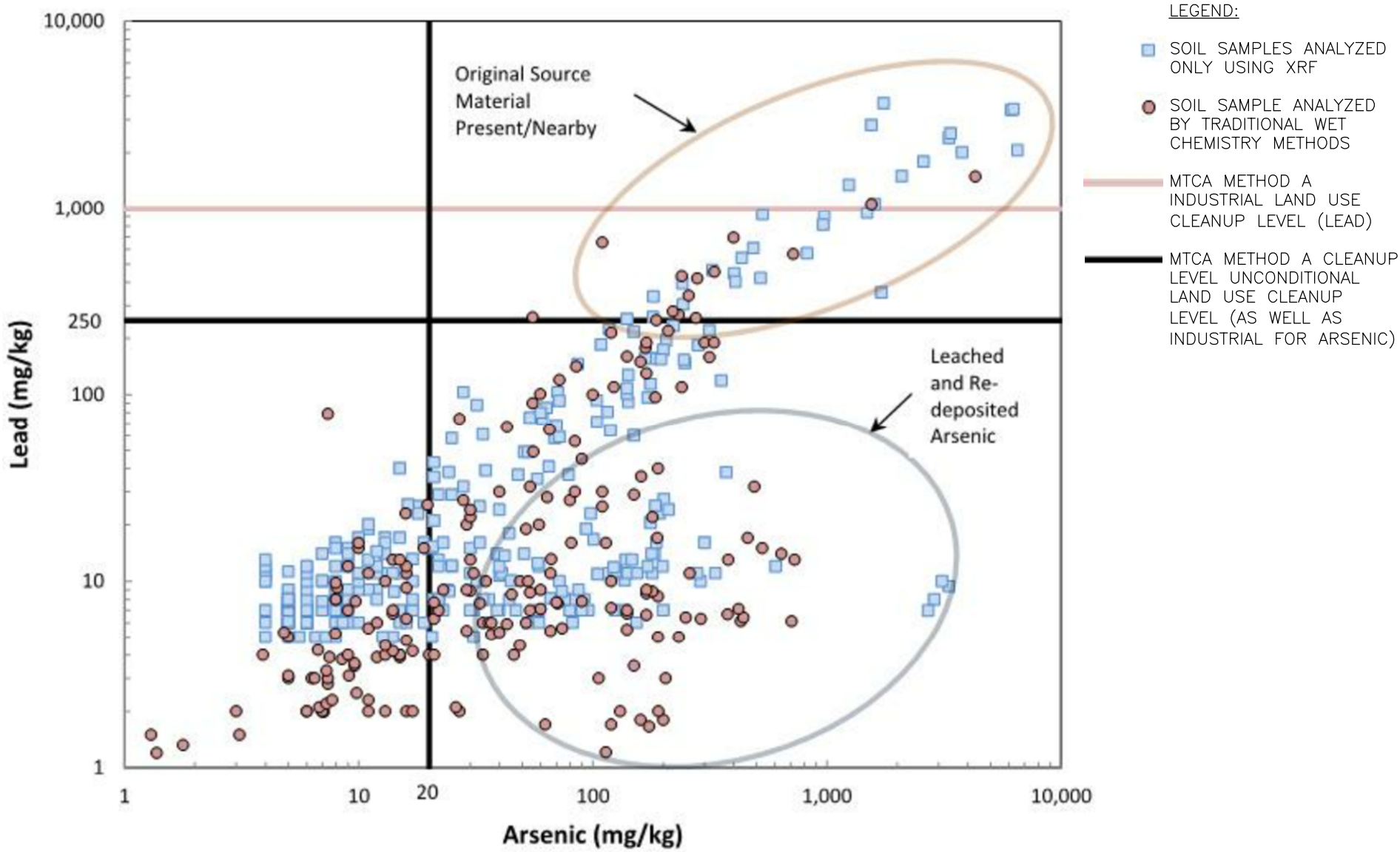


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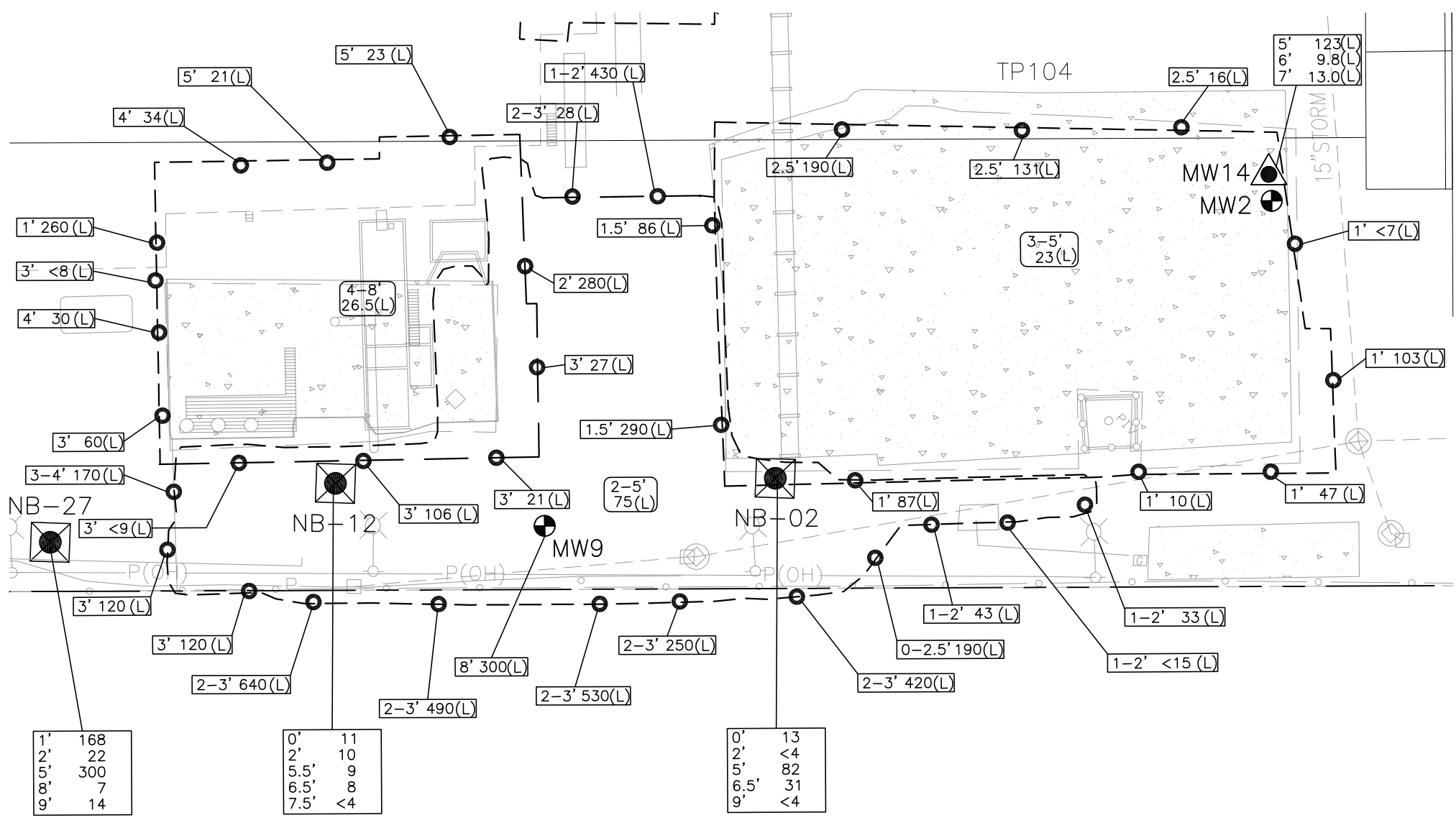


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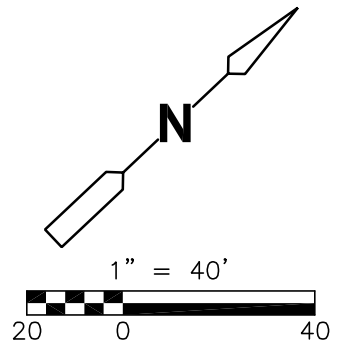
Figure No. 17
Comparison of Soil Lead and
Arsenic Data

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- LEGEND**
- GRAB SAMPLE LOCATION (CDM, 2005a)
 - ⊗ NB-12 DPT LOCATION (DOF, 2012)
 - ▲ MW24 ON-SITE SECOND AQUIFER MONITORING WELL LOCATION
 - ⊕ MW5 ON-SITE SURFACE MONITORING WELL LOCATION
 - - - HISTORICAL EXCAVATION BOUNDARY
 - EDGE OF NEW ASPHALT PAVED AREA
 - ▨ FORMER CONCRETE PAD
 - - - FORMER BUILDING LOCATION
 - ⊕ - - - ⊕ STORM DRAIN SYSTEM (PREVIOUS)
 - X-X' XX(L) SAMPLE DEPTH AND ARSENIC CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg) (LAB) OR PARTS PER MILLION (PPM) (XRF)
 - 2-5' 75(L) EXCAVATION DEPTH AND AVERAGE ARSENIC CONCENTRATION IN mg/kg
 - (L) LETTER VALUE INDICATES LAB ANALYSIS

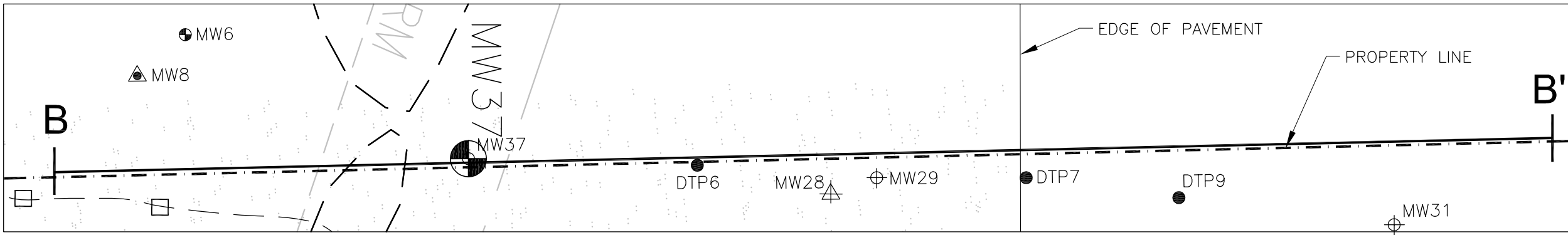


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Figure No.19
 Arsenic Concentrations in Soil
 Eastern Side of Production Building

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PLAN VIEW

- LEGEND:**
- 22 ARSENIC CONCENTRATION IN PARTS PER MILLION (XRF) OR MILLIGRAMS PER KILOGRAM (LAB) (MOST DATA OBTAINED USING AN XRF)
 - (L) DENOTES LABORATORY ANALYZED SAMPLE
- MONITORING WELLS**
- ▼ HIGHEST RECORDED WATER TABLE
 - ▽ LOWEST RECORDED WATER TABLE
 - * FOR SURFACE AQUIFER WELLS LITTLE OR NO FLUCTUATION IS MOSTLY DUE TO A LACK OF LONG-TERM DATA

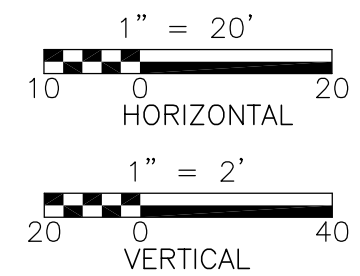
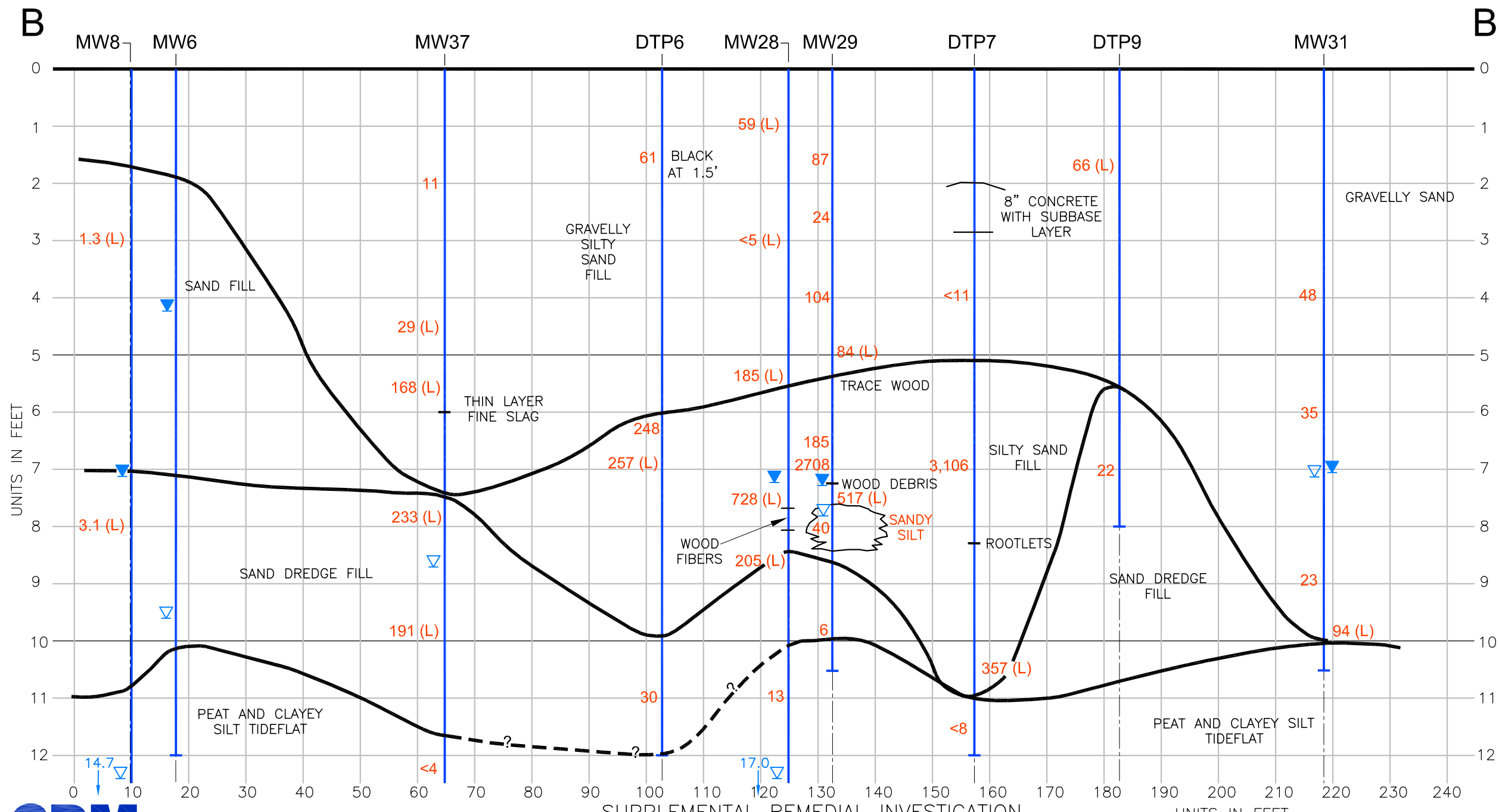
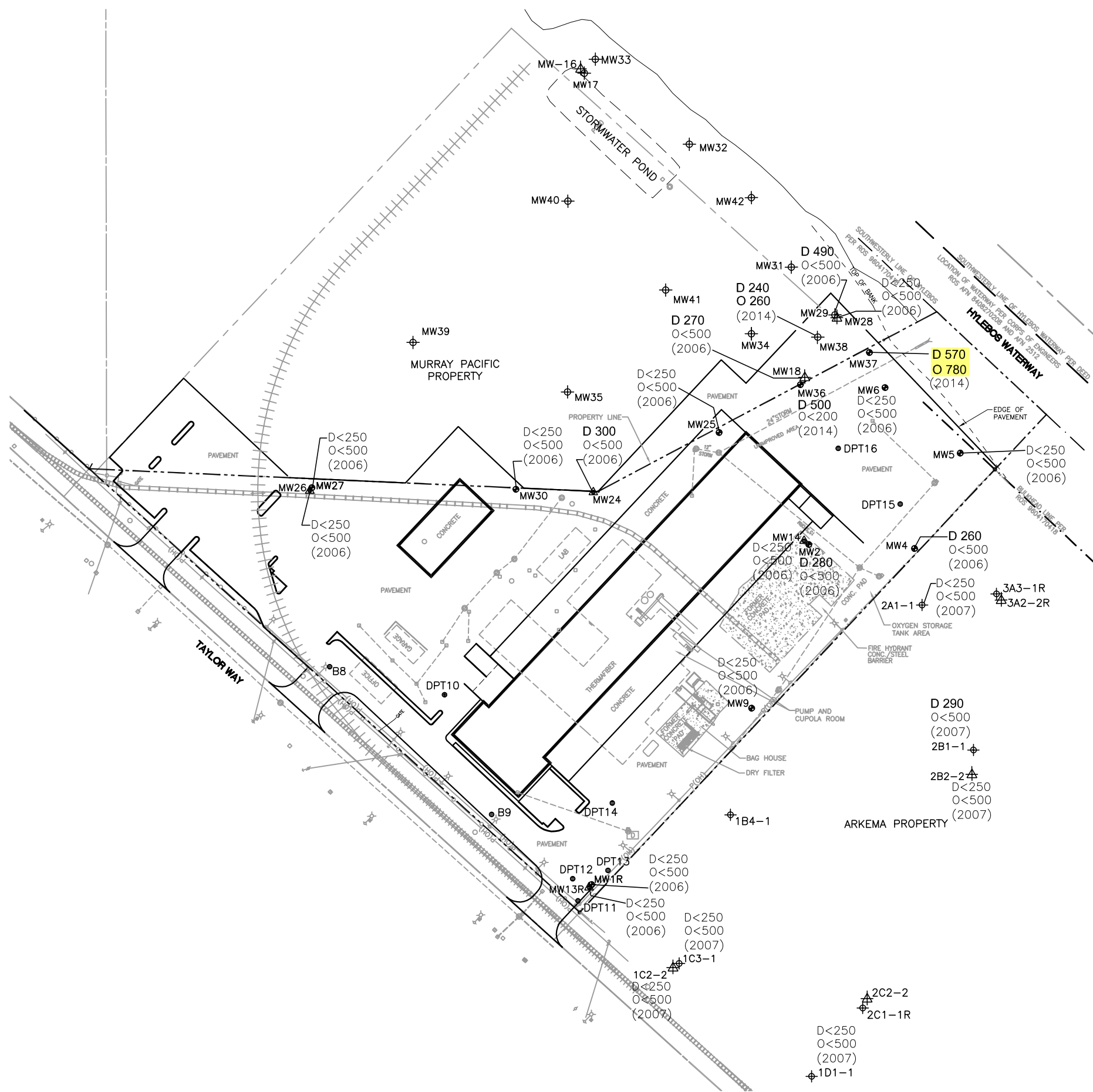


Figure No. 20
 Cross Section B-B'
 Taylor Way/Murray Pacific Property Line at
 Hylebos Waterway

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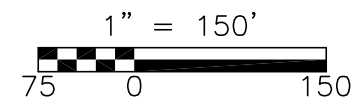
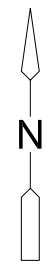


LEGEND:

- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2B2-2 ▲ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- TAYLOR WAY PROPERTY BOUNDARY
- ===== EXISTING BUILDING
- ===== NEW ASPHALT PAVED AREA
- [Stippled Box] FORMER CONCRETE PAD
- FORMER BUILDING LOCATION
- ⊕ STORM DRAIN SYSTEM
- D 260 - TOTAL PETROLEUM HYDROCARBONS (TPH) CONCENTRATION AS DIESEL IN MICROGRAMS PER LITER (µg/L)
- O 780 - TPH AS OIL IN µg/L
- YELLOW HIGHLIGHTED CONCENTRATIONS EXCEED THE MODEL TOXICS CONTROL AT (MTCA) METHOD A CLEANUP LEVELS (500µg FOR THE TPH-D AND TPH-O)
- < - LESS THAN THE LISTED CONCENTRATION
- (2006) - YEAR SAMPLED

REFERENCE:

UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED REV 2/12/14.
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 HYDROMETRICS INC., GEOTEXTILE PLACEMENT AND WELL LOCATIONS, DWG.# TAC-40796T18, SHEET 6/6, DATED 2/27/96.



SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 21
 Total Petroleum Hydrocarbons in Groundwater



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p:\DACPWAPP2\PW_PL1\Documents\19921\96914\03 Reports and Studies\71462-96914-106749 USG Tacoma\0-CADD\2015-DRAFT REPORT\Figure-22 (2015 DRAFT REPT
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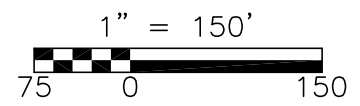


LEGEND:

- DPT16 ● DPT BORING WITH GRAB GROUNDWATER SAMPLE
- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2B2-2 ⊕ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- TAYLOR WAY PROPERTY BOUNDARY
- EXISTING BUILDING
- NEW ASPHALT PAVED AREA
- ▨ FORMER CONCRETE PAD
- FORMER BUILDING LOCATION
- ⊕ STORM DRAIN SYSTEM
- (2.6)(14) DISSOLVED ARSENIC CONCENTRATION IN MICROGRAMS PER LITER (RED) AND YEAR SAMPLED (BLUE)

REFERENCE:

UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED REV 2/12/14.
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SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 22
 Surface Aquifer Dissolved
 Arsenic Concentrations



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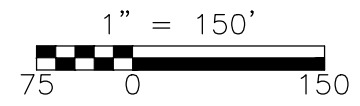
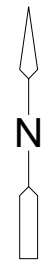


LEGEND:

- MW6 ● SURFACE AQUIFER WELL AND DESIGNATION
- MW26 ▲ SECOND AQUIFER WELL AND DESIGNATION
- 1C3-1 ⊕ OFF-SITE SURFACE AQUIFER WELL AND DESIGNATION
- 2B2-2 ⊕ OFF-SITE SECOND AQUIFER WELL AND DESIGNATION
- TAYLOR WAY PROPERTY BOUNDARY
- ===== EXISTING BUILDING
- NEW ASPHALT PAVED AREA
- [Stippled Area] FORMER CONCRETE PAD
- FORMER BUILDING LOCATION
- ⊕ STORM DRAIN SYSTEM
- (15) (12) DISSOLVED ARSENIC CONCENTRATION IN MICROGRAMS PER LITER (RED) AND YEAR SAMPLED (BLUE)

REFERENCE:

UNITED STATES GYPSUM CO., CHICAGO, ILL. PLANT PROPERTY LAYOUT, STORM WATER RUN-OFF DATED 8/27/85, DRAWING NO. C-1008-TAC, REV. 3.
 APEX ENGINEERING, WELL LOCATION EXHIBIT, SHEET 1 OF 1, FILE NO. 30528, DATED REV 2/12/14.
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SUPPLEMENTAL REMEDIAL INVESTIGATION
 2301 TAYLOR WAY
 TACOMA, WASHINGTON

Figure No. 23
 Second Aquifer Dissolved
 Arsenic Concentrations



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