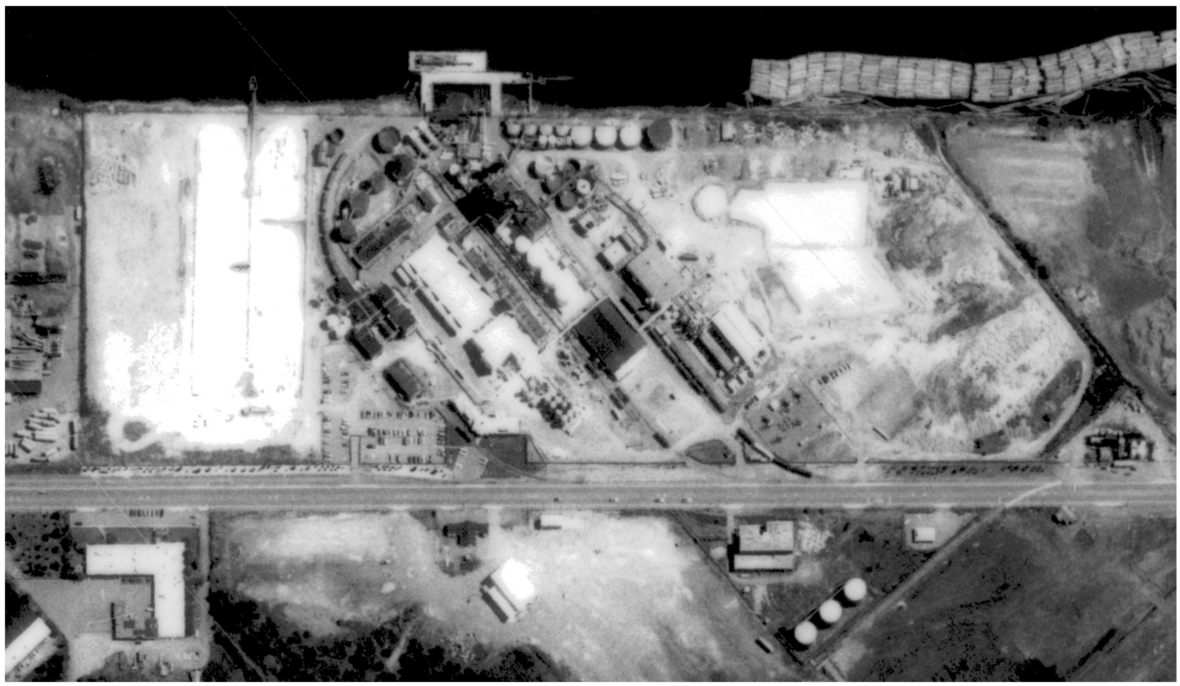
Final Remedial Investigation Report For

FORMER ARKEMA MANUFACTURING PLANT

2901 & 2920 Taylor Way

Tacoma, Washington



Volume 1

Text, Tables & Figures

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September 2013

Remedial Investigation Report
Former Arkema Manufacturing Plant
Tacoma, Washington
Volume 1 - Report

Prepared for:
Port of Tacoma

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September 2013

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Remedial Investigation Report
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1.0 INTRODUCTION

1.1 Purpose and Scope

This Remedial Investigation (RI) report for the former Arkema Manufacturing Plant (AMP) located on the Hylebos Waterway in Tacoma, Washington was prepared to meet the requirements of Deliverable 10 of Agreed Order DE5668 (AO) between the Port of Tacoma (Port) and Washington State Department of Ecology (Ecology), effective date July 25, 2011. The purpose of an RI is to *"collect, develop, and evaluate sufficient information regarding a site to select a cleanup action under WAC 173-340-360 through 173-340-390"* (WAC 173-340-350[1]). Data presented in this RI report are sufficient to support selection of a cleanup action for the AMP.

The project area includes the former Arkema Manufacturing property located at 2901 Taylor Way and the Wypenn property located at 2920 Taylor Way, Tacoma, Washington (Figures 1-1 and 1-2). The project area includes the former main manufacturing area property located between the Hylebos Waterway shoreline and Taylor Way, together with a smaller parcel called the Wypenn area located across Taylor Way from the main manufacturing area. For purposes of this report, the combined properties are termed the "*Arkema manufacturing plant*" or AMP, which consists of the "*Main Manufacturing Area*" (MMA) and the "*Wypenn Area*" (Wypenn).

Site North. In this report direction descriptions are in relation to site north that is parallel to the Arkema shoreline and towards the mouth of the Hylebos Waterway. Site north is approximately 45 degrees west (counter clockwise) of true north. Both site north and true north are shown on the plan view figures.

1.2 Regulatory History

1.2.1 Superfund Listing, Record of Decision, Consent Decrees and Current Status

The former AMP lies within the Commencement Bay/Nearshore Tide Flats (CB/NT) or Superfund Site. The CB/NT was designated as a Superfund site in September 1983. Ecology, with oversight by the U.S. Environmental Protection Agency (EPA), managed the completion of the RI (TetraTech 1985) and Feasibility Study or FS (TetraTech 1988) of the CB/NT.

Based on the 1985 RI, the CB/NT was divided into Operable Units (OUs). These operable units included OU01-CB/NT Sediments and OU05 – CB/NT Sources. In 1988, EPA assumed responsibility for sediment remediation, including sediments in the Hylebos Waterway. Under an interagency agreement, Ecology assumed responsibility for CB/NT upland source control response actions, at elevations above approximately +12 feet MLLW. As part of their responsibility, Ecology issued a number of *"Milestone Reports"* that documented the progress of upland source control efforts.

Soil and groundwater contamination on the Arkema properties was first discovered in 1981 (AWARE 1981). In June 1987, in conjunction with Ecology's source control responsibilities, Pennwalt signed a Consent Decree (No. 872011990) with Ecology for cleanup of the site including groundwater, surface impoundments, surface water and soils.

A Record of Decision (ROD) was issued by EPA (1989) for the CB/NT including the Hylebos Waterway. The ROD identified the Head of the Hylebos as a problem area and established Sediment Quality Objectives (SQOs) to be achieved by sediment remediation in the CB/NT. A number of local industries completed additional studies to further characterize the nature and extent of waterway sediment contamination and to develop a site-specific remedy for the problem area. In July 1997 and August 2000, EPA issued two Explanation of Significant Differences (ESDs) to the 1989 ROD. These ESDs modified the ROD in a number of ways:

- 1997 ESD – Modified the cleanup level for PCBs in CB/NT marine sediment.

- 2000 ESD – Refined the sediment remedies for the Hylebos and Thea Foss Waterways and provided performance standards that the remedies would need to achieve (among a number of other issues – e.g. changes in cost estimates, contaminated sediment volumes, etc.).

As part of the 2000 ESD, performance criteria for sediment caps were clarified. These criteria included the following:

1) Caps will have a minimum thickness of three feet and will be constructed to address adverse impacts through four primary functions:

    a. Physical isolation of contaminated sediment from the ecological receptors;

    b. Stabilization of contaminated sediments, preventing re-suspension and transport to other locations within the waterway;

    c. Reduction of contamination transported through the groundwater pathway to levels that will not re-contaminate surface sediments (defined as the *"biologically active zone"* where most sediment-dwelling organisms live) above the sediment quality objectives (SQOs) or cause adverse biological effects levels, or contaminate surface water at levels exceeding background concentrations or marine chronic water quality criteria.

d. Provide a cap surface that promotes colonization by aquatic organisms.

2) Long-term monitoring of the cap will include, as appropriate, visual inspection, bathymetric survey, sediment deposition monitoring, chemical monitoring, and biological monitoring.

As pointed out by Malcolm Pirnie (2006, p.2-3), *"[t]he implications of performance standards 1(c) and 1(d) above is that it provides a basis for establishing the Point of Compliance for contaminated groundwater entering into the Hylebos Waterway to be 10 cm below the surface of the sediments when deriving cleanup standards based on potential to re-contaminate the sediment matrix, and the mud/surface water interface for deriving cleanup standards based on marine chronic water quality criteria or background concentrations for surface waters"*.

General Metals and Arkema entered into a Consent Decree (C055319RBL) with EPA for cleanup of the Head of Hylebos problem area in May 2004. The waterway remedy was accomplished to achieve the performance criteria in the ROD and ESDs.

The Port purchased the Arkema properties in May 2007 and assumed Arkema's responsibilities for the remedial efforts. While the 1987 upland cleanup Consent Decree remains in effect, the Port negotiated an Agreed Order with Ecology (DE5668; effective July 25, 2011) to complete a RI/FS in accordance with the provisions of the Washington State Model Toxics Control Act (MTCA – Chapter 173-340 WAC). This report constituents the RI contemplated by the Agreed Order.

1.2.2 Source Control – Ecology Milestone Reports

Between May 1993 and June 2000, Ecology (1993a, b; 1999a, b; 2000) issued five source control milestone reports. The findings of each, as they relate to the Arkema properties, are briefly described below:

- **Milestone 1 (May 1993)** - Arkema was listed as one of nine <u>major</u> confirmed sources of problem chemicals to the Hylebos Waterway. Problem chemicals, including arsenic, were identified.

- **Milestone 2 (May 1993)** – Summarized administrative actions implemented to control problem chemicals, including the 1987 Pennwalt Consent Decree described above.

- **Milestone 3 (September 1999)** – Milestone 3 was met when source control was complete for the <u>major</u> sources of problem chemicals associated with Arkema. Head of Hylebos problem chemicals were arsenic, copper, zinc, nickel, and antimony. The report summarized actions taken by Arkema to control problem chemicals. Ecology concluded that the Arkema site is no longer considered a source of problem chemicals (primarily arsenic) to the Hylebos waterway, largely based on hydraulic containment by the pump and treat system. Arkema was not a source of PCBs to the waterway.

- **Milestone 4 (September 1999)** – Focus was on sites other than the Arkema properties.

- **Milestone 5 (June 2000)** – Focus was on sites other than the Arkema properties.

1.3 Property Ownership, Zoning and Future Land Use

A number of companies operated the AMP including Tacoma Electrochemical Company, Pennsylvania Salt Manufacturing Company of Washington, Pennwalt Corporation, Atochem North America Inc., Elf Atochem North America, Atofina Inc. and Arkema Inc. (Malcolm Pirnie 2006). The Port acquired three parcels of land from Arkema Inc. in May 2007 (Figures 1-1 and 1-2). These included the following parcels:

- Main Manufacturing Area (MMA) at 2901 Taylor Way,
- Mound Area at 3009 Taylor Way, and
- Wypenn Area at 2920 Taylor Way

The Arkema Mound Area is being cleaned up under a separate Ecology AO (DE 6129).

The former AMP is located on an industrial waterway that was historically used for heavy industrial purposes. The manufacturing plant lies within the boundary of the Comprehensive Scheme of Harbor Improvements that identifies areas in which the Port will invest capital to support its economic development mission. Zoning is Port Maritime and Industrial (PMI). The Port anticipates that the property will continue to be used for industrial purposes, likely associated with marine terminal and commercial land uses.

The MMA is bordered on the east by the Hylebos Waterway. Washington surface water standards classify the waterway as Class B (good quality) marine water for aquatic life (WAC 173-201A-612) with the following designated uses (WAC 173-201A-610 and -612).

- Fish (good quality salmon migration and rearing; other fish migration, rearing, and spawning; clam, oyster and mussel rearing and spawning; crustaceans and other shellfish [crabs, shrimp, crayfish, scallops, etc.] rearing and spawning),

- Recreation (secondary contact recreation, sport fishing, boating and aesthetic recreation),
- Harvesting, and
- Commerce and Navigation

1.4 Site Description and Facility Background

1.4.1 Blair-Hylebos Peninsula and Hylebos Waterway

The former AMP is situated on a man-made peninsula located between the Blair and Hylebos Waterways adjacent to the Hylebos Waterway at 2901 Taylor Way, Tacoma, Washington (Figures 1-1 and 1-2). Dredged material from the adjacent waterways was largely used to create the peninsula.

The Hylebos Waterway was initially dredged in 1931, although a channel was present by the former Arkema facility prior to this time (Figure 1-3). The earlier channel was called the Hylebos River (Hart Crowser, Undated) and extended beyond the AMP. By at least 1923, the waterway extended from the mouth approximately 2.2 miles to the location of the MMA dock and middle turning basin (Figures 1-1 and 1-3). What is now termed the *"middle turning basin"* was constructed in 1938/1939 and the dredged channel was extended an additional 0.2 miles, to a length of 2.4 miles. In the period 1965 to 1968, dredging further extended the channel a distance of approximately 0.74 mile to its present length (3.14 miles) and configuration including dredging of the *"upper turning basin"*.

1.4.2 Main Manufacturing Area (MMA)

The MMA operated from 1928 until the plant shut down in 1997. This area was the site of a chloro-alkali inorganic chemical plant producing primarily chlorine and sodium hydroxide (caustic) as well as hydrochloric acid and sodium arsenite (Penite). Sodium chloride (salt) was the primary raw feed stock.

The MMA plant expanded to increase production of chlorine, caustic and other products.

- An early (1940) plant layout is illustrated on Figure 1-4. The upland portion of the plant consisted of a salt pad, caustic building, chlorine building and cell room.
- By the mid-1950s (Figure 1-5) the plant included fuel (#2 fuel oil) storage in above ground storage tanks (ASTs), additional salt pad storage, and Penite manufacturing (beginning about 1939).
- The 1972 plant layout is shown on Figure 1-6. The salt pads had been expanded and liquid wastes were discharged to surface impoundments located southeast of the manufacturing facilities (chlorate pond and Taylor Lake - discussed further below). The "Ag Chem Bldg" located to the west of Taylor Way is located on the Wypenn Area.

- By 1990 (Figure 1-7), the manufacturing plant was largely build-out to its maximum extent. Additional facilities were constructed to the south and west of the original plant that included the cell renewal room, cell room, sodium chlorate tanks, and two additional surface impoundments (asbestos pond and cell room pond - also termed the brine pond).

The MMA layout, as of the late 1980s, is shown on Figure 1-8. Other significant features related to the site characterization activities are listed below:

- The plant used a significant amount of electrical power. Transformers and rectifiers were custom built. Rectifiers were housed in the Rectifier Building and transformers were located north and south of the Rectifier Building and south of the New Cell Room. Transformers adjacent to the Rectifier Building contained PCBs prior to the 1970's when PCB transformers were replaced or converted to non-PCB transformers (<50 ppm PCBs).

- A stripper was installed on the site in 1965 (Stripper Building) to remove chlorinated organic by-products (e.g. chloroform, carbon tetrachloride, methylene chloride, trichloroethene and tetrachloroethene) from chlorine. The VOCs removed were initially shipped off-site for reuse. Later some VOCs were disposed directly on the ground north (northeast using site north as a reference) of Taylor Lake. VOC production ended around 1978 when chlorine production using Glanor cells began.

Manufacturing facilities were dismantled and removed from the site after the plant shut down in 1997. The last of the plant structures were removed by the Port during the last half of 2008. Some foundation elements and vaults, injection wells, extraction wells and piping associated with a former pump and treat remedial system, as well as other subsurface utilities remain on the site.

The former MMA consists of approximately 45 acres and is relatively flat with elevations generally ranging between 15 feet and 20 feet Mean Lower Low Water (MLLW) (Figure 1-9). The lowest portion (14 to 15 feet MLLW) is in the area of the former salt pad storage pads while an elevation high (20 to 21 feet MLLW) lies in the former Taylor Lake area. Several soil piles are present along the northern site boundary.

Surface water collected in the plant storm water drainage system, combined with plant process waters, was treated, and discharged to Hylebos Waterway under a NPDES permit No. WA00033115 (KJC 1990). The Taylor Lake Area (south of the central portion of the MMA) did not drain into the plant storm drainage system. Runoff from this area migrated into the East Channel Ditch and discharged into the Hylebos Waterway. Currently there is no storm water collection system on the site and most of the precipitation infiltrates the relatively permeable surface soil.

In general terms, the site is divided into three areas based on activities that occurred within the areas.

Salt Pad Storage Area (SPA). The SPA lies within the northern portion of the MMA and is approximately 11 acres in size (Figure 1-8). It was primarily used to store sea salt on PVC and asphalt lined storage pads. A series of ditches encircling the southeast, west and north sides of the salt pads, known as Waggoner's Wallow, received discharges from manufacturing operations from 1969 to approximately the early to mid-1980s (KJC 1990; Hart Crowser 1986b). The maze of ditches allowed natural decomposition of residual chlorine through an extensive detention time prior to discharge to the Hylebos Waterway (KJC 1990). Discharges to Waggoner's Wallow included sodium hypochlorite residues from absorber tanks and off-gas from the chlorine process. Some of the discharges contained trihalomethanes.

Manufacturing process discharges caused the accumulation of sediment in the ditches. In 1981 the thicknesses ranged from 2 to 3 feet (KJC 1990). In 1989 the thickness was measured to range between 0.5 to 2.3 feet (Figure 1-10).

Since 1989, the ditches have been completely filled. As part of a program to enhance vegetative cover, a mixture of sediment excavated from the Taylor Lake ponds (described below) and wood remaining from a wood processing operation was spread over the area north and east of Waggoner's Wallow (Boateng 1990b). The application area where the pond sediment/wood bark materials were placed is illustrated on Figure 1-8.

Central Manufacturing Area (CMA). The CMA lies within the central portion of the MMA and is approximately 19 acres in size (Figure 1-8). Plant facilities included buildings to manufacture inorganic chemical products, tanks to store chemical products and fuels, electrical equipment including transformers, shops, storage rooms and warehouse, and administrative offices. All of the above ground structures and facilities have been demolished and removed.

Operations within the CMA included the production of the following products:

- Chlorine
- Caustic (sodium hydroxide)
- Penite (sodium arsenite herbicide) – 1939 to 1971. Penite was produced by dissolving arsenic trioxide (As_2O_3) in hot aqueous caustic (NaOH).
- Hydrochloric acid - starting in the 1950s
- Sodium chlorate – starting in 1978
- Aqueous ammonia – early 1960s to 1986

No. 2 fuel oil was stored in above ground tanks located within the northwestern portion of the CMA (Figure 1-8).

Taylor Lake Area (TLA). The TLA (Figure 1-8) lies within the southern portion of the MMA and is approximately 12.6 acres in size. The area primarily received discharges from manufacturing processes. The Taylor Lake Area consisted of five diked ponds or impoundments (Taylor Lake, Chlorate Pond, Asbestos Ponds and Brine Pond), and drainage ditches (KJC 1990).

- **Taylor Lake** was the initial impoundment constructed in the mid-1950s. It was used to contain brine muds from the brine purification process. The accumulated solids contained primarily calcium carbonate and magnesium hydroxide. No materials were discharged into Taylor Lake since at least 1981 (Hart Crowser 1986b).
- **Chlorate Pond** received brine sludge and graphite waste from 1967 to the mid-1970s. After temporary deactivation, the pond was used in 1978 and 1979 to contain sodium chlorate and dichromate. Discharge to the Chlorate Pond ceased in 1979.
- **Asbestos Pond** received wash water containing particulate asbestos from the electrolyzers used for the production of chlorine and caustic soda. Historically chlorine was produced using an asbestos diaphragm cell (ICF 1990b). Discharge to the Asbestos Pond ceased in 1979.
- **Brine Pond (Cell Room Pond)** was constructed in 1974 to dissipate residual chlorine from the Glanor Cell Room. The pond also received overflow brine mud slurry from Taylor Lake. It was still being used in 1986 (Hart Crowser 1986b).
- **Taylor Lake Moat –** was a ditch that encircled most of the Taylor Lake area to provide secondary containment. Collected liquids were pumped back into the impoundment. Pennwalt filled most of the Taylor Lake Moat in 1981.

Up to 40,000 gallons per day (gpd) were discharged to the impoundment system (AGI 1987). Discharges to most of the impoundments ceased by the early 1980s. The last active impoundment was the Cell Room Pond (Brine Pond) that was removed from service in 1989. The arsenic groundwater treatment plant was constructed over a portion of this area in 1992 (Figure 1-9).

Manufacturing process discharges to the impoundments resulted in the accumulation of solids (Figure 1-10). In 1989 the thicknesses of the solids ranged from approximately 1.5 to 6.3 feet (KJC 1990). In 1990 approximately 1,200 cubic yards of solids were removed from the asbestos ponds and disposed off-site (Malcolm Pirnie 2006).

A Sand Blast Shed (Figure 1-8) was located along the Hylebos Waterway where sands from the Asarco smelter were used for sandblasting for a period of time (Malcolm Pirnie 2006).

1.4.3 Wypenn Area (Wypenn)

The Wypenn Area is a relatively flat triangular shaped property consisting of approximately 3 acres, located to the west of MMA across Taylor Way (Figures 1-2 and 1-8). The approximate center of the area is approximately 1,000 feet from the Hylebos Waterway and approximately 2,000 feet from the Blair Waterway.

The earliest known industrial occupancy of the property was the Wypenn Oil Company who operated on the site by at least the mid-1930s (ICF Technology 1990b). The company extracted fish oil that was stored in the former AST area (southwest portion of the property).

Pennsylvania Salt Manufacturing Company (PennSalt) acquired the property in the early 1950s. PennSalt used the property as a laboratory where small quantities of prospective insecticidal and herbicidal chemical compounds were mixed with carrier materials and tested for effectiveness. Agricultural chemical research was discontinued in 1987.

The Port purchased the Wypenn Area from Arkema in 2007. The Port and the Puyallup Tribe (Tribe) entered into a Purchase and Sale Agreement in April 2008, governing a complicated multiple property transaction including the Wypenn Area. The Port, Tribe and Marine View Ventures (MVV) are currently working to address remaining environmental issues at the Wypenn Area in accordance with the agreement. The agreement requires the Port to clean up the site consistent with industrial standards so that the property may be transferred by the Tribe and the Bureau of Indian Affairs. Ecology approved a shallow soil interim action plan (DOF 2012d; 2013) under the 2011 Agreed Order that the Port intends to implement during the fall of 2013.

The Wypenn Area was used for agricultural research and the storage of Bunker C fuel and sodium hydroxide. Former facilities on the site included the following at the approximate locations shown on Figure 1-11(DOF 2009).

- **Former above Ground Storage Tanks (ASTs)** contained sodium hydroxide and Bunker C fuel. The tanks were originally used to store fish oil and stored Bunker C oil in 1974. Approximately 15,000 cubic yards of Bunker C contaminated soil from this area was bioremediated in the late 1990s.
- **Former Laboratory Building** – The building was originally used to support production of hydrogenated fish oil. Arkema then used the facility for pesticide research. The building was demolished in 1994.
- **Wypenn and Storm Water Ponds** – The Wypenn Pond was constructed in 1970 and received discharge from an oil skimmer servicing the ASTs and waste water from the laboratory sinks in the laboratory building. Surface soils in the storm water pond area were reportedly impacted by oil from the Wypenn Pond.

- **Greenhouse and Test Plot Areas** – The green house was used to test pesticides and herbicides while the test plot areas were used to test insecticidal and herbicidal compounds.
- **Disposal Pits** – Small quantities of solid and liquid wastes from research activities were disposed in two or three pits. Materials from two of the pits were removed during the 1980s.
- **Drainage Ditches –** Two drainage ditches were present on the site. One ditch originated at the storm water pond and trended westward to the site boundary where the ditch turned north. The second ditch was located along the south property line. The ditches received runoff and overflow from the ponds.

1.5 Surrounding Properties

Surrounding property boundaries are shown on Figure 1-12. The ownership and general status of the properties are briefly described below.

- **Hylebos Waterway**. The Hylebos Waterway is present along the eastern AMP property boundary. Sediment remediation was completed in the head of the waterway (Segments 1 and 2) between 2004 and 2006 under EPA Consent Decree C055319RBL (September 2004). The majority of sediment that exceeded the Commencement Bay Sediment Quality Objectives (SQOs) was removed. However, a "*wedge*" of contaminated sediment next to a steel sheet pile wall was not removed to maintain the geotechnical/structural integrity of the wall. As part of past remedial actions associated with the MMA, an intertidal cap was placed over contaminated sediment adjacent to the wall in 2004. In addition, in 2006 a subtidal cap was placed in an area adjacent to the bottom of the sheet pile wall. The location of the sheet pile wall and intertidal and subtidal caps are shown on Figure 1-9. The wedge and sediment caps are further discussed in Section 8.2 of this report.

- **Former US Gypsum (USG) -** The USG property is located to the north of the MMA property at 2301 Taylor Way (Figure 1-12) and was purchased by the Port in December 2002 The property was formerly used to produce mineral fiber insulation (1946 to 2002) (CDM 2010), otherwise known as rock wool. The mineral fiber insulation manufacturing facility was demolished after acquisition by the Port. The property is currently used as a trucking terminal and warehouse (Carlile Trucking).

  Rock wool was produced by mixing slag, basalt rock and coke, melting the mixture in cupolas and extruding the molten material into a spinning disk to produce fibers. From 1959 to 1973, ASARCO slag was used as a raw material. In 1992 Ecology discovered antimony, arsenic, copper, lead, zinc, chromium, nickel, silver, and mercury in site storm water being discharged to the Hylebos Waterway. Later testing indicated that metals and petroleum hydrocarbons had been released into the soil and groundwater. Interim

Remedial Actions (IRMs) were completed to remove some of the arsenic contaminated soil and source materials, as well as soil containing petroleum hydrocarbons.

Ecology requested a complete assessment of potential sources, pathways and receptors in 2006. On August 31, 2006, USG and the Port entered into Agreed Order No. DE3405 with Ecology to conduct a Supplemental RI. A draft supplemental RI report was submitted to Ecology in late December 2010 (CDM 2010). Comments on the draft supplemental RI report were received from Ecology in December 2012. Data on both the USG and MMA properties indicate releases of arsenic likely originated and migrated from the USG property onto the MMA. This issue is further addressed below in Section 7.0.

- **Former Reichhold Facility** - The former Reichhold facility is an approximately 52 acre property located to the northwest of the former MMA (Figure 1-12). A small part of the Reichhold property borders a portion of the Arkema property. The Reichhold property is currently owned by SSA Containers, Inc. (SSA). SSA plans to redevelop the property into a paved industrial facility related to marine cargo handling consistent with neighboring uses and designated zoning.

  The former Reichhold facility manufactured pentachlorophenol, urea-formaldehyde resins, calcium chloride solution, treated fiber products, and a formaldehyde catalyst between 1956 and 1990. Reichhold worked with Ecology and the EPA beginning in 1986 to investigate, begin remediation, and permit the facility for further cleanup action. Significant cleanup has been conducted and SSA will complete the requirements of a RCRA corrective action order (RCRA Corrective Action WAD 009252891) prior to development of the site.

- **Blair Backup Property (BBP/Puyallup Land Transfer Property)** - The BBP is located to the west of the MMA across Taylor Way and is contiguous with the Wypenn Area as shown on Figure 1-12. The BBP is approximately 85 acres in size and extends generally between Taylor Way on the east and Alexander Ave. on the west.

  The Port transferred the property to the Puyallup Tribe of Indians (Tribe) in accordance with the Puyallup Tribe of Indians Settlement Act of 1989, 25 U.S.C. §1773 (“The Settlement Act”). The BBP has been remediated in accordance with the March 21, 1990 Memorandum of Agreement (MOA) between EPA, Ecology, the Tribe and the Port and the implementing consent decree with EPA (Consent Decree No. 1092-06-01-106 – July 1992). The MOA guides the environmental investigation and any necessary cleanup of the BBP pursuant to The Settlement Act. The MOA provides, in part, that implementation of the cleanup activities will occur under EPA and Ecology oversight, and that EPA will oversee implementation of the approved cleanup plan under CERCLA enforcement authorities.

As shown on Figure 1-12, most of the site remains undeveloped. Ohio Ferro-Alloy Corporation (OFA) operated a chromium and ferrosilicate manufacturing plant on about 15 acres within the southeastern portion of the site between 1941 to 1974 (Hart Crowser 1992). ASARCO slag may also have been introduced to the OFA portion of the BBP as part of log-sorting operations. In addition, a truck repair shop and vehicle steam cleaning facility operated within the eastern portion of the property (north of Wypenn) until 1989. Combined, the portion of the BBP property immediately adjacent to Wypenn is termed the OFA Area of the BBP.

BBP cleanup activities were completed in 1994 and focused on the 17-acre former OFA smelter area. Cleanup included removal of about 4,264 cubic yards of charcoal briquettes and contaminated soil for disposal in the Klickitat County landfill. Other actions included incorporation of material removed from the Blair Waterway into a 7 acre portion of the BBP which was then capped with asphalt. Ten acres of contaminated soils that surround the 7-acre asphalt cap were covered with two feet of sand and gravel. Institutional controls restrict future use to industrial purposes under M2 or M3 of the City of Tacoma Zoning Code (or other commercial purposes if conditions are met), and restrict any construction activities that may damage the cap or cover. The Port is performing long-term monitoring of the capped and covered area.

Since the mid-1990s, the Port has been conducting groundwater monitoring of the OFA facility according to an EPA approved plan. The most recent three monitoring rounds were completed in October 2008, October 2010 and November 2012 (Hart Crowser 2009, 2011, 2013).

- **Former Arkema Mound Property** - The former Arkema Mound property is located to the south of the manufacturing area (Figure 1-12) and is owned by the Port. The site was formerly used as a log sort yard and ASARCO slag was placed as ballast material. Arkema remediated the arsenic- containing slag by consolidating the materials and placing them in a lined and covered containment cell (mound). After the Port purchased the property, the mound was removed and an RI/FS is being completed under Ecology AO DE6129 (November 2008).

- **Petroleum Reclaiming -** This site is a small triangular piece of property located near the southwest corner of the former MMA (Figure 1-12). Facilities on the site include tanks and other equipment used to recycle oil. The Petroleum Reclaiming property will be assessed and remediated under RCRA corrective action WAD 980511729.

- **Former Kaiser Aluminum Plant** - The Kaiser Aluminum plant was an aluminum reduction plant that was located to the southwest of the former MMA (Figure 1-12). After the plant was shut down in 2002, the Port purchased the property and over a period of time demolished the existing facilities. Assessment and cleanup of the former Kaiser property is being conducted under Ecology Agreed Order DE 5698 (May 2011). Treated process waste water from the Kaiser facility flowed to the Hylebos Waterway via the Kaiser Ditch located on the south side of the Arkema Mound property (Figure 1-12). Since the plant was demolished, little storm water flows offsite from this property. A portion of the Taylor Way storm sewer currently discharges to the Kaiser Ditch.

2.0 PROJECT CHRONOLOGY AND PAST STUDIES

2.1 Environmental Chronology

The AMP has a long regulatory and technical history. To assist the reader an "*Environmental Chronology*" was prepared that is included with this report as Table 2-1. A number of significant milestones presented in the table are listed below.

- 1927 to 1997 - Plant operation (70 years)
- Early 1950s - PennSalt purchased Wypenn property
- 1981 - Groundwater contamination first discovered
- 1987 - Consent Decree signed between Ecology and Arkema for upland source control
- 1989 - Commencement Bay Record of Decision (ROD) issued.
- 1990 - Sheet pile wall installed along southeast shoreline to prevent contaminant migration into Hylebos Waterway
- 1990 – Approximately 2,300 to 3,000 cubic yards of Penite pit waste materials and 1,200 cubic yards of asbestos pond sediment were excavated and disposed off-site
- 1992 to 2003 - Pump and treat system installed and operated (to remove arsenic from groundwater).
- 1996 to 2000 - VOC treatment system operated in Waggoner’s Wallow Area
- 2001 to 2004 - In-situ chemical injections completed to stabilize residual arsenic
- 2003 to 2006 - Hylebos Waterway dredged
- 2004 - Intertidal cap installed (Arkema shoreline)
- 2006 - Subtidal cap installed (Arkema shoreline)
- 2007 - Port purchased property
- 2008 - Implementation of DOF Remedial Investigation (RI) Work Plan
- 2011 - Agreed Order DE 5668 between Ecology and Port for completion of RI and FS, effective July 2011.

- 2011 – Submittal of a Site Characterization Data Report, August 2011 - AO Deliverable 1 (DOF 2011)
- 2012a – Submittal and implementation of a Data Gap Work Plan – AO Deliverable 3 - January 2012 (DOF 2012a) and Deliverable 4 (implementation).
- 2012d – Submittal of the Wypenn Final Interim Action Work Plan – AO Deliverable 8 - May 2012 (DOF 2012a)
- 2012e – Submittal of a draft Data Gap Technical Memorandum – AO Deliverable 5 - November 2012 (DOF 2012e) – Note that a final Data Gap Technical Memorandum (Deliverable 6) was not required by Ecology. Comments provided by Ecology are addressed in this draft RI report.

2.2 Past Studies

Past site characterization and remedial work documentation for the AMP are listed in the references section of this report. Significant documents and reports prepared through 2006 (before the Port acquired the property) are described in Appendix A. More recent studies are described below:

2.2.1 Malcolm Pirnie (2006/2007)

Malcolm Pirnie (2006) prepared a comprehensive report for Arkema that described the general site history, summarized available environmental data, identified preliminary groundwater constituents of potential concern (GW-COPCs) and identified data gaps. GW-COPCs identified by Malcolm Pirnie are listed in the following table:

Malcolm Pirnie Preliminary GW-COPCs - 2006

VOCs	SVOCs	Pesticides	Conventional/Metals
Chloroform	Hexachlorobutadiene	4,4-DDD	pH
Tetrachloroethene		4,4-DDE	Arsenic
Trichloroethene		4,4'-DDT	Chromium
		Endosulfan II	Copper
			Iron
			Lead
			Nickel
			Zinc

Malcolm Pirnie concluded that additional data were required to prepare a definitive list of GW- and Soil-COPCs. They recommended the phased approach summarized below.

Phase 1 Groundwater Evaluations

- Verify and confirm concentrations of GW-COPCs found for chemicals that were detected only a few times during a three year period (twelve to thirteen sampling events from 2003 to 2007).
- Evaluate the necessity of replacing monitoring wells decommissioned to accommodate upland sediment management during dredging of the Hylebos Waterway.
- Review field and laboratory methods to improve reporting limits and data quality. Malcolm Pirnie generally recommended the following:
    - Total dissolved solids, total organic carbon, major cations/anions and total/hexavalent chromium be analyzed.
    - Low flow sampling (0.2 to 2.0 liters/minute) of the wells.
    - Turbidity testing.

Malcolm Pirnie did not complete the Phase 1 recommended groundwater sampling prior to Arkema discontinuing work and transferring the property to the Port.

Ecology Comments on 2006 Report. The Malcolm Pirnie 2006 report was submitted to Ecology for review and comment. Ecology comments and Malcolm Pirnie's responses are summarized in a letter to Dom Reale dated December 11, 2006. With respect to the groundwater screening analyses used to identify GW-COPCs, Ecology concluded (Comment No. 2) that "*Arkema's approach to identification of Chemicals of Potential Concern (COPCs) to be on the right track*". A similar approach confirmed COPCs based on the results of additional sampling and analysis.

Phase 1 Soil Evaluations

A 2006 soil sampling and analysis program was implemented to identify Soil-COPCs. The program included the collection and analysis of surface and subsurface samples. Surface samples were obtained from the top three inches of soil while the subsurface samples were obtained from 3-inches to 6-feet and from 6 to 15 feet. Sampling was conducted in the following areas:

- Wypenn Area - 10 locations
- Salt Pad Storage Area - 12 locations
- Taylor Lake Area - 32 locations
- Central Manufacturing Area - 35 locations

The results of the sampling are documented in a data report prepared by Malcolm Pirnie (2007). While the sampling work was completed for Arkema, the work occurred during transfer of property ownership to the Port. Hence, the Port requested the data for site characterization purposes. The results of the soil sampling and analysis are discussed in Section 5.0 of this report.

2.2.2 Dalton, Olmsted & Fuglevand (2008 and 2009)

The Port originally planned to develop road and rail infrastructure on the MMA. DOF was retained by the Port to assist in resolving environmental cleanup issues to accommodate the redevelopment project. Based on review of available existing data, an independent RI Work Plan (DOF 2008a to c) was prepared that included the following elements.

- Health and Safety Plan
- Building Demolition Plan (prepared and implemented by others)
- Conceptual Model and Data Gap List report
- Sampling and Analysis Plan (SAP)

The focus of the RI Work Plan was the MMA, as the Port originally intended to address the Wypenn Area as part of an unrelated development action. A number of data gaps were identified and summarized in the Conceptual Model and Data Gap List mentioned above.

To fill the data gaps, a Sampling Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) were prepared and submitted to Ecology and the Environmental Protection Agency (EPA) in early July 2008. The Agencies provided informal comments on the proposed site characterization work in August 2008.

The SAP was implemented in late 2008 and 2009. Some of the significant task items included the following:

- Well Inventory - The results of the inventory are summarized in Appendix B.
- Installation and development of forty-two new and replacement wells. The boring logs of the installed wells are included with the well inventory data.
- Drilling and sampling of six soil borings.
- Collection and chemical analysis of:
  - Upland soil and groundwater samples,
  - Intertidal and subtidal cap sediment samples, and
  - Intertidal cap seeps and subtidal cap sediment interstitial/porewater samples,
- Geochemical testing to assess factors effecting the fate and transport of arsenic (and other metals) and volatile organic compounds (VOCs), and
- Excavation of test pits to make geotechnical observations related to remedy construction.

2.3 Demolition of Site Facilities

After the Port purchased the AMP in 2007, surveys of existing structures were made to develop a demolition plan. A demolition plan was submitted to Ecology and by 2008 the remaining above-ground structures had been removed from the MMA. The floor slabs for the buildings were not removed. Demolition of the existing structures removed materials of environmental concern such as asbestos and contaminated materials (e.g. with lead paint, arsenic, etc.). Removal of the structures also assisted with providing access for site characterization sampling work and ultimately will allow access to implement the selected remedy.

2.4 Final AO and Data Gap Testing (2011 to 2013)

AO DE5668 became effective on July 25, 2011 and Deliverable 1 (DOF 2011) was submitted to Ecology in August 2011. The Site Characterization Data Report documented the previous testing completed in 2008 and 2009 and identified a number of data gaps that needed to be addressed to complete the draft RI report. A final Data Gap Work Plan (AO Deliverable 3) was submitted to Ecology in January 2012 (DOF 2012a). Sampling and analysis outlined in the Data Gap Work Plan (AO Action 4) was completed during the balance of 2012 and generally included the following:

- Inventory of off-site monitoring wells for possible sampling/inclusion in the Arkema RI. Off-site properties included the Arkema Mound, USG, BBP and Reichhold Property. Monitoring wells were identified on the Arkema Mound, USG and BBP. Relatively recent data were identified for the Arkema Mound (DOF files) and for the OFA of the BBP (Hart Crowser 2009, 2011 and 2013).

- Wet land mapping was completed on the MMA (Grette 2013) and Wypenn (Geoengineers 2013). The wetland reports are included in Appendix C. The purpose of the mapping was to identify Corps permitting requirements for future sampling and remediation.

- Comprehensive water levels were measured in wells located both on and off the AMP during low and high tides (March 2012).

- Groundwater samples were obtained and analyzed from 139 wells located on the AMP and nineteen wells located on the USG and Arkema Mound sites.

- East Channel Ditch conditions were assessed. Conditions in the ditch were mapped and sidewall seep and soil samples, ditch bottom sediment samples and ditch water samples were collected and analyzed.

- Shoreline surface (0 to 10 cm) intertidal and subtidal sediment samples were obtained and analyzed to supplement data collected in 2008. Sampling included the top of the existing caps. At the request of Ecology, shallow cores were also advanced and sampled, and selected samples were analyzed for PCBs, consistent with a supplement to the RI work Plan (DOF 2012c). Testing corroborated earlier work confirming that the AMA is not a source of PCBs to the waterway.

- Sediment interstitial/porewater samples were collected from selected locations where the Intermediate Aquifer outcrops in the dredged channel sidewall and from beneath the subtidal cap. The samples were obtained to assess arsenic concentrations discharging to the Hylebos Waterway and to provide data to refine the site conceptual geochemical model.

- Seven deep soil borings were drilled for collection and analysis of soils within the upper two aquifers and aquitards. Samples were obtained to assess the integrity of the Second Aquitard for containment of contaminated Intermediate Aquifer groundwater.

- Forty-six shallow soil probes were advanced and sampled to assess conditions in the common boundary area with the former USG facility as part of establishing the RI site boundary.

A draft Data Gap Technical Memorandum (DOF 2012e) was prepared to document the results of the data gap sampling. This memorandum presented additional recommendations for targeted sampling and evaluation that are documented in this RI report. The targeted sampling was largely completed in January 2013.

Upper aquifer groundwater contour maps prepared using data collected in March 2012 showed groundwater depressions in the vicinity of Taylor Way and the Wypenn site. The presence of the depressions indicated the possibility of groundwater infiltration into the Taylor Way storm sewer system adjacent to the Wypenn site. The construction features of the Taylor Way storm sewer were identified and flow observations in the sewer were made to assess the occurrence of groundwater infiltration into the storm sewer. This issue is further discussed in Section 10.

Testing completed in 2008 to 2013 required the acquisition of a variety of samples and data including collection of surface and subsurface soil, groundwater, sediment, and soil/sediment interstitial/porewater samples. Field sampling was done using the methods and procedures outlined in the approved RI work plans and SAPs. The methods and procedures used to collect and document the sampling are generally described in Appendix D.

3.0 HYDROGEOLOGY

3.1 General Setting

The AMP is situated on the Blair-Hylebos Peninsula (Figure 1-1) that was created by dredging and placing the dredge spoils over natural, fine grained tidal flat deposits (Hart Crowser, Undated). The properties are relatively flat with elevations that range between 15 feet Mean Lower Low Water (MLLW) near the top of bank along the shoreline of the MMA (Figure 1-9) to approximately 21 feet MLLW in the former Taylor Lake area.

Most elevations on the properties range between 15 and 18 feet MLLW. Lower elevations (less than 15 feet MLLW) are present in the former SPA and higher elevations are present near the northern boundary of the site where a number of soil piles are present.

As part of the Hylebos dredging permitting requirements, a salt marsh was constructed along the northern shoreline (Figure 1-9). To construct the salt marsh, a number of monitoring wells were abandoned and the bank was cut back.

3.2 Geology

3.2.1 – Well, Boring and Test Pit Locations and Geologic/Construction Logs

The geology beneath the AMP was interpreted from well and boring logs. The locations of abandoned and existing monitoring wells on the AMP are shown on Figures 3-1a to 3-1c. Existing wells on the AMP and adjacent properties are shown on Figures 3-2a to 3-2c. Monitoring well boring logs are presented in the well inventory summary presented as Appendix B.

The locations of soil borings completed in the period 2008 to 2012 in the AMP are shown on Figures 3-3 to 3-4. The locations of borings and test pits completed in the Wypenn area in 2010 to 2012 are shown on Figure 3-5. Soil boring and test pit logs for work completed in 2008 to 2012 are presented Appendix E. The logs of test pits excavated for geotechnical sampling are included with Appendix K.

3.2.2 - Geologic Sequence

The general geologic sequence beneath the AMP is illustrated by Sections A-A' and B-B' (Figures 3-6 and 3-7) and is summarized below. The section trends are shown on Figures 3-1a to 3-1c.

- **Fill Unit** – The Fill Unit consists of variable fills consisting principally of gray, fine to medium sand (dredge sand) that is overlain, in places, by brown, gravelly sand (imported fill). Some well logs (e.g. 3A7-1, 3E3-1, 3D1-1) indicate the presence of "*till fill*", (containing e.g. brick, pipe, concrete, metal and wood debris). The unit generally ranges in thickness from approximately 4 feet to 13 feet.

- **Upper Silt** - Below the fill unit is a clayey silt to fine sandy silt with occasional fibrous organic material (former tide flat materials). The unit is of variable thickness and is not continuous beneath the site. The Upper Silt ranges in thickness from 4 to 12 feet, where present. The Upper Silt appears absent from a number of locations (Figures 3-1a and 3-1b), including from along the northern portion of the MMA shoreline (vicinity of 125+50). Windows through the silt were likely caused by erosion in stream channels such as those shown on Figure

3-8[i], historic dredging activities (along shoreline), and plant construction activities.

Two types of fibrous material were encountered. Organic fibers consisting of grasses and other common tide flat materials were present in many of the borings. In the area north of the salt pads, thin fibers were observed that consisted of rootlet casts composed of mineral crystalline precipitates.

- **Intermediate Sand** - A natural sand deposit lies below the Upper Silt. The unit generally consists of silty fine sand to fine to medium sand with shell fragments. The top of this unit was encountered at depths below ground surface of approximately 15 to 20 feet. Available data indicate the Intermediate Sand ranges in thickness from approximately 8 to 17 feet.

- **Lower Silt** - Below the Intermediate Sand is a finer grained unit consisting of very sandy silt to clayey silt. In places the silt/clay materials may grade into pockets of fine sand as illustrated in Section B-B' (locations 4B2-3 and 5B1-3). The top of this unit was encountered at depths below ground surface of approximately 20 to 35 feet. The logs of wells that penetrate through the Lower Silt indicate the unit ranges in thickness from approximately 8 to 15 feet.

- **Lower Sand** - The Lower Silt grades into a sandy deposit termed the Lower Sand. The upper portion of this unit consists of fine sand with silt interbeds and grades with depth grades into a fine to medium sand. The top of the lower sand was encountered at depths below ground surface between approximately 35 and 45 feet. The bottom of the unit was not encountered in any of the well borings, but the unit appears to be at least 20 feet thick.

3.3 Hydrostratigraphic Units

The geologic units can be divided into a number of hydrostratigaphic units. Using similar terminology developed by others for the AMP, these units include the following:

- Upper Aquifer - Saturated portions of the Fill Unit.
- First Aquitard - Upper Silt Unit, where present.
- Intermediate Aquifer - Intermediate Sand.
- Second Aquitard - Lower Silt Unit
- Deep Aquifer - Lower Sand

[i] Figure 3-8 shows the drainage patterns mapped in 1887. Drainage patterns in tide flat areas often change and the 1887 conditions do not necessarily reflect past or future conditions, especially as dredging and filling of the tide flats occurred.

Monitoring well designations indicate the unit in which the well is screened; "-1" indicates the Upper Aquifer, "-2" indicates the Intermediate Aquifer, and "-3" indicates the "Deep Aquifer". For example, well 4B4-1 is screened in the Upper Aquifer, while well 4B2-3 is screened in the Deep Aquifer.

The aquifers and aquitards are generally flat lying and are truncated by the waterway as illustrated by Section A-A (Figure 3-6). Each stratum is in hydraulic communication with the waterway at a position determined by the horizontal projection of the stratum to the off-shore bathymetry.

As noted above in the description of the First Aquitard, this fine grained unit is not present beneath all of the MMA. Intera (1995) noted three localized areas where the First Aquitard is missing (Figures 3-1a and 3-1b). PGG (2004) reports that these areas are in the vicinity of locations 6D9, 6D6, 7E13 and 6E5.

3.4 Groundwater Flow System Evaluations

The AMP is situated on the eastern side of a peninsula (Figure 1-1). A groundwater divide is expected to be present within the approximate middle of the peninsula with flow on either side of the divide to be towards the Hylebos and Blair Waterways, respectively. Flow from the AMP is towards the Hylebos Waterway based on their location on the peninsula and the available data. A summary of the groundwater flow systems evaluations for the AMP is presented below.

3.4.1 Main Manufacturing Area

ICF Technology (1990). Detailed evaluation of the groundwater flow system in the MMA started in the late 1980s and early 1990s as part of evaluating expedited response actions to mitigate arsenic migration to the Hylebos Waterway. In 1990, ICF Technology (ICF 1990a) completed an extensive investigation and developed a numerical groundwater flow model to evaluate a number of interim remedial alternatives. This work provided the technical basis for installing the sheet pile wall in 1990. The primary conclusions of this early work concerning site hydrogeology were as follows:

- The hydraulic integrity of the First Aquitard was questionable at a number of locations where local thinning of the unit occurs. One of these areas was adjacent to the Arkema shoreline near the former location of Tank #728 (Figure 1-8) where more than a 100 piles were driven to support the tank. Aquitard thinning and perhaps the piles were considered to have caused preferred migration pathways between the Upper and Intermediate Aquifers.

- Using a simplified water balance calculation that was later supported by numerical modeling, ICF concluded that the "*vast majority*" of the annual recharge passes through the First Aquitard to the Intermediate Aquifer.

- The flux of water from the Upper Aquifer was influenced by a low permeability zone on the outermost bank of the waterway. The low permeability zone was attributed to the precipitation of silica in the soil pores caused by the mixing of high pH groundwater containing high concentrations of dissolved silica mixing with lower pH water along the shoreline. The mixing lowered the pH that caused silica to precipitate and fill the soil pores.

- The primary migration pathway from the site to the Hylebos Waterway was through the Intermediate Aquifer.

- Approximately 40% of the annual precipitation (39 in/yr.) was estimated (conservatively – recharge may be higher) to recharge the local groundwater flow system.

- A barrier wall centered on the area where the highest Intermediate Arsenic concentrations were present would reduce the flux of arsenic to the waterway by more than 90% on an interim basis (i.e. in conjunction with an effective extraction and treatment system).

Intera (1995). As part of a reappraisal of the fate and transport of arsenic beneath the MMA, Intera completed additional evaluations of the shoreline mixing zone. High pH water that had been discharged at the site (starting in the late 1960s) had significantly increased dissolved silica concentrations in groundwater. As the high pH water containing the high concentrations of dissolved silica mixed with lower pH Hylebos water, the silica precipitated into the soil pores that reduced soil hydraulic conductivity. During the drilling of a number of soil borings Intera observed the following:

- *The Upper Aquifer shoreface is cemented uniformly, from the high tide line to the first aquitard, but is not cemented in Upper Aquifer borehole cores approximately 10 feet inland from the high tide line.*

- *Cementation of the Intermediate Aquifer shoreface is unknown at this time, but significant cementation occurs in Intermediate Aquifer borehole cores approximately 10 feet inland from the high tide line; in particular, in the upper portion of the Intermediate Aquifer*.

The interpreted hydrogeologic effects of the silica soil cementation was to block discharge from the Upper Aquifer that caused water levels to rise and increase downward flow to the Intermediate Aquifer. Intera also concluded that installation of the sheet pile wall had increased the downward hydraulic gradient to the Intermediate Aquifer.

DE&S (1998b). As part of monitoring the operation of the VOC extraction system in the SPA (VOA-A), DE&S assessed groundwater flow directions in the Upper and Intermediate Aquifers. Figures 3-9a and 3-9b show the estimated flow directions during relatively low tide conditions (-1 to +1 feet MLLW). Flow in both the Upper and Intermediate Aquifers was towards the Hylebos Waterway.

Boateng & Massman (1999). Additional field studies were completed in 1999 to further assess the impact of the sheet pile wall and extraction system on groundwater flow directions. Continuous water level measurements were made in selected wells over a six week period, refinements were made to the hydraulic conductivity of the hydrostratigraphic units and a numerical model (using MODFLOW) was developed to simulate groundwater flow, estimate a site water balance, evaluate the extent of hydraulic control at the northwest end of the sheet pile wall and assess the viability of using chemical tracer tests to further evaluate hydraulic containment. The primary findings of this work included the following:

- The net flow direction around the northwest end of the sheet pile wall is approximately to the northwest (relative to true north).
- The most sensitive model parameters were the hydraulic conductivity of the Upper and Intermediate Aquifers and the infiltration (recharge) rate.
- The Upper Aquifer is primarily recharged by local precipitation and the predominant flow direction is downward to the Intermediate Aquifer.
- Hydraulic containment was being attained in the vicinity of the barrier wall.

Pacific Groundwater Group (PGG) and J. Massman (2004). In 2003 it was discovered that a narrow bank of soil outside of the sheet pile wall exceeded the Commencement Bay Sediment Quality Objectives (SQOs). ATOFINA commissioned a study to evaluate the long-term effectiveness of proposed remedial actions and to identify other actions to meet sediment and water cleanup criteria. The work included revising an existing groundwater numerical model (MODFLOW). Conclusions related to the groundwater flow evaluations are summarized below (PGG 2004):

- The estimated rate of local precipitation recharge based on model simulations is approximately 16 inches per year (or about 40% of the annual precipitation amount of 39 inches per year).
- Nearly all (95%) of the local recharge to the shallow (Upper) aquifer behind the sheet pile wall moves downward to the Intermediate Aquifer. A small percentage (5% or less) moves horizontally around the ends of the wall[ii].

[ii] The model assumed the sheet pile wall to be impermeable. Given the age of the steel wall and field observations of corrosion, some groundwater leakage through the wall may be occurring.

- The predominant direction of groundwater flow in the Intermediate Aquifer is downward to the Deep Aquifer. However some horizontal flow (20%) is estimated to occur laterally around the ends of the wall and some flow (10 to 20%) occurs beneath the wall in the vicinity of a "*swale*" on the top of the Second Aquitard.

  The bottom of the sheet pile wall is mostly seated in the top of the Second Aquitard. However, in the vicinity of station 125+50 (Figures 3-1b and 3-7), the bottom of the wall did not extend deep enough to seat in the aquitard. This created a gap or pathway where groundwater could migrate directly towards the waterway from the Intermediate Aquifer. Most of the flow through the gap is estimated to originate from the Upper Aquifer.

- PGG's interpreted groundwater flow directions in the vicinity of the sheet pile wall are illustrated on Figures 3-9a, 3-9b and 3-10.

PGG and J. Massman (2008). As part of the early work associated with the Blair-Hylebos Terminal development project, preliminary evaluations of possible containment options were conducted. The primary option was a barrier wall surrounding the area with the highest dissolved arsenic concentrations coupled with a low permeability cap to prevent recharge in the contained area. The evaluation was conducted using the existing MODFLOW numerical groundwater flow model. The modeling exercise showed that sufficient hydrogeologic information is available to refine and use the existing numerical model to assess remedial alternatives as part of a Feasibility Study.

3.4.2 Wypenn Area

In 2010, as part of the soil sampling program in the Wypenn Area, water levels were measured in available wells. Depth to water measurements and water level elevations made on December 15, 2010 are summarized in Table 3-1. Measurements were made at relatively higher (11.4 feet MLLW) and lower (2.0 MLLW) tidal stages. In addition to the Wypenn Area wells, measurements were also made in a number of wells located in the MMA. As summarized in Table 3-1, there was little difference (less than 0.1 foot) between the two sets of measurements for the Upper and Intermediate Aquifers. However, a larger difference (0.81 to 1.74 feet) was measured in the Deep Aquifer wells. These data suggest that hydraulic communication between the Deep Aquifer and Hylebos Waterway is greater than with the overlying Upper and Intermediate Aquifers.

Figure 3-9a shows the estimated flow directions in the Upper Aquifer. Horizontal flow appears to be towards wells 5H1-1 and 5H4-1. Both wells have lower elevations as compared to surrounding wells. The flow pattern suggests that groundwater may be infiltrating into the sewer lines that exist beneath Taylor Way.

In October 2010[iii], Hart Crowser (2011) for the Port completed a monitoring round on the former OFA portion of the BBP. Water level elevations were determined in Upper Aquifer monitoring wells and the elevations were contoured as illustrated on Figure 3-9a. The elevations are similar to those measured in the Wypenn Area in December 2010. Beneath the OFA area, Upper Aquifer flow directions were to the southeast towards Taylor Way.

Figure 3-9b shows the estimated flow directions in the Intermediate Aquifer. The horizontal flow directions appear to be in a southerly to southwesterly direction. In 1991 Boateng (1992) estimated a southwesterly Intermediate Aquifer flow direction beneath the Wypenn site.

3.4.3 Groundwater Flow Direction Gradients – March 2012

To further assess, update and confirm previous horizontal and vertical flow direction gradients, water level measurements were made at low and high tides in 190 wells as part of the data gap work program (DOF 2012a). Measurements were made in available wells located on the AMP and in wells on adjacent properties. Measurements were made during the following periods:

- Low Tide (-0.6 feet MLLW at 1554 hrs.) – March 13, 2012 between 1500 and 1809 hours.
- High Tide (+10.6 feet MLLW at 0948 hrs.) – March 14, 2012 between 0851 and 1155 hours.

The time period for each set of measurements in relation to Commencement Bay tides is shown on Figure 3-11. Measurements were initially made in wells closest to the shoreline and progressed inland with time. Depth to water measurements and elevations are summarized in Tables 3-2a and 3-2b. Well locations are shown on Figures 3-2a to 3-2c.

Horizontal groundwater flow gradient contours at low and high tides are shown on the following figures:

- Upper Aquifer - Figures 3-12a and 3-12b
- Intermediate Aquifer - Figures 3-13a and 3-13b
- Deep Aquifer – Figures 3-14a and 3-14b

[iii] Hart Crowser (2013) also completed a monitoring round in November 2012 on the OFA of the BBP. Analysis of water level elevations presented in the Hart Crowser report indicate similar flow direction gradients as those interpreted by DOF based on water level measurements made in March 2012 – see Figure 3-12a and 3-12b.

Upper Aquifer – Horizontal gradient flow directions in the Upper Aquifer are similar for the high and low tide set of measurements. Flow gradients along the shoreline and adjacent to the East Channel Ditch are towards the surface water bodies. Groundwater mounds are present behind the southwest portion of the sheet pile wall and along the northeast site boundary with the former USG facility. Groundwater depressions are evident behind the northwest portion of the sheet pile wall and along Taylor Way in the vicinity of the Wypenn and BBP. As with the 2010 Wypenn flow gradient patterns, water level data collected in March 2012 suggest groundwater may be infiltrating into the sewer lines beneath Taylor Way (discussed further in Section 10).

The change in well water levels between high and low tides in the Upper Aquifer are illustrated on Figure 3-15a. For the most part, water levels in upland wells are not sensitive to tides and fluctuated only plus or minus a few tenths of a foot. In contrast, water levels in the OMMP wells on the outside of the sheet pile wall fluctuated between approximately 4 and 7.5 feet over the tidal cycle.

Intermediate Aquifer – Horizontal gradient flow directions for the Intermediate Aquifer are shown on Figures 3-13a and 3-13b. During low tidal stages flow is generally towards the Hylebos Waterway. Groundwater divides are present behind the sheet pile wall where gradients are to the waterway and within the central portion of the MMA where the flow gradients are initially in northerly and southerly directions and bend towards the waterway with flow behind the sheet pile wall.

At higher tidal stages, flow gradients reverse to an inland direction generally parallel with the shoreline. The flow reversal extends approximately 200 to 500 feet inland.

The change in well water levels between high and low tides in the Intermediate Aquifer are illustrated on Figure 3-15b. For the most part, water levels fluctuated less than one foot between high and low tide in upland wells. However, along the un-walled shoreline water levels fluctuated between approximately 4.5 and 8.0 feet. Most of the OMMP wells located on the outside of the sheet pile wall fluctuated between approximately 3.5 and 11.8 feet. Well 122+60-2 only declined 0.04 feet between high and low tide.

Deep Aquifer – Horizontal gradient flow directions for the Deep Aquifer are shown on Figures 3-14a and 3-14b. During low tidal stages flow is generally towards the Hylebos Waterway beneath the entire former AMP. During high tides flow gradients reverse to beyond Taylor Way. Note the sheet pile wall does not extend into the Deep Aquifer.

The change in well water levels between high and low tides in the Deep Aquifer are illustrated on Figure 3-15c. The amount of fluctuation is greatest along the shoreline (approximately 7 to 10 feet) and declines inland. Along the western property line adjacent to Taylor Way, water levels fluctuated approximately 2 to 3 feet.

Vertical Gradients – Vertical gradients depend on the combined fluctuation of water levels in the zones being evaluated. The direction and magnitude of the gradients were calculated for selected well nest locations. The magnitude of the gradient was estimated by dividing the distance between the mid-point elevation of the well screens by the water level elevation difference at each selected location.

Figure 3-16a shows the vertical gradient directions and magnitude between the Upper and Intermediate Aquifers. The gradient direction is generally downward for both low and high tidal stages (consistent with the previous analyses). Vertical gradients ranged between 0.031 to 0.400 based on high tide measurements and 0.003 to 0.860 based on low tide measurements. Higher gradients were generally observed during low tide along the shoreline.

Figure 3-16b shows the vertical gradient directions and magnitude between the Intermediate and Deep Aquifers. The direction of the gradient is less consistent as compared to that between the Upper and Intermediate Aquifers. During portions of the tidal cycle, upward and/or downward gradients are present depending on location. However, vertical gradients behind the sheet pile wall are consistently downward.

4.0 KNOWN RELEASES AND PAST REMEDIAL ACTIONS

4.1 Upland Area

Hazardous substance releases occurred as a consequence of the operation of the AMP. Reported releases and remedial actions are summarized below. Release areas are shown on Figure 4-1.

- **Documented Releases to the Environment**. As reported by E&E (1987), the first comprehensive environmental study of the site occurred in the early 1980s by AWARE (1981) for Pennwalt. The primary chemicals found in groundwater beneath the site included:

    - Arsenic,
    - Chromium,
    - Chloroform,
    - Cyanide, and
    - Other organic chemicals such as carbon tetrachloride, tetrachloroethene, toluene, phenol and chlorinated ethanes.

  High arsenic concentrations in groundwater were attributed by AWARE to the inactive Penite (sodium arsenite) waste disposal area (Hart Crowser 1986c). In 1981, Aware detected dissolved arsenic concentrations up to 3,670 mg/l in well P-6SS (later designated 6E1-1). Dissolved arsenic concentrations up to 1,680 mg/l were also detected in samples from well P-3SS (6E2-1).

  Four contaminant migration pathways to the Hylebos Waterway were identified including:

- Groundwater migration,
- Visual seeps along the waterway shoreline,
- Three sewer lines, and
- Surface water runoff.

Initial remedial actions (in 1981) included:

- Discontinued operations at the Taylor Lake and Wypenn areas, and
- Sealing the three sewers upgradient from the inactive Penite Area (discussed below) and diverting surface water runoff to the plant storm water system.

- **Sodium Chlorate Release (January 2, 1985)** - A 50% aqueous solution containing 44% sodium chlorate, 5% salt and 4-5 grams per liter sodium dichromate was released when a tank ruptured (Weston 1985; Hart Crowser 1986a). Sodium dichromate contains chromium in the hexavalent state. Approximately 175,000 gallons was released. After the initial cleanup, approximately 75,000 gallons remained unaccounted for. The spill area is shown on Figure 4-1(after Weston 1985). Hart Crowser was hired to conduct soil sampling in the spill area.

  In July 1985, the top 6-inches of soil containing the chromium was excavated and placed in a lined leaching basin with the approval of Ecology (Hart Crowser 1986a). Characteristic dangerous waste designation (EP Toxicity testing) was used to guide the remedial action. The leaching basin was located near the easternmost property line and was 90 feet by 110 feet in size (Figure 4-1). The excavated area was backfilled with clean (uncontaminated) soil. Chromium was leached with an appropriate solution to remove chromium until a steady-state leachable chromium value was achieved. The leachate was recycled into the plants sodium chlorate process stream. The basin was closed by folding the PVC liner on the basin walls down into the basin; puncturing the liner to drain the impoundment; and grading the impoundment area to surrounding ground elevation. Treated soils were left within the basin.

- **Pennwalt 1986 Solid Waste Management Plan**. Fifteen types of wastes were generated at the chemical plant (EPA 1987) including:

  - Brine waste,
  - Brine sludge,
  - Brine polishing filter cake,
  - Wastewater from chlorine plant cleaning,
  - Sodium chlorate sludge (State dangerous waste),
  - Sodium chlorate filter cake,
  - Caustic pot cleaning wastes,

  - Caustic tank car cleaning wastes,
  - Caustic tank cleaning wastes,
  - Fuel tank cleaning sludge,
  - Maintenance shop wastes,
  - Sandblasting wastes,
  - Paint shop wastes,
  - Laboratory wastes, and
  - Boiler blowdown water.

  In 1986, the solid waste management plan indicates that the Cell Room Pond (Brine Pond) was the only remaining active impoundment.

- **1986 Hydrogeologic Study**. In 1986, Hart Crowser (1986c) studied the hydrologic and water quality conditions at the site. Hart Crowser concluded that the total loading of arsenic to the waterway via groundwater, storm sewers and site outfalls decreased between 75% and 95% from September 1981 and September 1986. However, the report indicated a plume of arsenic contaminated groundwater was moving from the buried sodium arsenite waste area (i.e. Penite pits) to the waterway. Arsenic concentrations over 1,000 mg/l were detected in samples from Upper Aquifer wells P-3SS (6E2-1), P-6SS (6E1-1) and P-14SS (later designation unknown).

- **Consent Decree of 1987.** In 1987 Ecology and Pennwalt negotiated a Consent Decree (No. 872011990) for expedited action. The decree required that Pennwalt develop and implement a plan that included the following:

  - Groundwater sampling and analysis,
  - Surface impoundment sampling and analysis,
  - Surface water sampling and analysis,
  - Soil sampling and analyses for the Penite and Wypenn areas, and
  - Engineering evaluation of arsenic mitigation alternatives for the uppermost aquifer (i.e. Upper Aquifer).

  Applied Geotechnology Inc. (AGI 1987) completed a supplemental hydrogeologic investigation and engineering evaluation of arsenic migration alternatives for the Upper Aquifer. AGI's work was completed to support site characterization by Kennedy/Jenks/Chilton (KJC 1990). The KJC report presents the results of sampling and analysis of a number of media on the AMP including groundwater, surface impoundment solids and surface water. Additional work was completed by ICF (1990b). The sampling results indicated the following:

  - Metals and organic compounds were detected in groundwater samples. Arsenic was the most commonly detected metal while chloroform was the most commonly detected organic compound. Up to 2,400 mg/l of arsenic was detected in the Upper Aquifer (Figure 4-2); up to 1,100 mg/l was detected in the Intermediate Aquifer (Figure 4-3); and 0.9 mg/l was detected in the Deep Aquifer (P-4D later 3A1-3).

- Seep sample arsenic concentrations ranged from less than 1 mg/l to 105 mg/l, and the exposed shoreline face appeared to be cemented by a light-colored precipitate that effectively sealed portions of the Upper Aquifer (ICF 1990b). The highest concentration in the seep water sample occurred near the center of the arsenic plume in the uppermost aquifer.

- The migration pathway from the Upper to the Intermediate Aquifers occurred in areas where former stream channels scoured and eroded the First Aquitard (see Figures 3-1a, 3-1b, and 3-8)

- Impoundment solids are generally alkaline, with high pH ranging between 8.7 and 12.3. Some arsenic and VOCs were detected in the solids (discussed below).

- Sporadic detection of organic compounds (primarily VOCs) was detected in groundwater samples. Methylene chloride, chloroform, tetrachloroethene, acetone and phenol were detected. Chloroform was the most frequently detected VOC at concentrations up to 49,000 ug/l.

- Surface water samples from the East Channel Ditch had pH that ranged from 7.8 to 10.2 and total arsenic concentrations that ranged between approximately 0.076 mg/l and 0.49 mg/l. VOCs were generally not detected in the surface water samples.

Arsenic was documented in the Intermediate Aquifer in 1989 (ICF 1990b). This finding indicated that the scope of the remedy needed to address both the Upper and Intermediate Aquifers.

- **Expedited Response Actions (1990)**. Expedited response actions (ERAs) included the following (ATO 1990; ICF 1990a):

  - Excavation of heavily contaminated soils and Penite waste,
  - Elimination of recharge from Brine Mud Ponds,
  - Installation of sheet pile wall,
  - Excavation of asbestos pond (eliminate source of recharge)
  - Initiation of a feasibility study for addressing arsenic migration between aquifers.

- **Penite Waste Materials**. From approximately 1940 to 1972 Pennwalt manufactured Penite which is the trade name for a herbicide containing sodium arsenite (KJC 1987; ICF 1990a). Water material (sludges, washdown water and filter cake) produced during the production of the arsenical herbicide, was deposited in two pits (Penite pits) generally located within the southeastern portion of the CMA (Figure 4-1). The pits were backfilled with soil after Penite production ceased.

The pits were initially located in 1987 based on review of aerial photographs. Three pits were identified, two of which contained a sludge-like material from two to seven feet deep in two borings (KJC 1987). Analysis of the Penite waste indicated arsenic concentrations that ranged between 100,000 mg/kg and 190,000 mg/kg. Soil samples from borings drilled outside the pits contained arsenic concentrations of 2,000 mg/kg or less. Leaching of arsenic from the pits contaminated soil and groundwater beneath the site and sediment along the AMP shoreline.

Penite waste was excavated and disposed off-site in early 1990 (ICF 1990c; MPS 1990). The Penite waste was readily identified during excavation that was completed to a nominal depth of ten feet (until aquitard material was encountered). A total volume of 2,300 cubic yards[iv] of material was excavated from the approximate area shown on Figure 4-4. The excavated material was mixed with kiln dust to remove free water and transported to the hazardous waste landfill at Arlington, Oregon for disposal. Approximately 2,650 tons of the mixture was transported off-site. In addition, approximately 145 tons of groundwater was also transported, stabilized and disposed in Arlington.

- **High pH materials were discharged into brine ponds (Taylor Lake) starting in 1967** (Intera 1994a). The arsenic leaching process from the Penite pits was enhanced by the seepage of high pH (>pH 10) leachate from brine ponds. Intera believed there was "*strong reason to believe that the initial fluxes of arsenic to the Hylebos waterway through ground-water discharge would have been minor"*, but for the high pH discharges to the caustic brine pond.

- **Plant Wastewater Discharges**. Wastewaters from plant production activities were discharged to portions of the site, including the areas referred to as "T*aylor Lake*" and "*Waggoner's Wallow*". The Taylor Lake system consisted of several impoundments as discussed above. Alkaline pH water (associated with the production of sodium hydroxide) was discharged to a number of locations including Taylor Lake. Solids accumulated in the impoundments over time. In 1990, thicknesses ranged between 1.7 and 6.3 feet in Taylor Lake and 0.5 to 2.3 feet in the Waggoner's Wallow ditches (Figure 1-10). Alkaline pH conditions (up to approximately pH 12) existed in soil and groundwater beneath portions of the site. Discharges to Waggoner's Wallow ceased in December 1985 (Hart Crowser 1986b). Discharges to Taylor Lake ceased after 1981.

[iv] The ICF (1990c) reports that over 3,000 cubic yards of highly contaminated waste and soil were removed from the Penite pits in 1990.

Liquids associated with off-gas chlorine production contained volatile organic compounds (VOCs) which were discharged into Waggoner's Wallow and Taylor Lake. VOCs have been detected in solids from both areas (Figure 4-5) and groundwater. Two VOC groundwater plumes (VOC Areas) have been identified (Figure 4-1). VOCs detected in groundwater samples collected between 2003 and 2007 included chloroform (up to 403 mg/l) and tetrachloroethene (up to 46.5 mg/l). Other detected VOCs (in groundwater) included carbon tetrachloride, trichloroethene, cis-1, 2-dichloroethene and vinyl chloride.

The chlorate pond received brine sludge, graphite waste, and sodium chlorate waste. Some dichromate used as a corrosion inhibitor was also discharged to the pond.

Discharges to the Waggoner's Wallow and Taylor Lake Pond system ceased by 1990. The Waggoner's Wallow ditches have been filled and the Taylor Lake pond system was capped with sandy material.

- **Additional Penite Waste Excavation**. An additional 185 cubic yards of Penite solids were removed in 2003 based on a work plan prepared by ERM (2003). Soil with arsenic concentrations between 1,630 mg/kg and 33,666 mg/kg was removed to a depth of nine feet (Figure 4-4). Arsenic concentrations outside the remedial excavation areas ranged between 160 mg/kg and 5,550 mg/kg.

- **No. 2 Fuel Storage Tanks**. During decommissioning of the three above ground storage tanks (No. 2 fuel) located within the northeastern portion of the CMA (Figure 4-1) petroleum containing soil was discovered. Petroleum containing soils were bioremediated (Malcolm Pirnie 2007).

- **Asbestos Ponds Excavation**. Twelve-hundred (1,200) cubic yards of wet solids from the asbestos ponds were excavated and disposed off-site in 1990.

- **Sheet Pile Wall Installation**. A steel sheet pile wall was installed in 1990 along the shoreline to mitigate the migration of arsenic containing groundwater to the waterway. ICF (1990c) estimated that installation of the wall would reduce arsenic flux to the waterway by over 90%. The wall was constructed of interlocking sheets 21.6 inches wide and 0.315-inches thick driven to a depth of 30 feet and seated into the Second Aquitard (ICF 1990b). Every second joint was welded and those joints not welded were sealed with an asphalt material (ICF 1990c; PGG 2004). The northwest portion of the wall was extended in 1995 to improve containment (Elf Atochem 1995). Additional sheet piling was installed approximately 12 feet along the waterway and 82 feet at an angle of 57^{o} toward the caustic building. The bottom of the extension was approximately 32 feet from ground surface. In June 1997, the wall was extended another 96 feet (Elf Atochem 1997b).

The original installation report indicated that the bottom of the wall penetrated at least four feet into the Second Aquitard (ICF 1990b). However, in 2004 it was discovered that the wall did not penetrate into the Second Aquitard along a portion of the sheet pile wall (PGG 2004). A gap existed between the bottom of the wall and the top of the Second Aquitard near waterway station 125+50 (Figure 3-2b). This gap provides a migration pathway for arsenic contaminated groundwater to flow towards the waterway.

- **Pump and Treat System**. A pump and treat system was installed upgradient of the sheet pile wall that began operation in late 1992 (ICF Kaiser 1995). The boundary of the arsenic plume was defined as the 1 mg/l concentration contour while groundwater extraction was to hydraulically contain the approximate area defined by the 5 mg/l concentration contour (ICF 1992). The groundwater extraction system consisted of five primary components (Figure 4-6):

    - Extraction trenches with collection sumps in the trenches,
    - Recharge (infiltration) trenches with distribution boxes in the trenches,
    - Extraction wells,
    - Infiltration wells, and
    - Piping Systems.

The arsenic treatment system used co-precipitation involving the addition of ferric chloride (ICF Kaiser 1995). The process also adjusted the pH of water without causing high levels of silica to form a gel. The precipitated metal solid was separated from the water using two primary drum filters in parallel and a secondary plate-and-frame filter. The filter cake (precipitated solids containing high concentrations of arsenic) was shipped off site for stabilization and disposal. An enhanced sand filter was added to the treatment train in 1998. The plant was designed to treat up to 60 gallons per minute (gpm) of contaminated groundwater. A recommended early interim treatment system operation plan included treating 30 gpm with an arsenic concentration of 50 mg/l (Intera 1994a).

High silica concentrations dissolved in groundwater (caused by high groundwater pH) reduced the efficiency of arsenic removal and made operation of the plant more difficult. Treated effluent concentrations less than 1 mg/l were initially discharged to the Hylebos Waterway (Intera 1994a). A review of monthly operations reports indicate that discharge to the City of Tacoma's sanitary sewer system started during the first quarter of 1998 (Elf Atochem 1998).

Initial influent arsenic concentrations were greater than 100 mg/l (ERM 2003). By 1994, the system was treating a monthly average groundwater flow rate of 12.5 gpm with a monthly average influent arsenic concentration of 76.7 mg/l (DE&S 1999). During 1994, it was estimated that arsenic was being recovered at an average rate of approximately 302 pounds/month.

An infiltration plan was submitted to Ecology in August 1996 (Elf Atochem 1996a). While the system had been designed for infiltration of water, infiltration did not begin until August 1997 (Elf Atochem 1997c). The primary purpose of the infiltration, which included both treated effluent and City water, was to maintain the extraction of arsenic in the Upper Aquifer during the drier portions of the year. Infiltration also occurred during other wetter portions of the year.

By 2001, flow rates had declined to a monthly average of approximately 5.8 gpm with a monthly average influent arsenic concentration of 32.6 mg/l (Boateng 2003). During 2001, it was estimated that arsenic was being recovered at an average rate of approximately 64 pounds/month.

The reduction in the amount of arsenic being recovered was a function of both the declining flow rate and influent arsenic concentration. At several of the extraction points where high pH water mixes with lower pH water, the declining flow rate likely was caused, at least in part, by the precipitation of silica that clogged the well screens and pumps (Intera 1996a). To mitigate the effects of silica precipitation on the pumping system, Intera (1996a, 1996b) proposed a pilot test to inject caustic soda to raise pH levels near the end of the northwest portion of the sheet pile wall. The caustic injection pilot test was completed within the Intermediate Aquifer near the northwest end of the sheet pile wall in January 1997 (Elf Atochem 1997a). The pilot results and other information indicated the most feasible way to enhance hydraulic containment of the Intermediate Aquifer was to extend another section of the barrier wall.

Between October 1992 and March 2003 the system was estimated to have removed approximately 22,508 pounds of arsenic from groundwater (Boateng 2003). Influent arsenic concentrations declined from between approximately 100 and 240 mg/l in 1993 to between 0.01 and 9.83 mg/l during the first four months of 2003.

The pump and treat system was intended to operate over a ten year period to produce significant reductions in arsenic levels (ICF 1990b). It was anticipated that some fraction of arsenic would remain after the extraction and treatment system was no longer effective at removing arsenic from the site. Any residual arsenic was to be treated by passive means that was to focus on immobilizing residual arsenic in-situ. Arkema shut the system down in December 2003 after about ten years of operation. In-situ treatments began with pilot scale testing in 2001 ramping up to full scale treatments in 2003 and 2004.

- **Volatile Organic Compound (VOC) Treatment System.** A VOC treatment system was installed and operated where high groundwater VOC concentrations were detected in the Waggoner's Wallow area (VOC Area A on Figure 4-1). The system consisted of groundwater extraction wells, two vapor extraction wells, a vertical air stripper, vacuum blower, thermal oxidation unit and a caustic adsorption unit. In 1996, the system was pumping/treating approximately 3 gallons per minute (gpm) from the Upper Aquifer and 10 gpm from the Intermediate Aquifer (Elf Atochem 1996b). Influent concentrations were 20 mg/l chloroform and 30.4 mg/l total VOCs.

The system operated between September 1996 and January 2000. The system was shut-down *"[as] a result of a favorable determination that monitored natural attenuation (MNA) is the appropriate strategy for the Atofina Tacoma site"*. (Boateng 2002c).

- **Hydrochloric Acid Spill**. A 20,000 gallon release of hydrochloric acid (28%) occurred on June 7, 1996 (Elf Atochem 1996). The spill occurred from tank #513 (Figure 4-1) and approximately 1,118 gallons of the release was unaccounted for and may have infiltrated into the soil. Boateng prepared a plan to evaluate the spill (Boateng 1996a). The results of concrete coring and soil and groundwater sampling indicated no measurable impact on groundwater (Boateng 1996b).

- **In-Situ Treatment.** In-situ injections using hydrogen peroxide and ferric chloride were completed in the period 2001 to 2004 (ERM 2005). The injection/treatment areas are shown on Figures 4-7 and 4-8, along with initial (2001) groundwater dissolved arsenic concentrations.

  An early (1990) remedial assumption was that the pump and treat system would operate for about 10 years, during which time most of the readily desorbable arsenic would have been removed from the aquifer system (Intera 1994a). In March 1998 Boateng completed soil sampling to assess whether soil arsenic concentrations had decreased by pumping between 1992 and 1998. The 1998 data was compared to soil data collected in 1990. While Boateng concluded that a general decrease had occurred, a statistical analysis completed by Duke Engineering & Services (DE&S) suggested that there had been no statistical change in the mass of arsenic between 1990 and 1998 (DE&S 2001c). Because the *"vast majority of the arsenic is not dissolved in the ground water but adsorbed to minerals"* (Intera 1994a), the geochemical conditions caused continuous de-sorption of arsenic into the dissolved phase.

  The primary goal of the in-situ treatment program is summarized below:

  > "*After the extraction and treatment system has been operated to remove as much arsenic as is technically and economically feasible, some arsenic will remain in the uppermost and intermediate aquifers and the upper aquitard. The primary goal of the passive phase will be to stabilize the fraction of arsenic that cannot be removed through the extraction system*" [ICF 1990d).

  A Phase 1 (Upper Aquifer) pilot study was completed in November/December 2001 and a Phase 2 (Upper and Intermediate Aquifer) pilot study was completed in

August 2002. Initial injections of hydrogen peroxide were made to oxidize arsenic (III) to arsenic (V) followed by injection of a 22-percent (by weight) ferric chloride solution with a pH of 2. The ferric chloride injection was intended to reduce groundwater pH and introduce amorphous ferric oxide/hydroxides that would precipitate arsenical salts and/or adsorb arsenate. ERM reported that nine to sixteen months after the pilot studies were completed, sustained reductions in arsenic concentrations of approximately 80 percent over the entire treatment area were achieved.

Full scale treatments were completed between October 2003 and June 2004. The initial target areas had arsenic concentrations greater than 100 mg/l, followed by in-situ treatments in areas where arsenic concentrations remained. In all, approximately 268,000 gallons of ferric chloride were injected into the Upper Aquifer and approximately 97,000 gallons were injected into the Intermediate Aquifer, which is equivalent to approximately 139 tons of iron.

Dissolved arsenic groundwater concentrations for 2004 at the end of the in-situ treatments are shown on Figures 4-9 and 4-10 (ERM 2005). ERM concluded that significant reductions in dissolved arsenic concentrations were achieved by the in-situ treatments. Upper Aquifer concentrations were reduced from over 500 mg/l (870 mg/l at 6E2-1) to less than 50 mg/l and Intermediate Aquifer concentrations were reduced from over 500 mg/l (980 mg/l at 6E9-2) to less than 10 mg/l.

- **Groundwater Monitoring**. A groundwater monitoring program was implemented in 2003. By 2007, over 200 wells were installed and sampled on the site. Selected wells were sampled between 2003 to January 2007, although the analytes, sampling frequency and reporting limits varied between wells and sampling events. Data are also available for the period 1981 to 2003.

Overall, the remedial actions implemented by Arkema reduced dissolved arsenic concentrations in groundwater by approximately 90 percent. Much of the concentration reduction is attributed to the in-situ treatment program implemented between 2001 and 2004.

4.2 Hylebos Waterway

- **Dredging of Waterway**. The Head of Hylebos Cleanup Group (HHCG) elected to dredge Segments 1 and 2 of the waterway, so that the remaining sediments were below the Commencement Bay/Nearshore Tide flats (CB-NT) ROD Sediment Quality Objectives (SQOs). The contaminated sediments were removed from along the Arkema shoreline except in two areas:
    - Intertidal area immediately adjacent to the Arkema sheet pile wall (herein termed the "*Wedge Material*", and

- Subtidal area where Intermediate Aquifer material exposed after dredging was contaminated with arsenic above the SQOs.

- **Capping of Intertidal Area** occurred between May and July 2004 and consisted of debris and some sediment removal (13,100 tons) with off-site disposal and placement of an intertidal cap (ITC) (PGG 2006b). The ITC extends from station 122+40 to 131+20 between top of the sheet pile wall (+17 feet MLLW) and 0 feet MLLW (Figure 4-1). The cap is approximately 1.1 acres in size and consists of three layers including:

    - Two-foot thick (minimum) layer of Transition Zone Grading Material (TZGM), over
    - One-foot thick (minimum) layer of quarry spalls, over
    - Non-woven geotextile placed directly over the exposed post-debris removal surface.

- **Capping of the Subtidal Area** occurred between November 2005 and February 2006. In a portion of the waterway dredging exposed Intermediate Aquifer material with arsenic concentrations up to 1,500 mg/kg, well above the SQO of 57 mg/kg. It was determined that additional dredging would likely not achieve the arsenic SQO, so a subtidal cap was designed and placed (PGG 2006b). Additional dredging (1,500 cubic yards) was completed to prepare the surface for placement of the cap and rip-rap buttress. In the final capped area, arsenic concentrations in the pre-capping surface ranged between approximately 20 mg/kg and 770 mg/kg (see Figure 8-9).

  The subtidal cap was placed between stations 124+20 and 127+65 (Figure 4-1) from approximately 0 feet MLLW (bottom of intertidal cap) to -35 feet MLLW (ending at the pierhead line). The cap is approximately 0.5 acres in size and consists of three layers including:

    - Slope capping topping (fish mix), over
    - One and one-half (1.5) foot thick (minimum) layer of quarry spalls, over
    - Two foot thick (minimum) of filter material placed over the exposed dredged surface.

5.0 CONSTITUENTS OF POTENTIAL CONCERN (COPCS)

5.1 Objective and Approach to Analysis

As part of the process of identifying COPCs, an exposure pathway analysis was completed based on review of the site data and likely future land uses. The purpose of the analysis was to identify the media and relevant exposure pathways for the AMP. The results of the analysis are illustrated on Figure 5-1. Based on the exposure pathway analysis, the following media and exposure pathways were further evaluated.

Possible Completed Exposure Pathways by Media Type

Media	Exposure Pathway	Comment
Soil	Soil Contact	Human health - industrial site use
Soil	Inhalation	Human health - particulates
Soil	Terrestrial Ecologic Exposure	Based on existing (undeveloped) condition
Sediments	Erosion of Bank Soils and Exposure to Marine Organisms	Primarily East Channel Ditch bank soils
Surface Water	Via Groundwater Discharge to Surface Water (Hylebos Waterway and East Channel Ditch)	Protection of marine organisms and human health (shell fish gathering)
Soil	Leaching to Groundwater (protection of surface water)	Based on groundwater analytical data
Groundwater	Vapor Intrusion into Buildings	Possible future concern

GW-COPCs for the drinking water exposure pathway were not evaluated because it is extremely unlikely that groundwater within the affected aquifers would ever be used for drinking water purposes, as it is considered a non-potable source, aquifer connections on-site are to marine waters, the site is industrial and municipal water supplies are available. A restrictive covenant is also anticipated that will prohibit use of groundwater from the AMP as drinking water.

COPCs were identified using a stepwise process that is briefly described below.

- The initial step was to compile soil and groundwater analytical data and identify screening levels (SLs) based on Cleanup Levels (CULs) developed using the methods and procedures in the Model Toxics Control Act (MTCA).

- SLs were compared to the maximum concentration and if the maximum concentration exceeded the SL, the contaminant was carried forward for additional evaluation.

- For COPCs based on soil contact (to protect human health and terrestrial wildlife) and possible erosion into marine water (to protect marine organisms), the procedures outlined in section WAC 173-340-740(7) were used to apply the SLs. In general, there are three criteria that need to be satisfied before concluding soil samples meet the SLs:

    - No single concentration can exceed two times the SL

    - No more than 10 percent of the samples can exceed the SL

    - The Upper 95% Confidence Limit (UCL95%) on the mean is below the SL. Ecology has developed a statistical program (MTCA-Stat) to assess data distributions (normal, lognormal) and estimate the UCL95% concentration.

- An alternative to applying the three criteria is to compare the reported maximum concentration to the SL. If the maximum concentration is below the SL, the SL is assumed to be satisfied.

- Carcinogenic PAHs (CPAHs) were evaluated using the toxicity equivalency factor (TEF) methodology adopted by Ecology in October 2007 (Ecology 2007). This method assesses the combined toxicity of seven CPAHs into a single concentration (Toxicity Equivalent Quotient or TEQ) that is compared to the CUL for benzo(a)pyrene. The following TEFs were used to calculate sample TEQs.

CPAH Toxicity Equivalent Factors (TEF)

CPAH	TEF (unitless)
Benzo(a)pyrene	1.0
Benzo(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.1
Chrysene	0.01
Dibenzo(ah)anthracene	1.0
Indeno(1,2,3-cd)pyrene	0.1

- Evaluation of GW-COPCs focused on protection of surface water receptors via the groundwater discharge to surface water pathway. Soil-COPCs to protect groundwater via leaching were identified using the empirical approach consistent with WAC 173-340-747(3)(f).

- Evaluation of vapor intrusion of VOCs into future site buildings was also addressed.

5.2 Soil Analytical Data and Sources

5.2.1 Main Manufacturing Area

Soil analytical data includes analysis of ditch/pond sediment and soil samples for a variety of constituents including:

- Metals,
- Volatile organic compounds (VOCs),
- Polycyclic aromatic hydrocarbons (PAHs),
- Polychlorinated biphenyls (PCBs),
- Chlorinated Pesticides,
- Petroleum hydrocarbons,
- Asbestos,
- Ethylene glycol, and
- Perchlorate.

Sources of soil analytical data consist of historical sampling data and data collected as part the Port's RI sampling activities completed in 2008 and 2012. Soil analyses were completed by Analytical Resources Inc. (ARI) using Ecology/EPA standard methods as outlined in the approved RI work plans. Data collected by the Port was validated by DMD Inc. DMD's validation reports are presented in Appendix F (on CD) along with the ARI laboratory reports (on CD). Sources of soil analytical data are described below:

1989 Ditch/Pond Sediment Sampling (by Kennedy/Jenks/Clinton) - In June 1989, Kennedy/Jenks/Clinton (1990) sampled and analyzed ditch/pond sediment in the following areas:

Sample Number – Ponds/Waggoner's Wallow Sediment-1989

Location	Number of Samples
Chlorate Pond	4
Asbestos Pond	3
Taylor Lake	9
Cell Room (Brine) Pond	8
Taylor Lake Moat	2
Waggoner's Wallow	7
Total	**33**

Samples were analyzed for the following constituents:

- pH
- Total Metals (As, Ba, Cd, total Cr, Cu, Pb, Hg, Se, Ag)
- E.P. Toxicity (leachable) metals
- VOCs (EPA Method 8240)

Sample locations are presented on Figure 5-2 and sediment thicknesses are presented on Figure 1-10. Data tables from the KJC 1990 report are presented in Appendix G. Sediment pH and concentrations of arsenic, total chromium, lead, and mercury are illustrated on Figures 5-3 to 5.7. Tetrachloroethene (PCE) sediment concentrations are illustrated on Figure 4-5.

In 1989 sediment thicknesses ranged between 0.5 feet (Waggoner's Wallow) and 6.3 feet (Brine Pond) as summarized below.

Ponds/Waggoner's Wallow – Sediment Thicknesses (1989)

Location	Sediment Thickness (ft.)
Chlorate Pond	1.7 to 4.8
Asbestos Pond	1.5 to 2.7
Taylor Lake	3.7 to 5.0
Cell Room (Brine) Pond	3.0 to 6.3
Taylor Lake Moat	1.6
Waggoner's Wallow	0.5 to 2.3

Since 1989, the Taylor Lake impoundments were capped and the Waggoner's Wallow ditches filled. Filling and placement of capping material has likely caused consolidation (compaction) of the ditch/pond sediment.

The pH of ditch/pond sediment was measured in 1989 and ranged between 8.7 (Waggoner's Wallow) and 12.4 (Brine Pond) as illustrated on Figure 5-3 and summarized below.

pH of Ponds/Waggoner's Wallow Sediment (1989)

Location	Sediment pH
Chlorate Pond	10 to 11.3
Asbestos Pond	11 to 12.1
Taylor Lake	10 to 12.2
Cell Room (Brine) Pond	11.9 to 12.4
Taylor Lake Moat	9.8 to 10.4
Waggoner's Wallow	8.7 to 10.1

1990 Sediment/Soil Sampling (by Boateng) - As part of a program to enhance vegetative cover in the late 1980s, a mixture of sediment excavated from the Taylor Lake impoundments and wood remaining from a wood processing operation was spread over the area north and east of Waggoner's Wallow (Figure 4-1). Boateng (1990b) collected and analyzed thirty soil samples from 4 to 10 inch depths in the vegetative material. The samples were analyzed for total metals, total phenols and TCLP metals to determine if the material was hazardous. Three soil samples were also submitted for toxicity testing using a 96-hr fish bioassay for designation purposes. The metals/phenol results were reported as follows:

1990 Vegetation Amendment Samples (Boateng 1990)

Constituent	Detection Frequency	Concentration Range (mg/kg)	UCL 95% (mg/kg)
Antimony	10/30	nd to 9.2	9.2 (maximum)
Arsenic	30/30	4.0 to 41.8	28.3
Beryllium	0/30	nd	nd
Cadmium	30/30	0.22 to 0.84	0.53
Chromium	30/30	7.6 to 24.6	14.4
Copper	30/30	25.6 to 159	59.2
Lead	30/30	21.2 to 36	28.7
Mercury	11/30	nd to 0.12	0.12 (maximum)
Nickel	30/30	81.2 to 200	142
Selenium	1/30	nd to 17.8	17.8 (maximum)
Silver	0/30	nd	nd
Thallium	0/30	nd	nd
Zinc	30/30	71.5 to 103	88.3
Total phenol	2/30	nd to 1.0	1.0 (maximum)

Note: Samples from northern portion of manufacturing area.

TCLP metals concentrations were below EPA hazardous waste criteria and results of the bioassays showed that the material was not classified as an extremely hazardous or dangerous waste.

2007 Soil Sampling (by Malcolm Pirnie) - In April/May 2007, Malcolm Pirnie (2007) collected soil samples from numerous locations using a direct push-type drilling rig (Geoprobe). The rational (sampling based on plant operations, known releases etc.) for the sampling program was described in Malcolm Pirnie (2006) that was reviewed by Ecology. Sampling locations were generally based on site history, the results of groundwater analyses, and sampling work by Aware (1981), Boateng (1990a, b), and Kennedy/Jenks/Clinton (KJC 1990). A Sampling and Analysis Plan (SAP) was prepared to guide the work that was also submitted to and reviewed by Ecology.

Malcolm Pirnie sampled and analyzed soils to depths of approximately 10 feet. Sample locations are shown on Figure 3-3. For the most part, samples were analyzed from the depth intervals 0 to 0.25 feet (noted as “0” in the summary tables), 0.25 to 6 feet (noted as 6 feet in the summary tables), and 6 to 10 feet (noted as 10 feet in the summary tables). Analyses were made for the following constituents:

- Metals – 245 analyses
- Volatile Organic Compounds (VOCs) – 44 analyses
- Polychlorinated Biphenyls (PCBs) – 22 analyses
- Chlorinated Pesticides – 38 analyses
- Polycyclic Aromatic Hydrocarbons (PAHs) – 20 analyses
- Total Petroleum Hydrocarbons (TPH) – 34 analyses
- Asbestos – 20 analyses
- Ethylene glycol – 4 analyses
- Perchlorate – 2 analyses

The analytical results are summarized in Tables 5-1 to 5-6.

East Channel Ditch Sampling (2012) - Soil samples were collected from nine transects on the north bank of the East Channel Ditch (ECD)[v] in April 2012. Sample locations are shown on Figure 5-8 and the soil (and ditch sediment) analytical data are summarized in Table 5-7.

DOF Soil Borings (2008 and 2012) - In October 2008 and July 2012 fourteen soil borings were drilled in the CMA (Figure 3-3). The primary purpose of these borings was to assess the vertical extent of arsenic soil concentrations in the Penite Area and to provide soil and sediment porewater samples for geochemical testing. The boring soil

[v] The south bank of the ECD is being assessed and remediated as part of the Arkema Mound project under an Ecology Agreed Order.

sample analytical data are summarized in Table 5-8 (2008 borings) and Table 5-9 (2012 borings).

Also in July 2012, forty-six shallow soil probes ("NB" series borings) were drilled and sampled to depths of twelve to fifteen-feet in the area north of the salt pads (Figure 3-4). The north MMA property line is the common boundary between the MMA and the former USG rock-wool production facility. Arsenic is a common constituent for both properties. The purpose of the borings was to collect data to assess the nature and extent of soil contamination in the "*North Boundary Area"* and the likely source or sources.

The North Boundary area sampling activities were jointly documented by DOF (for the Port) and by USG's consultant (CDM-Smith). Measurements for metals were made in the field using a hand-held x-ray fluorescence spectrometer (XRF). XRF field data for arsenic and lead and the results of laboratory analyses for samples collected by DOF are summarized in Table 5-10. Additional information furnished by CDM-Smith is presented in Appendix G.

5.2.2 Wypenn Area

Shallow soil in the Wypenn Area is being addressed as part of an Ecology approved Interim Action Work Plan or IAWP (DOF 2012d and 2013) that is scheduled to be implemented during the summer of 2013. The purpose of the IAWP is to reduce shallow (<15 feet deep) soil concentrations of COPCs (arsenic) to below industrial soil contact cleanup levels. Implementation of the IAWP should also have a beneficial impact on groundwater. Because there is an IAWP that already addresses soil contact, this exposure pathway is not discussed in this RI. Soil concentrations will be discussed later in this report as part of addressing the nature and extent of COPCs in groundwater beneath the AMP.

5.3 Human Health Soil Contact and Particulate Inhalation

The point of compliance for the soil contact exposure pathway is 15 feet below ground surface [WAC 173-340-740(6)(d)]. Since 1989, over 400 soil samples, collected from depths of less than 15 feet, have been analyzed for metals, VOCs, SVOCs (including PAHs), PCBs, chlorinated pesticides and/or petroleum hydrocarbons. Compilation of the analytical results indicates that forty-six individual metal or organic compounds were detected as summarized in Table 5-11.

Soil contact (ingestion and dermal contact) industrial site use SLs for the detected compounds were generally developed using the work sheet for individual hazardous substances available on Ecology's web site. The analysis used the default assumptions presented in WAC 173-340-745(5). Chemical specific input parameters were obtained from Ecology's on-line data base CLARC. If sufficient information was not available for a specific compound, Method A values were used as indicated in Table 5-11.

Table 5-11 presents the number of sample analyses, detected constituents, maximum concentrations and SLs. A comparison of the maximum concentrations with the SLs indicated that concentrations of one or more of the following constituents were higher than the SL:

Constituents Carried Forward for Additional Evaluation (Soil Contact)

Constituent	Screening Level (mg/kg)	Maximum Concentration (mg/kg)
Antimony	533	27000
Arsenic	33	25000
Cadmium	2	14
Lead	1000	4070
Mercury	2	910

5.3.1 Antimony

Antimony concentrations ranged between not detected (RL approximately 6 mg/kg) and 27,000 mg/kg. Only three of the 344 samples analyzed (<1%) exceeded the soil contact SL of 533 mg/kg. All three samples were in the vicinity of the former Penite pits at locations PT33 and PT35[vi] (Table 5-1 and Figures 5-9a to 5-9c). The three samples also had high arsenic concentrations ranging from 3,300 to 25,000 mg/kg (Figures 5-10a and 5-10b). Based on the low number of samples that exceeded the antimony SL and the presence of high arsenic concentrations in the samples, antimony is not identified as a soil contact COPC. Remedial measures implemented for arsenic will also be protective of the localized area where antimony concentrations exceeded the soil contact SL.

5.3.2 Arsenic

Arsenic concentrations in soil ranged between approximately 2 and 25,000 mg/kg. The highest concentration of the over 400 samples analyzed was detected in a sample from the Penite pit area (PT33 – Table 5-1). There are two general areas within the MMA with high arsenic concentrations (greater than 500 mg/kg) including:

- **Former Penite waste pit area**, located on the landward side of the sheet pile wall (Figures 5-10a, b, c). Prior to the removal of Penite sludge in the early 1990s, arsenic concentrations were reported to range between 100,000 and 190,000 mg/kg. Remaining soils above a depth of fifteen feet in the pit area contain Penite residuals with much lower concentrations (generally less than approximately 1,000 to 4,000 mg/kg).

[vi] In the north boundary area the highest antimony concentration, 325 mg/kg at location NB15 (6-6.5 feet), is well below the soil contact SL of 533 mg/kg.

Arsenic soil concentration profiles are presented on Figures 5-11a and 5-11b to illustrate the vertical extent of arsenic soil concentrations in the vicinity of the Penite waste pits. The profile trends are shown on Figure 3-3. A composite sample (PT33 from 0.25 to 6 feet) obtained in the immediate waste pit area had a concentration of 25,000 mg/kg. Concentrations greater than 500 mg/kg appear to extend to near the bottom of the First Aquitard and are generally limited to depths of less than 20 to 25 feet. One sample located near the top of the Second Aquitard (at a depth of 29 feet from push-probe B-C on Figure 5-11b), had a concentration of 3,260 mg/kg.

High arsenic concentrations are present in shallow soils within the Upper Aquifer and into the top of the First Aquitard in the former waste pit area where arsenic concentrations up to 3,800 mg/kg (boring B-B) were detected. The source of arsenic was physical placement of Penite waste materials and leaching, migration and subsequent precipitation of arsenic.

Higher soil arsenic concentrations (800 to approximately 3,100 mg/kg) are also present in a deeper zone that extends from the Penite waste pit area towards the Hylebos Waterway (Figure 5-11b). This zones lies at an approximate depth of between 12 and 22 feet and is generally coincident with the First Aquitard. The vertical concentration pattern shown on Figure 5-11b is consistent with the vertical arsenic concentrations beneath the wedge area as illustrated on Figure 8-3 (the section trend is shown on Figure 8-2) and Figure 8-4. The source of arsenic was leaching of Penite waste materials with subsequent migration and precipitation of arsenic in the downgradient groundwater flow direction. Much of the precipitated arsenic within the Intermediate Aquifer was likely caused by the in-situ chemical injections that occurred in this area (see Figure 4-8).

Seepage of arsenic into the waterway along the outcrop of the Intermediate Aquifer in the navigation channel sidewall is likely limited by the sheet pile wall and precipitation of silica into the soil pores (before the wall was installed) based on the geochemical evaluations (described in Section 9.2). Silica precipitation near the aquifer/waterway interface has substantially reduced the hydraulic connection to the Hylebos Waterway along portions of the Arkema shoreline. This finding is supported by Intermediate Aquifer sediment porewater sample analyses (see Section 8.4.2). For example, the dissolved arsenic concentrations from OMMP Wells 122+60-2 and 124+00-2 ranged between approximately 11,600 and 46,500 ug/l while the sediment porewater dissolved concentration along the shoreline in the vicinity of these wells ranged between 1.9 ug/l and 4.6 ug/l (see Figure 8-11b).

- **North Boundary area,** generally located on the north side of the former salt pads (Figures 5-12a to 5-12d). Arsenic soil concentrations ranged between 3.7 and

3,770 mg/kg[vii]. The highest concentrations were detected along the property line in the vicinity of the former USG production and air pollution control facilities. High arsenic concentrations extend to depths of at least 10 to 13 feet as illustrated on Figures 5-12d, 5-13a and 5-13b. An arsenic concentration of 1,150 mg/kg was detected at a depth of ten to eleven feet at boring NB-26. Away from the area with relatively deeper arsenic concentrations, high arsenic concentrations exist in shallower soils at depths of between one and seven feet below ground surface (Figures 5-13c and 5-13d).

Based on the high concentrations of arsenic in soil, arsenic is confirmed as a soil contact COPC. The primary source of arsenic in the area south of the salt pads was the disposal of Penite manufacturing waste materials. The source of arsenic to the North Boundary area is discussed later in Section 7.0.

5.3.3 Lead

Lead concentrations in soil ranged between approximately 5 and 4,070 mg/kg (Figures 5-14a to 5-14d). Twelve of the 381 samples analyzed for lead (3.1%) exceeded the soil contact SL of 1,000 mg/kg as summarized below.

Lead Concentrations above the SL of 1,000 mg/kg

Location	Area	Lead (mg/kg)
MA5	South Salt Pads	1900
MA5	South Salt Pads	1400
PT33	Penite Area	1800
NB10	North Salt Pads	2270
NB11	North Salt Pads	2620
NB15	North Salt Pads	2740
NB16	North Salt Pads	1440
NB17	North Salt Pads	4070
NB26	North Salt Pads	1260
NB31	North Salt Pads	3120
NB37	North Salt Pads	1220
NB42	North Salt Pads	1840
NB49	North Salt Pads	1850

The highest lead concentrations were detected in samples collected from the “NB” series borings in the area north of the salt pads. Concentrations above the SL in the northern area ranged between 1,220 and 4,070 mg/kg while those in the southern area ranged between 1,400 and 1,900 mg/kg. Cleanup of arsenic containing soil in the North Boundary area will also address soil with lead concentrations above the SL.

[vii] Based on laboratory analyses (not including XRF field screening analyses).

For discussion purposes with regard to soil lead concentrations, the site is divided into two general areas termed the South Manufacturing area (generally south of the salt pads) and the North Boundary area (generally north of the salt pads).

- **South Manufacturing Area**. Lead concentrations in the South Manufacturing area are illustrated on Figures 5-14a to 5-14c. Most concentrations (approximately 99%) are less than 500 mg/kg and only three samples exceed the SL of 1,000 mg/kg. Summary statistics are presented below.

  Lead Soil Concentration Statistics – South Manufacturing Area

Evaluation Parameter	Manufacturing Area (N=267)
Maximum Soil Concentration (mg/kg)	1,900
% Exceed SL (1,000 mg/kg)	1.1 (N=3)
% Exceed 2X SL (2,000 mg/kg)	0 (N=0)
UCL 95% Concentration (mg/kg)	<20

  Analysis of the lead soil concentration data for the South Manufacturing Area indicates that lead is not a soil contact COPC because no sample exceeds two times the SL, less than 10% of the samples exceed the SL and the UCL95% concentration (<20 mg/kg) is substantially less than the SL of 1,000 mg/kg.

- **North Boundary area.** Lead concentrations in the North Boundary area are illustrated on Figures 5-15a to 5-15d. The highest detected concentrations were detected along the property line adjacent to the former USG production facilities. Concentrations in samples from this area ranged between 1,260 and 4,070 mg/kg. The highest concentration was detected at location NB17 collected at a depth of six feet. Concentrations greater than the SL were also detected in shallow soil samples (approximately 1,850 mg/kg in samples collected from depths of one to two feet) south of Waggoner's Wallow (Figure 5-15a).

  Lead concentration profiles are shown on Figures 5-16a to 5-16d. Concentrations greater than the SL appear limited to soil less than approximately seven feet in depth adjacent to the former USG facilities. Samples that exceed the lead soil contact SL also have high arsenic concentrations ranging between 281 and 3,790 mg/kg. Lead is identified as a soil contact COPC in the North Boundary area because five samples exceeded two times the SL.

5.3.4 Mercury

Mercury concentrations ranged between not detected (RL generally less than 0.025 mg/kg) and 910 mg/kg. The SL for mercury is based on the Method A soil CUL for industrial sites that is based on protection of groundwater, as a reference dose is not available to calculate a Method B CUL for mercury. Summary statistics for mercury in soil are presented below.

Mercury Soil Concentration Statistics

Evaluation Parameter	Manufacturing Area (N=287)
Maximum Soil Concentration (mg/kg)	910
% Exceed SL (2 mg/kg)	10.1 (N=29)
% Exceed 2X SL (4 mg/kg)	5.2 (N=15)
UCL95% Concentration (mg/kg)	0.24

Figures 5-17a to 5-17c show the mercury concentration patterns within the MMA. Concentrations exceeding the SL were only detected in the vicinity of the former Penite pits. The highest concentration (910 mg/kg) was detected at location PT33 where the highest arsenic concentration was detected. Mercury is identified as a soil contact COPC because concentrations exceed two of the evaluation criteria and the magnitude of the highest concentrations. Remedial measures implemented for arsenic should also be protective of the localized area where mercury concentrations exceeded the soil contact SL.

5.3.5 Cadmium

Cadmium concentrations ranged between not detected (RL generally less than 0.8 mg/kg) and 14 mg/kg. The SL for cadmium is based on the Method A soil CUL for industrial sites that is based on protection of groundwater, as a reference does is not available to calculate a Method B CUL for cadmium.

Summary statistics for cadmium in soil are presented below. Cadmium was detected in less than 20% of the 278 samples analyzed. Eight samples (2.9%) exceeded the SL of 2 mg/kg. Three samples (1.1%) exceeded two times the SL.

Cadmium Soil Concentration Statistics

Evaluation Parameter	Manufacturing Area (N=278)
Maximum Soil Concentration (mg/kg)	14
% Exceed SL (2 mg/kg)	2.9 (N=8)
% Exceed 2X SL (4 mg/kg)	1.1 (N=3)
UCL95% Concentration (mg/kg)	1.6 (a)

Notes: (a) – Based on assumed lognormal distribution for 54 samples where cadmium was detected above the RL.

Cadmium concentrations meet two of the three MTCA evaluation criteria (less than 10% exceed the SL and the UCL95% is less than the SL). The three samples that exceed two times the criteria occurred at locations PT33, PT35 and MA31 as summarized below:

Locations Where Cadmium Exceeds 2X SL

Location	Cadmium (mg/kg)	Arsenic (mg/kg)
PT33	14	25,000
PT35	12	3,300
MA31	5.8	770

Given the low number of samples that exceeded two times the cadmium SL and the presence of high arsenic concentrations in the samples, cadmium is not identified as a soil contact COPC. The samples containing the higher concentrations of cadmium are located in the Penite pit area. Remedial measures implemented for arsenic will also be protective of the localized area where cadmium concentrations exceeded the soil contact SL.

5.3.6 Summary of Soil Contact COPCs

- The results of the MMA analysis indicate that arsenic is the primary COPC via the soil contact exposure pathway based on an industrial site use. Mercury is also identified as a COPC within a small part of the CMA site (co-located with the highest arsenic concentrations in the Penite pit area).

- Lead is identified as a soil contact COPC in the North Boundary area. High lead concentrations are co-located with high arsenic concentrations in this area.

An exposure analysis of human health risks associated with the inhalation of particulates was not completed. It is assumed that remedial measures protective of arsenic direct contact will be protective of inhalation risks associated with arsenic and other COPCs.

5.4 Terrestrial Ecologic Contact

Identification of terrestrial COPCs is based on future industrial use although a specific layout and use has not been proposed for the AMP. However, industrial site development typically includes paving large areas, especially of marine terminal areas where heavy equipment is operated.

Terrestrial ecologic contact COPCs were identified by comparing the concentrations of soil constituents with the "*Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals*" (Table 749-3 - WAC 173-340-900). Because the site is an industrial site, the wildlife values (herein termed "*Wildlife Screening Level*" or "*WSL*") consistent with WAC 173-340-7490(3)(b) and data within the soil interval of 0 to 15 feet consistent with WAC 173-340-7490(4)(b) were used. The comparisons are summarized in Table 5-12. The terrestrial analysis is primarily based on the Malcolm Pirnie data collected in 2007 that is generally representative of the overall site conditions (except for the North Boundary Area). Using the 2007 soil data, a set of preliminary findings were developed that were modified based on review of boring and other data as discussed below.

5.4.1 Main Manufacturing Area (MMA)

The following terrestrial COPCs were identified for the MMA:

- Arsenic
- Total Chromium
- Copper
- Lead
- Mercury
- Selenium
- Zinc (North Boundary Area only)
- Sum DDD/DDE/DDT

With the exception of arsenic and selenium, the indicated COPCs were identified based on one or more samples exceeding two times the WSL. Selenium and arsenic soil concentrations also exceeded the WSL in more than 10% of the samples and the UCL95% arsenic concentration was higher than the WSL. A UCL95% selenium concentration could not be estimated because of the large number of non-detects. Each of the terrestrial COPCs are discussed below.

Arsenic. The WSL for arsenic is 20 mg/kg (7 mg/kg adjusted for Washington State background). Figures 5-10a to 5-10c show arsenic soil concentrations for three depth intervals. The greatest exceedance of the WSL is within the central CMA near the former Penite pits where arsenic concentrations generally range from 100 to 4,200 mg/kg with one sample as high as 25,000 mg/kg (2.5% by weight). High concentrations of arsenic are also present in the North Boundary Area (Figures 5-12a to 5-12d). Outside of the Penite pit and North Boundary areas, localized areas exceed the WSL. In these areas, arsenic concentrations generally range up to 450 mg/kg.

Total Chromium. The WSL for total chromium is 67 mg/kg. The highest concentrations (98 to 370 mg/kg) were reported for the area where the sodium chlorate tanks were formerly present (Figures 5-18a to 5-18c). Outside the sodium chlorate tank area, only four sample concentrations were above the WSL. Several isolated samples exceeded the WSL, with the highest concentration (200 mg/kg) being co-located with soil containing relatively high arsenic concentrations. None of the 1989 ditch/impoundment sediment samples or the 2012 boring samples total chromium concentrations exceeded the WSL. Note the north boring area soil samples were not analyzed for chromium.

Copper. The WSL for copper is 217 mg/kg. Only 5 of 245 samples analyzed in 2007 exceeded the WSL (Figures 5-19a to 5-19c). In the Penite pit area, three sample concentrations ranged between 330 and 2,000 mg/kg. Outside the Penite pit area, one Waggoner Wallow sample had a concentration of 550 mg/kg and one sample below the former shop/storage building had a concentration of 290 mg/kg (Figure 5-19b). This latter sample appears to represent surface soil (0.25 to 0.5 feet). None of the 1989 ditch/impoundment sediment samples, or MMA 2012 boring sample copper concentrations exceeded the WSL. Copper concentrations in North Boundary area borings ranged between less than 10 mg/kg to over 800 mg/kg. Eleven of seventy-seven samples (14%) exceeded the WSL and were generally co-located with high arsenic and lead concentrations.

Lead. The WSL for lead is 118 mg/kg. Sediment samples from the Waggoner's Wallow ditch north of the former salt pads ranged between 120 and 290 mg/kg (Figure 5-15b). Most of the remaining ditch/impoundment sediment samples were substantially less than the WSL. Only 9 of 245 soil samples analyzed in 2007 exceeded the WSL (Figures 5-14a to 5-14c). In the Penite pit area, three sample concentrations ranged between 340 and 1,800 mg/kg. Outside the Penite pit area, three samples beneath former shop/storage building had concentrations of between 300 and 1,900 mg/kg and two samples near the former sand blast shed had lead concentrations between 120 and 160 mg/kg. The ninth sample, located in the Waggoner's Wallow area along the north property boundary, had a lead concentration of 450 mg/kg. The 2012 North Boring soil sampling program detected lead at concentrations greater than 118 mg/kg as shown on Figures 5-15a to 5-15c. The highest concentrations were detected along the north property line.

Mercury. The WSL for mercury is 5.5 mg/kg. Concentrations of mercury only exceeded the WSL in samples from the Penite pit area where high arsenic concentrations were also detected (Figures 5-17a to 5-17c). In the Penite pit area, mercury concentrations ranged between approximately 14 and 910 mg/kg. None of the 1989 ditch/impoundment samples exceeded the mercury WSL. Mercury was not analyzed in the 2012 North Boundary area boring samples.

Selenium. The WSL for selenium is 0.3 mg/kg. Selenium soil concentrations ranged from not detected (as low as <0.27 mg/kg) to 71 mg/kg (Figures 5-20a to 5-20c). The highest concentrations were detected in the Penite pit area where concentrations greater than 1 mg/kg were generally encountered. Outside the Penite pit area, most selenium concentrations were not detected or were detected at less than 2 times the WSL. One surface sample located south of the former Taylor Lake impoundments had a concentration of 0.67 mg/kg (Figure 5-20a), while sample concentrations along the north boundary ranged up to 0.88 mg/kg (Figure 5-20b).

Sum DDD/DDE/DDT (herein termed DDT). The WSL for the sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT (total DDTs) is 0.75 mg/kg. Figure 5-21 shows the locations where these pesticides were analyzed and where the reported DDT concentrations exceeded the WSL. Two surface samples (0 to 0.25 feet deep) exceed the WSL. A sample near the warehouse had a DDT concentration of 35 mg/kg while a sample located on the south side of the former chlorate tanks had a concentration of 1.2 mg/kg. The 0.25 to 6 feet samples at these two locations did not exceed the WSL of 0.75 mg/kg. DDD, DDE and DDT were not analyzed in the 1989 impoundment samples.

5.4.2 Wypenn Area

The previously completed terrestrial COPC analysis (DOF 2011) identified arsenic as a terrestrial COPC. As noted in Section 5.2.2 above, the Wypenn interim remedial action will reduce soil arsenic concentrations. Furthermore, land use plans for the site are for an industrial marine terminal that will eliminate the terrestrial exposure pathway. The deferral of terrestrial COPC evaluation is recommended until the permitting and development plans for Wypenn are proposed.

5.5 Erosion of East Channel Ditch (ECD) Bank Soils

The East Channel Ditch (ECD) receives groundwater discharge from the southern portion of the MMA. The northern banks of the ditch are unprotected and susceptible to erosion. In 2012 the lower portions of the ditch were mapped to assess whether visual evidence of silica precipitation had occurred in the banks of the ditch. Such precipitation would occur when high pH water (pH > 8.7) discharges into the ditch and mixes with lower pH water (DMD 2011 – Appendix H).

Figure 5-22 shows the results of the mapping that occurred at low tide. Evidence of silica precipitation was observed along the lower 100 foot reach of the ditch during a low tide. The upstream extent was near the end of the sheet pile wing wall. Four small seeps were also observed during the mapping at the locations shown on Figures 5-8 and 5-22. The results of seep and ditch water sampling are discussed in Section 6.0.

To assess the presence of arsenic in north ECD bank soils, soil samples were collected along nine transects as shown on Figure 5-8. One to four samples were collected from the top to the bottom of the slope. The number of samples at each location depended on the height of the slope. A ditch bottom sediment was also collected at each transect. All the ECD soil/sediment samples were analyzed for arsenic. The analytical results are summarized in Table 5-7.

The ECD soil and sediment data were compared to the following arsenic SLs:

- Soil Contact SL – 33 mg/kg based on ingestion/dermal contact on an industrial land use site.
- Sediment – 57 mg/kg – Commencement Bay Sediment Quality Objective (SQO).

ECD north bank arsenic soil concentrations ranged between 2.4 and 20.6 mg/kg. The highest sample concentration for each transect is plotted on Figure 5-23a. The UCL95% concentration was estimated to be 12.6 mg/kg. Arsenic concentrations in all the bank soil samples were below the soil contact SL and SQO as was the UCL95% concentration.

Ditch sediment concentrations ranged between 9.4 and 203 mg/kg. Seven of the thirteen sediment samples exceeded the SQO as shown on Figure 5-23b. Sediment concentrations near the mouth of the ditch ranged between 12 and 17 mg/kg, indicating that little arsenic in sediment is migrating down the ditch towards the waterway. The source of the higher arsenic concentration ditch sediment was likely erosion of material from the Arkema Mound site. South bank soil concentrations adjacent to the mound site ranged between 24 and 1,260 mg/kg. The mound site and ditch are being remediated under a separate Ecology order.

5.6 Other Constituents

A number of other constituents were analyzed as part of past work. While these constituents were not identified as soil contact or terrestrial COPCs, soil concentration plots are provided to provide documentation of sample locations and analytical results. These constituents include PCBs, asbestos, perchlorate and ethylene glycol and are discussed below. Note soil samples also analyzed for petroleum hydrocarbons are discussed with the groundwater analytical data.

5.6.1 PCBs

Figure 5-24 shows the locations of samples analyzed for PCBs on the AMP. In the MMA, samples were obtained from locations where PCB releases may have occurred including an electrical substation and rectifier. No PCBs were detected in soil surrounding the substation and only low concentrations (highest 0.22 mg/kg) were detected in the vicinity of the rectifier. These concentrations are below SLs based on human health (1 mg/kg) and terrestrial wildlife exposure (0.65 mg/kg).

In 2010 samples from the Wypenn Area were also analyzed for PCBs. PCBs were not detected in samples from 10 of 14 locations. The highest concentration (0.3 mg/kg) which is below both the SL and WSL was reported for a sample collected from WP-B4.

5.6.2 Asbestos

In 2007, samples from ten locations in the Taylor Lake area, including from the former asbestos pond location, were analyzed for asbestos (Figure 5-25). Asbestos was not detected in any of the twenty-six samples analyzed.

5.6.3 Perchlorate and Ethylene Glycol

Figure 5-25 shows the location of perchlorate and ethylene glycol samples. Perchlorate was not detected in two samples; one near the Penite pits and one in the Taylor Lake impoundment. Ethylene glycol was not detected in two samples obtained near the southwest corner of the MMA near the Petroleum Reclaiming facility.

5.7 Groundwater Analytical Data, Sources and COPCs

5.7.1 Main Manufacturing Area (MMA) – Data and Sources

Malcolm Pirnie (2006). Groundwater sampling began in the early 1980s after releases of arsenic were documented. In 2006 before the Port acquired the AMP, Malcolm Pirnie completed a review of available data to identify preliminary GW-COPCs. Their approach is described below:

- SLs were identified based on potential risks to surface water ecologic receptors.
- Data was evaluated based on detection frequency and designation as "*essential minerals*"[viii]. Those constituents either not detected or detected at a frequency of less than 5%, or identified as essential minerals were not retained for further evaluation.
- Detected constituents whose concentrations were below SLs were not retained for further evaluation.

Those groundwater constituents retained for further evaluation are listed below:

GW-COPCs Retained for Further Evaluation in 2006

Dissolved Metals/Conventionals	Organics
Arsenic	Chloroform
Chromium	cis-1,2-Dichloroethene
Copper	Methylene chloride
Iron	Tetrachloroethene
Lead	Trichloroethene
Nickel	Hexachlorobutadiene
Zinc	Indeno(1,2,3-cd) pyrene
pH	Naphthalene
	Pentachlorophenol
	Pyrene
	PCBs
	4,4-DDD, 4,4'-DDE, 4,4'-DDT
	Endosulfan II

Based on further review, the following constituents were not retained as GW-COPCs by Malcolm Pirnie based on data available as of 2006. In the following discussion, the 2006 data was supplemented with data collected in 2008 and 2012.

- **cis-1,2-Dichloroethene** – Samples from only two locations (3C1-1 and 7E10-1) exceeded the SL of 680 ug/l (EPA Region 3 marine screening benchmark – there are no surface water criteria listed in CLARC). The highest concentration (7,500

[viii] Calcium, magnesium, potassium and sodium.

ug/l) was detected at location 3C1-1. In 2012 (Table 5-13) a sample from well 3C1-1 had a concentration of 28 ug/l and the highest detected concentration was 450 ug/l (7E7-2). Based on the Malcolm Pirnie evaluation and the 2012 groundwater sampling data, cis-1,2-dichloroethene was not retained as a GW-COPC. Note that the maximum reported concentration was detected in area VOC-A (discussed in Section 5.7.4) where other VOCs have been identified as COPCs. Cis-1,2-Dichloroethene is an intermediate degradation product of other solvents, and degrades to vinyl chloride. Monitoring and cleanup for vinyl chloride will address the presence of this compound.

- **Methylene chloride** – Exceeded the SL (2,560 ug/l – EPA Region 3 marine screening bench-mark) in only two locations (3C1-1 and 7E10-1). The maximum concentration was detected in a sample from 7E10-1. The CWA[ix] surface water criterion listed in CLARC to protect human health is 590 ug/l. No shoreline well samples exceeded the SL. The highest concentration of methylene chloride was detected in a sample from Area VOC-B (see Section 5.7.4). Methylene chloride is not retained as a GW-COPC because no shoreline samples exceeded the current criteria and monitoring and cleanup for other VOC compounds such as chloroform will address the presence of this compound.

- **Indeno (1,2,3-cd) pyrene** – Detected above the SL (0.5 ug/l) at an upgradient Upper Aquifer well location (well 7I-1 at 0.98 ug/l) in only one of thirty-four samples. No shoreline samples exceeded the SL. Based on the low frequency of detection (10 of 34 samples), number of locations that exceeded the SL (one sample) and limited magnitude of exceedance (<2 times the SL), this compound was not retained as a GW-COPC.

- **Naphthalene** – Detected in only nine of seventy-seven samples and exceeded the SL (1.4 ug/l) in samples from five locations (CLARC lists a surface water Method B criterion of 4,900 ug/l - no CWA or NTR[x] criteria are listed). The maximum detected concentration was 17 ug/l at location 6D18-2. Two of the exceedances were reported for Intermediate Aquifer wells and one exceedance was reported for a Deep Aquifer well. Naphthalene was not retained as a GW-COPC because of the low detection frequency, lack of spatial patterns, and suspect nature of some of the reported detections (i.e. it is unlikely naphthalene would be detected in deep aquifer samples).

- **Pentachlorophenol** – Detected in only two of thirty-two samples. Exceeded the SL (7.9 ug/l) in only one sample (Intermediate Aquifer well 6D12-2 at 380 ug/l). Pentachlorophenol was not retained as a GW-COPC because of the low frequency

[ix] CWA – Clean Water Act
[x] NTR – National Toxics Rule

of detection, low likelihood of an on-site source and lack of a spatial pattern of exceedance.

- **Pyrene** – Detected in only three of thirty-four samples. Exceeded the SL (0.24 ug/l) in only two locations at a maximum concentration of 0.36 ug/l in a sample from upgradient well 7I1-1. CLARC lists a surface water Method B criterion of 2,600 ug/l. Pyrene was not retained as a GW-COPC because of the low detection frequency, magnitude of exceedance (<2 times the SL), lack of a spatial pattern of exceedances and upgradient location of maximum exceedance.

- **PCBs** – Detected in only two of thirty-four samples and exceeded the SL (0.03 ug/l) at only two locations (5C3-1 and 5B1-2). The maximum reported concentration was 0.21 ug/l in a sample from Upper Aquifer well 5C3-1. PCBs were not retained as groundwater COPCs by Malcolm Pirnie based on the low detection frequency, lack of detection of other PCBs (only Aroclor 1254 was detected), and lack of known use at the site other than for the potential for incidental contamination from sediment restoration activities.

  PCBs were also potentially associated with electrical equipment such as rectifiers and the substation (Figure 1-8). As discussed in Section 5.6.1 and shown on Figure 5-24, analysis of soil samples by these facilities did not detect significant concentrations of PCBs (the highest concentration of total PCBs was 0.22 mg/kg), which is unlikely to be a significant source of groundwater contamination. In 2008, samples from four Upper Aquifer wells/seep samplers in the vicinity of 5C3-1 and four wells in the vicinity of 5B1-2 (including 5B1-2) were analyzed for PCBs. PCBs were not detected at a reporting limit (PQL) of 0.01 ug/l. The 2008 sampling confirmed that PCBs are not GW-COPCs for the AMP.

Additional detail of the SLs used by Malcolm Pirnie, frequency and magnitude of detections of identified constituents are included in Appendix I (Tables 7-1 to 7-11 from Malcolm Pirnie (2006).

The "*final*", herein preliminary, GW-COPCs identified in 2006 are listed below.

Preliminary GW-COPCs Identified in 2006

Dissolved Metals	**Organics**
Arsenic	Chloroform
Chromium	Tetrachloroethene
Copper	Trichloroethene
Iron	Hexachlorobutadiene
Lead	4,4'-DDD
Nickel	4,4'-DDE
Zinc	4,4''-DDT
	Endosulfan II

Dalton, Olmsted & Fuglevand, Inc. – 2008. Based on the Malcolm Pirnie (2006) findings described above, a groundwater sampling program was implemented in 2008 (DOF 2008b). The program included an on-site well inventory, repair or replacement of monitoring wells, the installation of new monitoring wells and the collection/analysis of groundwater samples as follows:

- Installed forty-two replacement or new wells
- Collected samples from 130 locations:
  - 68 from upper aquifer wells (including shoreline seep samplers)
  - 43 from intermediate aquifer wells
  - 17 from deep aquifer wells
  - 2 porewater samples (subtidal cap)
- Analyzed the samples for:
  - Field parameters (pH, conductivity, temperature, dissolved oxygen, oxidation/reduction potential, ferrous iron, turbidity)
  - Total (unfiltered) metals (arsenic, calcium, iron, magnesium)
  - Dissolved (field filtered) metals (arsenic, calcium, total chromium, copper, iron, lead, magnesium, mercury, nickel, zinc, silicon)
  - Conventional parameters (alkalinity, total suspended solids-TSS, ferrous iron, chloride, N-nitrate, sulfate, sulfide, dissolved organic carbons-DOC, total organic carbon-TOC)
  - Volatiles (vinyl chloride, cis-1,2-dichloroethene,chloroform, trichloroethene, tetrachloroethene)
  - Hexachlorobutadiene
  - Chlorinated pesticides (DDE, DDD, DDT, endosulfan II, and PCBs)
  - Arsenic species (see DMD 2011 – Appendix H)
  - Others (methane, ethane, ethane, perchlorate, microbial iron reducers)

The results of the 2008 groundwater sampling are documented in the DOF Site Characterization Data Report (DOF 2011) and are summarized in Tables 5-13 and 5-16.

Dalton, Olmsted & Fuglevand, Inc. – 2012. After the Agreed Order became effective in July 2011, an RI Work Plan and Sampling and Analysis Plan (and supplements) were prepared to complete the RI/FS for the AMP (DOF 2012a, b, and c). To further assess and refine the list of GW-COPCs and refine the RI site boundary the following work was completed:

- Off-site well inventory (Arkema Mound, Blair Backup Property, USG site and Reichhold site).
- Collected groundwater samples from 129 Arkema plant locations:
  - 61 from upper aquifer wells (including shoreline seep samplers)
  - 49 from intermediate aquifer wells
  - 19 from deep aquifer wells
  - 18 samples USG Site wells (14 upper aquifer/4 intermediate aquifer)
  - 1 Arkema Mound (intermediate aquifer)

    - 4 seep samples (East Channel Ditch)
    - 7 shoreline porewater samples (intermediate aquifer outcrop)
- Analyzed the samples for:
    - Field parameters (pH, conductivity, temperature, dissolved oxygen, oxidation/reduction potential, ferrous iron, turbidity)
    - Dissolved (field filtered) metals (arsenic, calcium, total chromium, hexavalent chromium, copper, iron, magnesium, mercury, nickel)
    - Conventional parameters (alkalinity, TSS, chloride, sulfate, sulfide, DOC)
    - Volatiles (vinyl chloride, cis-1,2-dichloroethene,chloroform, trichloroethene, tetrachloroethene)
    - Hexachlorobutadiene
    - Chlorinated pesticides (DDE, DDD, DDT, endosulfan II)
    - Arsenic species
- Identified and reviewed recent pertinent groundwater data from the Arkema Mound and Blair Backup properties.

The results of the 2012 groundwater sampling are documented in the DOF Data Gap Technical Memorandum (DOF 2012e) and are summarized in Table 5-13.

Dalton, Olmsted & Fuglevand, Inc. – 2013. The DOF (2012e) data gap memorandum identified some additional testing necessary to confirm the results of the previous analyses and to further evaluate laboratory methods for analysis of dissolved arsenic near the SL (5 ug/l) in samples with high dissolved solids content (primarily chloride). The following work was completed:

- Collected samples from 16 locations:
    - 5 upper aquifer wells
    - 11 intermediate aquifer wells
- Analyzed the samples for:
    - Field parameters (see previous list above)
    - Dissolved metals (arsenic, calcium, copper, iron, magnesium, mercury)
    - Dissolved arsenic species
    - Conventional parameters (chloride, sulfate, sulfide, DOC)

The results of the 2013 groundwater sampling are documented in this report and are summarized in Table 5-13.

5.7.2 Wypenn Area – Data and Sources

Groundwater samples were collected from the Wypenn Area wells in 2008 and 2012 as follows:

- Collected samples from 10 locations:
    - 5 upper aquifer wells

    - 4 intermediate aquifer wells
    - 1 deep aquifer well
- Analyzed the samples for:
    - Field parameters (see previous list above)
    - Petroleum hydrocarbons (TPH-G and TPH-Dx)
    - Dissolved metals (arsenic, total chromium, hexavalent chromium, copper, iron, mercury and nickel)
    - VOCs
    - PAHs
    - Chlorinated pesticides

Results of the 2008 analyses were documented in DOF (2011) and are summarized in Table 5-13 while the 2012 analyses are documented in the Wypenn Interim Action Work Plan (DOF 2112d) and are summarized in Table 5-14.

5.7.3 Groundwater SLs

Table 5-17 lists the SLs that Malcolm Pirnie used to identify the preliminary GW-COPCs, together with the following environmental criteria consistent with MTCA:

- Surface Water Quality (WAC 173-201A) - Groundwater discharge to marine surface water.
- Marine Chronic Criteria (EPA 2010) - Groundwater discharge to surface water - protection of marine aquatic organisms.
- Marine Surface Water Criteria (EPA 2010) - Groundwater discharge to surface water - human health consumption of marine organisms.
- National Toxics Rule [40 CFR 131.36] - Groundwater discharge to surface water - human health consumption of marine organisms.
- MTCA Method B - Surface Water Cleanup Levels (WAC 173-340-730) - Groundwater discharge to surface water - human health consumption of marine organisms.

Generally the lowest criteria were selected as conservative surface water SLs with the following adjustments:

- The SL for arsenic was adjusted to 5 ug/l based on Washington State background (see footnote "*a*" to Table 720-1 in WAC 173-340-900)
- The SLs for DDD, DDE and DDT were adjusted to the practical quantitation limit (PQL).

The list of preliminary GW-COPCs developed in 2006 were evaluated using the refined SLs and the results of the comprehensive analyses completed in 2008 and 2012, supplemented with the 2013 testing results. Each of the preliminary GW-COPCs is discussed in the following report section.

5.7.4 Groundwater COPCs (via migration to surface water)

Each of the preliminary GW-COPCs were either retained for inclusion on the final list of GW-COPCs or eliminated from the list for the stated reasons.

Volatile Organic Compounds. The occurrence of chloroform, tetrachloroethene (PCE), trichloroethene (TCE) and vinyl chloride (VC)[xi], by aquifer, are illustrated on Figures 5-26 to 5-29. The range of detected concentrations (all samples) and surface water SLs are summarized below:

Range of VOC Groundwater Concentrations – 2008 and 2012

Compound	Upper Aquifer (ug/l)	Intermediate Aquifer (ug/l)	Deep Aquifer (ug/l)	SW SL (ug/l)
Chloroform	<0.2 to 14000	<0.2 to 30,000	<0.2 to 11,000	470
PCE	<0.2 to 6900	<0.2 to 3700	<0.2 to 35	3.3
TCE	<0.2 to 920	<0.2 to 470	<0.2 to 11	13
VC	<0.2 to 4900	<0.2 to 680	<0.2 to 5.2	2.4

Note: SW SL – Surface water screening level

The highest VOC concentrations coincide with two areas where releases of VOCs have been documented (see Section 5.10.1 regarding the release areas). These areas include Area VOC-A located on the south side of the salt storage pads and area VOC-B located on the east side of the Taylor Lake impoundment area.

While the highest VOC concentrations are present in the identified VOC areas, 2012 concentrations in shoreline wells were below SLs. Shoreline concentrations (2012 data) and SLs are summarized below:

Range of VOC Shoreline Groundwater Concentrations - 2012

Compound	Upper Aquifer (ug/l)	Intermediate Aquifer (ug/l)	Deep Aquifer (ug/l)	SW SL (ug/l)
Chloroform	1.1	25	<0.2	470
PCE	0.5	<0.2	<0.2	3.3
TCE	0.3	0.3	<0.2	13
VC	0.07	1.8	<0.2	2.4

Note: SW SL – Surface water screening level

Chloroform (Figures 5-26a to 5-26c) – Shoreline groundwater concentrations of chloroform ranged between not detected (<0.2 ug/l) and 25 ug/l. The highest concentration was detected in Intermediate Aquifer well sample 3A6-2 located

[xi] Vinyl chloride was not identified by Malcolm Pirnie as a GW-COPC. However, discussion of this compound is included because it is a common PCE/TCE breakdown product and provides strong evidence of reductive dechlorination.

downgradient of area VOC-A. No shoreline sample concentrations exceeded the surface water SL of 470 ug/l.

Interior site chloroform concentrations (2012) ranged between not detected (<0.2 ug/l) and 8,300 ug/l. The highest concentration was detected downgradient of area VOC-A in a sample from the Intermediate Aquifer (4B2-2). Chloroform was also detected (1,600 ug/l) in a Deep Aquifer sample from well 4B1-3 (also downgradient of area VOC-A).

Chloroform was not detected in any of the Wypenn groundwater samples. The reporting limit was 0.2 ug/l.

Tetrachloroethene (Figures 5-27a to 5-27c) – Shoreline groundwater concentrations of tetrachloroethene (PCE) ranged between not detected (<0.2 ug/l) and 0.5 ug/l. None of twenty-seven shoreline samples exceeded the surface water SL of 3.3 ug/l.

Interior site PCE concentrations (2012) ranged between not detected (<0.2 ug/l) and 6,900 ug/l. The highest concentration was detected within area VOC-A in a sample from the Upper Aquifer (3C2-1). PCE was also detected (20 ug/l) in a Deep Aquifer sample from well 4B1-3 (also downgradient of area VOC-A).

PCE was not detected in any of the Wypenn groundwater samples. The reporting limit was 0.2 ug/l.

Trichloroethene (Figures 5-28a to 5-28c) – Shoreline groundwater concentrations of trichloroethene (TCE) ranged between not detected (<0.2 ug/l) and 0.3 ug/l. No shoreline sample concentrations exceeded the surface water SL of 13 ug/l.

Interior site TCE concentrations (2012) ranged between not detected (<0.2 ug/l) and 470 ug/l. The highest concentration was detected downgradient of area VOC-B in a sample from the Intermediate Aquifer (7E6-2). TCE was also detected (11 ug/l) in a Deep Aquifer sample from well 4B1-3 (downgradient of area VOC-A).

TCE was not detected in any of the Wypenn groundwater samples. The reporting limit was 0.2 ug/l.

Vinyl Chloride (Figures 5-29a to 5-29c) – Shoreline groundwater concentrations of vinyl chloride (VC) ranged between not detected (<0.2 ug/l) and 2.9 ug/l. The highest concentration was detected in Intermediate Aquifer well 4B4-2 (2008 sample) located downgradient of area VOC-A. No 2012 shoreline sample concentrations exceeded the surface water SL of 2.4 ug/l.

Interior site VC concentrations (2012) ranged between not detected (<0.2 ug/l) and 680 ug/l. The highest concentration was detected downgradient of area VOC-B in a sample from the Intermediate Aquifer (7E7-2). VC was also detected (160 ug/l) in an Intermediate Aquifer sample from well 4B3-2 (downgradient of area VOC-A).

Based on available data, chloroform, PCE, TCE and VC are retained as GW-COPCs for the MMA. While no shoreline sample concentrations exceeded SLs, interior site concentrations located upgradient of the shoreline were substantially above the surface water SLs. Note, however, that these VOC constituents are not groundwater COPCs for the Wypenn Area.

A VOC groundwater remediation system operated in the VOC-A area from 1996 to 2003. The system was shut-down because available data indicated that natural attenuation was containing the VOC constituents. The presence of vinyl chloride provides evidence that natural attenuation via reductive dechlorination is occurring.

Hexachlorobutadiene (HCBD). Groundwater samples collected in 2003 indicated the presence of HCBD beneath the MMA. Similar concentrations were detected in the 2008 and 2012 samples. The range of reported concentrations by aquifer are summarized below.

Range of Hexachlorobutadiene Groundwater Concentrations – 2003 to 2012

Year	Upper Aquifer (ug/l)	Intermediate Aquifer (ug/l)	Deep Aquifer (ug/l)	SW SL (ug/l)
2003/2004	nd to 64	nd to 3.9	-----	18
2008	nd to 49	nd to 0.05	-----	18
2012	nd to 46	nd to 0.60	nd	18

Note: SW SL – Surface water screening level

The highest concentrations were detected in Upper Aquifer groundwater samples in areas VOC-A and VOC-B (Figure 5-30a). The co-location of HCBD with the VOCs indicates the compounds were likely produced and discharged together by plant operations.

The HCBD surface water SL is 18 ug/l. In area VOC-A, HCBD was detected at a concentration of 46 ug/l in a sample from 3C2-1 collected in 2012. Concentrations (24 to 28 ug/l) at two Upper Aquifer locations associated with area VOC-B exceeded the surface water SL in 2004. In 2008, the location with the higher of the two concentrations (28 ug/l) was resampled and a concentration of 13 ug/l was detected that was below the surface water SL.

HCBD was not detected in the 2012 samples collected/analyzed from the Wypenn Area. The 2012 reporting limit was 0.05 ug/l.

Based on available data, HCBD is eliminated as a GW-COPC. HCBD has not been detected in shoreline samples close to the likely groundwater point of compliance. While HCBD has been detected above the surface water SL in localized areas of the site, the data indicate that it is not significantly migrating in groundwater towards the shoreline or into underlying aquifers.

Chlorinated pesticides (DDD, DDE, DDT, Endosulfan II). Pesticide concentration patterns are shown on Figures 5-31a and 5-31b based on data collected in 2003, 2008 and 2012. All but one of the reported pesticide detections occurred in the 2003 sample set. Sampling was conducted in 2008 and 2012 to confirm the 2003 data. Analysis of twenty-nine samples in the MMA collected in 2008 and 2012 did not confirm the presence of the identified pesticides reported in 2003. In 2008 4,-4'-DDD was only detected (0.0022 ug/l) in an Upper Aquifer groundwater sample from interior well 5E1-1.

In 2012, samples from the Wypenn area were analyzed for chlorinated pesticides. No pesticides were detected at RLs between 0.1 ug/l and 0.05 ug/l.

Based on available data, DDD, DDE, DDT and Endosulfan II are <u>eliminated</u> as GW-COPCs. Samples obtained in 2008 and 2012 did not detect the presence of pesticides except for one sample near the RL.

Dissolved Arsenic. Dissolved arsenic is the primary GW-COPC for the AMP. The surface water SL is 5 ug/l. Figures 5-32a to 5-32c illustrate the groundwater dissolved arsenic concentration patterns on and in the vicinity of the former AMP based on data collected in 2008 and 2012.

The highest arsenic concentrations are present in groundwater located behind the sheet pile wall in both the Upper and Intermediate Aquifers, near the former Penite pits where waste materials containing arsenic were disposed. In 2012, concentrations behind the wall varied between 19 and 96,000 ug/l. Dissolved arsenic concentrations greater than 1,000 ug/l are located outside of the wall in well samples collected along the shoreline adjacent to the existing dock and in several of the OMMP wells located outside of the sheet pile wall. Samples of interstitial/porewater obtained from well points driven into the Intermediate Aquifer discharge area and subtidal cap were substantially lower. The porewater data are discussed below in Section 9.0 (Geochemical Model).

Arsenic concentrations away from the sheet pile wall area are substantially lower and generally ranged between approximately 14 and 450 ug/l in the Upper Aquifer and not detected (RL=2 to 5 ug/l) to 10 ug/l in the Intermediate Aquifer. Concentrations along the shoreline exceed the SL at a number of locations. The highest arsenic concentration away from the sheet pile wall area was detected on the former USG site in Upper Aquifer well MW-1 where a concentration of 1,100 ug/l was detected.

A relatively minor amount of arsenic is migrating into the Deep Aquifer (Figure 5-32c) in the area behind the sheet pile wall. However, concentrations in most Deep Aquifer samples are below the SL.

Arsenic concentrations in samples from the Wypenn area ranged between 40 to 680 ug/l in the Upper Aquifer and 6 to 18 ug/l in the Intermediate Aquifer. It should be noted that the high Upper Aquifer dissolved arsenic concentrations are in the immediate area of shallow soil also containing high arsenic concentrations that will be remediated as part of implementing the approved Wypenn Interim Action Work Plan (DOF 2012d).

Based on the available data, arsenic is <u>retained</u> as a GW-COPC for both the MMA and Wypenn areas.

Dissolved Chromium. In the environment, chromium is normally encountered in two valence states; trivalent chromium [CrIII] and hexavalent chromium (Cr[VI]). The SL for Cr[III] is 240,000 ug/l and the SL for Cr[VI] is 50 ug/l. Total chromium concentration patterns are illustrated on Figures 5-33a to 5-33c. The highest total chromium concentration detected on the site in 2012 was 297 ug/l in a sample from Intermediate Aquifer OMMP well 131+00-2. None of the detected total chromium concentrations exceeded the Cr[III] SL.

In 2012, Cr[VI] was analyzed in twenty-four Upper Aquifer samples and eighteen Intermediate Aquifer samples at the locations shown on Figures 5-33a and 5-33b, including samples where the total chromium concentration was greater than the Cr[VI] SL. Cr[VI] was not detected in any of the samples (RL varied between 10 and 100 ug/l). Total chromium and Cr[VI] data for samples where total chromium was detected at concentrations greater than 50 ug/l are summarized below:

Comparison of Total and Cr[VI] Concentrations – Manufacturing Area

Location	Total Cr (ug/l)	CrVI (ug/l)
3A7-1	126	nd (<50)
3C6-1	250	nd (<100)
5C14-2	181	nd (<10)
121+80-2	250	nd (<10)
124+00-2	254	nd (<10)
131+00-2	297	nd (<50)
8F2-2	369	nd (<50)
6E12-2	114	na
MWA2	120	nd (<10)

Notes: nd – not detected; < - Less than the indicated reporting level; na – not analyzed

Total chromium concentrations for the Wypenn area ranged between <1 and 100 ug/l. The highest concentration was detected in a sample from Upper Aquifer well 5I2-1. Total chromium concentrations in the other well samples ranged between <1 and 25 ug/l. Only one sample exceeded the SL based on Cr[VI].

Based on the available data, chromium is <u>eliminated</u> as a GW-COPC. Hexavalent chromium (Cr[VI]) was not detected in any of the samples analyzed where total chromium exceeded the SL. In addition, geochemical conditions at this site are sufficiently reduced (low ORP) to preclude the existence of any oxidized chromium species (Cr[VI]).

Dissolved Copper. Dissolved copper concentration patterns are illustrated on Figures 5-34a to 34c. The SL for copper is 2.4 ug/l. The 2012 dissolved concentration range for MMA wells within each aquifer unit is summarized below:

Range of Dissolved Copper Concentrations – Manufacturing Area - 2012

Aquifer Unit	Shoreline Concentration Range (ug/l)	Interior Concentration Range (ug/l)	Location of Highest Concentrations (shoreline/interior)
Upper	1 to 144	nd (<1) to 288	3A7-1/3C1-1
Intermediate	nd (<2) to 37	nd (<1) to 87	131+00-2/6D25-2
Deep	nd (<1) to 1	nd (<0.5 to 3)	126+90-3/5D1-3

Shoreline and interior dissolved copper concentrations exceed the SL in samples from the Upper and Intermediate Aquifers. No shoreline samples from the Deep Aquifer exceeded the SL. Along the shoreline, fifteen of eighteen samples from the Upper Aquifer and eight of fourteen samples from the Intermediate Aquifer exceeded the SL.

Dissolved copper concentrations beneath the Wypenn area ranged between 1.7 and 33 ug/l in Upper Aquifer well samples. Dissolved copper was not detected in any of the Intermediate Aquifer well samples.

Based on the available data, dissolved copper is retained as a GW-COPC. Samples in shoreline and interior wells exceeded the SL.

Dissolved Lead. Dissolved lead was eliminated as a GW-COPC based on the analysis presented in DOF (2011). The following discussion was included for completeness.

Dissolved lead concentrations are shown on Figures 5-35a to 5-35c. The SL for dissolved lead is 8.1 ug/l. Based on samples collected in 2008, lead was sporadically detected in Upper Aquifer well samples (MMA) and was not detected in samples from the Intermediate or Deep Aquifers at reporting limits ranging from <2 to <20 ug/l. The highest dissolved lead concentration was detected in a sample from well 5E4-1 at 60 mg/l located near the Penite pits. Lead was not detected in samples from the Wypenn area. Given the infrequent detection of dissolved lead in the groundwater samples at relatively low concentrations, and that lead was not detected in any of the shoreline well samples, lead was eliminated as a GW-COPC.

Dissolved Mercury. Dissolved mercury concentration patterns are illustrated on Figures 5-36a to 5-36c. The SL for dissolved mercury is 0.025 ug/l. Mercury was not analyzed in 2008 but was added to the 2012 field program. Seven additional samples were collected in January 2013 to confirm the 2012 results at selected locations. The dissolved mercury concentration range for each aquifer unit is summarized below:

Range of Dissolved Mercury Concentrations

Aquifer Unit	Shoreline Concentration Range (ug/l)	Interior Concentration Range (ug/l)	Location of Highest Concentrations (shoreline/interior)
Upper	nd (<0.020) to 0.221	nd (<0.02) to 1.28	3A7-1/3C1-1
Intermediate	nd (<0.02) to 0.0299	nd (<0.02) to 0.037	124+00-2/6D25-2
Deep	nd (<0.02)	nd (<0.02 to<0.10)	-------

Mercury concentrations in most groundwater samples collected along the Arkema shoreline are below the SL as follows:

- Fifteen of eighteen Upper Aquifer samples;
- Eleven of thirteen Intermediate Aquifer samples, and
- Ten of ten Deep Aquifer samples.

Concentrations of between 0.025 and 0.221 ug/l were detected in Upper Aquifer samples along the north shoreline (Figure 5-36a). Concentrations at one Intermediate Aquifer shoreline location concentration (124+00-2 – Figure 5-36b) slightly exceeded the SL.

Higher mercury concentrations were detected from Upper Aquifer groundwater samples within the interior of the site where concentrations greater than 0.05 ug/l were detected (areas highlighted in yellow on Figure 5-36a). Mercury concentrations in most interior Intermediate Aquifer samples were below the SL. Mercury was not detected on the Wypenn site at a reporting level of 0.1 to 0.5 ug/l.

Based on the available data, dissolved mercury is <u>retained</u> as a GW-COPC.

Dissolved Nickel. Dissolved nickel concentration patterns are illustrated on Figures 5-37a to 5-37c. The SL for dissolved nickel is 8.2 ug/l. The 2012 dissolved concentration range for each aquifer unit is summarized below:

Range of Dissolved Nickel Concentrations – Manufacturing Area

Aquifer Unit	Shoreline Concentration Range (ug/l)	Interior Concentration Range (ug/l)	Location of Highest Concentrations (shoreline/interior)
Upper	1 to 1200	nd (<1) to 136	131+00-1/7F3-1
Intermediate	4 to 81	2 to 120	131+00-2/8F2-2
Deep	nd (<2) to 5	1 to 10	122+60-3 & 129+65-3/5D1-3

Nickel concentrations exceed the SL primarily in OMMP seep samples and Upper Aquifer wells located on the outside of the sheet pile wall. Lower concentrations were detected in samples from Upper Aquifer wells located inside of the wall and in Intermediate Aquifer well samples. Nickel concentrations did not exceed the SL in Deep Aquifer shoreline samples. One interior Deep Aquifer sample slightly exceeded the SL.

Dissolved nickel concentrations in samples from wells in the Wypenn area ranged between 2.3 and 166 (Upper Aquifer) and 3 to 5 ug/l (Intermediate Aquifer). Concentrations in the Upper Aquifer exceed the SL while those in the Intermediate Aquifer are less than the SL.

Based on the available data, dissolved nickel is retained as a GW-COPC.

Dissolved Zinc. Dissolved lead was eliminated as a COPC based on the analysis presented in DOF (2011). The following discussion was included for completeness.

Dissolved zinc concentrations are shown on Figures 5-38a to 5-38c. The surface water SL for zinc is 81 ug/l. The large majority of Upper Aquifer and Intermediate Aquifer groundwater samples were below the SL while all the reported concentrations in the Deep Aquifer samples were below the SL. Two Upper Aquifer samples in the immediate vicinity of the Penite pits had dissolved zinc concentrations of 160 to 270 ug/l. Dissolved zinc was not detected in samples from the Wypenn area wells.

Dissolved zinc is eliminated as a GW-COPC. Dissolved zinc was infrequently detected, and the zinc detections were in the area with high dissolved arsenic concentrations that will be addressed as part of the arsenic remedial efforts.

Groundwater pH. The groundwater pH on the AMP measured in 2008 and 2012 is illustrated on Figures 5-39a to 5-39c. The Arkema data was supplemented with 2011 data from the Arkema Mound property (DOF files) and 2012 data from the OFA portion of the BBP (Hart Crowser 2013). Groundwater pH is an important factor affecting the solubility and mobility of arsenic and the leaching/precipitation of silica.

The pH beneath the AMP has been highly modified from natural conditions by plant discharges to the MMA that raised the pH and by in-situ ferric chloride remedial injections that decreased the pH (behind portions of the sheet pile wall). In addition, evidence indicates that the pH within the western portion of the Wypenn area may also have been increased by releases of caustic materials that were handled in this area. Caustic was stored in ASTs within the western portion of the area.

The pH of Upper Aquifer samples ranged from approximately 4.9 to 12.0 in the MMA. The lower pHs (approximately 4.9 to 8.7 behind the sheet pile wall) were measured in the areas where in-situ treatments using hydrogen peroxide and ferric chloride occurred from 2001 to 2004. Adjacent to the treatment areas (to the north and south) higher pH (9.6 to 12.0) zones resulted from releases during plant operations.

A relatively high pH area (pH 9.2 to 11.8) exists beneath the western corner of the Wypenn area. Elsewhere on the AMP and along the north MMA property line, pH varied between approximately 5.8 and 7.0.

Intermediate Aquifer pHs varied over a wide range between approximately 5.2 and 11.3. Generally lower pH was measured in the area of in-situ treatments and two zones of higher pH (9.8 to 11.3) exist to the north and south of the in-situ treatment area. The area of the Intermediate Aquifer impacted by plant/remedial operations is much less as compared to the Upper Aquifer. The Intermediate Aquifer pH beneath most of the MMA varied between 5.1 and 6.5.

The pH of Deep Aquifer groundwater samples varied between 6.9 and 8.8. Only one sample exceeded a pH of 8.0.

Petroleum Hydrocarbons. Soil concentrations of diesel and lubricating (lube) oil range hydrocarbon concentrations are summarized in Table 5-5. Sample locations and the sum of diesel and lube oil range hydrocarbon concentrations (TPH-D+O) in soil are shown on Figure 5-40. Concentrations ranged between less than 100 mg/kg and 6,000 mg/kg. The highest concentration was detected at location MA16, in the vicinity of the former shop and storage rooms. Two of the sample concentrations exceeded the MTCA Method A CUL of 2,000 mg/kg set to prevent the accumulation of free product on the water table. There are no surface water criteria for petroleum hydrocarbons.

Wells 4C1-1 and 4D1-1 (Figure 3-2a) are located in the area where the highest petroleum hydrocarbon concentrations in soil were detected. A review of the logs (see Appendix B) indicates no field evidence (sheen or stained soils) were observed when the wells were installed in July 2003. Groundwater samples were obtained from both wells in November 2008 and May 2012. During sampling of these (and other) wells, no evidence of the accumulation of petroleum hydrocarbon product was observed. Based on the field observations, petroleum hydrocarbons are <u>not retained</u> as GW-COPCs.

5.8 Vapor Intrusion into Future Buildings

While there are no existing structures on the former MMA, the presence of VOCs in Upper Aquifer groundwater is a consideration for future redevelopment within localized portions of the property (areas VOC-A and VOC-B on Figures 5-26a, 5-27a, 5-28a, 5-29a and 5-30a). Upper Aquifer concentrations of chloroform, PCE, TCE, VC and HCBD exceed vapor intrusion groundwater SLs as summarized below.

Range of VOC Groundwater Concentrations - Upper Aquifer

Compound	Upper Aquifer (ug/l)	Vapor Intrusion SLs (ug/l)
Chloroform	<0.2 to 14,000	12
PCE	<0.2 to 6,900	10
TCE	<0.2 to 920	4.2
VC	<0.2 to 4,900	3.5
HCBD	nd to 64	8.1

Note: Method C Groundwater Screening Level - Table B-1 (Ecology 2009)

No vapor intrusion COPCs were identified for the Wypenn area.

5.9 Summary of Groundwater COPCs

The following table lists the confirmed GW-COPCs by AMP area.

Confirmed GW-COPCs

Constituent	MMA	Wypenn Area
Dissolved Arsenic	Yes	Yes
Dissolved Copper	Yes	Yes
Dissolved Mercury	Yes	No
Dissolved Nickel	Yes	Yes
Chloroform	Yes (also indoor air)	No
Tetrachloroethene	Yes (also indoor air)	No
Trichloroethene	Yes (also indoor air)	No
Vinyl Chloride	Yes (also indoor air)	No
Hexachlorobutadiene	Indoor air only	No

Note: Primary pathway – groundwater discharge to surface water

5.10 Soil Leaching to Groundwater

VOCs and metals are the primary GW-COPCs.

5.10.1 VOC Area Soils

VOCs were detected at the highest groundwater concentrations in areas termed VOC-A and VOC-B (see Figure 5-26a). Historical site operational information indicates these were areas where VOCs were released. In 2012, two soil borings (B-AA and B-BB) were drilled and sampled in the identified VOC areas (DOF 2012e). Drilling was completed to a depth of approximately 37 feet at each location. Soil boring locations are shown on Figures 3-3. Boring logs are presented in Appendix E.

Boring B-AA was drilled in VOC Area A while boring B-BB was drilled in VOC Area B. Samples from each hydrostratigraphic unit (four samples from each boring) were analyzed for VOCs. Sample depths ranged between 3 and 34 feet below ground surface. The sample analytical results are summarized in Table 5-9. The data indicate that VOCs are present in soil to depths of approximately twenty-feet.

The highest detected VOC compound concentrations are summarized in the following table for each area.

Highest Concentrations of Detected VOC Compounds - 2012

VOC Area	Chloroform (ug/kg)	PCE (ug/kg)	TCE (ug/kg)	VC (ug/kg)	HCBD (ug/kg)
VOC-A	580,000	14,000	1,600	<4800	3,000
VOC-B	1,800	1,700	32	ND (<1.1 to 2.0)	4.5

Note: ND – Not detected at indicated reporting limit.

In VOC-A, relatively low concentrations (<10 ug/kg) were detected in the sample from the Upper Aquifer. The highest concentrations (chloroform and PCE) were detected in the sample from the top of the First Aquitard while the highest HCBD concentration was detected near the top of the Intermediate Aquifer. Moderate concentrations of chloroform, TCE and PCE were detected in the sample from the top of the Intermediate Aquifer. Only HCBD was detected in the sample from the top of the Second Aquitard.

In VOC-B, lower concentrations of VOCs were detected in the boring samples as compared to the VOC-A area. Relatively low concentrations (<10 ug/kg) were detected in the samples from the Upper Aquifer and First Aquitard. Relatively higher concentrations of chloroform (2,300 ug/kg) and PCE (4,400 ug/kg) were detected in the samples from the Intermediate Aquifer.

5.10.2 Metals Leaching from Soils

As presented above, the metals GW-COPCs include arsenic, copper, mercury and nickel. Leaching of Penite waste materials and soils containing Penite residues containing high concentrations of arsenic (over 100,000 mg/kg) caused high concentrations of arsenic to be released to groundwater. The leaching of arsenic was further exacerbated by the discharge of alkaline waters (discussed in Section 9.0) that increased the solubility of arsenic. High soil arsenic concentrations (Figures 5-10a to 5-10c) are generally co-incident with high groundwater arsenic concentrations (Figures 5-32a to 5-32c).

Past remedial actions removed a substantial amount of the Penite waste materials. Initial concentrations in the Penite pit area were greater than 100,000 mg/kg. Most recent concentrations are less than 5,000 mg/kg (see Figures 4-4 and 5-10b), although one sample collected by the former Penite waste area had a concentration of 25,000 mg/kg (Figure 5-10b).

In 2008 two soil borings (B-A and B-B on Figure 3-3) were drilled to collect soil samples in the Penite pit area. The borings were drilled to a depth of approximately 17 feet, into the First Aquitard. The logs of the borings are presented in Appendix E and the data is summarized in Table 5-9. The vertical profiles are summarized below.

Arsenic Concentrations with Depth in 2008 - Penite Area

Depth (feet)	As - Boring BA (mg/kg)	As - Boring BB (mg/kg)	Unit
3-4	1600	15	Upper Aquifer
5-6	150	-----	Upper Aquifer
6-7	-----	4200	Upper Aquifer
7-8	290	-----	Upper Aquifer
9-10	-----	290	First Aquitard
10-11	174	-----	First Aquitard
12-13	-----	3800	First Aquitard
13-14	10	-----	First Aquitard
15-16	-----	1400	First Aquitard
16-17	7.7	-----	First Aquitard

The vertical patterns of arsenic concentrations in the Penite waste pit area are shown on Figures 5-11a and 5-11b Profile trends are shown on Figure 3-3. The sections show that arsenic has leached, vertically migrated and precipitated (to cause concentrations greater than 500 ug/kg) to depths of approximately 15 to 20 feet beneath the waste pit area. Horizontal migration and precipitation predominately occurred in an easterly direction (towards the waterway) near the First Aquitard from the waste pit area (Figure 5-11b).

Leaching of other metals (copper and nickel) has occurred within site soils. Copper concentrations above the SL in groundwater appear to be relatively distributed throughout the site within the Upper Aquifer (Figure 5-34a). Some of the higher copper concentrations are located in the vicinity of the former salt pads. Overall, copper concentrations in soil appear to also be relatively distributed throughout the site, although limited data is available in the salt pad area (Figures 5-19a to 5-19c). Some of the higher copper concentrations behind the sheet pile wall in the Intermediate Aquifer (Figure 5-34b) may have been caused by the in-situ treatments in 2001 to 2004 where injections lowered the groundwater pH to approximately 2, and concurrently increased metals concentrations (DOF 2012e).

Nickel also appears to have leached from site materials. Relatively high nickel concentrations are present in the vicinity of the sheet pile wall (Figure 5-37a). Taylor Lake sediments are relatively high in nickel (discussed in Section 7.0) and may be a source of the nickel to groundwater.

6.0 EAST CHANNEL DITCH – SEEP AND SURFACE WATER SAMPLING

6.1 Groundwater Seeps

Site mapping identified four groundwater seeps on the north ditch bank near the mouth of the ECD (Figures 5-8 and 5-22). The seeps are located outside the sheet pile wall above the observed cemented layer (see Section 5.5), approximately 110 feet upstream from the confluence of the ditch and Hylebos Waterway.

The four seeps (Seep 1 to Seep 4) were sampled in April 2012 and Seeps 1 and 2 were resampled in January 2013. Field parameters, total and dissolved arsenic, arsenic species (January 2013), sulfides and DOC were analyzed. The results are summarized in Table 5-15.

The pH of the samples ranged between 8.1 and 10.4 (Figure 6-1). The elevated seep pHs are consistent with the Upper Aquifer pH of groundwater adjacent to the inside of the sheet pile wall in this portion of the MMA (Figure 5-39a).

Dissolved arsenic concentrations in the seep samples for April 2012 are shown on Figure 6-2. Concentrations ranged between approximately 150 and 250 ug/l. Total and dissolved arsenic concentrations were similar. The sum of arsenic species analyses of seeps 1 and 2 sampled in January 2013 ranged between approximately 280 and 260 ug/l, with arsenate being the predominate (>95%) arsenic species.

6.2 East Channel Ditch Surface Water

The East Channel Ditch is generally divided into two sections; lower and upper. The upper portion of the ditch starting near station 4+00 and 4+50 is dammed by a road crossing with flow through a culvert and consists of pools of water that slowly drain into the lower portion of the ditch. The lower portion of the ditch is tidally influenced. During low tides, a relatively small stream of water flows to the Hylebos Waterway. Low tide ditch flow is maintained by flow from the upper portion of the ditch and groundwater discharge from the north and south banks.

East Channel Ditch surface water was sampled during low tides on April 5, 2012 and January 18 and 22, 2013. Field parameters, total and dissolved arsenic, arsenic species (January 2013), sulfides and DOC were analyzed. The results are summarized in Table 5-15.

The pH of upper ditch water ranged between 7.0 and 7.2 (Figure 6-1). Higher pHs were measured in the lower portions of the ditch between 7.6 and 9.4. The increase in lower ditch water pH was likely caused by north bank seep and groundwater discharge to the ditch as Upper Aquifer pHs on the adjacent Arkema Mound site are lower (approximately 6.0 to 7.0 – see Figure 5-39a).

Dissolved arsenic concentrations in ditch water ranged between 11 and 87 ug/l (Figure 6-2). Upper ditch water samples collected in January 2013 ranged between 11 and 87 ug/l. Concentrations in the lower ditch varied between 23 and 66 ug/l. Generally higher concentrations were detected near the mouth of the ditch. In the upper portion of the ditch, 13 to 60% of the total dissolved concentration consisted of arsenate as compared to the lower portion of the ditch where arsenate predominated at over 95 %.

7.0 COMPARISON OF SOURCE MATERIALS TO NORTH BOUNDARY AREA SOILS

As discussed in Section 5.3.2, arsenic concentrations greater than 1,000 mg/kg were detected in the area north of the former salt pads (Figures 5-10 and 5-12). Arsenic is the primary COPC on both the AMP and former USG site that share a common property boundary on the north side of the MMA. In 2012, additional soil data were collected to further assess possible sources of arsenic in this area. This data was obtained, in part, to assist in setting the AMP RI north site boundary.

7.1. Summary of North Boundary Sampling Program

In 2006 Malcolm Pirnie completed sampling in the north boundary area using a direct push-probe. Two probes encountered soils with arsenic concentrations up to 480 mg/kg (DOF 2011). In July 2012, forty-six soil borings (“NB” series borings) were drilled and sampled to depths of approximately twelve to fifteen-feet. Boring locations are shown on Figure 3-4. Work plan borings NB-01, NB-28 and NB-39 were not drilled because of access issues. During the field work, borings NB-48 and NB-49 were added to the data gap field program at the request of Ecology.

Representatives of DOF and CDM-Smith (USG’s consultant) jointly logged the borings and completed field screening for arsenic and lead using a hand-held x-ray fluorescence spectrometer (XRF). DOF prepared draft boring logs and submitted them to CDM-Smith for review and comment. The final logs are included in Appendix E.

DOF collected three hundred eighteen (318) soil samples and screened these samples for arsenic and lead in the field. Two hundred forty-eight (248) samples were delivered to the analytical laboratory and seventy-seven samples were analyzed for metals, including arsenic, lead and TOC. The field and laboratory results are summarized in Table 5-10.

DMD Inc. (2012e) compared the XRF and laboratory derived arsenic and lead results. DMD found that the XRF results were biased high as compared to the DOF laboratory results, averaging 1.6x for arsenic and up to as much as 4x for lead. Correlation analysis of XRF and laboratory data indicated R values of 0.75 for arsenic and 0.62 for lead. In the following discussion, laboratory data are primarily used to describe the site conditions, where available. The laboratory data are supplemented with the XRF data.

CDM-Smith completed additional XRF measurements using both field and laboratory equipment. Field measurements were made for "*secondary metals*" (antimony, copper, iron, nickel, silver and zinc) and laboratory XRF measurements were made for arsenic, lead and the secondary metals discussed above on 305 samples. In addition, CDM-Smith contracted Columbia Analytical Services to analyze sixteen soil samples for arsenic, lead and the secondary metals. The CDM-Smith data are included in Appendix G.

7.2 North Boundary Soil Analysis Results.

The North Boundary Area soil results are compared to the soil contact SL of 33 mg/kg in the follow discussion. Figures 5-12a to 5-12d show the arsenic soil concentration patterns based on sample depth intervals of 0 to 2 feet, 2 to 6 feet; 6 to 10 feet, and 10 to 13 feet, respectively. Each depth interval is described below[xii]:

- **0 to 2 feet** – Surface concentrations of arsenic exceed the SL primarily near the northwest and southwest corners of the contiguous properties (Figure 5-12a). In the areas that exceed the SL, arsenic concentrations ranged between 90 and 1,730 mg/kg. The highest concentrations (787 to 1,730 mg/kg arsenic) were detected in samples from NB42 and NB49 in a thin (1 to 2.5 inch layer) described as a red-black to black fine sand with fibers.

- **2 to 6 feet** – The largest area that exceeds the arsenic soil SL lies within the 2 to 6 feet depth interval (Figure 5-12b). The highest concentration, up to 3,770 mg/kg was adjacent to the former USG production facilities and the property line. Arsenic concentrations are highest near the property line and decline with distance in a southerly direction towards the former salt pads. A relatively high concentration of arsenic (600 mg/kg) was detected near the southeast corner (NB41) of the former USG property. The southerly extent of arsenic concentrations that exceed the SL appears to be defined by the east-west leg of Waggoner's Wallow.

- **6 to 10 feet** – Similar to the overlying soil interval (2 to 6 feet), the highest arsenic concentrations in the 6 to 10 feet deep interval were detected adjacent to former USG production facilities (Figure 5-12c). The highest detected concentration was 2,890 mg/kg in a sample collected from boring NB15. Arsenic concentrations decline to below 20 mg/kg in a southerly direction over a distance of approximately 100 feet. As illustrated on Figure 5-12c, arsenic concentrations greater than the SL were detected in two areas near the property line south of the production facilities. Arsenic concentrations in these two areas ranged between 111 and 215 mg/kg.

[xii] When a sample collection interval spanned or fell on an interval break (i.e. 2, 6, and 10 feet), the sample concentration was reviewed and a judgment was made as to which interval the sample would be plotted with to be most representative of the site conditions.

- **10 to 13 feet –** In this deeper interval, arsenic concentrations above the SL appear primarily restricted to the common property line adjacent to the USG production facilities. Concentrations in this area range between 117 and 1,150 mg/kg. Away from this area, concentrations are substantially lower, generally less than 20 mg/kg.

Vertical arsenic soil concentration profile sections were prepared along the trends shown on Figure 3-4 to illustrate the subsurface soil concentration patterns. The sections are shown on Figures 5-13a to 5-13d. Sections A-A' and B-B' show that soil with high arsenic concentrations is present to depths of at least twelve to thirteen feet in the area just east of the former USG production facilities and thins in an eastward and westward direction along the property line. A relatively thick accumulation of high concentration soil appears to extend to the east towards Waggoner's Wallow.

Sections C-C' and D-D' show the other areas with high arsenic concentrations to be thinner and generally shallower in depth as compared to the materials adjacent to the USG production facilities. Soil with a moderately high concentration of arsenic (368 mg/kg) was detected in boring NB-46 at a depth of approximately six to seven feet (Section D-D' on Figure 5-13d).

7.3 Likely Source of Arsenic in North Boundary Soil

The available data indicate that releases from the former USG facility were the likely source of arsenic to North Boundary soil. This finding is based on the following lines of evidence:

- Information contained in the CDM draft Remedial Investigation Report (CDM 2010)

    - The USG facility manufactured mineral fiber insulation from 1959 to 1996. From 1959 to 1973, insulation was produced by melting together ASARCO slag and basalt in large cupolas. The resulting mixture was spun to produce mineral fiber insulation.

    - Waste materials included baghouse dust, a sand sized cylindrical material called "*shot*" and off-spec product. The waste materials contained high concentrations of metals derived from slag, including arsenic, copper, lead, zinc, antimony and silver.

    - Raw and waste materials were stored in stockpiles mostly on unpaved surfaces within the northeastern portion of the USG facility and in an area southeast of the production building (Figure 7-1).

  - Shot and other waste products derived from ASARCO slag were used as fill in a temporary storage pile area and southeastern truck passageway to raise grade.

  - Baghouse dust settled and accumulated in the vicinity of the baghouse.

  - Releases of the USG waste materials required remediation in the area between the production facilities and the USG south property line and elsewhere on the USG facility. Reported remedial areas are shown on Figures 5-12a to 5-12d.

- Puget Sound Air Pollution Control Authority (PSAPCA) Files

  - Confirmed that ASARCO slag was used at the site from 1959 to 1973 that contained up to one percent arsenic and other metals in high concentrations.

  - A bag filter system was installed in 1970 (over ten years after the facility started operating using ASARCO slag). Baghouse dust consisted of small particles derived from the manufacturing process when ASARCO slag was used as a raw material and has a consistency of dry, loose silt. A sample of baghouse dust analyzed by ASARCO in March 1973 contained over 20% arsenic and high percentages of other metals including lead.

  - Air emission Notice of Violations indicated releases of waste materials as reported by inspectors for PSAPCA. For example:

    - During a site visit on May 26, 1969 (Beckwith 1969) an engineer for PSAPCA visited the facility and noted that "*The six-inches deep accumulation of the wool and slag beads on the plant roof and grounds is a positive evidence of its release and of poor industry housekeeping*".

    - A sketch included with a PSAPCA inspection report indicated a smoke plume emanating from the USG facility, onto the adjacent MMA in July 1972 (Cox 1972). A USG smoke plume drifting towards the Arkema property is shown on a 1961 historic aerial photograph (Figure 7-2).

    - An inspector noted that "*fly wool*" from the USG facility had accumulated on the USG parking lot and adjacent property in August 1973 (Cox 1973). A follow-up letter from USG to PSAPCA (USG 1973) indicated the property was Pennwalt, a predecessor company to Arkema.

- Arsenic Concentration Patterns

    - The proximity of the high arsenic concentration soils immediately adjacent to the common property line, USG production facilities, and areas where USG remediated soil provides strong evidence of the source. USG excavated contaminated soil on their property. The excavation is reported to have extended onto the MMA.

- Metals Profiles of USG and Arkema Waste Materials

    One of the goals of the North Boundary soil boring program was to profile the metals soil concentrations along the common property line and compare this profile with what would be expected of a waste material that used ASARCO slag as a feed-stock and possible Arkema source materials. Possible Arkema source materials include Penite waste and brine process waste.

    North Boundary soils were profiled using the results of soil samples with arsenic concentrations greater than 500 mg/kg. Fourteen soil samples had arsenic concentrations greater than 500 mg/kg (Table 5-10).

    Penite Waste Materials were profiled using the results of soil samples collected from the Penite pit area in the CMA. The location of the Penite pits is shown on Figure 3-3. The results of twenty samples with arsenic concentrations greater than 500 mg/kg were used to profile the Penite waste material (Table 7-1). Sample locations are shown on Figure 3-3.

    Brine Waste Materials were profiled using two sources of information including sampling of bark/sediment and Taylor Pond sediment. In the late 1980s, a soil amendment program was started on the AMP to establish a vegetation layer. Sediments excavated from the Taylor ponds was mixed with wood remaining from a wood processing operation and spread over the north portion of the MMA (Boateng 1990b). The pond sediment/wood application area is shown on Figure 3-3. In September 1990, Boateng collected surface samples of the bark mixture for analysis of metals. Samples were collected by first removing four inches of the upper crust and obtaining a sample from four to six inches. Samples were obtained from thirty locations. The results are summarized in Table 7-2.

    Malcolm Pirnie (2007) obtained samples of Taylor Pond sediment in 2007 (TLA10 to TLA13 and TLA15 to TLA18 shown on Figure 3-3) using a push-probe. Eight samples were obtained and analyzed. The results are summarized in Table 7-3.

7.3.1 Profiling Analysis

The average (mean) metals concentration was calculated for each potential Arkema source material, as well as impacted North Boundary soil. The average arsenic concentration for each material type is summarized below:

Arsenic Concentrations in Potential North Boundary Sources

Material Type	Average Arsenic Concentration (mg/kg)
North Boundary Soil	1562
Penite Production Area Soil	2281
Bark Sludge	27
Taylor Lake Sludge	26

Based on average arsenic concentrations alone, non-Penite process wastes (brine wastes) and bark sludge were clearly not the source of the high arsenic concentrations observed in the North Boundary area.

To further evaluate the possible source, histograms were prepared to compare metal concentration profiles. Figure 7-3 compares the North Boundary soil metal profile with possible Arkema source materials. North Boundary area soils with high arsenic concentrations are also enriched in lead, zinc and to a lesser extent copper (Figure 7-3, p. 1 of 3). In contrast, the Penite Area soils exhibit high arsenic concentrations but have substantially lower relative and absolute concentrations of copper, lead, and zinc. Thus, the differing metal profiles establish that Penite soils are not the source material for impacted North Boundary area soils.

Histograms in Figure 7-3(p. 2 of 3) and 7-3(p. 3 of 3) (expanded scale) compare North Boundary area soil with Arkema non-Penite process waste. Non-Penite process wastes exhibit low arsenic concentrations, but are enriched with nickel. In contrast, North Boundary area soils are high in arsenic and low in nickel. Given the differing profiles, non-Penite process wastes are not the source of arsenic to North Boundary area soils.

Pre-remedial soil data was used to compare soils on the south side of the USG facility with the North Boundary area soils. The USG facility soil analytical results are summarized in Table 7-4. Figure 7-4 compares the USG soil metal profile with that of the North Boundary area profile. As shown, the USG pre-remedial soils contained high concentrations of arsenic, lead and zinc, and moderate relative concentrations of copper similar to the North Boundary area soils.

Figure 7-5 shows a scatter plot and least squares line fit for lead vs. arsenic concentrations for three material types including USG-MW9 soils, Arkema Penite soils and North Boundary (NB) area soils. The USG/MW9 and USG/NB (North Boundary area) soils plot together. The North Boundary area soils are enriched with more lead as compared to the MW-9 soils, likely as a result of differential leaching of arsenic and lead (see below). In contrast, the Penite production area soils show a very different line trend with the samples being much more enriched with arsenic as compared to lead, and cannot be a significant source of arsenic to the North Boundary area.

To summarize:

- Testing as part of cleanup of the former USG MW-9 area indicated that soils in this area contained high concentrations of arsenic, copper, lead and zinc (KJ 2002 – Appendix K).

- The North Boundary area soils are enriched with arsenic, lead, zinc, and to a lesser extent copper, and have low nickel concentrations.

- Penite waste impacted soil is enriched, to a similar degree, with arsenic but has low relative concentrations of copper, lead, nickel and zinc.

- Arkema non-process wastes have relatively low arsenic, copper, lead and zinc concentrations compared to the other waste materials and are enriched with nickel.

The North Boundary metal profile is consistent with an ASARCO slag source and other soils analyzed on the former USG site that are also enriched with arsenic, copper, lead and zinc. The metal profiles for Penite and the Arkema non-process waste indicate that these materials could not be a significant source of arsenic to the North Boundary area.

Differential Leaching of Arsenic and Lead. The North Boundary area soil also contains lead up to 4,070 mg/kg (Figures 5-15a to 5-15d) and is a soil contact COPC for this area. Lead is not a soil contact COPC for the MMA south of the former salt pads.

Some of the soils in the North Boundary area are enriched with arsenic and have low lead concentrations. For example, laboratory XRF measurements for samples from NB-17 showed arsenic concentrations in samples up to 1,398 mg/kg with corresponding low lead concentrations of less than approximately 20 mg/kg, in samples below material with both high arsenic and lead content. To further evaluate the concentration patterns, soil profile sections were prepared for lead similar those prepared for arsenic (Figure 5-16a to 5-16d).

The lead concentration patterns for Section A-A’ and B-B’ are different as compared to arsenic. Both arsenic and lead are high in soils located at a depth of approximately six to seven, feet however, below this depth arsenic continues to be relatively high and lead concentrations substantially decline. The data indicate that arsenic is leaching downward into and through a silt layer and that lead is not. The selective leaching appears to be occurring through root casts where a yellowish precipitate was observed while collecting and logging the soil samples.

Arsenic is generally more leachable than lead. The differential leaching characteristics of arsenic and lead are confirmed by TCLP testing completed on samples from the former USG facility (AGI 1996). Figures 7-6a and 7-6b show TCLP (leachable) vs. total metal concentrations for arsenic and lead. As the concentration of arsenic in soil increases, the concentration of arsenic in the TCLP solution also increased (Figure 7-6a). The data suggest that soils with arsenic concentrations greater than approximately 500 mg/kg would designate as a dangerous waste (DW). In contrast, the concentration of lead in the TCLP solution remained at about the same concentration as total lead concentrations increased in the samples (up to 3,200 mg/kg) (Figure 7-6b).

8.0 CONDITIONS ALONG ARKEMA SHORELINE

8.1 Modifications to Arkema Shoreline by Sheet Pile Wall

The shoreline along the sheet pile wall has been highly modified since the wall was installed in 1990 as part of the remedial work completed by Arkema. The work included the following:

- In 2004 approximately 100 creosote timber pilings were removed from beneath the existing dock. These piles were embedded 30 to 50 feet below the mudline, and likely penetrated into and through the Second Aquitard.

- While debris and contaminated soil/sediments were removed from the intertidal area some contaminated materials remained. In 2004, an intertidal cap was installed to isolate remaining impacted soil/sediment. The location of the intertidal cap in relation to the sheet pile wall and existing monitoring well locations is shown on Figure 3-2. The capped materials are part of the "*wedge*" materials referenced in the 2011 AO.

- Dredging of the Hylebos Waterway was completed over a three year period (2004 to 2006). The goal of the dredging was to provide a clean bottom with sediment chemical concentrations below the Commencement Bay Sediment Quality Objectives (SQOs). However, this was not feasible along about 300 feet of the Arkema shoreline where high post-dredge arsenic concentrations exceeded the SQO of 57 mg/kg.

- In 2006, a subtidal cap (shown on Figure 8-2) was placed over the bottom area with high post-dredge arsenic concentrations to isolate the materials from the environment. The subtidal cap is located downgradient of a gap in the sheet pile wall. The gap is located at approximately Sta. 125+50 that allows groundwater to flow under the wall from the Intermediate Aquifer.

8.2 Description of Wedge Materials

8.2.1 - Soil Borings, Material Descriptions and OMMP Monitoring Wells

In 2003 and 2004, a series of push-probe and auger borings were drilled along the outside face of the sheet pile wall (Figure 8-1). The purpose of the sampling was to assess bank materials adjacent to the wall that could not be removed by dredging. Twenty-two probes/borings were completed as summarized below.

- AT-5 to AT-16 – Push-probe borings by Boateng in April 2003 (DOF 2004)
- SB1 to SB7 - Auger borings by DOF June 2003 (DOF 2004)
- PGG-1 to PGG-3 - Push-probes by PGG in January/February 2004 (PGG 2004)

Bank materials were generally described as gray, slightly silty to silty, fine to medium sand to medium sand. The materials appear to have been physically placed on the outside of the sheet pile wall as brick fragments/rubble and other debris (e.g. Gibb's cells) were observed on the shoreline surface. Brick fragments were noted in the log of SB-4.

Approximately six feet of bank materials (top of bank – approximately +17 feet MLLW - to elevation +11 feet MLLW) were excavated eight to ten feet horizontally from the sheet pile wall (DOF 2006). From the bench, the cut followed an approximate 2 horizontal to one vertical slope (2H:1V) down to elevation 0 feet MLLW where a second bench of variable width was cut. Bank soils were removed primarily to remove asbestos containing material (Figure 8-3). Approximately 6,777 tons of material were disposed off-site. Excavation created a bench and sloping surface on which to place the intertidal cap (elevation +12 feet to 0 feet MLLW). Cap placement occurred between May 18 and July 6, 2004.

Most of the borings penetrated through the First Aquitard into the Intermediate Aquifer as shown on Figure 8-3. The trend of the section along the shoreline is shown on Figure 8-2. Some of the borings were drilled into the top of the Second Aquitard and three of the borings (PGG-1 to PGG-3) extended into the Deep Aquifer.

Chemical analysis of the shallower bank materials that remained after excavation indicated that SQOs were exceeded in one or more samples (Table 8-4). Testing of samples of the Upper Aquitard (DOF 2004) indicated concentrations below SQOs with the exception of arsenic. SQOs were exceeded for the following constituents.

Chemicals Exceeding SQOs in Bank Wedge Materials

Metals	Organics
Arsenic	Hexachlorobutadiene (HCBD)
Nickel	Phenanthrene, Benzo(ghi)perylene, Dibenzo(ah)anthracene
Mercury	Chlorinated Pesticides (DDT, DDE, DDD)
	Tetrachloroethene
	Hexachlorobenzene

Wedge (bank) materials containing constituent concentrations above SQOs were identified because aquatic receptors are the primary concern if the intertidal or subtidal caps were to be disturbed. It seems highly unlikely that soil contact CULs to protect human health would apply as: 1) Much of the soil exceeding SQOs, with the exception of arsenic was removed to place the intertidal cap; 2) An intertidal cap covers the wedge materials; 3) Wedge materials are located on the outside of the sheet pile wall along an industrial waterway with limited access; 4) Excavation for foundations or other subsurface structures is generally precluded based on location; and 5) Institutional controls (such as a restrictive covenant and signage) may be part of the selected remedy.

To provide perspective on the wedge material concentrations, the maximum concentrations for individual constituents was compared to the SQOs and industrial landuse soil contact CULs (ingestion only). The comparisons are summarized in Table 8-4. SQO exceedance factors (EFs)[xiii] ranged between 1.1 (benzo[ghi]perylene) to 52.6 (arsenic). Most of the exceedances were for samples collected from depths of 4 to 8 feet below the original grade (estimated elevation +13 to +9 feet MLLW) where the remedial excavation was to +11 feet MLLW. The bottom portions of soil represented by the samples lies below the intertidal cap. Comparison of the maximum wedge soil concentrations with industrial landuse soil contact CULs indicates that concentrations are substantially below soil contact CULs with the exception of arsenic.

A number of deeper samples exceeded the SQOs for arsenic, PCE and HCBD (see Figure 8-3). As part of a proposed Operations, Maintenance and Monitoring Plan (OMMP) for the MMA, a series of seep samplers and wells (herein termed OMMP wells) were installed outside of the sheet pile wall at the locations shown on Figures 3-2a to 3-2c. The seep samples were installed on top of the bank materials at the bottom of the intertidal cap. Wells were installed in the Upper, Intermediate and Deep Aquifers. The logs of the wells are included in Appendix B (Well Inventory) and available groundwater analytical data collected in 2008/2012 for the OMMP seep sampler and wells are summarized in Table 5-13.

Of the constituents in the wedge materials that exceeded an SQO, HCBD, PAHs, chlorinated pesticides, and hexachlorobenzene were not identified as GW-COPCs (see

[xiii] The exceedance factor (EF) was calculated by dividing the soil concentration by the SQO.

Section 5.7.4). Soil with these constituents above the SQOs are being effectively contained by the intertidal cap.

While PCE and mercury were identified as GW-COPCs, these constituents do not appear to be leaching from the wedge materials at concentrations above surface water SLs. It should be noted that:

- PCE concentrations in samples from locations outside of the sheet pile wall are below the surface water SL of 3.3 ug/l (Figures 5-27a to 5-27c).

- Mercury concentrations in all but one sample are below the surface water SL of 0.025 ug/l (Figures 5-36a to 5-36c). Mercury in one Intermediate Aquifer sample (124+00-2 on Figure 5-36b) slightly exceeded the SL (at 0.038 ug/l). This exceedance can be attributed to a source located on the inside of the wall (location 6D25-2).

Arsenic (Figures 5-32a to 5-32c), and nickel (Figures 5-37a to 5-37c) exceeded groundwater SLs in samples on the outside of the wall.

While a number of other constituents were identified as GW-COPCs, the primary COPC (for soil and groundwater) in the MMA is arsenic. The highest detected soil arsenic concentration for each location in the bank wedge materials is illustrated on Figure 8-2. Arsenic concentrations in the wedge and deeper materials are illustrated in section on Figure 8-3. The vertical distribution of arsenic concentrations is further illustrated on the vertical data plots shown on Figure 8-4.

As shown on Figures 8-2 and 8-3, arsenic concentrations greater than the SQO were generally detected over approximately 450 to 500 linear feet of the Arkema shoreline beneath the intertidal cap. The range of arsenic concentrations by hydrostratigraphic unit are summarized below:

Summary of Arsenic Concentrations in Wedge Soils

Hydrostratigraphic Unit	**Range of Arsenic Concentrations (mg/kg)**
Upper Aquifer	33 to 3,000
First Aquitard	<6 to 3,090
Intermediate Aquifer	12 to 391
Second Aquitard	<6 to 113
Deep Aquifer	<6 to 11

Note: nd - Not detected

The highest arsenic concentrations were detected in the Upper Aquifer and top of the First Aquitard wedge materials (Figures 8-3 and 8-4). Substantially lower concentrations were detected in the Intermediate Aquifer, Second Aquitard and Deep Aquifer soil samples. In the Intermediate Aquifer, the highest arsenic concentration (391 mg/kg) was detected near the top of the unit in the vicinity of where the First Aquitard is absent (borings SB-3 and AT-10). As discussed in Section 9.0, available data indicate that a large proportion of the arsenic migrating through the sheet pile wall gap co-precipitates with iron in soils between the sheet pile wall and the waterway as groundwater mixes with marine water.

The highest arsenic wedge soil concentrations were detected immediately east of where the greatest Upper Aquifer groundwater concentrations (>10,000 ug/l) were detected in the Penite pit area (Figure 8-2). Section Xw-Xe (Figure 5-11b), indicates the source of the observed high wedge soil arsenic concentrations to be leaching, migration towards the waterway and precipitation within a mixing zone where reduced groundwater mixed with oxygenated estuarine water.

To further illustrate the relationship of arsenic soil/groundwater concentrations beneath the upland and wedge areas, four additional profiles (W1-W1' to W4-W4') were prepared along the lines shown on Figure 8-5. The profile lines are perpendicular to the North-South profile shown on Figure 8-3. Note, W2-W2' trends along a similar line as Xw-Xe, but crosses the wedge area south of the end of Xw-Xe. The section profiles are shown on Figures 8-6a to 8-6d.

Profiles W1-W-1' and W2-W2' trend across the area impacted by the Penite waste disposal. High arsenic concentrations (>500 mg/kg) are present in shallow soils with evidence of leaching, migration and precipitation of arsenic in an easterly direction near the top of the First Aquitard and within the *window* where the aquitard is absent (W1-W1'). Wedge material arsenic concentrations were detected to be 250 mg/kg or less along the profile lines. The concentration pattern for profile Xw-Xe is similar to that for W2-W2', except that high arsenic concentrations (>800 mg/kg) were detected in wedge material approximately thirty feet south of the end of profile W2-W2'.

Profile W3-W3' is located south of the Penite waste pit area where surficial soils appear not to have been significantly impacted by waste disposal. However, leaching, migration and precipitation have created a high arsenic concentration zone (in soil) within the First Aquitard and near the top of the Intermediate Aquifer. Similar high arsenic concentrations (>1,000 mg/kg) are present in upland and wedge materials.

Profile W4-W4' is located further south of W3-W3'. The profile is outside the area of greatest impact of the Penite waste disposal. Relatively lower concentrations of arsenic were detected in upland and wedge soils.

Dissolved arsenic concentrations (2012 samples) are also shown on the figures. Comparison of the soil and groundwater concentration patterns indicate that leaching of arsenic is occurring from the high concentration soils (typically Upper Aquifer/First Aquitard soils) and that arsenic is mostly in the dissolved phase within the Intermediate Aquifer.

Dissolved arsenic concentrations in the OMMP seep samplers and Upper Aquifer wells ranged between 11 and 202 ug/l[xiv] as compared to the substantially higher concentrations (over 300 times higher) on the inside of the wall (Figure 5-32b). Arsenic concentrations in groundwater samples obtained on the outside of the wall are primarily attributed to leakage through the wall.

The amount of groundwater leakage through the sheet pile wall for a particular groundwater sample can be estimated based on sulfate and hardness concentrations (see Geochemical Model discussion in Appendix H). Upper Aquifer OMMP well samples consist of between 40 and 70 percent groundwater (marine water from 30 to 60 percent). The high percentage of groundwater in the Upper Aquifer OMMP well samples indicates that the wall is leaking into the wedge materials above the Intermediate Aquifer. The percentage of groundwater in the "*wedge*" in the vicinity of 125+50 and 126+90 is estimated to be 50-60%, which is immediately downgradient of Upper Aquifer arsenic concentrations of 8,540 to 51,700 µg/l behind the sheet pile wall (wells 6E2-1 and 6D14-1). Arsenic in groundwater in the vicinity of 125+50-1 and 126+90-1 are 92 and 183 µg/l, respectively. Simple dilution and mixing alone cannot account for the low concentrations in the Upper Aquifer OMMP wells located on the outside of the wall.

In addition to high arsenic concentrations on the inside of the wall, there are also high concentrations of reduced iron (28,700 to 356,000 ug/l). Iron concentrations in Upper Aquifer OMMP well samples (125+50-1 and 126+90-1 are <100 to 120 ug/l, respectively) are also substantially lower than on the inside of the wall and these lowered iron concentrations cannot be accounted for by simple mixing and dilution. The available geochemical data and evaluations indicate that arsenic and ferrous iron are co-precipitating as crystalline and amorphous [metallic oxides/hydroxides] solids when reduced groundwater mixes with more oxidized estuarine water between the sheet pile wall and the waterway. Arsenic concentration reductions are on the order of 99%. Soil arsenic and iron concentrations are likely to continue to increase in this "*treatment zone*", which provides protection to the waterway from leakage of groundwater through and under the sheet pile wall.

Copper and nickel concentrations in Upper Aquifer materials (solids) beneath the intertidal cap are summarized below. Most of the bank wedge material copper and nickel concentrations are near or below background for soils in the Puget Sound region. However, copper and nickel concentrations in the sample from boring SB-4 are well above background. The SB-4 sample also had a high arsenic concentration (2,960 mg/kg) and brick fragments were observed in the sample suggesting a fill material.

[xiv] The arsenic concentrations may be biased high because of high total dissolved solids, including chloride concentrations (see Section 9.5).

Copper and Nickel Concentrations in Bank Wedge Materials

Location	Composite Interval (ft.)	Copper (mg/kg)	Nickel (mg/kg)
SB-1	0 to 9	39.5	12
SB-2	0 to 9	36.1	31
SB-3	0 to 14	37.8	13
SB-4	0 to 11.5	1500	100
SB-5	0 to 11.5	13.2	10
SB-6	0 to 11.5	30.6	25
SB-7	0 to 4	92.4	46
Background	-----	36	48
SQO	-----	390	140

Note: Background concentrations from Ecology (1994)

Leakage through the sheet pile wall may be contributing some of the dissolved copper and nickel concentrations detected in OMMP seep samplers and Upper Aquifer wells. Available data suggest that leaching of wedge materials may be contributing a portion of the observed metal concentrations based on the following:

- **Copper** – Dissolved copper concentrations occurred more frequently on the outside of the wall (Figure 5-34a) than on the inside of the wall. Dissolved copper concentrations on the inside of the wall ranged between not detected and 48 ug/l; most concentrations were less than 5 ug/l. Concentrations in samples collected on the outside of the wall were higher and ranged between 5 and 40 ug/l with most concentrations being greater than 5 ug/l.

- **Nickel** – Similar to copper, dissolved nickel concentrations on the inside of the wall are lower than those on the outside of the wall (Figure 5-37a). Concentrations on the inside of the wall ranged between approximately 4 and 404 ug/l; most concentrations were less than 50 ug/l. Concentrations in samples collected on the outside of the wall were higher and ranged between 7 and 1,200 ug/l; most concentrations were greater 100 ug/l.

8.3 Arsenic Migration to the Hylebos Waterway in Groundwater

Creation of the waterway by dredging exposed the face of the Intermediate Aquifer and Second Aquitard and upper portion of the Deep Aquifer. Groundwater modeling studies (PGG 2004) indicate that the primary arsenic groundwater migration pathway to the Hylebos Waterway originates behind the sheet pile wall and flows through the gap below the wall within the Intermediate Aquifer. Leakage also occurs through joints and holes in the wall. This is illustrated on Arsenic Section A-A' (Figure 8-7) where the dissolved arsenic concentrations are plotted in relation to the hydrostratigraphic units, sheet pile wall and sediment caps. Note the trend of section (Figures 3-1a to 3-1c and Figure 8-2) runs through the area with the highest groundwater concentrations and the gap below the sheet pile wall.

In 2004 it was recognized that remedial dredging would expose covered Intermediate Aquifer material and that arsenic concentrations along a portion of the shoreline might exceed the SQO, making it impracticable to achieve a clean bottom. Figure 8-8 shows the estimated face of the Intermediate Aquifer that was expected to be exposed by dredging. A series of pre-dredge cores were collected at the locations shown on Figure 8-8. Some of the exposed Intermediate Aquifer soil samples had arsenic concentrations (up to 100 mg/kg) above the SQO. The highest arsenic concentrations were centered near the gap in the sheet pile wall. This finding prompted the design and installation of the subtidal cap.

As dredging was completed, bottom samples were obtained to confirm that chemical concentrations in the remaining bottom sediments were below SQOs. This sampling showed that bottom sediment arsenic concentrations were below the SQO except where the Intermediate Aquifer was exposed near Station 125+50 (Figure 8-9). Arsenic concentrations between approximately 500 and 770 mg/kg were detected in this area that is now covered by the subtidal cap. Outside of the subtidal cap area, arsenic concentrations of native materials ranged between 1.4 and 36 mg/kg, below the SQO of 57 mg/kg. The core data shows that historic arsenic migration from the upland to the waterway only affected a relatively small area now covered by the subtidal cap.

8.4 Subtidal Cap and Shoreline Porewater Sample Results

8.4.1 Subtidal Cap Sediment-Porewater Sampling

On December 17, 2008, samples of water from within the subtidal cap were obtained at location SE 125+00(ST1) shown on Figure 8-10b. A diver inserted a tube approximately one foot below the top of the cap and a peristaltic pump was used to collect the sample from the shoreline. Samples were obtained at a low flow rate (100 milliliters per minute) during low and high tides. Sampling procedures are further described in Appendix D. The results of the analyses are summarized in Table 8-1.

The dissolved arsenic concentrations in OMMP wells outside the wall but upstream of the subtidal cap within the Intermediate Aquifer were found to range from 890 ug/l (125+50-2) to 1,500 ug/l (125+90-2) in 2008 (Figure 5-32b). The dissolved arsenic concentration in the subtidal cap, approximately one foot below the mudline was 21 ug/l[xv] in both the high and low tide samples. Assuming an average of 1,200 ug/l for the upstream samples, this represented a decline of over 98% before discharge to the waterway from the subtidal cap.

[xv] The 2008 subtidal cap arsenic concentrations are likely to be biased high because of high TDS and chloride concentrations in the samples caused by groundwater/estuarine water mixing (see Section 9.5).

In September 2012, porewater from the subtidal cap was re-sampled in a similar manner as in 2008. The results are summarized in Table 8-1. Two porewater samples were obtained, one from SE 125+00(ST1) and one from SE 126+80(ST1) on Figure 8-10b. The dissolved arsenic concentrations outside the wall but upstream of the subtidal cap within the Intermediate Aquifer were found to range from 2,300 ug/l (125+50-2) to 1,600 ug/l (125+90-2) in 2012 (Figure 5-32b). The dissolved arsenic concentration in the subtidal cap, approximately one foot below the mudline ranged between 1.9 and 2.3 ug/l (sum of arsenic species). Assuming an average of 2,000 ug/l (upstream samples), this represents a decline of over 99.9% before discharge to the waterway from the subtidal cap. The mechanisms for this decline are further discussed based on the geochemical testing in Section 9.0.

8.4.2 Porewater – Intermediate Aquifer Discharge Area

In addition to the two subtidal cap samples collected in September 2012, five additional sediment porewater samples were also obtained from the outcrop of the Intermediate Aquifer (approximate elevation -5 feet MLLW) outside of the intertidal cap where aquifer groundwater discharges to the waterway. Sample locations are shown on Figures 8-10a and 8-10b.

The samples were collected by divers during low tidal conditions from a depth of approximately 1 foot below mudline by driving a stainless steel well screen and using a peristaltic pump. Sampling procedures are further described in Appendix D. The results of the analyses are summarized in Table 8-1 and shown on Figures 8-11a and 8-11b.

Dissolved arsenic concentrations ranged between <1.1 and 1.5 ug/l in the samples south of the subtidal cap and between 4.6 and 28.3 ug/l, north of the subtidal cap. The highest concentrations were detected in the vicinity of the dock, beyond the sheet pile wall.

8.5 Arsenic and PCB Sediment Concentrations along Arkema Shoreline

In 2008 and 2012, intertidal and subtidal sediment samples were obtained and analyzed to compare with the arsenic SQO. In addition, because of the discovery of increased concentrations of PCBs in post-dredging Hylebos sediment, surface and shallow core sediment samples collected along the Arkema shoreline were analyzed for PCBs as requested by Ecology.

8.5.1 Intertidal Shoreline Sediment

Intertidal surface (0 to 10 cm) sediment sampling was completed in 2008 and 2012. Sample locations are shown on Figures 8-10a and 8-10b. The goal of the sampling was to assess whether arsenic concentrations in surface sediment exceeded the SQO of 57 mg/kg. Each sampling event is described below.

- Three surface sediment samples were obtained from top of the intertidal cap in September 2008 during a low tide (DOF 2011). The samples were analyzed for arsenic, and other constituents as summarized in Table 8-2. Intertidal cap surface sediment concentrations ranged between not detected (<6 mg/kg) and 20 mg/kg, well below the SQO.

- Eleven intertidal (elevation +3 to +4 feet MLLW) surface sediment samples were collected along the Arkema shoreline in August 2012. Four of the samples were on top of the intertidal cap and one sample was collected from the mouth of the ECD. The samples were collected during a low tide and analyzed for arsenic and other constituents summarized in Table 8-3.

  Intertidal cap sediment arsenic concentrations in 2012 ranged between 6 and 19 mg/kg (Figures 8-11a and 8-11b), well below the SQO. The highest concentration detected in 2008 (20 mg/kg) was also at the same location of the highest concentration detected in 2012 (19 mg/kg). Comparison of the 2008 and 2012 intertidal cap surface sediment data indicate that arsenic concentrations have not appreciably changed over the four year period 2008 to 2012.

- Five additional intertidal surface sediment samples were collected in 2012 along the shoreline north of the intertidal cap (Figure 8-11a). Arsenic concentrations ranged between 11 and 14 mg/kg (one sample was reported as <20 mg/kg). A sample collected in the intertidal area adjacent to the northeast corner of the Arkema Mound site (Figure 8-11b) had an arsenic concentration of less than 6 mg/kg. All sample arsenic concentrations were below the SQO.

8.5.2 Subtidal Shoreline Sediment

In December 2008, two samples of surface sediment that had accumulated over a period of two years on the subtidal cap were collected by divers and analyzed. In addition a near-shore subtidal sediment sample was obtained from Station 133+00 as a reference sample. The results are summarized in Table 8-2. Arsenic concentrations up to 7 mg/kg were detected.

Twenty-two subtidal surface (0 to 10 cm) sediment samples were collected by divers in September 2012 (Figures 8-10a and 8-10b). Eleven of the samples were collected from the interpreted outcrop of the Intermediate Aquifer (approximate elevation minus 5 feet MLLW) and eleven samples were collected from the interpreted outcrop of the Deep Aquifer (approximate elevation minus 25 feet MLLW). In addition to the surface samples, at the request of Ecology, six shallow (0 to 20 cm) cores were obtained. The cores were co-located with selected surface sediment sample locations. All the subtidal sediment samples were analyzed for the same parameters as the intertidal sediment samples. Co-located surface and core samples were also analyzed for semi-volatile organic compounds (SVOCs), selected pesticides (DDD, DDE, DDT) and PCBs. The results are summarized in Table 8-3.

Arsenic concentrations in surface and shallow subsurface subtidal sediment are shown on Figures 8-11a and 8-11b. The range of arsenic concentrations by sample type and location are summarized below:

Summary of Shoreline Subtidal Sediment Arsenic Sampling Results

Type	Location	Arsenic Concentration Range (mg/kg)
Subtidal Surface	North Shoreline – Intermediate Aquifer Outcrop	4.7 to 21
Subtidal Surface	South Shoreline – Intermediate Aquifer Outcrop	2.2 to 36
Subtidal Core	North Shoreline – Intermediate Aquifer Outcrop	5.3 to 9.1
Subtidal Core	South Shoreline – Intermediate Aquifer Outcrop	2.1 to 3.5
Subtidal Surface	North Shoreline – Deep Aquifer Outcrop	6.3 to 16.8
Subtidal Surface	South Shoreline – Deep Aquifer	3.6 to 29

All sediment concentrations were below the SQO of 57 mg/kg. Arsenic concentrations in surface sediment along the Arkema shoreline were similar to composite sample concentrations (10 to 17 mg/kg) detected in subtidal sediment samples collected in the Hylebos Waterway adjacent to the Arkema site in February 2012.

8.5.3 Upland Not a Source of PCBs to Hylebos Waterway

Selected surface sediment and the shallow core samples were analyzed for PCBs (Table 8-3). The results are presented on Figures 8-12a and 8-12b. Total PCB surface sample concentrations ranged between 30 ug/kg and 196 ug/kg, while PCBs were not detected in any of the core samples (RL 8.3 to 9.1 ug/kg). The surface sediment total PCB concentrations along the Arkema shoreline are generally lower than the concentrations detected in subtidal sediment composite samples (99 to 446 ug/kg) collected in the waterway adjacent to the Arkema shoreline. PCBs were also not detected in groundwater samples (see Section 5.7). These data indicate PCB recontamination of Hylebos sediments in not a result of releases from the Arkema property.

8.5.4 Hylebos Water Column Samples

Two Hylebos Waterway surface water samples were collected off of the subtidal cap near the waterway channel line in September 2012 (Figure 8-11b). One sample was collected three feet below the water surface and a second water sample was collected approximately three feet above the mudline. The samples were analyzed for the same parameters as the Intermediate Aquifer surface sediment interstitial/porewater samples. The results are summarized in Table 8-1.

Arsenic was not detected in the surface water samples at a reporting limit of 0.11 ug/l (based on arsenic species analyses). Chloride concentrations ranged between 14,200 mg/l (near water surface) and 17,500 mg/l (three feet above mudline).

9.0 GEOCHEMICAL EVALUATIONS AND IMPLICATIONS

As part of the 2008 sampling and analysis work (DOF 2011), a geochemical testing program was designed and implemented to refine the evaluation of the fate and transport of arsenic beneath the AMP. The primary objectives of the sampling program were as follows:

- Refine the primary factors controlling the solubility and mobility of arsenic,

- Assess the longer term effects of the in-situ chemical injections completed by Arkema in the period 2001 to 2004.

- Identify the geochemical processes affecting arsenic concentrations when groundwater mixes with Hylebos Water (marine surface water from the Hylebos Waterway).

Subsequent monitoring was performed during 2012 and 2013 for confirmation of previous analyses, evaluation of trends, and addressing of data gaps. Available data were compiled and evaluated for the development of a refined Geochemical Conceptual Site Model (GCSM). The GCSM developed from data collected up to and including the 2008 monitoring activities was confirmed and further enhanced by the 2012/2013 data sets. These analyses were completed by DMD Inc. The results of DMDs work are presented in Appendix H and are summarized below.

9.1 Factors Controlling Arsenic Solubility and Mobility

Arsenic solubility and mobility are controlled by a number of site specific factors including:

- **Form or species of arsenic (arsenite *vs.* arsenate anions)**. Mobility of arsenite (As[III]) is greater in groundwater than that of arsenate (As[V]) because of lower affinities for anion exchange and adsorption to solid phase amorphous metal phosphates and oxides/hydroxides, such as Fe_2O_3, $Fe(OH)_3$, and Al_2O_3. Ferric arsenate ($FeAsO_4$) is relatively insoluble compared to sodium arsenite (Na_3AsO_3), which exhibits high solubility in water.

  A goal of the 2001 to 2004 chemical injections was to convert arsenite into arsenate by the injection of hydrogen peroxide. Despite these efforts, a considerable amount of the dissolved arsenic remains in the chemically reduced form. During the 2008 monitoring, approximately 86% of the dissolved arsenic in the Upper Aquifer and 74% of the dissolved arsenic in the Intermediate Aquifer was estimated to be in the more soluble arsenite form. The data indicate that an insufficient amount of oxidant was introduced to the subsurface to completely immobilize and provide long-term stabilization of subsurface arsenic.

- **Amount of metal oxides/hydroxides (ferric iron) present in solid form**. Arsenic mobility can be reduced by the presence of ferric iron (Fe[III] or Fe^{+3} in solid form (amorphous ferric oxides/hydroxides). Ferrous iron (Fe[II] or Fe^{+2} dissolved in groundwater does not provide substrate to immobilize arsenic, whereas amorphous ferric oxide/hydroxides provide active surface for adsorption of arsenate. Also, the presence of ferrous iron has the potential to reduce arsenate to the more soluble arsenite.

  Ferric chloride was introduced to the subsurface to provide a source of iron for arsenic adsorption. The data indicate that a substantial amount of arsenic was stabilized. However, an insufficient amount of oxidant (in this case hydrogen peroxide) was introduced during the in-situ treatments to overcome the available reducing potential caused by ferrous iron, arsenite, sulfides, and dissolved and total organic carbon present in the hydrogeologic system. In other words, much of the introduced ferric iron was converted to ferrous iron that remains dissolved in the groundwater and now contributes to the reducing conditions. This is demonstrated especially well in the Intermediate Aquifer in the vicinity of 6E3-2 where the levels of dissolved iron (Fe = 2,500,000 µg/L as ferrous iron) and arsenic concentrations have increased since 2008 and the relative contribution of As[III] is 97% of the total dissolved arsenic (As = 141,690 µg/L in 1/2013).

- **Redox potential (dissolved oxygen and high oxidation/reduction potential [ORP] yield oxidizing conditions for maintenance of arsenic as arsenate and iron as amorphous ferric hydroxides/oxides).** Redox potential (measured in terms of ORP) is controlled by the level of oxidants and reductants (both natural and introduced) present. Principal oxidants in this system include dissolved oxygen, ferric oxides/hydroxides, arsenate, and sulfate. Reductants include ferrous iron, arsenite, organic carbon (dissolved and total) and sulfides. Groundwater redox potential is strongly controlled by the presence and level of dissolved oxygen (DO) and dissolved organic carbon (DOC).

  A comparison of groundwater chemistries for 2008 and 2012 shows that, overall, the oxidizing conditions or oxidation potential are increasing in both aquifers, but especially the Upper Aquifer. Dissolved arsenic concentrations decreased about 67% from 2008 to 2012 with concomitant changes in dissolved organic carbon (DOC) and dissolved iron in Upper Aquifer groundwater. The Intermediate Aquifer showed a 27% decrease in dissolved arsenic and similar change in DOC (changes in Fe concentrations were not as dramatic). The principal factor responsible for the increase in oxidation, especially in the Upper Aquifer, is air infiltration facilitated by precipitation leading to oxidation of both arsenic and iron resulting in co-precipitation and adsorption of arsenate to soils.

The introduction of high pH waters to the groundwater system beneath the AMP increased the reducing potential of groundwater (and mobility of arsenic) by increasing concentrations of total sulfides and DOC. Chemical injections were completed behind the sheet pile wall that lowered pH but high pH conditions still persist beneath portions of the site as illustrated on Figures 5-39a and 5-39b.

- **pH (alkalinity)**. Acidic pH (pH<5) conditions deplete soil amorphous iron (iron dissolves into groundwater and is not available to stabilize arsenic). In addition, silica is dissolved under alkaline conditions from soil at pH>9 and other (including naturally occurring) metals (e.g. nickel, zinc) are dissolved from soil at pH<5. As discussed above, elevated pH increases the reducing potential of groundwater by increasing sulfide and DOC concentrations. With other factors in control, the optimum pH for minimizing arsenic solubility in groundwater is between pH 5 and 9.

- **Level of competing anions (alkalinity)**. Solid phase arsenate (from anion exchange and/or adsorption to metal oxides) is displaceable by other anions, such as Cl^-, OH^- , SO_4^{-2}, and PO_4^{-3}. Alkalinity does not appear to be a principal controlling mechanism for solubilization of arsenic.

- **Sequestration (encapsulation)**. Encapsulation/immobilization of arsenic by insoluble carbonate and silicate "*rinds*". The dissolution of silica by elevated pH groundwater with subsequent precipitation upon exposure to estuarine water of the Hylebos Waterway is an important mechanism for the cementation of sediments at the groundwater-surface water interface along the shoreline. This cementation has provided a barrier to contaminated groundwater flow decreasing the mass of arsenic migrating into the waterway.

9.2 Effect of Silica Cementation

The introduction of high pH water increased the solubility of silicon. The relationship of silicon concentrations vs. pH in Arkema groundwater based on the 2008 samples is shown on Figure 9-1. The solubility of silicon dramatically increases at a pH greater than approximately 8.7. As high pH groundwater mixes with lower pH water (such as Hylebos water with a pH of 7.8), silicon precipitates as a cement in the soil/sediment pores. As discussed earlier, cemented bank soils were observed along the Arkema shoreline prior to installation of the sheet pile wall, cemented soils were observed in cores advanced into the Intermediate Aquifer, and a cemented layer was observed along a portion of the ECD north bank (Figure 5-22).

Figure 5-32b shows the pattern of dissolved arsenic concentrations in the Intermediate Aquifer in 2008/2012. A zone of high concentrations (approximately 17 to 47 mg/l) is present outside the northern portion of the sheet pile wall. The available data indicate groundwater represented by these concentrations migrated to the OMMP well locations prior to the wall being installed and is currently trapped between the wall and the Hylebos Waterway. This is based on the following lines of evidence:

- Silicon is dissolved in groundwater at a pH above about 8.7 and precipitates out of groundwater at a pH less than about 8.7.

- When high pH groundwater mixes with Hylebos Waterway (pH = 7.8) the pH of the mixed water falls below 8.7 and silica precipitates into the soil/sediment pore spaces.

- Evidence of silica cementation of soil/sediment pore spaces has been observed in bank soils and in Intermediate Aquifer soils (based on soil cores).

- The estimated percentage of Hylebos Water in the Intermediate Aquifer OMMP well samples is illustrated on Figure 9-2. DMD concluded that five of the nine OMMP wells located along and beyond the sheet pile wall contain little evidence of the presence of Hylebos Water in the well samples (i.e. no measurable exchange with estuarine water). These estimates were made using the hardness/sulfate relationship shown on Figure DMD-1 (DMD 2011; Appendix H) and indicate that the materials screened by the wells are relatively isolated from the waterway.

- Within the middle portion of the sheet pile wall a significant amount of mixing between the sheet pile wall and the waterway appears to be occurring (the samples contain 30 to 70% Hylebos Water) while the amount of mixing decreases along the southern portion of the wall.

- Observed mixing occurring between the sheet pile wall and the waterway are qualitatively consistent with the amount of dredging that occurred along the Arkema shoreline based on conversations with Paul Fuglevand (DOF), manager of the Hylebos Waterway cleanup adjacent to the MMA. It appears shoreline dredging removed the cemented soil resulting in increased hydraulic communication between the groundwater flow system and the waterway. Most sediment was removed near the center of the sheet pile wall during installation of the subtidal cap.

A model of the shoreline mixing/silica precipitation is conceptually illustrated on Figure 9-3. Condition A (see Figure 9-2 for approximate location) shows our interpretation of the conditions along the northern portion of the wall. The higher arsenic concentrations are trapped between the wall and the cemented Intermediate Aquifer zone. Imperfect isolation from the waterway is observed by demonstration of some leakage of contaminated groundwater in surface sediment interstitial/porewaters. Sediment interstitial/porewater characteristics indicate negligible exchange and mixing of estuarine with groundwater is occurring in shoreline soils/sediments based on the relatively high reducing conditions of the seepage. Condition B represents the post-dredging condition where the cemented material zone was removed allowing increased communication and mixing with Hylebos water between the sheet pile wall and the waterway. It is this mixing and reaction zone that provides extremely high attenuation of arsenic. The implication of this geochemical analysis is that care needs to be exercised in disturbing the subsurface along and on the edges of the sheet pile wall.

9.3 Effect of In-Situ Injections and Arsenic Migration through the Gap

The gap beneath the sheet pile wall provides a migration pathway for Intermediate Aquifer groundwater flow to deeper shoreline soils. The evidence indicate favorable geochemical conditions that are effectively decreasing dissolved arsenic concentrations by greater than 99.9% before flow through near-surface (0 to 10 cm) sediments and discharge to the water column. The precipitation mechanism and lines of evidence for this are summarized below:

- The ferric chloride in-situ injections completed in 2001 to 2004 and migration between the Upper and Intermediate Aquifers introduced a substantial amount of iron into the Intermediate Aquifer. Ferrous iron concentrations behind the wall near the gap were as high as 1,230 mg/l during 2008 and as high as 2,500 mg/l in 2013 (well 6E3-2).

- During 2008, the Intermediate Aquifer arsenite behind the sheet pile wall was approximately 44% of the dissolved arsenic concentration. Downstream of the gap, on an inward tidal flow, arsenic consisted of near 100% arsenite, indicating essentially complete depletion of available arsenate within the initial groundwater-estuarine mixing zone (i.e. arsenate is co-precipitating with iron).

- As groundwater containing the high iron and arsenic concentrations migrates under the sheet pile wall it mixes with Hylebos estuarine water (see Figure 9-2). An increase in the ORP results causing the iron and arsenate to rapidly co-precipitate into a solid form. After the initial co-precipitation occurs, the groundwater contains pre-dominantly arsenite (based on analysis of samples from OMMP wells 125+50-2 and 126+90-2 during 2008).

- The remaining arsenite converts to arsenate and continues to co-precipitate with the ferrous iron (converted into ferric oxides/hydroxides and ferric arsenate).

- Dilution/dispersion also contributes to the arsenic concentration decreases within the aquifer groundwater mixing zone and within the subtidal cap.

- Using data for the wells/samples located nearest the gap beneath the sheet pile wall the following concentration reductions were observed in the 2012/13 data;

    - Behind wall 142 mg/l (6E3-2)
    - Outside Wall 1.2 mg/l (OMMP wells 125+50-2);

- Subtidal Cap mean 0.0021 mg/l (2.06 ug/l)

Concentrations declined approximately 99% from behind the wall to outside the wall in the Intermediate Aquifer. Further concentration declines occurred from the OMMP well location to the subtidal cap with an overall decline of greater than 99.99%.

- Dilution/dispersion alone cannot account for the observed arsenic concentration decline. Assuming that the OMMP wells contain a mean 58%[xvi] Hylebos Water, if dilution were the only mechanism to cause the decline, the resulting concentration would be on the order of 22 mg/l, not 1.2 mg/l as observed at 125+50-2 (142 mg/l was measured at well 6E3-2 on the upgradient side of the sheet pile wall).

- The observed native Intermediate Aquifer solids concentrations cannot be accounted for by simple adsorption onto native materials. Surface adsorption of arsenic to solids from the dissolved phase is quantitated by the application of a partition coefficient, K_P. This coefficient is defined as the ratio of arsenic concentrations in solid phase *vs.* the dissolved phase. The range of apparent K_P's documented for site samples and from the literature range up to approximately 25 L/kg and average 10 L/kg (PGG 2004). The apparent arsenic K_P in Intermediate Aquifer sand subtidal cap surface sediments downgradient of the gap ranges from 3,000 to 4,900 L/kg. Intermediate Aquifer sands downstream of the sheet pile wall gap exposed during 2006 dredging revealed arsenic concentrations up to 770 mg/kg. This clearly indicates that something more than simple partitioning of arsenic from the dissolved phase to native solid surfaces is occurring. We conclude that the accumulation of high-arsenic solids in the groundwater-estuarine mixing zone (beneath the subtidal cap) is a result of oxidation and active co-precipitation of arsenic with ferric iron complexes. This is supported by multiple lines of evidence discussed above and in Appendix H. By comparison, the apparent K_P for samples collected in the Intermediate Aquifer sands but on the flanks of the sheet pile wall gap discharge range from 2 to 30 L/kg, within the range previously documented by PGG (2004) for site materials due to solid-phase adsorption partitioning.

9.4 Effects of In-Situ Treatments on Dissolved Metals Concentrations

The introduction of hydrogen peroxide and ferric chloride lowered groundwater pH from higher than pH 8 to as low as pH 2. Concentrations of dissolved metals declined as the pH increased (recovered), but the pH remains low in portions of the site and relatively high concentrations of some metals were detected in the 2008 and 2012 samples. This finding is illustrated on Figure 9.5 that presents pH and dissolved arsenic, chromium,

[xvi] Using 2008, 2012 and 2013 data.

copper and nickel concentrations for Upper Aquifer well 6D14-1, located within the in-situ treatment area.

In October 2003, in-situ treatments in this area caused the pH to decline to approximately 2 and arsenic concentrations declined from approximately 100,000 ug/l to 1,300 ug/l. At the same time, dissolved chromium (<15 ug/l to 1,700 ug/l), copper (<50 ug/l to 1,700 ug/l) and nickel (<40 ug/l to 1,800 ug/l) concentrations temporarily increased. As the pH rose from pH 2 to pH 8 after the treatments, metal concentrations decreased (Cr to 10 ug/l; Cu to <5 ug/l; Ni to 10 ug/l). Arsenic concentrations also appear to have rebounded from 1,800 ug/l to greater than 50,000 ug/l.

At least some of the metal concentrations that exceed SLs appear to be the residual result of the in-situ treatments. For example, nickel concentrations in Upper Aquifer well 6D-14-1 were as high as 1,800 ug/l after the in-situ treatments in 2003 but have declined to 124 ug/l by May 2012 and still appear to be declining. We would expect as the groundwater system reaches an approximately equilibrium condition, assuming pH stabilizes in the pH 6 to 8 range, that dissolved metal concentrations (other than arsenic) would decline.

9.5 Arsenic Analytical Methods

The assessment of arsenic in groundwater and estuarine waters at this site was accomplished by the employment of four different analytical techniques/methods:

- U.S. EPA method 200.8 (ICP-MS)
- U.S. EPA method 200.8 (ICP-DRC/MS) [DRC = dynamic reaction cell]
- U.S. EPA method 1632 (arsenic speciation by hydride generation and measurement by AAS)
- Special performance method (arsenic speciation by ion chromatography and measurement by ICP-DRC/MS [IC-ICP-DRC/MS])

Comparison of the results by the methods listed above indicated wide variability in some of the analytical results, especially for low arsenic concentrations (near the reporting limit and SL) in samples with high total dissolved solids (primarily chloride). A reliable analytical method to analyze arsenic concentrations in the presence of high chloride concentrations is critical, because the groundwater point of compliance (to protect surface water) will be along a tidally influenced marine shoreline.

Evaluation of the analytical methods and data was completed by DMD (2013) that is included in Appendix J. Based on this analysis, some of the arsenic results in samples with high chloride concentrations are biased high. For example, the reported dissolved arsenic concentration in the 2012 Hylebos estuarine water samples was 7 to 9 ug/l using Method 200.8 while arsenic was not detected using the IC-ICP-DRC/MS at a reporting level of 1.1 ug/l. Appendix J provides a discussion and comparison of the arsenic analytical methods used at the AMP.

Consequently, it is recommended that a highly selective and discriminative technique be applied for the measurement of low-level arsenic in high-saline environments; such as IC-ICP-DRC/MS. Portions of the AMP that warrant the application of IC-ICP-DRC/MS for accurate arsenic determinations can be found by review of the chloride (Figures 9-4a to 9-4c) and arsenic spatial concentration plots (Figures 5-32a to 5-32c). Candidate areas include the following:

- Intermediate Aquifer in the vicinity of the former salt pads,
- Shoreline and OMMP wells,
- Shoreline interstitial/pore waters,
- Several locations in the deep aquifer, and
- Estuarine water column.

Future monitoring for arsenic at points of compliance must be implemented by methodologies (such as IC-ICP-DRC/MS) that possess a high level of certainty for low arsenic levels in high saline environments.

10.0 WYPENN MIGRATION VIA TAYLOR WAY STORMSEWER

10.1 Initial Assessment

Evaluation of Upper Aquifer groundwater flow direction gradients in the vicinity of the Wypenn area (Figures 3-12a and 3-12b) indicated a groundwater depression adjacent to Taylor Way. Water levels in March 2012 (towards the end of the wet season) adjacent to Taylor Way ranged between approximately 12 and 13 feet MLLW. A storm sewer is located beneath Taylor Way in close proximity to the localized groundwater depression, suggesting that is leakage of groundwater into the storm sewer may be occurring.

To assess the construction of the sewer a site reconnaissance was made in February 2013 and the City of Tacoma was contacted to obtain engineering data on the system. Data was gathered from the City of Tacoma GIS database (govMe.org) and an AutoCad survey file provided by the Port of Tacoma. Select manhole configurations and depths were verified at the Tacoma Source Control Office and in the field on March 8, 2013 with the cooperation of Mark Stafford (Tacoma Science & Engineering Division – Source Control).

The trends of the pipelines and invert elevations are shown on Figures 10-1 and 10-2. In the vicinity of the AMP the system split into two sections. One section starts north of the Wypenn area and flows to the north (Figure 10-1). The second section starts adjacent to the Wypenn area flows to the south and ultimately discharges to the Kaiser Ditch (Figures 10-1 and 10-2).

The system consists of a 24- inch (near start of southern system) to 30-inch (near discharge point at Kaiser Ditch) diameter trunk pipeline connected to catch basins and lateral pipelines. The upstream invert elevation of the system flowing to the south is 9.8

feet MLLW while the invert elevation near the head of the Kaiser ditch is 7.7 feet MLLW. The water table in March 2013 was approximately 2.5 to 3.0 feet higher than the pipeline invert elevations.

Two catch basins and a 10-inch lateral pipeline are located on the Wypenn area near the start of the southern leg of the storm-water system. During the site visit on March 8, 2013, 2 to 3 gallons per minute (gpm) was flowing in the Wypenn catch basin[xvii]. It was not raining that day and no obvious surface water was entering the catch basin on Wypenn, suggesting that groundwater was entering the system at an unknown location.

10.2 Dry Season Assessment - 2013

In June 2013 additional observations were made to assess possible groundwater infiltration into the storm water system. This work included the following:

- Wells were surveyed to confirm top of casing elevations summarized in the Arkema well inventory data base and groundwater elevations. The casing elevations were confirmed and survey errors were judged not to have significantly affected the groundwater flow interpretations. A comparison of data base and re-survey elevations is presented in Table 10-1.

- On June 6, 2013, during a predicted low tide of -1.2 feet MLLW (10:31am), water levels in selected wells were measured to confirm/refine previous groundwater flow interpretations. The measurements and elevations are summarized in Table 10-1 and Upper Aquifer groundwater contours in the Wypenn vicinity are illustrated on Figure 10-3. Comparison of the March 2012 contours (Figures 3-12a and 3-12b) with the June 2013 contours indicates the groundwater low adjacent to Wypenn is still present while the low within the eastern portion of the OFA of BBP has disappeared. The data indicate that the low by the OFA of BBP may be a relic of groundwater level fluctuations and differing times for water levels to adjust.

- On July 9, 2013, the lids of man-holes located between the Wypenn property and the Kaiser Ditch outfall were removed to observe flow within the sewer. The observations were made by DOF staff and a representative of the City of Tacoma after 12 days of dry weather between 1300 and 1500 hours during a predicted low tide of -1.1 feet MLLW at 1221 hours. Flow within the sewer was likely caused by infiltrating groundwater and possibly discharge of marine water that entered

[xvii] During the spring of 2013 flowing water was observed on the Taylor Way paving in the vicinity of the Wypenn property. The observed water flow was traced to a City of Tacoma broken water line that was repaired on May 24 and 25, 2013 (R. Post e-mail – City of Tacoma - August 28, 2013). It is unlikely that the observations made in early June, 2013 (see Section 10.2) were impacted by this water leak as no evidence of a water line leak were present or the leak was repaired when the March and June observations were made.

the sewer during high tides (there is no tide gate on the Kaiser Ditch or storm sewer)[xvii].

Figure 10-4 illustrates the visible (qualitative) estimates of flow within the sewer. No flow was observed at the very upstream end of the system. Some flow, estimated at less than 1 gallon per minute (gpm), was present in the manhole located near the end of the line and remained steady until the southern corner of the Wypenn property where flow increased to approximately 1 to 2 gpm. Flow increased to 2 to 3 gpm near the boundary of the OFA of BBP and former Kaiser facility. A flow estimate of approximately 1 gpm was made for the manhole on the south side of the Kaiser Ditch Outfall. Less than 5 gpm was estimated to be flowing from the Kaiser Ditch Outfall. Available data indicate that groundwater infiltration of approximately 1 to 2 gpm was occurring in the vicinity of the Wypenn property[xvii].

11.0 RESULTS OF WETLAND SURVEYS

11.1 Main Manufacturing Area (MMA)

A wetland survey of the former MMA was completed by Grette Associates (Grette 2013) in early October 2012. Their report is included in Appendix C. There were no jurisdictional wetland features documented on this former industrial plant. However, there is a saltmarsh restoration area located along the northern shoreline that was constructed as part of the Hylebos Waterway remedial dredging project.

11.2 Wypenn Area

A wetland survey of the Wypenn Area was completed by GeoEngineers in January 2013 to corroborate the presence of two wetlands previously delineated in 2008 (AMEC, 2009). Their report is included in Appendix C. Wetland M is located within the area of the interim action planned for 2013. Either a Corps Nationwide 38 permit will be required, or the work will have to be performed under the mitigation plan for the Puyallup Tribal Terminal.

12.0 CONCEPTUAL MODEL

A conceptual model of the site conditions was developed based on the information described above. The major components of the model by topic area are summarized below:

12.1 Hydrogeology

The project area lies over a peninsula of land created by filling with dredge and other materials when the adjacent waterways were created. The geology and hydrostratigraphy beneath the Arkema properties has been well characterized and consists of the following units:

Geologic and Hydrogeologic Units

Geologic Unit	Hydrostratigraphic Unit
Fill Unit	Upper Aquifer
Upper Silt	First Aquitard
Intermediate Sand	Intermediate Aquifer
Lower Silt	Second Aquitard
Lower Sand	Deep Aquifer

The aquifers are in direct hydraulic communication with the adjacent waterway except where a sheet pile wall was installed and where silica has precipitated in the soil pores. Silica cementation in soils is a result of mixing of high pH silica-laden groundwater with lower pH Hylebos water along the intertidal and subtidal portions of the middle and southern Arkema shoreline. Geochemical analysis of groundwater on either side of the wall indicates that groundwater is leaking through the wall, as well as migrating under the wall through a gap at the bottom of the Intermediate Aquifer.

In general, groundwater flow beneath the Blair-Hylebos peninsula is controlled by a groundwater divide that likely lies along the central axis of the peninsula. Groundwater flow beneath the AMP is generally towards the Hylebos Waterway. However, flow directions beneath the Wypenn area are less sure. There is some evidence that infiltration into buried storm sewer lines beneath Taylor Way may be occurring within the Upper Aquifer.

Numerical groundwater modeling indicates that most recharge to the AMP is from local precipitation (16 of 39 inches per year) and that nearly all (95%) of the flow from the Upper Aquifer is in a downward direction to the Intermediate Aquifer. Similarly, behind the sheet pile wall, most (60 to 70%) Intermediate Aquifer flow is downward to the Deep Aquifer, although 20% is estimated to occur laterally around the ends of the sheet pile wall and an estimated 10 to 20% occurs through a gap in the sheet pile wall.

12.2 Constituents of Concern, Past Releases and Remedial Efforts

The following table identifies Constituents of Potential Concern (COPCs) based on media and exposure pathway. The analyses represent conditions after completion of remedial actions based on data collected between 2008 and 2013.

The COPCs are consistent with the known site history and releases. The primary COPCs are metals (principally arsenic) and VOCs (in groundwater), south of the former salt pads. The principal source of arsenic was waste material from the production of Penite, an arsenical based herbicide that was deposited in two pits within the central portion of the MMA. The solubility and mobility of arsenic was enhanced by the discharge of waste waters of high pH generated by the production of caustic. The VOCs were produced during manufacturing of chlorine. The known discharge areas contain the highest concentrations of VOCs in groundwater.

High concentrations of arsenic and lead have been detected in soils in the North Boundary Area located on the north side of the former salt pads. Available data indicate the source of the arsenic and lead was the USG facility formerly located along the north Arkema property line. USG used ASARCO slag between 1959 and 1973 as a feed stock to produce rock wool insulation.

COPCs by Media Type and Exposure Pathway (2008-2012 Data)

Media	Exposure Pathway	Manufacturing Area (MMA)	Wypenn Area	RI Report Section
Soil	Soil Contact	Arsenic, Mercury (a), Lead (b)	Arsenic	5.3
Soil	Particulate Inhalation	Arsenic	Arsenic	5.3.6
Soil	Terrestrial Ecologic Exposure	Arsenic, Total Chromium, Copper, Lead, Mercury, Selenium, Zinc (b), Pesticides	Arsenic	5.4
Surface Water	Via Groundwater Discharge to Surface Water (Hylebos Waterway and East Channel Ditch)	Chloroform, PCE, TCE, vinyl chloride, arsenic, copper, mercury, nickel	Arsenic (possible Upper Aquifer flow into sewer line)	5.7.4 (MMA); 10.0 (Wypenn)
Soil	Leaching to Groundwater (protection of surface water)	Chloroform, PCE, TCE, VC, arsenic, copper, mercury, nickel,	Arsenic	5.10
Ground-water	Vapor Intrusion into Buildings	VOCs (in future)	None	5.8
Sediments	Erosion of Bank Soils (East Channel Ditch) - Exposure to Marine Organisms	Arsenic concentrations in bank soil below screening levels; concentrations in ditch sediment above SQO – likely source 3009 Taylor Way	Not applicable	5.5

Note: COPC - Constituent of Potential Concern; (a) In Penite Area only; (b) In North Boundary Area only

Past remedial actions included the following:

- **Excavation of Penite Waste Materials**. Approximately 2,500 to 3,000 cubic yards with arsenic concentrations greater than 100,000 mg/kg were removed from the site. While a significant amount of arsenic remains in site soils near the former Penite waste pits, current concentrations are mostly below 5,000 mg/kg, although one sample collected in 2007 had a concentration of 25,000 mg/kg.

- **Sheet Pile Wall**. A steel sheet pile wall installed in the 1990s retards groundwater migration to the Hylebos Waterway, although installation of the wall increased the amount of downward groundwater flow to the aquifers underlying the Upper

Aquifer and likely caused some spreading of dissolved arsenic behind the sheet pile wall.

- **Pump and Treat System**. A hydraulic containment system was operated for approximately 10 years. The system removed approximately 22,000 pounds of arsenic from the subsurface, but does not appear to have substantially reduced the mass of arsenic with the potential to leach from soils into groundwater. The system did reduce the amount of arsenic migrating to the waterway via groundwater.

  The high-pH groundwater dissolved silica that precipitates when high-pH silica-laden water is mixed with lower pH water. This made the operation and maintenance of the pump and treat system more difficult and costly due to clogging and plugging of the treatment system plumbing.

- **In-Situ Injections**. In-situ injections of hydrogen peroxide and ferric chloride occurred in the period 2001 to 2004 in an attempt to immobilize in-situ arsenic. The injections reduced arsenic concentrations substantially, however not enough oxidant was injected to overcome the reducing capability of groundwater thus allowing arsenic to continue to leach into groundwater. There is evidence that groundwater dissolved arsenic concentrations are increasing in some locations.

  In some areas, the in-situ injections lowered the groundwater pH to approximately 2. The lower pH caused the leaching of a number of metals. As the pH recovers towards neutral, metal concentrations are declining, however residual impacts of the injections are still evident and at least some of the higher metal concentrations that exceed screening levels (based on 2008 data) are likely the result of pH changes from the in-situ injections. It is expected that metal concentrations will decline further as the groundwater systems recovers from the injections.

- **VOC Remediation System**. A VOC remediation system operated in area VOC-A from 1996 and 2002. The system was shut down in favor of monitored natural attenuation. Based on the 2008 data, VOC concentrations exceed groundwater screening levels but concentrations along the shoreline are just at or below applicable criteria.

- **Intertidal and Subtidal Caps**. A wedge of contaminated material exists on the outside of the sheet pile wall that is covered by an intertidal cap (installed in 2004) and a subtidal cap (installed in 2006). The caps are effective in physically isolating the contaminated soils from the waterway. In 2008 and 2012, sediment concentrations were below Commencement Bay SQOs.

Arsenic is the primary soil and groundwater COPC. Overall, past remedial work completed between the early 1980s and 2004 reduced arsenic concentrations by approximately 90%. In the past arsenic concentrations greater than 3,000 mg/l were measured in groundwater. In 2012 the highest dissolved arsenic concentration was 96 mg/l.

12.3 Geochemical Evaluations - Arsenic

- The primary site-specific factors controlling arsenic mobility include the form of arsenic (arsenate vs. arsenite), redox potential, pH and amount of available ferric iron (in solid form).

- The groundwater conditions remain highly reducing which favors the leaching of solid-phase arsenic and the presence of more soluble and mobile arsenite. The reducing conditions also favor the prevalence of dissolved ferrous iron that is not available for adsorption of arsenic.

- The highly reducing conditions in the groundwater system are a consequence of the presence of elevated concentrations of total and dissolved organic carbon, arsenite, ferrous iron and sulfide. High pH groundwater generates and maintains relatively high reducing capacity. Past injections of hydrogen peroxide (a powerful oxidant) did not permanently overcome to a sufficient degree the reducing capacity of the groundwater/soil system.

- The data indicate that excess iron present near to and upgradient of the sheet pile wall provides sufficient reactant for decreasing the amount of groundwater arsenic released through both the intertidal and subtidal caps. Arsenic that flows through the sheet pile wall gap in the Intermediate Aquifer is being attenuated by more than 99.99% before discharge from the subtidal cap into the waterway.

13.0 RI/FS SITE BOUNDARY

The proposed RI/FS site boundary for the former Arkema Manufacturing Plant is shown on Figure 13-1. The basis for the recommendation is as follows:

- **South Site Boundary** – The south site boundary is proposed as the East Channel Ditch (property line), except for a portion of the Intermediate Aquifer where project data indicate that migration of groundwater constituents is occurring beneath the Arkema Mound property. The estimated area impacted by the AMP was addressed in the Site Characterization report (DOF 2011 – Figure 5-19b) based on dissolved arsenic migration. Dissolved arsenic migration in the Intermediate Aquifer onto Arkema Mound property was confirmed by a sample from well MW-A2 (Figure 3-2b).

- **East Site Boundary –** The east site boundary is proposed as where the bottom of the Intermediate Aquifer outcrops in the side of the navigation channel (see Figures 8-10a and 8-10b), and upland groundwater discharges from the Intermediate Aquifer to the waterway. Sediment sampling completed in 2008 and

2012 indicates sediment along the Arkema shoreline meets the Commencement Bay SQOs for arsenic. Groundwater monitoring of Deep Aquifer (OMMP) wells along the shoreline indicate groundwater concentrations below screening levels (and likely CULs). Groundwater monitoring will likely occur at a shoreline elevation below the top of slope where discharge occurs from the Upper and Intermediate Aquifers.

- **West Site Boundary –** The west site boundary is proposed as the western property line of the AMP. Most of the area west of the AMP (Blair Backup Property - BBP) has been remediated under a consent decree with EPA and is well within the monitoring phase of that project.

  Approximately 500 feet of the west site boundary, south of the proposed north RI/FS boundary is not bounded by the BBP. Based on flow directions in the Upper Aquifer (Figures 3-12a and 3-12b), this portion of the AMP lies on the upgradient side of the property. Furthermore, GW-COPC concentrations in the Intermediate Aquifer, while not close to the anticipated point of compliance, are low and generally meet SLs. The area west of this portion of the AMP, the Reichhold/SAA property, is currently undergoing remediation under an Ecology Order.

- **North Site Boundary –** The north site functional boundary is proposed as the north property line between the former Arkema and USG/Thermafiber sites. This boundary is based on an agreement between the Port and USG, and discussions with Ecology.

14.0 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives were developed based on the identified COPCs, and migration pathways and receptors of concern. The objectives will include compliance with CULs for COCs at established (to be determined) points of compliance (POCs). RAOs will be the foundation of the Feasibility Study and include the following.

- Prevent/minimize discharge of groundwater containing COPCs above screening levels to water and sediment of the Hylebos Waterway and East Channel Ditch.

- Prevent/minimize soil contact of industrial site workers and terrestrial ecologic receptors to soil containing COPCs above screening levels.

- Prevent/minimize the potential for vapor intrusion into future site structures in areas with groundwater volatile organic compound (VOC) concentrations above screening levels.

15.0 GEOTECHNICAL DATA

In 2008 as part of the terminal development project, geotechnical testing was completed to begin to assess the impact to construction of soft soils that are present in portions of the site such as in the former Taylor Lake impoundments and potentially in the Waggoner's Wallow ditches. This work included excavation of test pits and testing for common geotechnical parameters such as moisture content, specific gravity, Atterberg limits, and grain size. The geotechnical data are presented in Appendix K.

16.0 CLOSING AND SIGNATURE

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

Dalton, Olmsted & Fuglevand, Inc.

Matthew G. Dalton
Sr. Consulting Hydrogeologist.

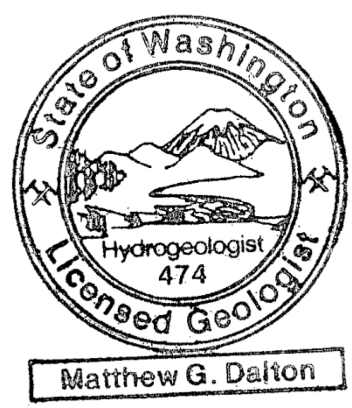

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TABLE 2-1 - Arkema Environmental Chronology

Period	Item	Comment
1927 - 1997 (70 yrs.)	Chemical Production	Primarily chlorine, caustic soda, sodium chlorate; also hydrochloric acid and **arsenical herbicide** 1)1940 to 1972 - Penite Production (created Penite Pits) 2)1950s to 1989 - Taylor Lake discharges (alkaline muds) 3)1969 to 1986 - Waggoner's Wallow discharges (VOCs)
Mid-1950s to 1987	Operations on Wypenn Property	Agricultural testing of pesticides/herbicides; storage of caustic and Bunker C fuel
1981 to present	Investigation, Remediation, and Monitoring	Groundwater contamination first discovered in 1981; Upper Aquifer - arsenic concentrations > 2,000 mg/l - 1990
June 1987	Consent Decree (Upland)	No. 87-2-01199-0 (between Ecology and Arkema) for upland source control
Nov. 1987 to 1988	Upper Aquifer Arsenic Mitigation Alternatives (Original)	1) Waterway barrier 2) Focused containment/capping 3) Arsenic performance level of 1 mg/l
May to Nov. 1989	Remedial Action Work	Groundwater extraction and treatment Intermediate Aquifer arsenic concentrations >1,000 mg/l
Sept. 1989	Record of Decision	Cleanup of Hylebos Waterway - Requires Sediment Quality Objectives (SQOs) as Site Specific Cleanup Levels
1990	Expedited Actions	1) Excavation/off-site disposal Penite Area (2,300 to 3,000 CY); additional removal in 2003 (185 CY). 2) Elimination of discharges to Taylor Lake Area 3) Installed sheet pile wall (addition of wings 1995 and 1997) 4) Excavation material from asbestos pond (1,200 CY)
Dec. 1990	Final Remedial Action Plan (FRAP)	1) Pump and treat to remove arsenic from GW - for 10 yrs. 2) Leading to in-situ treatments
2000	Hylebos Explanation of Significant Differences (ESD)	August 2000 - PCB SQO revised and CAP Performance Stds.
Oct. 1992 to Dec. 2003	Pump and Treat System	Removed 22,260 pounds of arsenic from groundwater; By 2003 system at end of service life and Arkema completed in-situ in-situ treatments consistent with the FRAP.
Sept. 1996 to Dec. 1999	In-situ VOC treatment System	Waggoner's Wallow Area
Nov. 2001 to June 2004	In-situ Chemical Injections	1) Stabilize arsenic in groundwater 2) Pilot and full scale treatments 3) Hydrogen peroxide and ferric chloride 4) Upper and intermediate aquifers
2002	UAO CERCLA 10-2002-0065 (Hylebos Waterway)	Issued by EPA to HHCG - Cleanup of Hylebos
2003 to 2007	Trimester monitoring	Assess impact of in-situ treatments
2003 to 2005	Hylebos Dredging (approved by EPA)	Objective: Clean bottom (meet SQOs)
2003	Shoreline Wedge Material	1) Upper aquifer "wedge material" identified 2) Investigation - borings

TABLE 2-1 - Arkema Environmental Chronology

Period	Item	Comment
2004	Intertidal Cap (approved by EPA)	1) Finish design of intertidal cap over wedge material 2) Construct intertidal cap
2004	Intermediate Aquifer Outcrop Arsenic Conc. Discovered	Testing indicated dredging likely not meet SQOs with removal of "recent" sediment. Arsenic concentrations above SQOs discovered in intermediate aquifer native material along portion of Arkema shoreline
	Hylebos Work Plan Addendum No. 1	2) Preliminary design of subtidal cap (cap sediment with arsenic concentrations above SQOs)
	Dredge Portion of Arkema Shoreline Area	3) Post-dredge sampling provided basis for final design of subtidal cap footprint (December 2004)
	Shoreline OMMP Wells Installed and Sampled	4) First sampling in December 2004
Sept. 2004	Consent Decree (Hylebos Waterway)	No. C055319RBL (between EPA and HHCG) (RD/RA - Segs. 1 and 2 Hylebos Waterway); Replace UAO
2005	Sample OMMP Wells	March and May
	Hylebos Work Plan Addendum No. 2	Final design of subtidal cap (October)
	Finish Dredging Along Arkema Shoreline	Exposed high arsenic concentrations in native sediment
2006	Subtidal Cap (approved by EPA)	Completed February 06
	OMMP Arkema Sediment Caps	Submitted to EPA; never finalized or fully implemented
2007	Soil Testing (Upland)	by Malcolm Pirnie started for Arkema (May 07); report completed for Port (Oct. 07)
	Port Purchased Property	**Port assumed Arkema liabilities (May 07)**
2008	Blair Terminal Dev. Project	Started "full speed" consideration of environmental aspects; coordination with development aspects Taylor Yard.
	RI Work Plan	by Dalton, Olmsted & Fuglevand, Inc. (DOF); Submitted to Ecology and EPA in July. Informal comments received and incorporated into Work Plan.
	Upland Sampling	New wells; groundwater sampling/analysis (Nov. and Dec. 08)
	Shoreline Sediment and Porewater Sampling	Sept. (intertidal sediment); Dec. (subtidal cap - sediment and porewater) - OMMP Type Sampling
2009	Compilation and Review Environmental Data	Continued coordination with development project; likely alternatives identified and preliminarily evaluated, included numerica modeling of containment options
	Blair Terminal Dev. Project Canceled	Based on economic considerations
2010	Conceptual model	Refined conceptual model incorporating results of geochemical testing program.
2011	Agreed Order DE 5568	Between Ecology and Port for completion of RI/FS; Effective July 25, 2011
	Site Characterization Data Report	Agreed Order Deliverable 1 - Submitted August 2011; Identified additional data gaps.

TABLE 2-1 - Arkema Environmental Chronology

Period	Item	Comment
2012	Data Gap Work Plan	Agreed Order Deliverable 3 - Submitted January 2012
	Wypenn Interim Action Plan	Agreed Order Deliverable 8 - Submitted May 2012
	Implementation of Data Gap Work Plan	Agreed Order Action 4 - Generally completed 3rd. Quarter 2012
	Draft Data Gap Technical Memorandum	Agreed Order Deliverable 5 - Submitted November 2012 (Ecology did not require preparing a final technical memorandum - Deliverable 6 - comments to be incorporated into draft RI report). Memorandum identifies a number of additional data gaps to be filled. This work completed during January and February 2013.

TABLE 3-1- Wypenn Groundwater Level Data - December 2010

Well	Easting	Northing	Elevation (a)	High Tide (c)			Low Tide (d)			High/Low Tide	
	(feet)	(feet)	TOC (feet)	Time	Depth to Water (ft)	Elevation (ft)	Time	Depth to Water (ft)	Elevation (ft)	Difference	Average
Upper Aquifer										(feet)	(feet)
Wypenn Site											
4G1-1	1174784.2	710311.4	18.57	1106	3.62	14.95	1830	3.63	14.94	-0.01	
4H1-1	1174766.9	710153.3	16.96	1110	1.90	15.06	1834	1.90	15.06	0.00	0.01
4H3-1	1174765.8	710032.2	16.35	1112	2.95	13.40	1841	2.86	13.49	0.09	
5H1-1	1175023.1	710134.3	17.68	1115	4.49	13.19	1845	4.55	13.13	-0.06	
5H4-1	1175014.1	710139.9	17.17	1124	6.6 (b)	-----	1848	4.51	12.66	(b)	
5I2-1	1175098.6	709929.4	16.47	1137	1.49	14.98	1851	1.43	15.04	0.06	
Arkema Site											
7I1-1	1175500.5	709903.7	17.14	1149	2.96	14.18	1859	2.97	14.17	-0.01	
6H1-1	1175305.3	710160.0	20.00	1153	4.10	15.90	1905	4.11	15.89	-0.01	
5G1-1	1175027.9	710416.1	19.06	1205	3.29	15.77	1912	3.29	15.77	0.00	
Intermediate Aquifer											
Wypenn Site											
4G2-2	1174790.9	710304.6	17.57	1107	6.94	10.63	1831	6.93	10.64	0.01	
4H2-2	1174766.4	710144.1	17.80	1111	7.36	10.44	1835	7.39	10.41	-0.03	-0.01
4H4-2	1174778.8	710031.5	16.62	1113	6.30	10.32	1842	6.30	10.32	0.00	
5H2-2	1175018.8	710144.6	16.41	1122	6.20	10.21	1846	6.22	10.19	-0.02	
5I1-2	1175083.8	709934.1	16.04	1136	7.05	8.99	1850	7.00	9.04	0.05	
Arkema Site											
7I3-2	1175520.5	709903.8	16.27	1151	2.53	13.74	1901	2.52	13.75	0.01	
6G3-2	1175174.9	710410.2	17.05	1202	6.82	10.23	1908	6.85	10.20	-0.03	
4F1-2	1174870.9	710546.9	18.49	1210	7.95	10.54	1914	8.01	10.48	-0.06	
Deeper Aquifer											
Wypenn Site											
5H3-3	1175018.6	710141.4	17.20	1123	7.11	10.09	1847	7.92	9.28	-0.81	
Arkema Site											-1.29
7I2-3	1175514.5	709907.3	18.54	1150	8.25	10.29	1900	9.51	9.03	-1.26	
6G2-3	1175170.9	710409.2	17.58	-----	7.40	10.18	1909	9.14	8.44	-1.74	
5G1-3	1174937.9	710390.1	18.59	1207	8.28	10.31	1913	9.63	8.96	-1.35	

(a) - All wells measured relative to 5G1-3 as datum.
(b) - The high tide level measurement in well 5H-4-1 is considered unreliable based on comparison of the high and low tide measurements (change 2.1 feet)
(c) - High tide 11.4 feet at 1145 hrs on 12-15-10.
(d) - Low tide 2.0 feet MLLW at 1910hrs on 12-15-10.

TABLE 3-2a - Water Level Data - Low Tide - March 13, 2012

3/13/2012 - Low Tide (-0.6' @ 15:54)												
Well No.	**Aquifer Unit**	**Easting feet**	**Northing feet**	**MP**	**TOC Elev. (ft-MLLW)**	**Time**	**Depth to Water (ft)**	**Water Level Elev. (ft-MLLW)**	**Comments**	**Time**	**Depth to Water**	**Water Level Elev. (ft)**
Upper Aquifer										~3 hours after initial		
121+80-1	1	1175093	711295	Top of PVC	21.34	15:53	7.60	13.74				
122+60-1	1	1175174	711225	Top of PVC	14.79	15:51	9.26	5.53				
124+00-1	1	1175277	711128	Top of PVC	15.04	15:43	6.21	8.83				
125+50-1	1	1175383	711028	Top of PVC	14.30	15:37	7.07	7.23				
126+90-1	1	1175481	710933	Top of PVC	13.81	15:31	9.05	4.76				
128+30-1	1	1175594	710828	Top of PVC	14.67	15:25	7.21	7.46				
129+65-1	1	1175689	710738	Top of PVC	14.56	15:20	8.07	6.49		1812	8.51	6.05
131+00-1	1	1175752	710679	Top of PVC	13.35	15:13	7.06	6.29				
1B4-1	1	1174021	711507	Top of PVC	18.90	17:09	0.75	18.15				
1C3-1	1	1173951	711304	Top of PVC	17.97	17:03	1.91	16.06				
1D1-1	1	1174129	711159	Top of PVC	20.70	16:58	4.02	16.68				
2A1-1	1	1174274	711781	Top of PVC	20.31	15:33	8.19	12.12				
2B1-1	1	1174314	711582	Top of PVC	20.40	15:37	7.54	12.86				
2C1-1	1	1174197	711250	Top of PVC	19.35	16:55	3.25	16.10				
2D1-1	1	1174314	711000	Top of PVC	15.79	17:20	0.00	15.79				
3A3-1R	1	1174375	711801	Top of PVC	21.39	15:29	9.32	12.07		1805	9.40	11.99
3A7-1R	1	1174573	711679	Top of PVC	21.46	15:24	9.86	11.60				
3C1-1	1	1174480	711310	Top of PVC	18.54	16:44	4.60	13.94				
3C2-1	1	1174411	711204	Top of PVC	19.08	16:51	2.94	16.14				
3C6-1R	1	1174429	711450	Top of PVC	18.75	15:47	4.55	14.20				
3D1-1	1	1174538	710914	Top of PVC	18.88	16:45	2.74	16.14				
4B3-1	1	1174597	711440	Top of PVC	19.93	15:16	3.26	16.67				
4B4-1	1	1174715	711563	Top of PVC	19.57	15:15	6.37	13.20				
4C1-1	1	1174829	711194	Top of PVC	18.66	16:12	2.61	16.05				
4C2-1	1	1174665	711255	Top of PVC	18.86	16:40	2.79	16.07				
4D1-1	1	1174840	711141	Top of PVC	18.52	16:19	2.00	16.52				
4D2-1	1	1174667	711084	Top of PVC	20.05	16:37	3.63	16.42				
4F1-1	1	1174667	710634	Top of PVC	18.73	17:28	2.85	15.88				
5B1-1R	1	1174873	711484	Top of PVC	19.58	15:11	5.90	13.68				
5C12-1	1	1174970	711255	Top of PVC	18.65	16:03	2.59	16.06				
5C13-1	1	1174949	711220	Top of PVC	18.51	16:02	2.35	16.16				
5C16-1R	1	1174876	711348	Top of PVC	19.14	15:58	3.22	15.92				
5D2-1R	1	1175091	711173	Top of PVC	21.14	16:00	4.80	16.34				
5D7-1R	1	1175129	710948	Top of PVC	19.96	16:04	3.26	16.70				
5E1-1	1	1174891	710856	Top of PVC	18.48	16:29	2.25	16.23				
5E2-1	1	1174957	710848	Top of PVC	18.74	16:28	2.26	16.48				
5E4-1 (flush)	1	1175060	710853	Top of PVC	16.64	17:01	0.00	16.64	water level at TOC after monument pump out; artesian (?)			
5E8-1	1	1175052	710699	Top of PVC	20.37	17:03	3.67	16.70				
5F1-1	1	1174894	710658	Top of PVC	18.65	17:31	2.87	15.78				
5G1-1	1	1175028	710416	Top of PVC	19.03	17:11	3.28	15.75				
6D14-1	1	1175303	710953	Top of PVC	19.65	16:16	2.27	17.38				
6D20-1	1	1175301	710962	Top of PVC	18.90	16:19	0.74	18.16				

TABLE 3-2a - Water Level Data - Low Tide - March 13, 2012

3/13/2012 - Low Tide (-0.6' @ 15:54)												
Well No.	Aquifer Unit	Easting feet	Northing feet	MP	TOC Elev. (ft-MLLW)	Time	Depth to Water (ft)	Water Level Elev. (ft-MLLW)	Comments	Time	Depth to Water	Water Level Elev. (ft)
6D25-1	1	1175216	711081	Top of PVC	21.89	16:06	5.00	16.89				
6E1-1	1	1175226	710911	Top of PVC	18.11	16:14	3.72	14.39				
6E2-1	1	1175370	710911	Top of PVC	18.43	16:22	1.09	17.34				
6F2-1	1	1175194	710559	Top of PVC	17.22	17:21	0.12	17.10				
6F3-1	1	1175191	710576	Top of PVC	18.79	17:31	8.64	10.15				
6G1-1 (flush)	1	1175180	710423	Top of PVC	16.21	17:16	0.00	16.21	cap not on; water level at Toc ~3 min after pump down; artesian (?)			
6H1-1	1	1175305	710160	Top of PVC	20.02	17:41	4.13	15.89				
7E10-1	1	1175460	710787	Top of PVC	19.40	16:39	1.85	17.55				
7E3-1	1	1175522	710808	Top of PVC	19.98	16:30	2.17	17.81				
7E8-1	1	1175425	710830	Top of PVC	19.07	16:35	1.63	17.44				
7F2-1 (flush)	1	1175597	710482	Top of PVC	19.18	16:50	0.43	18.75				
7F3-1 (flush)	1	1175441	710591	Top of PVC	20.81	16:53	3.08	17.73				
7F4-1	1	1175593	710639	Top of PVC	21.03	16:47	3.70	17.33				
7G1-1	1	1175477	710302	Top of PVC	21.30	17:43	3.23	18.07	TOC Elev. In 7-5-11 Master as 2130.00			
7I1-1	1	1175501	709904	Top of PVC	17.29	18:06	2.95	14.34				
8F1-1R	1	1175746	710655	Top of PVC	19.42	16:45	3.21	16.21				
8G2-1	1	1175745	710419	Top of PVC	17.84	17:53	1.79	16.05				
8H1-1	1	1175644	710141	Top of PVC	20.15	17:50	4.41	15.74				
MW-1R (USG)	1	1173826	711414	Top of PVC	16.84	15:40	1.40	15.44				
MW-2 (USG)	1	1174125	711867	Top of PVC	16.22	15:34	5.15	11.07				
MW-4 (USG)	1	1174265	711861	Top of PVC	19.00	15:17	7.40	11.60				
MW-5 (USG)	1	1174326	711988	Top of PVC	21.21	15:16	10.00	11.21				
MW-6 (USG)	1	1174226	712075	Top of PVC	17.72	15:12	7.05	10.67				
MW-9 (USG)	1	1174051	711650	Top of PVC	16.46	15:37	2.48	13.98				
MW-25 (USG)	1	1174006	712014	Top of PVC	17.39	15:19	6.62	10.77				
MW-27 (USG)	1	1173464	711942	Top of PVC	17.60	15:30	3.58	14.02				
MW-28 (USG)	1	1174160	712172	Top of PVC	18.07	15:09	7.31	10.76				
MW-30 (USG)	1	1173735	711940	Top of PVC	17.68	15:24	5.38	12.30				
MW-31	1	1174105	712231	Top of PVC	17.44	15:05	6.71	10.73				
MW-32 (USG)	1	1173966	712399	Top of PVC	15.18	15:03	2.62	12.56				
MW-33 (USG)	1	1173841	712512	Top of PVC	15.02	15:01	4.08	10.94				
MW-34 (USG)	1	1174048	712146	Top of PVC	17.30	15:07	6.10	11.20				
MW-35 (USG)	1	1173804	712069	Top of PVC	16.84	15:20	4.12	12.72				
MW-1	1	1176017	709458	Top of pvc	17.09	16:31	1.20	15.89	SW entering			
MW-3	1	1176322	709884	Top of pvc	17.47	16:21	5.85	11.62				
MW-4	1	1176435	709617	Top of pvc	16.8	16:23	4.55	12.25				
MW-A	1	1175829	710515	Top of pvc	17.33	16:05	5.95	11.38				
MW-AK2	1	1176440	709284	Top of pvc	16.28	16:27	4.40	11.88				
MW-B	1	1175986	710142	Top of pvc	16.24	16:12	3.55	12.69				
MW-C	1	1176366	710013	Top of pvc	19.22	16:20	7.59	11.63				
MW-D	1	1175774	709691	Top of pvc	15.31	16:36	0.71	14.60	SW entering			
MW-E	1	1176266	709277	Top of pvc	16.4	16:28	4.92	11.48				

TABLE 3-2a - Water Level Data - Low Tide - March 13, 2012

3/13/2012 - Low Tide (-0.6' @ 15:54)												
Well No.	**Aquifer Unit**	**Easting feet**	**Northing feet**	**MP**	**TOC Elev. (ft-MLLW)**	**Time**	**Depth to Water (ft)**	**Water Level Elev. (ft-MLLW)**	**Comments**	**Time**	**Depth to Water**	**Water Level Elev. (ft)**
MW-F	1	1175980	710380	Top of pvc	21.11	16:09	9.45	11.66				
MW-G	1	1175801	710255	Top of pvc	14.88	16:14	0.32	14.56				
MW-H	1	1175849	710536	Top of pvc	16.86	16:07	4.78	12.08				
MW-J	1	1175970	709409	Top of pvc	15.93	17:47	1.88	14.05				
MW-K	1	1176151	709248	Top of pvc	15.43	17:48	3.15	12.28				
MW-L	1	1176456	709615	Top of pvc	15.80	16:26	3.11	12.69				
MW-M	1	1175803	710380	Top of pvc	14.43				Mon. Under water			
MW-N	1	1175912	710453	Top of pvc	19.62	16:08	8.12	11.50				
MW-RRI -B-147S	1	1175858	709943	Top of pvc	17.17	16:35	3.35	13.82				
MW-RRI-B-117	1	1176100	710278	Top of pvc	15.25	16:11	3.20	12.05				
MW-RRI-B-146S	1	1176053	709755	Top of pvc	17.97	16:32	4.96	13.01	SW entering			
4G1-1	1	1174784	710311	Top of pvc	18.57	16:46	3.65	14.92				
4H1-1	1	1174767	710153	Top of pvc	16.96	16:48	1.87	15.09				
4H-3-1	1	1174766	710032	Top of pvc	16.35	16:50	3.36	12.99				
5H1-1	1	1175023	710134	Top of pvc	17.70			17.70				
5I2-1	1	1175099	709929	Top of pvc	16.47	16:58	1.58	14.89				
5H4-1	1	1175014	710140	Top of pvc	17.20	16:54	4.43	12.77				
EPA-9SR	1	1175016	709886	Top of pvc	18.18	17:02	3.21	14.97				
HC-4S	1	1174686	709951	Top of pvc	17.65	17:06	2.89	14.76				
HC-11-SR	1	1174598	709793	Top of pvc	18.93	17:26	4.50	14.43	Riser broken - poor GW			
HC-12S	1	1174538	709532	**Top of plug**	18.93	17:30	5.30	13.63				
HC-15SR	1	1175379	709365	Top of pvc	18.44	17:34	6.45	11.99				
HC-16S	1	1175540	709651	**Top of plug**	15.24	17:38	3.88	11.36				
HC-26S	1	1175353	709827	**Top of plug**	17.45	17:39	4.67	12.78				
EPA-7SR (ON KAISER LOCKED)				N/A	N/A				Well not located.			
Intermediate Aquifer												
120+75-2	2	1175027	711366	Top of PVC	14.62	15:00	11.85	2.77				
121+80-2	2	1175097	711290	Top of PVC	21.27	15:55	18.40	2.87				
122+60-2	2	1175168	711231	Top of PVC	15.03	15:49	7.11	7.92				
124+00-2	2	1175269	711136	Top of PVC	14.78	15:41	13.96	0.82				
125+50-2	2	1175376	711034	Top of PVC	14.57	15:36	13.71	0.86				
126+90-2	2	1175475	710938	Top of PVC	13.92	15:30	11.83	2.09				
128+30-2	2	1175586	710836	Top of PVC	14.44	15:24	13.49	0.95				
129+65-2	2	1175683	710745	Top of PVC	14.29	15:18	10.34	3.95		1813	10.71	3.58
131+00-2	2	1175747	710683	Top of PVC	13.36	15:12	7.11	6.25				
1C2-2	2	1173952	711299	Top of PVC	17.12	17:05	5.65	11.47				
2B2-2	2	1174333	711556	Top of PVC	19.17	15:38	10.10	9.07				
2C2-2	2	1174203	711262	Top of PVC	15.64	17:13	0.65	14.99	cap removed, filling with water			
2D3-2	2	1174308	710995	Top of PVC	16.24	17:21	5.23	11.01				
3A2-2R	2	1174379	711797	Top of PVC	21.43	15:28	18.75	2.68		1806	17.60	3.83
3A6-2R	2	1174576	711677	Top of PVC	21.45	15:23	18.35	3.10				
3C5-2	2	1174412	711212	Top of PVC	18.82	16:53	8.25	10.57				
3C7-2R	2	1174432	711454	Top of PVC	18.58	15:45	9.54	9.04				

TABLE 3-2a - Water Level Data - Low Tide - March 13, 2012

3/13/2012 - Low Tide (-0.6' @ 15:54)												
Well No.	**Aquifer Unit**	**Easting feet**	**Northing feet**	**MP**	**TOC Elev. (ft-MLLW)**	**Time**	**Depth to Water (ft)**	**Water Level Elev. (ft-MLLW)**	**Comments**	**Time**	**Depth to Water**	**Water Level Elev. (ft)**
3D1-2	2	1174562	711222	Top of PVC	18.80	16:46	8.27	10.53				
3E1-2	2	1174566	710901	Top of PVC	18.56	17:24	7.58	10.98				
4B2-2	2	1174615	711454	Top of PVC	18.99	15:50	10.45	8.54	Field data appeared to be reversed with 4B4-2			
4B3-2	2	1174621	711267	Top of PVC	19.08	16:43	9.11	9.97				
4B4-2	2	1174718	711561	Top of PVC	19.50	15:16	15.50	4.00	Field data appeard to be reversed with 4B4-4			
4E1-2	2	1174825	710924	Top of PVC	19.07	16:32	6.11	12.96				
4F1-2	2	1174871	710547	Top of PVC	18.48	17:34	8.16	10.32				
5B1-2R	2	1174877	711483	Top of PVC	19.90	15:10	14.52	5.38				
5C10-2	2	1174975	711259	Top of PVC	19.11	16:02	10.29	8.82				
5C14-2	2	1174933	711223	Top of PVC	19.04	16:09	9.93	9.11				
5C16-2R	2	1174872	711347	Top of PVC	19.05	15:59	12.26	6.79				
5C21-2N	2	1175094	711177	Top of PVC	21.30	15:58	10.99	10.31				
5D8-2	2	1175012	711040	Top of PVC	18.11	16:25	7.55	10.56				
5E1-2	2	1175049	710698	Top of PVC	20.06	17:06	9.52	10.54				
6B19-2	2	1175300	710954	Top of PVC	18.38	16:17	6.75	11.63				
6D25-2	2	1175220	711079	Top of PVC	21.92	16:08	5.94	15.98				
6E12-2	2	1175328	710771	Top of PVC	23.37	16:59	12.78	10.59				
6E3-2	2	1175370	710915	Top of PVC	18.46	16:23	6.30	12.16				
6E9-2	2	1175225	710915	Top of PVC	18.24	16:12	9.78	8.46				
6F1-2	2	1175193	710586	Top of PVC	18.83	17:23	8.55	10.28				
6G3-2	2	1175175	710410	Top of PVC	17.01	17:16	7.18	9.83				
6G4-2	2	1175225	710432	Top of PVC	19.10	17:19	8.98	10.12				
7E13-2R	2	1175628	710720	Top of PVC	20.05	16:42	7.71	12.34				
7E6-2 (flush)	2	1175481	710848	Top of PVC	17.26	16:33	5.00	12.26				
7E7-2	2	1175518	710812	Top of PVC	19.27	16:38	8.02	11.25				
7E9-2	2	1175464	710781	Top of PVC	19.65	16:36	6.84	12.81				
7F1-2	2	1175500	710639	Top of PVC	23.24	16:55	11.90	11.34				
7G1-2	2	1175478	710300	Top of PVC	21.45	17:45	11.71	9.74				
7I3-2	2	1175521	709904	Top of PVC	16.48	18:09	2.60	13.88				
8F2-2R	2	1175749	710653	Top of PVC	19.45	16:46	7.23	12.22				
8G3-2	2	1175743	710406	Top of PVC	17.95	17:55	9.69	8.26				
MW-13R (USG)	2	1173833	711410	Top of PVC	17.09	15:39	5.54	11.55				
MW-14 (USG)	2	1174119	711871	Top of PVC	16.73	15:35	7.95	8.78				
MW-18	2	1174120	712089	Top of PVC	17.49	15:12	12.20	5.29				
MW-24 (USG)	2	1173839	711936	Top of PVC	17.41	15:22	7.95	9.46				
MW-26	2	1173461	711938	Top of PVC	17.56	15:29	7.20	10.36				
MW-29 (USG)	2	1174158	712176	Top of PVC	18.19	15:10	15.10	3.09				
MW-147-2	2	1175863	709950	Top of pvc	17.18	16:34	8.26	8.92				
MW-A2	2	1175828	710513	Top of pvc	16.94	16:06	10.90	6.04				
MW-AK1	2	1176131	709386	Top of pvc	17.18	16:30	10.90	6.28	Methane odor/SW			
MW-F2	2	1175986	710375	Top of pvc	21.21	16:10	17.36	3.85				
MW-G2	2	1175801	710250	Top of pvc	14.89	16:15	5.85	9.04				
4G2-2	2	1174791	710305	Top of pvc	17.57	16:47	6.46	11.11				

TABLE 3-2a - Water Level Data - Low Tide - March 13, 2012

3/13/2012 - Low Tide (-0.6' @ 15:54)												
Well No.	**Aquifer Unit**	**Easting feet**	**Northing feet**	**MP**	**TOC Elev. (ft-MLLW)**	**Time**	**Depth to Water (ft)**	**Water Level Elev. (ft-MLLW)**	**Comments**	**Time**	**Depth to Water**	**Water Level Elev. (ft)**
4H2-2	2	1174766	710144	Top of pvc	17.80	16:49	7.54	10.26				
4H4-2	2	1174779	710032	Top of pvc	16.62	16:52	6.45	10.17				
5H2-2	2	1175019	710145	Top of pvc	16.43	16:56	6.35	10.08				
HC-4I	2	1174691	709949	Top of pvc	16.87	17:05	6.67	10.20				
Deep Aquifer												
122+60-3	3	1175161	711238	Top of PVC	15.09	15:45	12.31	2.78				
124+00-3	3	1175263	711142	Top of PVC	14.80	15:39	12.41	2.39				
125+50-3	3	1175370	711040	Top of PVC	14.66	15:34	12.15	2.51				
126+90-3	3	1175470	710945	Top of PVC	13.79	15:28	10.51	3.28				
128+30-3	3	1175578	710844	Top of PVC	14.83	15:22	11.19	3.64				
129+65-3	3	1175677	710752	Top of PVC	14.57	15:15	11.04	3.53		1814	9.85	4.72
131+00-3	3	1175743	710687	Top of PVC	13.35	15:08	9.42	3.93				
1C1-3	3	1173944	711296	Top of PVC	18.19	17:01	9.84	8.35				
3A1-3R	3	1174384	711792	Top of PVC	21.27	15:26	16.45	4.82		1807	16.10	5.17
4B1-3	3	1174594	711429	Top of PVC	19.85	15:51	13.30	6.55				
4B2-3	3	1174721	711556	Top of PVC	19.49	15:14	15.12	4.37				
5B1-3R	3	1174880	711481	Top of PVC	19.49	15:08	15.35	4.14				
5D1-3	3	1175044	711045	Top of PVC	19.38	16:02	13.37	6.01	13.54 @ 16:20 (rising)			
5G1-3	3	1174938	710390	Top of PVC	18.59	17:38	10.65	7.94				
6E7-3	3	1175221	710913	Top of PVC	18.02	16:10	12.87	5.15				
6E8-3	3	1175370	710918	Top of PVC	18.66	16:25	15.14	3.52				
6G2-3	3	1175171	710409	Top of PVC	17.50	17:14	10.20	7.30	Casing leaning, shot on low side.			
7E5-3	3	1175445	710837	Top of PVC	19.61	16:31	15.40	4.21				
7I2-3	3	1175515	709907	Top of PVC	18.70	18:07	10.78	7.92				
5H3-3	3	1175019	710141	Top of pvc	17.23	16:55	8.90	8.33				

Notes:

Vertical datum is per Port of Tacoma 2007 Control Survey holding monument numbers:

182 = 16.59'

180 = 17.48'

175 = 16.15'

178 = 15.95'

Measure points noted as Top of Plug were full of water. Per Dave Cooper elevation was measured at top of plug. See diagram below.

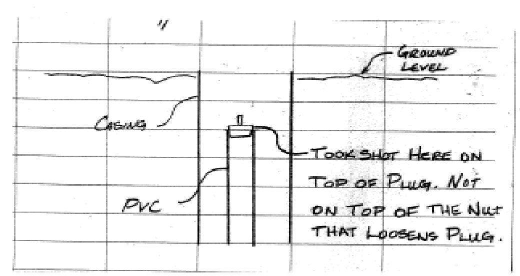


Table 3-2b - Water Level Data - High Tide - March 13, 2012

3/14/2012 - High Tide (10.6' @ 0948)												
Well No.	Aquifer Unit	Easting feet	Northing feet	MP	TOC Elev. (ft-MLLW)	Time	Depth to Water	Water Level Elev. (ft-MLLW)	Comments	Time	Depth to Water	Water Level Elev. (ft-MLLW)
Upper Aquifer										~3 hours after initial		
121+80-1	1	1175093	711295	Top of pvc	21.34	9:36	7.37	13.97				
122+60-1	1	1175174	711225	Top of pvc	14.79	9:34	2.56	12.23		12:04	3.95	10.84
124+00-1	1	1175277	711128	Top of pvc	15.04	9:26	2.04	13.00				
125+50-1	1	1175383	711028	Top of pvc	14.30	9:18	1.96	12.34				
126+90-1	1	1175481	710933	Top of pvc	13.81	9:14	1.41	12.40				
128+30-1	1	1175594	710828	Top of pvc	14.67	9:10	2.56	12.11				
129+65-1	1	1175689	710738	Top of pvc	14.56	9:02	2.58	11.98		11:57	3.21	11.35
131+00-1	1	1175752	710679	Top of pvc	13.35	8:54	1.31	12.04				
1B4-1	1	1174021	711507	Top of pvc	18.90	10:44	0.40	18.50				
1C3-1	1	1173951	711304	Top of pvc	17.97	11:05	2.03	15.94				
1D1-1	1	1174129	711159	Top of pvc	20.70	11:14	4.10	16.60				
2A1-1	1	1174274	711781	Top of pvc	20.31	9:17	8.02	12.29				
2B1-1	1	1174314	711582	Top of pvc	20.40	9:21	7.35	13.05				
2C1-1	1	1174197	711250	Top of pvc	19.35	10:30	3.35	16.00				
2D1-1	1	1174314	711000	Top of pvc	15.79	11:18	0.00	15.79				
3A3-1R	1	1174375	711801	Top of pvc	21.39	9:15	9.38	12.01		12:03	9.33	12.06
3A7-1R	1	1174573	711679	Top of pvc	21.46	9:10	9.71	11.75				
3C1-1	1	1174480	711310	Top of pvc	18.54	9:41	4.72	13.82				
3C2-1	1	1174411	711204	Top of pvc	19.08	10:27	3.91	15.17				
3C6-1R	1	1174429	711450	Top of pvc	18.75	10:37	4.44	14.31				
3D1-1	1	1174538	710914	Top of pvc	18.88	9:45	3.75	15.13				
4B3-1	1	1174597	711440	Top of pvc	19.93	9:37	3.18	16.75				
4B4-1	1	1174715	711563	Top of pvc	19.57	9:05	6.42	13.15				
4C1-1	1	1174829	711194	Top of pvc	18.66	10:04	2.60	16.06				
4C2-1	1	1174665	711255	Top of pvc	18.86	9:50	2.76	16.10				
4D1-1	1	1174840	711141	Top of pvc	18.52	10:06	2.00	16.52				
4D2-1	1	1174667	711084	Top of pvc	20.05	10:22	3.65	16.40				
4F1-1	1	1174667	710634	Top of pvc	18.73	11:32	2.93	15.80				
5B1-1R	1	1174873	711484	Top of pvc	19.58	8:59	6.01	13.57				
5C12-1	1	1174970	711255	Top of pvc	18.65	10:01	2.60	16.05				
5C13-1	1	1174949	711220	Top of pvc	18.51	9:55	2.31	16.20				
5C16-1	1	1174876	711348	Top of pvc	19.14	9:30	3.27	15.87				
5D2-1R	1	1175091	711173	Top of pvc	21.14	9:43	4.83	16.31				
5D7-1R	1	1175129	710948	Top of pvc	19.96	10:38	3.31	16.65				
5E1-1	1	1174891	710856	Top of pvc	18.48	10:17	2.24	16.24				
5E2-1	1	1174957	710848	Top of pvc	18.74	10:15	2.51	16.23				
5E4-1 (flush)	1	1175060	710853	Top of pvc	16.64	10:37	0.00	16.64	water level at TOC after monument pump out; artesian (?)			
5E8-1	1	1175052	710699	Top of pvc	20.37	10:54	3.54	16.83				
5F1-1	1	1174894	710658	Top of pvc	18.65	11:39	2.90	15.75				
5G1-1	1	1175028	710416	Top of pvc	19.03	11:03	3.25	15.78				
6D14-1	1	1175303	710953	Top of pvc	19.65	9:49	2.31	17.34				
6D20-1	1	1175301	710962	Top of pvc	18.90	9:51	0.81	18.09				

Table 3-2b - Water Level Data - High Tide - March 13, 2012

						3/14/2012 - High Tide (10.6' @ 0948)						
Well No.	**Aquifer Unit**	**Easting feet**	**Northing feet**	**MP**	**TOC Elev. (ft-MLLW)**	**Time**	**Depth to Water**	**Water Level Elev. (ft-MLLW)**	**Comments**	**Time**	**Depth to Water**	**Water Level Elev. (ft-MLLW)**
6D25-1	1	1175216	711081	Top of pvc	21.89	9:45	4.98	16.91				
6E1-1	1	1175226	710911	Top of pvc	18.11	10:28	3.83	14.28				
6E2-1	1	1175370	710911	Top of pvc	18.43	9:55	1.10	17.33				
6F2-1	1	1175194	710559	Top of pvc	17.22	10:16	0.18	17.04				
6F3-1	1	1175191	710576	Top of pvc	18.79	10:45	8.78	10.01				
6G1-1 (flush)	1	1175180	710423		16.21	10:53	0.00	16.21	water level at ToM ~3 min after pump down; artesian (?)			
6H1-1	1	1175305	710160	Top of pvc	20.02	11:07	4.09	15.93				
7E10-1	1	1175460	710787	Top of pvc	19.40	10:06	1.83	17.57				
7E3-1	1	1175522	710808	Top of pvc	19.98	9:58	2.17	17.81				
7E8-1	1	1175425	710830	Top of pvc	19.07	10:03	1.65	17.42				
7F2-1 (flush)	1	1175597	710482	Top of pvc	19.18	10:16	0.51	18.67				
7F3-1 (flush)	1	1175441	710591	Top of pvc	20.81	10:21	2.90	17.91				
7F4-1	1	1175593	710639	Top of pvc	21.03	10:10	3.66	17.37				
7G1-1	1	1175477	710302	Top of pvc	21.30	11:28	3.09	18.21				
7I1-1	1	1175501	709904	Top of pvc	17.29	11:09	3.06	14.23				
8F1-1R	1	1175746	710655	Top of pvc	19.42	10:12	2.65	16.77				
8G2-1	1	1175745	710419	Top of pvc	17.84	11:16	1.57	16.27				
8H1-1	1	1175644	710141	Top of pvc	20.15	11:23	4.31	15.84				
MW-1R (USG)	1	1173826	711414	Top of pvc	16.84	9:57	1.45	15.39				
MW-2 (USG)	1	1174125	711867	Top of pvc	16.22	9:48	5.10	11.12				
MW-4 (USG)	1	1174265	711861	Top of pvc	19.00	9:25	7.31	11.69				
MW-5 (USG)	1	1174326	711988	Top of pvc	21.21	9:24	9.95	11.26				
MW-6 (USG)	1	1174226	712075	Top of pvc	17.72	9:18	7.06	10.66				
MW-9 (USG)	1	1174051	711650	Top of pvc	16.46	9:53	2.28	14.18				
MW-25 (USG)	1	1174006	712014	Top of pvc	17.39	9:27	6.55	10.84				
MW-27 (USG)	1	1173464	711942	Top of pvc	17.60	9:42	3.50	14.10				
MW-28 (USG)	1	1174160	712172	Top of pvc	18.07	9:15	7.30	10.77				
MW-30 (USG)	1	1173735	711940	Top of pvc	17.68	9:36	5.25	12.43				
MW-31	1	1174105	712231	Top of pvc	17.44	9:03	6.79	10.65				
MW-32 (USG)	1	1173966	712399	Top of pvc	15.18	8:58	2.95	12.23				
MW-33 (USG)	1	1173841	712512	Top of pvc	15.02	8:59	3.75	11.27				
MW-34 (USG)	1	1174048	712146	Top of pvc	17.30	9:05	6.08	11.22				
MW-35 (USG)	1	1173804	712069	Top of pvc	16.84	9:31	4.47	12.37				
MW-1	1	1176017	709458	Top of pvc	17.09	10:54	1.65	15.44	SW			
MW-3	1	1176322	709884	Top of pvc	17.47	10:19	5.66	11.81				
MW-4	1	1176435	709617	Top of pvc	16.8	10:35	4.50	12.30				
MW-A	1	1175829	710515	Top of pvc	17.33	10:04	4.70	12.63				
MW-AK2	1	1176440	709284	Top of pvc	16.28	10:37	3.95	12.33				
MW-B	1	1175986	710142	Top of pvc	16.24	10:32	3.35	12.89				
MW-C	1	1176366	710013	Top of pvc	19.22	10:18	7.41	11.81				
MW-D	1	1175774	709691	Top of pvc	15.31	11:02	1.00	14.31	SW cover			
MW-E	1	1176266	709277	Top of pvc	16.4	10:38	4.48	11.92				
MW-F	1	1175980	710380	Top of pvc	21.11	10:07	9.41	11.70				
MW-G	1	1175801	710255	Top of pvc	14.88	10:24	0.39	14.49				

Table 3-2b - Water Level Data - High Tide - March 13, 2012

						3/14/2012 - High Tide (10.6' @ 0948)						
Well No.	Aquifer Unit	Easting feet	Northing feet	MP	TOC Elev. (ft-MLLW)	Time	Depth to Water	Water Level Elev. (ft-MLLW)	Comments	Time	Depth to Water	Water Level Elev. (ft-MLLW)
MW-H	1	1175849	710536	Top of pvc	16.86	10:05	4.96	11.90				
MW-J	1	1175970	709409	Top of pvc	15.93	11:08	1.96	13.97				
MW-K	1	1176151	709248	Top of pvc	15.43	11:06	2.88	12.55				
MW-L	1	1176456	709615	Top of pvc	15.80	10:34	3.22	12.58				
MW-M	1	1175803	710380	Top of pvc	14.43				Mon. Under water			
MW-N	1	1175912	710453	Top of pvc	19.62	10:06	7.95	11.67				
MW-RRI -B-147	1	1175858	709943	Top of pvc	17.17	10:28	3.44	13.73				
MW-RRI-B-117	1	1176100	710278	Top of pvc	15.25	10:13	3.05	12.20				
MW-RRI-B-146	1	1176053	709755	Top of pvc	17.97	10:57	4.90	13.07	SW/pressure			
4G1-1	1	1174784	710311	Top of pvc	18.57	11:14	3.81	14.76				
4H1-1	1	1174767	710153	Top of pvc	16.96	11:15	2.01	14.95				
4H-3-1	1	1174766	710032	Top of pvc	16.35	11:17	3.30	13.05				
5H1-1	1	1175023	710134	Top of pvc	17.68	11:20	4.75	12.93				
5I2-1	1	1175099	709929	Top of pvc	16.47	11:27	1.52	14.95				
5H4-1	1	1175014	710140	Top of pvc	17.17	11:21	4.77	12.40				
EPA-9SR	1	1175016	709886	Top of pvc	18.18	11:29	3.23	14.95				
HC-4S	1	1174686	709951	Top of pvc	17.65	11:41	2.82	14.83				
HC-11-SR	1	1174598	709793	Top of pvc	18.93	11:51	4.26	14.67	Broken riser- poor			
HC-12S	1	1174538	709532	**Top of plug**	18.93				Mon. Under water			
HC-15SR	1	1175379	709365	Top of pvc	18.44	11:55	6.59	11.85				
HC-16S	1	1175540	709651	**Top of plug**	15.24	11:45	3.78	11.46				
HC-26S	1	1175353	709827	**Top of plug**	17.45	11:50	4.81	12.64				
EPA-7SR (ON KAISER LOCKED)				N/A	N/A				Well not located.			
Intermediate Aquifer												
120+75-2	2	1175027	711366	Top of pvc	14.62	8:51	3.70	10.92				
121+80-2	2	1175097	711290	Top of pvc	21.27	9:38	10.16	11.11				
122+60-2	2	1175168	711231	Top of pvc	15.03	9:33	7.07	7.96		12:03	6.90	8.13
124+00-2	2	1175269	711136	Top of pvc	14.78	9:25	2.33	12.45				
125+50-2	2	1175376	711034	Top of pvc	14.57	9:17	1.94	12.63				
126+90-2	2	1175475	710938	Top of pvc	13.92	9:13	1.77	12.15				
128+30-2	2	1175586	710836	Top of pvc	14.44	9:07	2.12	12.32				
129+65-2	2	1175683	710745	Top of pvc	14.29	9:00	2.73	11.56		11:56	2.55	11.74
131+00-2	2	1175747	710683	Top of pvc	13.36	8:53	3.72	9.64				
1C2-2	2	1173952	711299	Top of pvc	17.12	11:04	5.23	11.89				
2B2-2	2	1174333	711556	Top of pvc	19.17	9:22	10.06	9.11				
2C2-2	2	1174203	711262	Top of pvc	15.64	10:31	0.00	15.64				
2D3-2	2	1174308	710995	Top of pvc	16.24	11:19	5.19	11.05				
3A2-2R	2	1174379	711797	Top of pvc	21.43	9:14	9.89	11.54		12:04	10.97	10.46
3A6-2R	2	1174576	711677	Top of pvc	21.45	9:09	11.13	10.32				
3C5-2	2	1174412	711212	Top of pvc	18.82	10:26	8.11	10.71				
3C7-2R	2	1174432	711454	Top of pvc	18.58	10:36	9.40	9.18				
3D1-2	2	1174562	711222	Top of pvc	18.80	9:43	8.87	9.93				
3E1-2	2	1174566	710901	Top of pvc	18.56	11:30	7.50	11.06				
4B2-2	2	1174615	711454	Top of pvc	18.99	9:35	9.14	9.85				
4B3-2	2	1174621	711267	Top of pvc	19.08	9:48	8.84	10.24				

Table 3-2b - Water Level Data - High Tide - March 13, 2012

					3/14/2012 - High Tide (10.6' @ 0948)							
Well No.	Aquifer Unit	Easting feet	Northing feet	MP	TOC Elev. (ft-MLLW)	Time	Depth to Water	Water Level Elev. (ft-MLLW)	Comments	Time	Depth to Water	Water Level Elev. (ft-MLLW)
4B4-2	2	1174718	711561	Top of pvc	19.50	9:07	9.55	9.95				
4E1-2	2	1174825	710924	Top of pvc	19.07	10:19	7.93	11.14				
4F1-2	2	1174871	710547	Top of pvc	18.48	11:40	8.05	10.43				
5B1-2R	2	1174877	711483	Top of pvc	19.90	8:58	8.65	11.25				
5C10-2	2	1174975	711259	Top of pvc	19.11	10:00	9.65	9.46				
5C14-2	2	1174933	711223	Top of pvc	19.04	9:54	9.12	9.92				
5C16-2R	2	1174872	711347	Top of pvc	19.05	9:31	8.92	10.13				
5C21-2	2	1175094	711177	Top of pvc	21.30	9:41	6.38	14.92				
5D8-2	2	1175012	711040	Top of pvc	18.11	10:11	7.12	10.99				
5E1-2	2	1175049	710698	Top of pvc	20.06	10:58	9.30	10.76				
6B19-2	2	1175300	710954	Top of pvc	18.38	9:50	6.68	11.70				
6D25-2	2	1175220	711079	Top of pvc	21.92	9:47	5.59	16.33				
6E12-2	2	1175328	710771	Top of pvc	23.37	10:24	12.54	10.83				
6E3-2	2	1175370	710915	Top of pvc	18.46	9:54	6.26	12.20				
6E9-2	2	1175225	710915	Top of pvc	18.24	10:30	9.54	8.70				
6F1-2	2	1175193	710586	Top of pvc	18.83	10:42	8.33	10.50				
6G3-2	2	1175175	710410	Top of pvc	17.01	10:52	7.03	9.98				
6G4-2	2	1175225	710432	Top of pvc	19.10							
7E13-2R	2	1175628	710720	Top of pvc	20.05	10:08	7.14	12.91				
7E4-2	2	1175446	710839	Top of pvc	19.16	10:00	6.58	12.58				
7E6-2 (flush)	2	1175481	710848	Top of pvc	17.26	10:01	4.42	12.84				
7E7-2	2	1175518	710812	Top of pvc	19.27	10:05	8.02	11.25				
7E9-2	2	1175464	710781	Top of pvc	19.65	10:05	6.63	13.02				
7F1-2	2	1175500	710639	Top of pvc	23.24	10:19	11.47	11.77				
7G1-2	2	1175478	710300	Top of pvc	21.45	11:27	11.48	9.97				
7I3-2	2	1175521	709904	Top of pvc	16.48	11:12	2.34	14.14				
8F2-2R	2	1175749	710653	Top of pvc	19.45	10:14	6.58	12.87				
8G3-2	2	1175743	710406	Top of pvc	17.95	11:19	8.74	9.21				
MW-13R (USG)	2	1173833	711410	Top of pvc	17.09	9:56	5.45	11.64				
MW-14 (USG)	2	1174119	711871	Top of pvc	16.73	9:49	7.81	8.92				
MW-18	2	1174120	712089	Top of pvc	17.49	9:12	6.92	10.57				
MW-24 (USG)	2	1173839	711936	Top of pvc	17.41	9:34	7.59	9.82				
MW-26	2	1173461	711938	Top of pvc	17.56	9:41	7.20	10.36				
MW-29 (USG)	2	1174158	712176	Top of pvc	18.19	9:16	6.78	11.41				
MW-147-2	2	1175863	709950	Top of pvc	17.18	10:29	7.25	9.93				
MW-A2	2	1175828	710513	Top of pvc	16.94	10:03	6.50	10.44				
MW-AK1	2	1176131	709386	Top of pvc	17.18	10:59	6.92	10.26				
MW-F2	2	1175986	710375	Top of pvc	21.21	10:07	9.94	11.27				
MW-G2	2	1175801	710250	Top of pvc	14.89	10:25	5.31	9.58				
4G2-2	2	1174791	710305	Top of pvc	17.57	11:13	6.46	11.11				
4H2-2	2	1174766	710144	Top of pvc	17.80	11:16	7.42	10.38				
4H4-2	2	1174779	710032	Top of pvc	16.62	11:18	6.40	10.22				
5H2-2	2	1175019	710145	Top of pvc	16.41	11:23	6.21	10.20				
HC-4I	2	1174691	709949	Top of pvc	16.87	11:40	6.56	10.31				

Table 3-2b - Water Level Data - High Tide - March 13, 2012

						3/14/2012 - High Tide (10.6' @ 0948)						
Well No.	Aquifer Unit	Easting feet	Northing feet	MP	TOC Elev. (ft-MLLW)	Time	Depth to Water	Water Level Elev. (ft-MLLW)	Comments	Time	Depth to Water	Water Level Elev. (ft-MLLW)
Deep Aquifer												
122+60-3	3	1175161	711238	Top of pvc	15.09	9:29	2.39	12.70		12:01	4.46	10.63
124+00-3	3	1175263	711142	Top of pvc	14.80	9:21	2.61	12.19				
125+50-3	3	1175370	711040	Top of pvc	14.66	9:16	1.91	12.75				
126+90-3	3	1175470	710945	Top of pvc	13.79	9:12	1.53	12.26				
128+30-3	3	1175578	710844	Top of pvc	14.83	9:04	2.44	12.39				
129+65-3	3	1175677	710752	Top of pvc	14.57	8:57	2.43	12.14		11:54	4.06	10.51
131+00-3	3	1175743	710687	Top of pvc	13.35	8:52	1.47	11.88				
1C1-3	3	1173944	711296	Top of pvc	18.19	11:03	7.55	10.64				
3A1-3R	3	1174384	711792	Top of pvc	21.27	9:13	9.73	11.54		12:05	10.29	10.98
4B1-3	3	1174594	711429	Top of pvc	19.85	9:38	8.94	10.91				
4B2-3	3	1174721	711556	Top of pvc	19.49	9:03	7.94	11.55				
5B1-3R	3	1174880	711481	Top of pvc	19.49	8:56	7.70	11.79				
5D1-3	3	1175044	711045	Top of pvc	19.38	10:32	8.46	10.92	8.60 @ 10:04 (rising)			
5G1-3	3	1174938	710390	Top of pvc	18.59	11:45	7.87	10.72				
6E7-3	3	1175221	710913	Top of pvc	18.02	10:27	10.73	7.29				
6E8-3	3	1175370	710918	Top of pvc	18.66	9:53	6.87	11.79				
6G2-3	3	1175171	710409	Top of pvc	17.50	10:50	7.00	10.50	Casing leaning, shot on low side.			
7E5-3	3	1175445	710837	Top of pvc	19.61	9:59	7.52	12.09				
7I2-3	3	1175515	709907	Top of pvc	18.70	11:10	7.78	10.92				
5H3-3	3	1175019	710141	Top of pvc	17.20	11:22	6.54	10.66				

Notes:

Vertical datum is per Port of Tacoma 2007 Control Survey holding monument numbers:

182 = 16.59'

180 = 17.48'

175 = 16.15'

178 = 15.95'

Measure points noted as Top of Plug were full of water. Per Dave Cooper elevation was measured at top of plug. See diagram below.

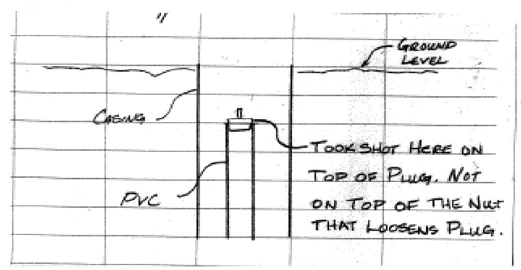


TABLE 5-1 - Summary of Metals Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	NORTHING (Feet)	EASTING (Feet)	Sample ID	Metals (mg/kg)												
						Anitmony	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Total Number of Soil Analyses						**245**	**245**	**245**	**245**	**245**	**245**	**245**	**245**	**245**	**245**	**245**	**245**	**245**
Maximum Concentration						**27000**	**25000**	**200**	**14**	**370**	**2000**	**55000**	**1900**	**910**	**420**	**71**	**14**	**880**
SPA1	0	-----	711776.74	1174398.43	SPA-SS01-0	<5.6	3.7	47	<0.56	20	23	19,000	<5.6	0.023J	18J	0.28	<0.56	41
SPA1	6	-----	711776.74	1174398.43	SPA-SB01-6	12	22	18	<0.55	11	25	9,600	43	0.031J	23J	<0.27	<0.55	87
SPA1	10	-----	711776.74	1174398.43	SPA-SB01-10	<6.3	7.8	10	<0.63	6.6	11	7,500	<6.3	<0.025	9.1	<0.31	<0.63	30
SPA2	0	-----	711644.94	1174340.97	SPA-SS02-0	5.9	19	23	<0.54	16	27	10,000	28	0.082J	19J	<0.27	<0.54	63
SPA2	6	-----	711644.94	1174340.97	SPA-SB02-6	8.2	13	17	<0.60	11	19	8,700	23	0.025J	11J	<0.30	<0.60	52
SPA3	0	-----	711512.86	1174218.31	SPA-SS03-0	12	30	55	<0.63	36	45	13,000	40	0.210J	100J	0.42	<0.63	110
SPA3	6	-----	711512.86	1174218.31	SPA-SB03-6	110	480	32	<0.72	32	47	16,000	160	0.074J	19J	0.87	<0.72	300
SPA4	0	-----	711521.92	1174110.39	SPA-SS04-0	<5.5	14	28	<0.55	55	22	9,700	18	0.110J	19J	0.54	<0.55	49
SPA4	6	-----	711521.92	1174110.39	SPA-SB04-6	120	440	45	<0.65	43	96	21,000	450	0.057J	20J	0.8	<0.65	210
SPA5	0	-----	711456.99	1174063.13	SPA-SS05-0	<5.3	14	17	<0.53	42	17	8,600	22	0.120J	21J	<0.26	<0.53	58
SPA5	6	-----	711456.99	1174063.13	SPA-SB05-6	<6.8	38	140	<0.68	49	550	55,000	35	0.054J	28J	0.88	<0.68	880
SPA6	0	-----	711287.91	1174061.14	SPA-SS06-0	<6.4	11	65J	<0.64	35	23	11,000	17	0.140J	30J	0.39	<0.64	59
SPA6	6	-----	711287.91	1174061.14	SPA-SB06-6	9.5	9.5	9.8	<0.68	20	12	8,600	16J	<0.027UJ	6.7J	<0.34	<0.68	34
SPA7	0	-----	711154.01	1174203.51	SPA-SS07-0	<6.5	9.4	49	<0.65	31	25	11,000	13	0.16J	16J	0.33	<0.65	49
SPA7	6	-----	711154.01	1174203.51	SPA-SB07-6	<6.3	5.5	42	<0.63	26	24	11,000	11	<0.025UJ	15J	<0.32	<0.63	41
SPA8	0	-----	711185.02	1174372.26	SPA-SS08-0	15	14	91	<0.58	52	73	25,000	44	0.39J	36J	<0.29	<0.58	100
SPA8	6	-----	711185.02	1174372.26	SPA-SB08-6	<6.7	19	13	<0.67	22	14	8,100	8.1	<0.027UJ	10J	<0.33	<0.67	32
SPA9	0	-----	711760.79	1174306.51	SPA-SS09-0	<5.3	4.4	25	<0.53	17	16	550	10	0.032	13J	<0.27	<0.53	33
SPA9	6	-----	711760.79	1174306.51	SPA-SB09-6	8.8	12	17	<0.54	11	17	470	17	<0.022UJ	11J	<0.27	<0.54	72
SPA9	10	-----	711760.79	1174306.51	SPA-SB09-10	<6.1	6.1	7.6	<0.61	12	10	6,500	2.9	<0.024	6.6	<0.30	<0.61	30
SPA10	0	-----	711582.84	1174203.17	SPA-SS10-0	8.1	21	47	<0.58	42	38	12,000	37	0.150J	58J	0.38	<0.58	95
SPA10	6	-----	711582.84	1174203.17	SPA-SB10-6	20	57	25	<0.68	19	19	17,000	24	0.058J	19J	0.45	<0.68	50
SPA11	0	-----	711334.15	1173942.06	SPA-SS11-0	<6.0	9.2	34	<0.60	47	21	9,600	18	0.084J	19J	0.38	<0.60	50
SPA11	6	-----	711334.15	1173942.06	SPA-SB11-6	21	45	30	<0.65	31	26	11,000	99	<0.026UJ	14J	0.36	<0.65	62
SPA12	0	-----	711225.89	1174054.25	SPA-SS12-0	<6.4	8.7	44	<0.64	32	24	10,000	17	0.170J	13J	0.34	<0.64	58
SPA12	6	-----	711225.89	1174054.25	SPA-SB12-6	18	19	16	<0.63	23	23	8,700	42	0.031J	13J	0.34	<0.63	65
PT52	2	-----	711622.43	1174282.29	PT-SB52-2	5.8	23	23	<0.56	19J	47J	<13000	61	0.056	24	0.57	<0.56	88
PT53	1	-----	711666.58	1174289.28	PT-SB53-1	<5.9UJ	7.4	16	<0.59	13	22	9,800	12	<0.024	10	0.52	<0.59	39
PT54	1	-----	711667.11	1174320.70	PT-SB54-1	<5.7UJ	12J	27	<0.57	15	28	17,000	25J	0.029	11	0.58	<0.57	55
PT55	2	-----	711674.16	1174373.52	PT-SB55-2	<5.4	21	17	<0.54	15J	24	14000J	21	0.025	15	0.27	<0.54	55
PT56	1	-----	711706.41	1174348.47	PT-SB56-1	12J	33	38	0.66	27	96	20,000	110	0.11	28	0.75	<0.58	130
PT57	1	-----	711758.28	1174246.85	PT-SB57-1	<7.5UJ	9	28	<0.75	14	43	14,000	9.7	<0.030	8.6	0.77	<0.75	44
PT58	1	-----	711739.11	1174204.45	PT-SB58-1	<5.6UJ	7.1	17	<0.56	12	17	11,000	9.6	0.026	8	0.38	<0.56	29
PT59	1	-----	711706.86	1174227.49	PT-SB59-1	<5.4UJ	6.7	24	<0.54	15	25	13,000	18	0.032	11	0.42	<0.54	63
PT60	1	-----	711706.14	1174181.82	PT-SB60-1	6.7J	14	25	<0.52	17	26	10,000	24	0.073	20	<0.26	<0.52	76
PT61	1	-----	711654.39	1174210.57	PT-SB61-1	<5.2UJ	8.4	22	<0.52	13	22	9,700	18	0.032	13	0.33	<0.52	52
TLA1	0	PT3	709997.11	1175554.33	TLA-SS01-0	<6.0	18	41	<0.60	19	30J	12,000	21	0.1	57	<0.30	<0.60	78
TLA1	6	PT3	709997.11	1175554.33	TLA-SB01-6	<6.0	4.3	11	<0.60	8.8	15J	8,300	<6	<0.024	18	<0.30	<0.60	26
TLA2	0	PT4	710147.90	1175462.28	TLA-SS02-0	<6.3	7	42	<0.63	12	22J	11,000	13	0.13	28	<0.31	<0.63	56
TLA2	6	PT4	710147.90	1175462.28	TLA-SB02-6	10	22	37	<0.57	41	28J	11,000	20	0.067	63	<0.29	<0.57	66
TLA3	0	PT5	710233.57	1175627.95	TLA-SS03-0	<6.1	16	69	<0.61	23	29J	13,000	15	0.11	130	<0.30	<0.61	61
TLA3	6	PT5	710233.57	1175627.95	TLA-SB03-6	<6.0	10	28	<0.60	36	24J	9,000	10	0.037	45	<0.30	<0.60	37
TLA4	0	PT6	710459.10	1175646.24	TLA-SS04-0	7.6	12	73	<0.63	25	27J	13,000	15	0.14	60	<0.32	<0.63	68
TLA4	6	PT6	710459.10	1175646.24	TLA-SB04-6	<5.9	3.1	45	<0.59	26	15J	11,000	<5.9	0.037	74	<0.29	<0.59	33
TLA5	0	-----	710344.39	1175459.81	TLA-SS05-0	<5.7	7.9	51	<0.57	23	22J	11,000	10	0.072	96	<0.28	<0.57	49

TABLE 5-1 - Summary of Metals Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	NORTHING (Feet)	EASTING (Feet)	Sample ID	Metals (mg/kg)												
						Anitmony	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc
TLA5	6	-----	710344.39	1175459.81	TLA-SB05-6	<5.9	12	64	<0.59	26	23J	11,000	14	0.092	180	<0.29	<0.59	57
TLA6	0	-----	710365.05	1175370.52	TLA-SS06-0	<5.9	4.1	62	<0.59	26J	23	14000J	12	0.069	130	<0.29	<0.59	63
TLA6	6	-----	710365.05	1175370.52	TLA-SB06-6	<5.6	29	53	<0.56	29J	24	12000J	21	0.074	92	<0.28	<0.56	51
TLA7	0	PT25	710438.46	1175319.54	TLA-SS07-0	<5.2	4.6	40	<0.52	28	32J	17,000	9.5	0.079	21	<0.26	<0.52	72
TLA7	6	PT25	710438.46	1175319.54	TLA-SB07-6	<5.6	12	64	<0.56	25	25J	13,000	13	0.074	110	<0.28	<0.56	56
TLA7	10	PT25	710438.46	1175319.54	TLA-SB07-10	<6.6	1.3	83	<0.66	13	19	9,500	11	0.027	9.3	<0.33	<0.66	34
TLA8	0	PT24	710434.16	1175279.77	TLA-SS08-0	14J	24J	51	<0.61	23	27J	14,000	17J	0.16	30	<0.30	<0.61	82J
TLA8	6	PT24	710434.16	1175279.77	TLA-SB08-6	7.6	24	59	<0.61	17	21	12,000	11	0.044	14	<0.30	<0.61	51
TLA9	0	PT23	710593.09	1175209.58	TLA-SS09-0	26	30	40	<0.54	24	56	18,000	20	0.67	52	0.38	<0.54	93
TLA9	6	PT23	710593.09	1175209.58	TLA-SB09-6	<6.2	57J	16	<0.62	9.5	14	8,100	<6.2	0.055	6.8	0.44	<0.62	23
TLA10	0	PT18	710548.87	1175255.58	TLA-SS10-0	<6.8	4.7	79	<0.68	21	35	15,000	17	0.26J	28	0.37	1.3	76
TLA10	6	PT18	710548.87	1175255.58	TLA-SB10-6	28	21	90	<0.78	23	59	23,000	41	0.30J	97	<0.39	<0.78	100
TLA11	0	-----	710478.12	1175380.61	TLA-SS11-0	<5.9	4.7	40	<0.59	12J	24	12,000J	7.7	0.064	14	<0.29	<0.59	60
TLA11	6	-----	710478.12	1175380.61	TLA-SB11-6	<6.1	12	70	<0.61	22J	28	14,000J	20	0.093	180	<0.30	<0.61	61
TLA11	10	-----	710478.12	1175380.61	TLA-SB11-10	<5.7	19	41	<0.57	20	24	13,000	17	0.059	45	0.35	<0.57	52
TLA12	0	-----	710427.14	1175415.22	TLA-SS12-0	<6.8	11	57	<0.68	19J	29	11,000J	17	0.27	51	0.35	<0.68	110
TLA12	6	-----	710427.14	1175415.22	TLA-SB12-6	<6.0	7.3	60	<0.60	18J	22	11,000J	13	0.069	160	<0.30	<0.60	42
TLA12	10	-----	710427.14	1175415.22	TLA-SB12-10	9.6	18	51	<0.61	29	25	14,000	18	0.069	65	0.35	<0.61	56
TLA13	0	-----	710512.19	1175438.83	TLA-SS13-0	8.9	44	90	0.67	24	36J	12,000	27	0.9	230	<0.32	<0.65	89
TLA13	6	-----	710512.19	1175438.83	TLA-SB13-6	<6.0	13	56	<0.60	16	24J	8,600	21	0.082	180	<0.30	<0.60	54
TLA13	12	-----	710512.19	1175438.83	TLA-SB13-12	<6.1	19	44	<0.61	19	22	12,000	23	0.073	44	0.35	<0.61	49
TLA14	0	-----	710495.84	1175507.39	TLA-SS14-0	<6.8	57	59	0.81	17J	33	11,000J	25	1	41	0.67	<0.68	93
TLA14	6	-----	710495.84	1175507.39	TLA-SB14-6	<6.0	6.6	69	<0.60	22J	23	13,000J	12	0.1	120	<0.30	<0.60	45
TLA15	0	-----	710619.84	1175516.40	TLA-SS15-0	<5.7	28	84	<0.57	25	32	14,000	9.1	0.61J	19	0.36	<0.57	100
TLA15	6	-----	710619.84	1175516.40	TLA-SB15-6	13	100	65	<0.57	35	26	12,000	20	1.1J	84	0.48	<0.57	63
TLA15	10	-----	710619.84	1175516.40	TLA-SB15-10	<6.8	3.8	92	<0.68	21	20	13,000	8	0.051	21	<0.34	<0.68	35
TLA16	0	-----	710659.62	1175445.98	TLA-SS16-0	<5.8	19	98	<0.58	24	30	13,000	14	0.140J	21	0.3	<0.58	110
TLA16	6	-----	710659.62	1175445.98	TLA-SB16-6	<6.5	15	110	0.47	36	32	10,000	23	0.084J	300	<0.32	<0.65	75
TLA16	10	-----	710659.62	1175445.98	TLA-SB16-10	<6.6	56	92	<0.66	33	26	13,000	21	0.043	100	0.39	<0.66	56
TLA17	0	PT19	710725.75	1175374.73	TLA-SS17-0	11	17	92	<0.55	21	35	12,000	15	0.27J	29	0.31	<0.55	83
TLA17	6	PT19	710725.75	1175374.73	TLA-SB17-6	6.4	15	170	<0.55	32	41	18,000	48	0.14	92	<0.27	<0.55	110
TLA17	10	PT19	710725.75	1175374.73	TLA-SB17-10	36	43	71	<0.60	12	58	12,000	40	0.55	17	0.42	<0.60	160
TLA18	0	PT17	710701.05	1175300.31	TLA-SS18-0	6.7	17	65J	<0.55	29	54	13,000	14	0.64J	46	0.46	0.82	100J
TLA18	6	PT17	710701.05	1175300.31	TLA-SB18-6	8.7	25	70	<0.57	23	29	13,000	16	0.65J	130	0.31	<0.57	76
TLA18	10	PT17	710701.05	1175300.31	TLA-SB18-10	30	45	67	<0.58	14	46	14,000	42	0.82	20	0.33	<0.58	120
TLA19	0	PT22	710673.90	1175263.04	TLA-SS19-0	<6.1	11	76	<0.61	23	37	15,000	18	0.40J	35	0.38	0.81	80
TLA19	6	PT22	710673.90	1175263.04	TLA-SB19-6	21	68	58	<0.59	18	27	9,900	18	0.94J	69	0.31	<0.59	51
TLA20	0	-----	710703.51	1175522.36	TLA-SS20-0	6.4	12	100	<0.58	22	34	14,000	13	0.15J	22	<0.29	<0.58	95
TLA20	6	-----	710703.51	1175522.36	TLA-SB20-6	<6.1	16	66	<0.61	15	30	13,000	40	0.097J	31	<0.30	<0.61	88
TLA21	0	-----	710794.02	1175471.42	TLA-SS21-0	90	63	39	0.52	62	110J	16,000	120	0.3	420	<0.27	<0.55	180
TLA21	6	-----	710794.02	1175471.42	TLA-SB21-6	19	18	39	<0.60	12	86J	10,000	31	0.033	14	<0.30	<0.60	100
TLA22	0	-----	710826.38	1175498.35	TLA-SS22-0	220	120	55	0.64	99	140J	24,000	160	0.94	99	0.41	<0.55	350
TLA22	6	-----	710826.38	1175498.35	TLA-SB22-6	<5.9	8.5	15	<0.59	11	12J	8,800	<5.9	0.025	7.9	<0.29	<0.59	23
TLA23	0	PT15	710825.26	1175293.72	TLA-SS23-0	97	180	54	1.1	36	46	15,000	28	16	78	2.4	<0.56	69
TLA23	6	PT15	710825.26	1175293.72	TLA-SB23-6	14	43	62	<0.56	20	18	10,000	11	1.4	110	0.34	<0.56	41
TLA23	10	PT15	710825.26	1175293.72	TLA-SB23-10	13	190	130	<0.77	41	24	15,000	16	1.4	170	0.42	<0.77	44
TLA24	0	PT16	710847.97	1175258.99	TLA-SS24-0	<5.2	11	36	<0.52	17	23	20,000	<5.2	0.31	13	0.31	<0.52	34

TABLE 5-1 - Summary of Metals Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	NORTHING (Feet)	EASTING (Feet)	Sample ID	Metals (mg/kg)												
						Anitmony	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc
TLA24	6	PT16	710847.97	1175258.99	TLA-SB24-6	130	180	48	<0.62	23	17	9,800	46	2	43	1.6	<0.62	30
TLA25	0	PT14	710856.03	1175343.22	TLA-SS25-0	30	63	42	<0.56	30	32	12,000	25	2.4	58	0.48	<0.56	70
TLA25	6	PT14	710856.03	1175343.22	TLA-SB25-6	10	33	50	<0.62	10	15	10,000	<6.2	0.28	18	<0.31	<0.62	28
TLA26	0	PT13	710900.55	1175389.49	TLA-SS26-0	80	93	36	0.6	33	49	12,000	52	2.1	41	0.4	<0.57	130
TLA26	6	PT13	710900.55	1175389.49	TLA-SB26-6	28	23	18	<0.58	13	25	8,600	11	0.12	17	<0.29	<0.58	72
TLA27	0	PT9	710947.56	1175396.72	TLA-SS27-0	74	100	40	<0.54	31	47	14,000	45	1.4	24	0.29	<0.54	100
TLA27	6	PT9	710947.56	1175396.72	TLA-SB27-6	19	280	15	<0.60	36	22	8,000	11	0.13	8.4	<0.30	<0.60	52
TLA28	0	PT11	710962.91	1175319.16	TLA-SS28-0	18	21	46	<0.54	24	30	14,000	25	0.34	20	0.28	<0.54	79
TLA28	6	PT11	710962.91	1175319.16	TLA-SB28-6	11J	32	20	<0.59	31	19	9,300	9.6	0.59J	19J	<0.29	<0.59	39
TLA29	0	PT10	711029.37	1175282.72	TLA-SS29-0	7.4	7.9	48	<0.55	17	15	15,000	8.4	0.24	15	<0.27	<0.55	48
TLA29	6	PT10	711029.37	1175282.72	TLA-SB29-6	14	65	23	<0.56	15	26	11,000	22	0.36	19	<0.28	<0.56	78
TLA30	0	PT12	710957.94	1175263.16	TLA-SS30-0	10	16	56	<0.55	20J	30	18,000J	16	0.44	20	0.3	<0.55	62
TLA30	6	PT12	710957.94	1175263.16	TLA-SB30-6	35	160	42	<0.63	17J	31	11,000J	26	0.37	16	0.33	<0.63	80
TLA31	0	PT8	710794.95	1175574.91	TLA-SS31-0	5.8	5.3	52	<0.53	17J	23	15,000J	7.2	0.062	15	<0.27	<0.53	44
TLA31	6	PT8	710794.95	1175574.91	TLA-SB31-6	9.3	21	27	<0.60	18J	23	9,000J	28	0.21	16	<0.30	<0.60	36
TLA32	0	PT7	710701.90	1175675.71	TLA-SS32-0	12	7.9	37	<0.52	17J	26	15,000	8.2	0.094	22	<0.26	<0.52	45
TLA32	6	PT7	710701.90	1175675.71	TLA-SB32-6	<6.3	11	20	<0.63	13J	38	13,000J	28	0.11	14	<0.31	<0.63	43
PT31	0	-----	710759.57	1175254.33	PT-SS31-0	11	17	47	<0.54	19	27	12,000	13	0.68J	16	0.31	<0.54	68
PT31	6	-----	710759.57	1175254.33	PT-SB31-6	100	210	26	1	11	24	7,000	25	11J	8.1	1.6	<0.60	40
PT1	-----	-----	709896.36	1175723.02	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT2	-----	-----	709925.93	1175664.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA1	-----	-----	711249.54	1174492.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA2	-----	-----	711274.67	1174513.60	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA3	0	-----	711252.70	1174677.60	MA-SS03-0	<5.9	17	82	<0.59	6.3	23	5,700	46	0.30J	12	0.31	<0.59	61
MA3	6	-----	711252.70	1174677.60	MA-SB03-6	<6.3	1.9	6.6	<0.63	6.8	8.6	6,600	<6.3	0.03J	6.7	<0.31	<0.63	18
MA4	0	-----	711235.42	1174721.93	MA-SS04-0	<5.9	4.6	16	<0.59	6.8	25	7,200	30	0.41J	9.6	<0.29	<0.59	40
MA4	6	-----	711235.42	1174721.93	MA-SB04-6	<6.3	3	19	<0.63	9.4	20	9,800	23	0.32J	8.8	<0.31	<0.63	51
MA5	0	-----	711134.50	1174772.63	MA-SS05-0	<24	66	21	<2.40	15	180	4,000	1900	0.1	25	<1.2	<2.4	160
MA5	0.5	-----	711134.50	1174772.63	MA-SB05-0.5	<22	33	14	<2.20	3.4	290	2,800J	1400	<0.087	7.6	<1.1	<2.2	140
MA5	6	-----	711134.50	1174772.63	MA-SB05-6	<7.4	3.4	84	<0.74	12	25	12,000	67	0.033	10	0.46	<0.74	33
MA6	0	-----	711078.81	1174727.90	MA-SS06-0	<6.3	2.1	97	<0.63	5.8	37	9,100	26	0.029	5.5	0.33	<0.63	37
MA6	6	-----	711078.81	1174727.90	MA-SB06-6	<7.0	4.3	110	<0.70	9.9	30	11,000	300	0.042	6.4	0.36	<0.70	36
MA7	0	-----	711022.19	1174717.57	MA-SS07-0	<5.8	2.2	62	<0.58	13	17	12,000	24	<0.023	9.1	<0.29	<0.58	32
MA7	6	-----	711022.19	1174717.57	MA-SB07-6	<6.1	1.8	52	<0.61	20	14	8,000	4.1	<0.024	6.3	0.31	<0.61	19
MA8	0	-----	710945.93	1174601.95	MA-SS08-0	6.6	14	29	<0.55	17	26	11,000	35	0.059	19	<0.27	<0.55	89
MA8	6	-----	710945.93	1174601.95	MA-SB08-6	<5.9	27	28	<0.59	29	20	7,900	14	0.025	11	<0.29	<0.59	110
MA9	0	-----	710822.61	1174601.49	MA-SS09-0	<5.8	14	37	<0.58	21	17	9,100	31	0.063	10	<0.29	<0.58	110
MA9	6	-----	710822.61	1174601.49	MA-SB09-6	<6.3	4.1	14	<0.63	9.4	11	7,000	<6.3	<0.025	6	<0.32	<0.63	26
MA10	0	-----	710860.65	1174679.79	MA-SS10-0	<5.6	3.1	45	<0.56	15	30J	15,000	5.7	<0.022	11	<0.28	1	38
MA10	6	-----	710860.65	1174679.79	MA-SB10-6	<6.2	1.8	55	<0.62	110	14J	8,700	<6.2	<0.025	11	<0.31	<0.62	24
MA11	0	-----	710856.27	1174734.04	MA-SS11-0	<6.3	4.3	67	<0.63	86	35J	11,000	14	0.031	12	<0.31	0.96	46
MA11	6	-----	710856.27	1174734.04	MA-SB11-6	<6.5	11	22	<0.65	350	20J	13,000	<6.5	<0.026	7.4	<0.32	<0.65	20
MA12	0	PT43	710807.83	1174801.02	MA-SS12-0	<5.5	15	17	<0.55	28	21J	9,400	22	0.13	28	<0.27	<0.55	58
MA12	6	PT43	710807.83	1174801.02	MA-SB12-6	<6.3	40	14	<0.63	18	19J	8,600	<6.3	<0.025	9.7	<0.31	<0.63	24
MA13	-----	-----	710719.69	1174742.56	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA14	-----	-----	710661.66	1174743.01	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA15	-----	-----	711000.51	1174821.90	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-1 - Summary of Metals Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	NORTHING (Feet)	EASTING (Feet)	Sample ID	Metals (mg/kg)												
						Anitmony	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc
MA16	-----	PT45	711057.95	1174824.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA17	-----	PT46	711138.85	1174823.59	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA18	-----	PT47	711217.88	1174839.16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA19	-----	-----	711292.04	1174849.06	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA20	-----	-----	710666.65	1174899.96	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA21	-----	-----	710659.83	1174947.78	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA22	-----	-----	710785.12	1174899.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA23	-----	-----	710804.99	1174934.66	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA24	0	-----	710675.84	1175050.47	MA-SS24-0	<6.3UJ	9	16	<0.63	7.5	17J	6,800	<6.3	0.046	8.4	<0.31	<0.63	61
MA24	6	-----	710675.84	1175050.47	MA-SB24-6	<6.4UJ	9.6	13	<0.64	7	15J	6,900	<6.4	<0.026	5.8	<0.32	<0.64	28
MA25	0	PT21	710677.44	1175217.51	MA-SS25-0	38	37	54	<0.54	16	27	13,000	38	0.42	11	<0.27	<0.54	150
MA25	6	PT21	710677.44	1175217.51	MA-SB25-6	9	110	33	<0.60	19	21	12,000	15	0.28	21	<0.30	<0.60	58
MA26	0	PT20	710753.47	1175198.89	MA-SS26-0	230J	160	37J	1.5	17	120J	10,000	51J	100	21	31	0.59	120J
MA26	6	PT20	710753.47	1175198.89	MA-SB26-6	360	270	22	1.4	17	330	11,000	58	45	22	20	<0.60	72
MA27	0	-----	710889.59	1175006.64	MA-SS27-0	<5.7	16	24	<0.57	14	18	11,000	21	0.033	11	<0.29	<0.57	46
MA27	6	-----	710889.59	1175006.64	MA-SB27-6	<6.6	210	8.6	<0.66	7.9	11	7,000	<6.6	<0.026UJ	6.8	<0.33	<0.66	18
MA28	0	-----	710931.76	1175058.49	MA-SS28-0	27	60	48	<0.54	29	58	19,000	78	0.95	46	0.28	<0.54	140
MA28	6	-----	710931.76	1175058.49	MA-SB28-6	17	600	11	<0.55	13	19J	27,000J	7.8	0.18	10	0.29	<0.55	25
MA29	0	-----	710877.50	1175121.65	MA-SS29-0	10	15	24	<0.56	14	23	9,500	8.8	0.22	11	<0.28	<0.56	38
MA29	6	-----	710877.50	1175121.65	MA-SB29-6	140	420	14	3.3	7.1	89	6,100	100	23	6.8	2.6	<0.65	120
MA30	0	-----	710968.79	1175134.04	MA-SS30-0	38	150	37	<0.53	18	80	14,000	71	1.5	21	0.36	<0.53	99
MA30	6	-----	710968.79	1175134.04	MA-SB30-6	69	210	26	<0.60	15	120	11,000	90	2.3	19	0.51	<0.60	140
MA31	0	-----	710919.25	1175182.05	MA-SS31-0	28	62	88	0.65	26	49	16,000	28	2.8	21	1.5	<0.56	93
MA31	6	-----	710919.25	1175182.05	MA-SB31-6	470	770	35	5.8	88	120	19,000	150	34	100	8.7	<0.61	270
MA32	0	-----	710964.60	1175215.64	MA-SS32-0	19	7.3	66	<0.56	25	36	18,000	9.2	0.22	18	0.28	<0.56	62
MA32	6	-----	710964.60	1175215.64	MA-SB32-6	39	62	50	<0.60	16	42	11,000	31	0.61	17	<0.30	<0.60	77
MA33	0	-----	711071.95	1175187.71	MA-SS33-0	<5.6	5.7	69	<0.56	24	34	19,000	7.9	0.09	21	<0.28	<0.56	68
MA33	6	-----	711071.95	1175187.71	MA-SB33-6	18	31	26	<0.56	17	33	8,800	21	0.16	23	<0.28	<0.56	83
MA34	0	-----	710844.30	1175092.66	MA-SS34-0	27	330	13	0.68	7.4	23	7,600	35	3.1	9.5	0.59	<0.63	59
MA34	6	-----	710844.30	1175092.66	MA-SB34-6	21	350	7.2	<0.61	5.8	11	7,800	<6.1	0.12	5	0.48	<0.61	13
MA34	10	-----	710844.30	1175092.66	MA-SB34-10	33	570	10	<0.64	8.2	13	7,800	12	1.2	7.1	0.51	<0.64	30
MA35	0	-----	710809.91	1175091.65	MA-SS35-0	17	66	13	<0.59	7.6	12	6,700	11	0.93	8	<0.29	<0.59	30
MA35	6	-----	710809.91	1175091.65	MA-SB35-6	16	380	16	<0.66	9.7	16	8,300	<6.6	0.16	8.8	0.8	<0.66	22
MA35	9	-----	710809.91	1175091.65	MA-SB35-9	19	260	5.9	<0.63	6.4	9.8	5,000	<6.3	<0.025	6.6	<0.32	<0.63	16
MA36	0	-----	710823.90	1175080.11	MA-SS36-0	16	100	20	<0.60	8.7	35	8,600	29	1.5	12	<0.30	<0.60	58
MA36	6	-----	710823.90	1175080.11	MA-SB36-6	20	630	9.2	<0.63	6.9	11	6,400	<6.3	0.13	6.8	0.42	<0.63	17
MA36	9	-----	710823.90	1175080.11	MA-SB36-9	6.4	700	5.3J	<0.63	5.8	9.5	5,000	<6.3	<0.025	5.3	<0.32	<0.63	13
MA37	0	-----	710823.22	1175103.88	MA-SS37-0	37	160	10	<0.63	9.5	14	6,900	11	2	7.6	<0.31	<0.63	29
MA37	6	-----	710823.22	1175103.88	MA-SB37-6	41	550	7	<0.63	5.3	10	5,300	<6.3	0.12	5.8	0.37	<0.63	17
MA37	9	-----	710823.22	1175103.88	MA-SB37-9	43	170	6.8	<0.67	6.3	11	6,500	<6.7	0.075	6.3	0.45	<0.67	15
MA38	0	-----	710842.82	1175114.75	MA-SS38-0	37	430	92	2.8	19	59	18,000	100	0.65	32	0.44	2	150
MA38	6	-----	710842.82	1175114.75	MA-SB38-6	45	150	31	<0.54	18	40	16,000	60	0.67	26	0.29	<0.54	87
MA39	0	-----	710808.84	1175113.06	MA-SS39-0	37	320	7.5	<0.65	4.7	9.4	5,000	<6.5	0.17	5.3	<0.32	<0.65	14
MA39	6	-----	710808.84	1175113.06	MA-SB39-6	94	230	7.8	<0.64	6.3	11	5,500	<6.4	0.13	5.3	0.54	<0.64	16
MA39	9	-----	710808.84	1175113.06	MA-SB39-9	22	50	4.6	<0.64	4.6	7.3	4,200	<6.4	0.037	3.8	<0.32	<0.64	11
MA40	0	-----	710822.56	1175121.95	MA-SS40-0	77	250	15	<0.67	14	16	13,000	10	2.2	15	0.63	<0.67	30
MA40	6	-----	710822.56	1175121.95	MA-SB40-6	96	210	16	<0.63	12	26	13,000	7.3	3.2	12	0.62	<0.63	34

TABLE 5-1 - Summary of Metals Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	NORTHING (Feet)	EASTING (Feet)	Sample ID	Metals (mg/kg)												
						Anitmony	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc
MA40	8.5	-----	710822.56	1175121.95	MA-SB40-8.5	49	79	12	0.73	7.3	26	5,400	<6.1	0.62	8.8	<0.3	<0.61	33
MA41	0	-----	710842.16	1175133.61	MA-SS41-0	80	100	14	<0.61	12	51	12,000	12	14	11	0.67	<0.61	58
MA41	6	-----	710842.16	1175133.61	MA-SB41-6	160	170	12	<0.63	7.8	40	8,300	<6.3	3.1	7.2	0.37	<0.63	29
MA41	9.5	-----	710842.16	1175133.61	MA-SB41-9.5	36	190	9	<0.63	8.4	13	7,000	<6.3	0.36	6.4	<0.32	<0.63	19
MA42	0	-----	710808.39	1175129.36	MA-SS42-0	31	130	12	<0.61	8.9	17	9,000	12	0.65	8	0.36	<0.61	24
MA42	6	-----	710808.39	1175129.36	MA-SB42-6	100	280	8.6	<0.61	5.2	16	5,600	<6.1	0.85	5.3	0.32	<0.61	16
MA42	9	-----	710808.39	1175129.36	MA-SB42-9	41	250	7.1	<0.62	8.7	16	7,600	<6.2	3.5	5.3	<0.31	<0.62	14
MA43	7	-----	710842.99	1175121.43	MA-SB43-7	67	160	14	1.1	10	42	11,000	15	7.1	13	1	<0.65	95
MA44	0	-----	710845.73	1175072.53	MA-SS44-0	10	310	11	<0.59	6.6	20	6,600	21	2.6	6.2	0.66	<0.59	44
MA44	6	-----	710845.73	1175072.53	MA-SB44-6	55	1,300	7.3	<0.60	7.7	21	12,000	<6.0	0.27	9.1	0.41	<0.60	16
MA44	9	-----	710845.73	1175072.53	MA-SB44-9	21	97	5.1	<0.66	5.7	13	5,100	<6.6	0.04	7.1	0.6	<0.66	16J
MA45	0	-----	710824.74	1175064.00	MA-SS45-0	17	240	12	<0.61	10	34	14,000	13	0.95	16	0.39	<0.61	29
MA45	6	-----	710824.74	1175064.00	MA-SB45-6	11	340	5.9	<0.63	5.7	11	5,600	<6.3	0.078	5.2	0.4	<0.63	14
MA45	9	-----	710824.74	1175064.00	MA-SB45-9	<6.4	810	7.5	<0.64	7.8	14	5,200	<6.4	0.026	4	0.46	<0.64	97
MA46	6	-----	710835.54	1175065.22	MA-SB46-6	17	140	10	<0.62	7.6	10	8,000	<6.2	0.095	7.1	0.32	<0.62	19
MA46	8	-----	710835.54	1175065.22	MA-SB46-8	9.2	720	7.7	<0.66	8.1	12	7,900	<6.6	0.033	6.5	<0.33	<0.66	16
MA47	6	-----	710817.82	1175075.18	MA-SB47-6	16	350	11	<0.64	8.3	14	8,800	<6.4	0.24	8.2	0.61	<0.64	26
MA47	8	-----	710817.82	1175075.18	MA-SB47-8	<6.4	810	5	<0.64	5.1	7	4,400	<6.4	0.028	3.6	<0.32	<0.64	11
MA48	6	-----	710810.77	1175070.83	MA-SB48-6	9.8	66	5.8	<0.64	5.6	7.3	5,300	<6.4	0.075	5.1	<0.32	<0.64	13
MA48	9.5	-----	710810.77	1175070.83	MA-SB48-9.5	<6.4	880	7.3	<0.64	7.6	10	6,400	<6.4	0.046	5	0.34	<0.64	15
MA49	6	-----	710803.32	1175065.50	MA-SB49-6	7.6	41	8.8	<0.63	7.4	8	6,300	<6.3	0.15	6	<0.32	<0.63	30
MA49	8.5	-----	710803.32	1175065.50	MA-SB49-8.5	11	460	10	<0.65	8.8	12	7,100	<6.5	0.075	6.5	0.34	<0.65	18
MA50	6	-----	710834.88	1175084.28	MA-SB50-6	25	300	8.8	<0.64	6.8	12	8,900	<6.4	0.25	6.9	0.33	<0.64	17
MA50	10	-----	710834.88	1175084.28	MA-SB50-10	39	120	7.2	<0.66	8.2	11	7,400	<6.6	0.074	7.8	0.44	<0.66	19
MA51	6	-----	710815.98	1175095.99	MA-SB51-6	32	170	11	<0.62	7	11	7,100	<6.2	0.43	7.7	0.58	<0.62	20
MA51	9.5	-----	710815.98	1175095.99	MA-SB51-9.5	30	140	6.6	<0.66	9.6	8.4	7,300	<6.6	0.062	5.9	0.42	<0.66	15
MA52	6	-----	710803.06	1175083.17	MA-SB52-6	13	230	8.5	<0.62	7.7	11	7,000	<6.2	0.32	7.6	0.47	<0.62	20
MA52	8.5	-----	710803.06	1175083.17	MA-SB52-8.5	<6.8	1,200	8.8	<0.68	8.6	11	7,500	<6.8	0.034	5.1	0.35	<0.68	14
MA53	9	-----	710833.81	1175108.83	MA-SB53-9	43	310	14	<0.63	6	11	6,500	<6.3	0.63	6.3	0.5	<0.63	15
MA54	6	-----	710801.56	1175116.96	MA-SB54-6	78	190	6.9	<0.63	4.8	9.8	6,000	<6.3	0.31	5.4	0.32	<0.63	16
MA54	8.5	-----	710801.56	1175116.96	MA-SB54-8.5	63	400	6.5	<0.64	3.9	8.2	5,900	<6.4	0.14	3.8	0.34	<0.64	16
MA55	6	-----	710801.99	1175106.35	MA-SB55-6	52	260	7.5	<0.63	5.6	8.1	7,800	<6.3	0.16	5.6	0.33	<0.63	15
MA55	10	-----	710801.99	1175106.35	MA-SB55-10	39	260	5.5	<0.65	5.5	8.4	7,700	<6.5	0.05	6.1	<0.32	<0.65	14
MA56	6	-----	710831.84	1175130.47	MA-SB56-6	89	180	12	<0.63	10	36	9,000	<6.3	2.5	9.1	0.33	<0.63	23
MA56	9.5	-----	710831.84	1175130.47	MA-SB56-9.5	49	88	7.5	<0.64	6.4	11	6,700	<6.4	0.2	6.9	<0.32	<0.64	18
MA57	6	-----	710816.24	1175131.94	MA-SB57-6	96	160	18	<0.66	9.1	35	7,900	11	1.5	8	0.33	<0.66	31
MA57	9	-----	710816.24	1175131.94	MA-SB57-9	58	170	7.1	<0.63	7.7	18	7,700	<6.3	3.5	4.9	<0.32	<0.63	14
MA58	6	-----	710801.34	1175122.06	MA-SB58-6	64	110	7.2	<0.63	5.3	13	5,900	<6.3	0.39	4.8	<0.31	<0.63	17
MA58	9	-----	710801.34	1175122.06	MA-SB58-9	63	290	8.9	<0.65	10	22	7,000	<6.5	0.069	7.8	0.42	<0.65	19
PT26	-----	-----	710377.54	1175194.88	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT27	-----	-----	710278.20	1175106.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT28	-----	-----	710361.53	1175021.41	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT29	-----	-----	710436.23	1175061.14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT30	-----	-----	710423.79	1175165.06	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT31	-----	-----	710759.57	1175254.33	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT32	0	-----	710804.90	1175192.65	PT-SS32-0	270	720	17	<0.60	15	59	9,000	28	14	14	2.9	1.4	41
PT32	6	-----	710804.90	1175192.65	PT-SB32-6	140	420J	7.3	<0.61	14	23	5,300	<6.1	1.7	8.4	0.8	<0.61	22

TABLE 5-1 - Summary of Metals Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	NORTHING (Feet)	EASTING (Feet)	Sample ID	Metals (mg/kg)												
						Anitmony	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc
PT33	0	-----	710833.33	1175168.92	PT-SS33-0	8,200	4,200	11	2.3	9.9	510	3,400	340	220	11	12	6.2	49
PT33	6	-----	710833.33	1175168.92	PT-SB33-6	27,000	25,000	6.6	14	7	2000	2,900	1800	910	30	71	14	120
PT34	0	-----	710928.25	1175112.58	PT-SS34-0	24	67	50	<0.54	200	49	13,000	41	3.6	32	0.54	<0.54	74
PT34	6	-----	710928.25	1175112.58	PT-SB34-6	97	550	11	1.4	5.8	51	6,500	15	3	14	0.86	<0.60	72
PT35	0	-----	710901.69	1175151.14	PT-SS35-0	440	210	32	2.6	18	59	13,000	70	21	19	2.7	<0.53	97
PT35	6	-----	710901.69	1175151.14	PT-SB35-6	550	3,300	40	12	6.7	210	7,300	330	350	9.8	33	2.5	170
PT36	0	-----	710867.30	1175217.37	PT-SS36-0	70	220	58	0.65	21	38	14,000	25	4.1	21	2.1	<0.53	76
PT36	6	-----	710867.30	1175217.37	PT-SB36-6	180	630	8.7	1.2	12	38	7,000	27	13	7.8	2.4	<0.60	53
PT37	0	-----	711081.71	1174879.48	PT-SS37-0	<6.8	6.2	200	<0.68	19	41	19,000	47	0.1	39	0.44	<0.68	110
PT37	6	-----	711081.71	1174879.48	PT-SB37-6	<7.0	4.4	100	<0.70	20	36	13,000	21	0.077	8.8	<0.35	<0.70	60
PT37A	0	-----	710932.97	1175021.20	PT-SS37A-0	<5.4UJ	7.2	50	<0.54	15	24	13,000	<5.4	0.2	21	0.28	<0.54	45
PT37A	6	-----	710932.97	1175021.20	PT-SB37A-6	65J	1,100	28	0.8	5.4	20	5,800	7.4	0.39	14	0.92	<0.63	87
PT38	0	-----	710980.62	1174877.66	PT-SS38-0	13	21	200	<0.66	74	96	18,000	100	0.11	29	0.36	<0.66	200
PT38A	6	-----	710885.16	1175032.73	PT-SB38-6	<6.4	9.8	92	<0.64	63	28	11,000	6.4	<0.026	8	<0.32	<0.64	86
PT38A	0	-----	710885.16	1175032.73	PT-SS38A-0	<5.4UJ	24	71	<0.54	17	29	13,000	6.8	0.82	14	0.33	<0.54	75
PT38A	6	-----	710885.16	1175032.73	PT-SB38A-6	48J	570	17	0.69	6	19	5,400	17	0.81	5.6	0.51	<0.63	35
PT39	0	-----	710762.12	1174849.86	PT-SS39-0	<6.2	69	30	<0.62	28	45	11,000	65	<0.025	19	<0.31	<0.62	170
PT39	6	-----	710762.12	1174849.86	PT-SB39-6	<6.3	20	16	<0.63	30	7.8	6,100	<6.3	<0.025	4	<0.32	<0.63	25
PT40	0	-----	710708.93	1174856.25	PT-SS40-0	76	450	110	<0.60	25	65	10,000	59	0.074	17	0.48	<0.60	120
PT40	6	-----	710708.93	1174856.25	PT-SB40-6	<6.5	140	44	<0.65	14	19	8,100	7.2	0.053	7.5	0.36	<0.65	34
PT41	0	-----	711200.25	1174530.89	PT-SS41-0	18	18	82	<0.56	24	45	18,000	110	0.29	19	<0.28	<0.56	110
PT41	6	-----	711200.25	1174530.89	PT-SB41-6	<6.3	3.3	14	<0.63	11	22	6,700	18	0.45	5.8	<0.31	<0.63	46
PT42	0	-----	711161.80	1174525.40	PT-SS42-0	10	7	72	<0.55	33	59	27,000	60	0.15	15	<0.27	<0.55	55
PT42	6	-----	711161.80	1174525.40	PT-SB42-6	<6.1	5.1	67	<0.61	8.2	8.5	6,000	69	0.089	<3.0	<0.30	<0.61	12
PT43	0	MA12	710807.83	1174801.02	PT-SS43-0	7.9J	15	23	<0.54	27	24	10,000	19	0.13	31	<0.27	<0.54	86
PT43	6	MA12	710807.83	1174801.02	PT-SB43-6	<6.3UJ	21	18	<0.63	14	18J	7,800	<6.3	<0.025	6.1	<0.31	<0.63	34
PT44	-----	-----	710918.32	1174804.59	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT48	0	-----	710765.35	1174706.09	PT-SS48-0	<6.3	4.8	11	<0.63	280	15J	6,600	<6.3	<0.025	7.2	<0.32	<0.63	28
PT48	6	-----	710765.35	1174706.09	PT-SB48-6	<6.3	5.3	6.6	<0.63	130	13J	6,700	<6.3	<0.025	6.5	<0.32	<0.63	16
PT49	0	-----	710815.56	1174718.52	PT-SS49-0	<6.2	38	13	<0.62	370	18J	7,300	<6.2	<0.025	8.4	<0.31	0.98	25
PT49	6	-----	710815.56	1174718.52	PT-SB49-6	<6.3	8.5	8.9	<0.63	200	13J	7,200	<6.3	<0.025	5.9	<0.31	<0.63	15
PT50	0	-----	710910.92	1174716.30	PT-SS50-0	<6.1	7.4	78	<0.61	16	32	8,400	52	0.28	14	<0.30	<0.61	200
PT50	6	-----	710910.92	1174716.30	PT-SB50-6	<6.1	2.8	39	<0.61	98	14	8,800	16	0.056	13	<0.30	<0.61	36
PT51	6	-----	710955.36	1174720.33	PT-SB51-6	<6.1	2.4	50	<0.61	48	13	6,800	20	0.049	6.5	<0.30	<0.61	19

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007

TABLE 5-2 - Summary of VOC Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Samples	Northing (feet)	Easting (feet)	Sample ID	(cis) 1,2-Dichloro ethene	1,1-Dichloro-ethane	1,1-Dichloro-ethene	2-Butanone (MEK)	Acetone	Benzene	Bromodi-chloro-methane	Carbon Disulfide	Carbon Tetra-chloride
Total Number of Soil Analyses						**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**
Maximum Concentration (mg/kg)						**0.0073**	<0.0023	<0.0023	**0.02**	**0.16**	<0.0023	<0.0023	**0.009**	**0.0085**
Number of Detections						**5**	0	1	**5**	**16**	0	0	**12**	**2**
TLA5	3	-----	710344.39	1175459.81	TLA-SB05-3	**0.0015**	<0.0010	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010
TLA6	3	-----	710365.05	1175370.52	TLA-SB06-3	<0.0009	<0.0009	<0.0009	<0.0047	**0.014**	<0.0009	<0.0009	<0.0009	<0.0009
TLA7	3	PT25	710438.46	1175319.54	TLA-SB07-3	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010
TLA7	8	PT25	710438.46	1175319.54	TLA-SB07-8	<0.0017	<0.0017	<0.0017	<0.0086	<0.0086	<0.0017	<0.0017	<0.0017	<0.0017
TLA8	2	PT24	710434.16	1175279.77	TLA-SB08-2	<0.0010	<0.0010	<0.0010	**0.0094**	**0.052**	<0.0010	<0.0010	<0.0010	<0.0010
TLA9	2	PT23	710593.09	1175209.58	TLA-SB09-2	<0.0009	<0.0009	<0.0009	**0.0066**	**0.035**	<0.0009	<0.0009	**0.0083**	<0.0009
TLA10	3	PT18	710548.87	1175255.58	TLA-SB10-3	<0.0010	<0.0010	<0.0010	<0.0049	<0.0049	<0.0010	<0.0010	<0.0010	<0.0010
TLA11	3	-----	710478.12	1175380.61	TLA-SB11-3	**0.0016**	<0.0012	<0.0012	**0.007**	**0.013**	<0.0012	<0.0012	**0.0046**	<0.0012
TLA11	8	-----	710478.12	1175380.61	TLA-SB11-8	<0.0011	<0.0011	<0.0011	<0.0057	**0.013**	<0.0011	<0.0011	**0.0044**	<0.0011
TLA12	3	-----	710427.14	1175415.22	TLA-SB12-3	<0.0009	<0.0009	<0.0009	<0.0045	<0.0045	<0.0009	<0.0009	<0.0009	<0.0009
TLA12	8	-----	710427.14	1175415.22	TLA-SB12-8	<0.0014	<0.0014	<0.0014	**0.02**	**0.16**	<0.0014	<0.0014	**0.009**	<0.0014
TLA13	3	-----	710512.19	1175438.83	TLA-SB13-3	<0.0016	<0.0016	<0.0016	<0.0079	**0.025**	<0.0016	<0.0016	<0.0016	<0.0016
TLA13	8	-----	710512.19	1175438.83	TLA-SB13-8	<0.0010	<0.0010	<0.0010	<0.0047	**0.014**	<0.0010	<0.0010	**0.0034**	<0.0010
TLA14	3	-----	710495.84	1175507.39	TLA-SB14-3	<0.0010	<0.0010	<0.0010	<0.0051	<0.0051	<0.0010	<0.0010	<0.0010	<0.0010
TLA15	3	-----	710619.84	1175516.40	TLA-SB15-3	<0.0009	<0.0009	<0.0009	<0.0045	**0.02**	<0.0009	<0.0009	**0.0036**	<0.0009
TLA15	8	-----	710619.84	1175516.40	TLA-SB15-8	<0.0013	<0.0013	<0.0013	<0.0064	<0.0064	<0.0013	<0.0013	<0.0013	<0.0013
TLA16	3	-----	710659.62	1175445.98	TLA-SB16-3	<0.0012	<0.0012	<0.0012	<0.0058	<0.0058	<0.0012	<0.0012	<0.0012	<0.0012
TLA16	8	-----	710659.62	1175445.98	TLA-SB16-8	<0.0013	<0.0013	<0.0013	<0.0065	**0.0082**	<0.0013	<0.0013	**0.0021**	<0.0013
TLA17	3	PT19	710725.75	1175374.73	TLA-SB17-3	<0.0008	<0.0008	<0.0008	<0.0041	<0.0041	<0.0008	<0.0008	<0.0008	<0.0008
TLA17	8	PT19	710725.75	1175374.73	TLA-SB17-8	<0.0011	<0.0011	<0.0011	<0.0056	<0.0056	<0.0011	<0.0011	<0.0011	<0.0011
TLA18	3	PT17	710701.05	1175300.31	TLA-SB18-3	<0.0011	<0.0011	<0.0011	<0.0053	**0.017**	<0.0011	<0.0011	**0.0014**	<0.0011
TLA18	8	PT17	710701.05	1175300.31	TLA-SB18-8	<0.0010	<0.0010	<0.0010	<0.0050	**0.034**	<0.0010	<0.0010	<0.0010	<0.0010
TLA19	3	PT22	710673.90	1175263.04	TLA-SB19-3	<0.0009	<0.0009	<0.0009	<0.0047	**0.013**	<0.0009	<0.0009	**0.0012**	<0.0009
TLA20	3	-----	710703.51	1175522.36	TLA-SB20-3	<0.0010	<0.0010	<0.0010	<0.0052	<0.0052	<0.0010	<0.0010	<0.0010	**0.0085**
TLA21	3	-----	710794.02	1175471.42	TLA-SB21-3	<0.0010	<0.0010	<0.0010	<0.0052	<0.0052	<0.0010	<0.0010	<0.0010	**0.0021**
TLA22	3	-----	710826.38	1175498.35	TLA-SB22-3	<0.0011	<0.0011	<0.0011	<0.0056	<0.0056	<0.0011	<0.0011	<0.0011	<0.0011
TLA23	3	PT15	710825.26	1175293.72	TLA-SB23-3	<0.0009	<0.0009	<0.0009	<0.0047	<0.0047	<0.0009	<0.0009	<0.0009	<0.0009
TLA23	8	PT15	710825.26	1175293.72	TLA-SB23-8	<0.0010	<0.0010	<0.0010	<0.0051	<0.0051	<0.0010	<0.0010	<0.0010	<0.0010
TLA24	3	PT16	710847.97	1175258.99	TLA-SB24-3	<0.0012	<0.0012	<0.0012	<0.0061	<0.0061	<0.0012	<0.0012	<0.0012	<0.0012
TLA25	3	PT14	710856.03	1175343.22	TLA-SB25-3	<0.0012	<0.0012	<0.0012	<0.0058	<0.0058	<0.0012	<0.0012	<0.0012	<0.0012
TLA26	3	PT13	710900.55	1175389.49	TLA-SB26-3	<0.0011	<0.0011	<0.0011	<0.0054	<0.0054	<0.0011	<0.0011	<0.0011	<0.0011
TLA27	3	PT9	710947.56	1175396.72	TLA-SB27-3	**0.0021**	<0.0011	<0.0011	<0.0055	<0.0055	<0.0011	<0.0011	<0.0011	<0.0011
TLA28	3	PT11	710962.91	1175319.16	TLA-SB28-3	<0.0010	<0.0010	<0.0010	<0.0051	<0.0051	<0.0010	<0.0010	<0.0010	<0.0010
TLA29	3	PT10	711029.37	1175282.72	TLA-SB29-3	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010
TLA30	3	PT12	710957.94	1175263.16	TLA-SB30-3	<0.0011	<0.0011	<0.0011	<0.0055	<0.0055	<0.0011	<0.0011	<0.0011	<0.0011
TLA31	3	PT8	710794.95	1175574.91	TLA-SB31-3	**0.003**	<0.0011	<0.0011	<0.0054	<0.0054	<0.0011	<0.0011	<0.0011	<0.0011
TLA32	3	PT7	710701.90	1175675.71	TLA-SB32-3	**0.0073**	<0.0010	**0.0018**	<0.0052	**0.026**	<0.0010	<0.0010	**0.0019**	<0.0010
PT3	3	TLA1	709997.11	1175554.33	PT-SB03-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT4	3	-----	710147.90	1175462.28	PT-SB04-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT5	3	TLA3	710233.57	1175627.95	PT-SB05-3	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-2 - Summary of VOC Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Samples	Northing (feet)	Easting (feet)	Sample ID	(cis) 1,2-Dichloro ethene	1,1-Dichloro-ethane	1,1-Dichloro-ethene	2-Butanone (MEK)	Acetone	Benzene	Bromodi-chloro-methane	Carbon Disulfide	Carbon Tetra-chloride
PT6	3	TLA4	710459.10	1175646.24	PT-SB06-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT9	3	TLA27	710947.56	1175396.72	PT-SB09-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT10	3	TLA29	711029.37	1175282.72	PT-SB10-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT11	3	TLA28	710962.91	1175319.16	PT-SB11-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT12	3	TLA30	710957.94	1175263.16	PT-SB12-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT13	3	TLA26	710900.55	1175389.49	PT-SB13-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT14	3	TLA25	710856.03	1175343.22	PT-SB14-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT15	3	TLA23	710825.26	1175293.72	PT-SB15-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT15	8	TLA23	710825.26	1175293.72	PT-SB15-8	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT17	3	TLA18	710701.05	1175300.31	PT-SB17-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT18	3	TLA10	710548.87	1175255.58	PT-SB18-3	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA1	6	-----	711249.54	1174492.09	MA-SB01-6	<0.0023	<0.0023	<0.0023	0.012	0.012	<0.0023	<0.0023	<0.0023	<0.0023
MA2	6	-----	711274.67	1174513.60	MA-SB02-6	<0.0011	<0.0011	<0.0011	0.0056	0.0056	<0.0011	<0.0011	<0.0011	<0.0011
MA3	3	-----	711252.70	1174677.60	MA-SB03-3	<0.0012	<0.0012	<0.0012	0.0059	0.0059	<0.0012	<0.0012	<0.0012	<0.0012
MA4	3	-----	711235.42	1174721.93	MA-SB04-3	<0.0014	<0.0014	<0.0014	**0.0097**	**0.054**	<0.0014	<0.0014	**0.0077**	<0.0014
MA5	3	-----	711134.50	1174772.63	MA-SB05-3	<0.0014	<0.0014	<0.0014	0.0069	**0.0075**	<0.0014	<0.0014	**0.0069**	<0.0014
MA6	3	-----	711078.81	1174727.90	MA-SB06-3	<0.0013	<0.0013	<0.0013	0.0066	0.0066	<0.0013	<0.0013	<0.0013	<0.0013
MA7	3	-----	711022.19	1174717.57	MA-SB07-3	<0.0012	<0.0012	<0.0012	0.0059	0.0059	<0.0012	<0.0012	<0.0012	<0.0012

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007.
Concentrations in mg/kg

TABLE 5-2 - Summary of VOC Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Samples	Chloroform	Hexachloro-butadiene	Methylene Chloride	p-Isopropyl-toluene	Tetrachloro-ethene	Toluene	Trichloro-ethene	Vinyl Chloride
Total Number of Soil Analyses			**44**	**48**	**44**	**44**	**44**	**44**	**44**	**44**
Maximum Concentration (mg/kg)			**0.063**	**0.19**	**0.011**	**0.0066**	**0.91**	<0.0023	**0.5**	<0.0023
Number of Detections			**8**	**11**	**9**	**4**	**24**	0	**8**	0
TLA5	3	-----	<0.0010	**0.0089**	<0.0050	<0.0010	**0.0085**	<0.0010	**0.012**	<0.0010
TLA6	3	-----	<0.0009	**0.09**	<0.0047	<0.0009	**0.0041**	<0.0009	<0.0009	<0.0009
TLA7	3	PT25	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
TLA7	8	PT25	<0.0017	<0.0086	<0.0086	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017
TLA8	2	PT24	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
TLA9	2	PT23	<0.0009	<0.0046	<0.0046	**0.0024**	<0.0009	<0.0009	<0.0009	<0.0009
TLA10	3	PT18	<0.0010	-----	<0.0049	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
TLA11	3	-----	<0.0012	<0.0062	<0.0062	**0.0015**	<0.0012	<0.0012	<0.0012	<0.0012
TLA11	8	-----	<0.0011	<0.0057	<0.0057	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
TLA12	3	-----	<0.0009	**0.022**	<0.0045	<0.0009	**0.0046**	<0.0009	<0.0009	<0.0009
TLA12	8	-----	<0.0014	<0.0068	<0.0068	<0.0014	**0.0024**	<0.0014	<0.0014	<0.0014
TLA13	3	-----	<0.0016	**0.1**	<0.0079	**0.0036**	**0.078**	<0.0016	**0.0068**	<0.0016
TLA13	8	-----	<0.0010	<0.0047	<0.0047	<0.0010	**0.0015**	<0.0010	**0.0012**	<0.0010
TLA14	3	-----	<0.0010	<0.0051	<0.0051	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
TLA15	3	-----	<0.0009	<0.0045	<0.0045	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009
TLA15	8	-----	<0.0013	<0.0064	<0.0064	<0.0013	<0.0013	<0.0013	<0.0013	<0.0013
TLA16	3	-----	<0.0012	**0.012**	<0.0058	<0.0012	**0.0058**	<0.0012	**0.0023**	<0.0012
TLA16	8	-----	<0.0013	<0.0065	<0.0065	<0.0013	<0.0013	<0.0013	<0.0013	<0.0013
TLA17	3	PT19	<0.0008	**0.071**	<0.0041	<0.0008	**0.0084**	<0.0008	<0.0008	<0.0008
TLA17	8	PT19	<0.0011	**0.0063**	**0.0064**	<0.0011	**0.026**	<0.0011	<0.0011	<0.0011
TLA18	3	PT17	<0.0011	-----	<0.0053	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
TLA18	8	PT17	<0.0010	-----	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
TLA19	3	PT22	<0.0009	**0.0082**	**0.0084**	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009
TLA20	3	-----	**0.063**	**0.19**	**0.0055**	<0.0010	**0.91**	<0.0010	**0.0026**	<0.0010
TLA21	3	-----	**0.0048**	**0.0057**	<0.0052	<0.0010	**0.004**	<0.0010	<0.0010	<0.0010
TLA22	3	-----	0.0011	-----	<0.0056	<0.0011	**0.0051**	<0.0011	<0.0011	<0.0011
TLA23	3	PT15	<0.0009	-----	**0.0049**	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009
TLA23	8	PT15	<0.0010	<0.0051	<0.0051	<0.0010	**0.01**	<0.0010	**0.0026**	<0.0010
TLA24	3	PT16	<0.0012	<0.0061	<0.0061	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012
TLA25	3	PT14	**0.0015**	<0.0058	**0.0067**	<0.0012	**0.0052**	<0.0012	<0.0012	<0.0012
TLA26	3	PT13	<0.0011	<0.0054	**0.0093**	<0.0011	**0.0014**	<0.0011	<0.0011	<0.0011
TLA27	3	PT9	<0.0011	<0.0055	**0.011**	<0.0011	**0.0046**	<0.0011	<0.0011	<0.0011
TLA28	3	PT11	<0.0010	<0.0051	**0.0092**	<0.0010	**0.0027**	<0.0010	<0.0010	<0.0010
TLA29	3	PT10	<0.0010	<0.0050	**0.0088**	**0.0066**	**0.018**	<0.0010	**0.0014**	<0.0010
TLA30	3	PT12	**0.0015**	<0.0055	<0.0055	<0.0011	**0.016**	<0.0011	<0.0011	<0.0011
TLA31	3	PT8	**0.0049**	<0.0054	<0.0054	<0.0011	**0.013**	<0.0011	**0.0052**	<0.0011
TLA32	3	PT7	**0.0052**	**0.013**	<0.0052	<0.0010	**0.18**	<0.0010	**0.5**	<0.0010
PT3	3	TLA1	-----	<0.0060	-----	-----	-----	-----	-----	-----
PT4	3	-----	-----	<0.0046	-----	-----	-----	-----	-----	-----
PT5	3	TLA3	-----	<0.0059	-----	-----	-----	-----	-----	-----

TABLE 5-2 - Summary of VOC Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Samples	Chloroform	Hexachloro-butadiene	Methylene Chloride	p-Isopropyl-toluene	Tetrachloro-ethene	Toluene	Trichloro-ethene	Vinyl Chloride
PT6	3	TLA4	-----	<0.0069	-----	-----	-----	-----	-----	-----
PT9	3	TLA27	-----	<0.0049	-----	-----	-----	-----	-----	-----
PT10	3	TLA29	-----	<0.0052	-----	-----	-----	-----	-----	-----
PT11	3	TLA28	-----	<0.0054	-----	-----	-----	-----	-----	-----
PT12	3	TLA30	-----	<0.0057	-----	-----	-----	-----	-----	-----
PT13	3	TLA26	-----	<0.0056	-----	-----	-----	-----	-----	-----
PT14	3	TLA25	-----	<0.0057	-----	-----	-----	-----	-----	-----
PT15	3	TLA23	-----	<0.0047	-----	-----	-----	-----	-----	-----
PT15	8	TLA23	-----	<0.0054	-----	-----	-----	-----	-----	-----
PT17	3	TLA18	-----	<0.0050	-----	-----	-----	-----	-----	-----
PT18	3	TLA10	-----	<0.0047	-----	-----	-----	-----	-----	-----
MA1	6	-----	<0.0023	<0.0120	<0.0120	<0.0023	**0.0037**	<0.0023	<0.0023	<0.0023
MA2	6	-----	<0.0011	<0.0056	<0.0056	<0.0011	**0.012**	<0.0011	<0.0011	<0.0011
MA3	3	-----	<0.0012	-----	<0.0059	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012
MA4	3	-----	<0.0014	-----	<0.0068	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
MA5	3	-----	<0.0014	-----	<0.0069	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
MA6	3	-----	**0.0028**	-----	<0.0066	<0.0013	<0.0013	<0.0013	<0.0013	<0.0013
MA7	3	-----	**0.0012**	-----	<0.0059	<0.0012	**0.0022**	<0.0012	<0.0012	<0.0012

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007.
Concentrations in mg/kg

TABLE 5-3 - Summary of PCB Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	Northing (Feet)	Easting (Feet)	Sample ID	PCB Aroclors (mg/kg)								Total PCBs (mg/kg)
						1016	1221	1232	1242	1248	1254	1260	1262	
Total Number of Soil Analyses						22	22	22	22	22	22	22	22	22
Maximum Concentration						<0.068	<0.068	<0.068	**0.099**	**0.22**	**0.099**	<0.068	<0.068	**0.22**
Number of Detections						0	0	0	2	1	2	0	0	**5**
PT1	0	-----	709896.36	1175723.02	PT-SS01-0	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	nd
PT1	6	-----	709896.36	1175723.02	PT-SB01-6	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	nd
PT2	0	-----	709925.93	1175664.09	PT-SS02-0	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	nd
PT2	6	-----	709925.93	1175664.09	PT-SB02-6	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	nd
PT26	0	-----	710377.54	1175194.88	PT-SS26-0	<0.053	<0.053	<0.053	<0.053	<0.053	<0.053	<0.053	<0.053	nd
PT26	6	-----	710377.54	1175194.88	PT-SB26-6	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	nd
PT27	0	-----	710278.20	1175106.95	PT-SS27-0	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	nd
PT27	6	-----	710278.20	1175106.95	PT-SB27-6	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	nd
PT28	0	-----	710361.53	1175021.41	PT-SS28-0	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	nd
PT28	6	-----	710361.53	1175021.41	PT-SB28-6	<0.059	<0.059	<0.059	<0.059	<0.059	<0.059	<0.059	<0.059	nd
PT29	0	-----	710436.23	1175061.14	PT-SS29-0	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	nd
PT29	6	-----	710436.23	1175061.14	PT-SB29-6	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	nd
PT30	0	-----	710423.79	1175165.06	PT-SS30-0	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	nd
PT30	6	-----	710423.79	1175165.06	PT-SB30-6	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	nd
PT44	0	-----	710918.32	1174804.59	PT-SS44-0	<0.053	<0.053	<0.053	<0.053	**0.22**	<0.053	<0.053	<0.053	**0.22**
PT44	6	-----	710918.32	1174804.59	PT-SB44-6	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	nd
PT45	0	MA16	711057.95	1174824.07	PT-SS45-0	<0.054	<0.054	<0.054	<0.054	<0.054	**0.099**	<0.054	<0.054	**0.099**
PT45	6	MA16	711057.95	1174824.07	PT-SB45-6	<0.062	<0.062	<0.062	**0.099**	<0.062	<0.062	<0.062	<0.062	**0.099**
PT46	0	MA17	711138.85	1174823.59	PT-SS46-0	<0.051	<0.051	<0.051	<0.051	<0.051	**0.078**	<0.051	<0.051	**0.078**
PT46	6	MA17	711138.85	1174823.59	PT-SB46-6	<0.061	<0.061	<0.061	**0.099**	<0.061	<0.061	<0.061	<0.061	**0.099**
PT47	0	MA18	711217.88	1174839.16	PT-SS47-0	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	nd
PT47	6	MA18	711217.88	1174839.16	PT-SB47-6	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	nd

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007

TABLE 5-4 - Summary of Pesticide Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	Northing (Feet)	Easting (Feet)	Sample ID	4,4'-DDD (ug/kg) (1)	4,4'-DDE (ug/kg) (1)	4,4'-DDT (ug/kg) (1)	Dieldrin (ug/kg) (1)
Total Number of Soil Analyses						38	38	38	6
Maximum Concentration						**3400**	**1900**	**30000**	<6
Number of Detections						11	12	18	0
TLA-21	0	-----	710794.02	1175471.42	TLA-SS21-0	<11	**15**	**60**	-----
TLA-21	6	-----	710794.02	1175471.42	TLA-SB21-6	<12	<12	<12	-----
TLA-22	0	-----	710826.38	1175498.35	TLA-SS22-0	**12**	**14**	**59**	-----
TLA-22	6	-----	710826.38	1175498.35	TLA-SB22-6	<12	<12	<12	-----
TLA-25	0	PT14	710856.03	1175343.22	TLA-SS25-0	**19**	<11	**49**	-----
TLA-25	6	PT14	710856.03	1175343.22	TLA-SB25-6	<12	<12	<12	-----
TLA-26	0	PT13	710900.55	1175389.49	TLA-SS26-0	**56**	**86**	**250**	-----
TLA-26	6	PT13	710900.55	1175389.49	TLA-SB26-6	<12	<12	<12	-----
TLA-27	0	PT9	710947.56	1175396.72	TLA-SS27-0	**22**	**11**	**71**	<5.5
TLA-27	6	PT9	710947.56	1175396.72	TLA-SB27-6	<12	<12	<12	<6.0
TLA-28	0	PT11	710962.91	1175319.16	TLA-SS28-0	**15**	**18**	**180**	<5.5
TLA-28	6	PT11	710962.91	1175319.16	TLA-SB28-6	<12	**18**	**70**	<6.0
TLA-29	0	PT10	711029.37	1175282.72	TLA-SS29-0	<11	<11	**22**	<5.5
TLA-29	6	PT10	711029.37	1175282.72	TLA-SB29-6	**11**	**65**	**310**	<5.5
TLA-30	0	PT12	710957.94	1175263.16	TLA-SS30-0	<11	**14**	**140**	-----
TLA-30	6	PT12	710957.94	1175263.16	TLA-SB30-6	<13	<13	<13	-----
TLA-31	0	PT8	710794.95	1175574.91	TLA-SS31-0	<11	<11	<11	-----
TLA-31	6	PT8	710794.95	1175574.91	TLA-SB31-6	<12	<12	**72**	-----
TLA-32	0	PT7	710701.90	1175675.71	TLA-SS32-0	<10	<10	**11**	-----
TLA-32	6	PT7	710701.90	1175675.71	TLA-SB32-6	**120**	**15**	**370**	-----
MA-13	0	-----	710719.69	1174742.56	MA-SS13-0	<13	<13	<13	-----
MA-13	6	-----	710719.69	1174742.56	MA-SB13-6	<13	<13	<13	-----
MA-14	0	-----	710661.66	1174743.01	MA-SS14-0	**110**	**110**	**960**	-----
MA-14	6	-----	710661.66	1174743.01	MA-SB14-6	<13	<13	<13	-----
MA-20	0	-----	710666.65	1174899.96	MA-SS20-0	<11	<11	<11	-----
MA-20	6	-----	710666.65	1174899.96	MA-SB20-6	<13	<13	<13	-----
MA-21	0	-----	710659.83	1174947.78	MA-SS21-0	<11	<11	<11	-----
MA-21	6	-----	710659.83	1174947.78	MA-SB21-6	<12	<12	<12	-----
MA-22	0	-----	710785.12	1174899.10	MA-SS22-0	**96**	**91**	**390**	-----
MA-22	6	-----	710785.12	1174899.10	MA-SB22-6	<12	<12	**30**	-----
MA-23	0	-----	710804.99	1174934.66	MA-SS23-0	**3400**	**1900**	**30000**	-----
MA-23	6	-----	710804.99	1174934.66	MA-SB23-6	**21**	<10	**130**	-----
PT-47	0	MA18	711217.88	1174839.16	PT-SS47-0	<43	<43	<43	-----
PT-47	6	MA18	711217.88	1174839.16	PT-SB47-6	<12	<12	<12	-----
PT-48	0	-----	710765.35	1174706.09	PT-SS48-0	<13	<13	<13	-----
PT-48	6	-----	710765.35	1174706.09	PT-SB48-6	<13	<13	<13	-----
PT-49	0	-----	710815.56	1174718.52	PT-SS49-0	<12	<12	<12	-----
PT-49	6	-----	710815.56	1174718.52	PT-SB49-6	<13	<13	<13	-----

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007

(1) - Units (mg/kg) listed in the Malcolm Pirnie tables are in error. A check of the laboratory data sheets indicated the units should be ug/kg (ppb).

TABLE 5-5 - Summary of PAH and TPH Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	Northing (feet)	Easting (feet)	Sample ID	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-Anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i)-perylene	Benzo(k) fluoranthene	Chrysene	Dibenz(a,h) anthracene	Fluoranthene	Fluorene
Total Number of Soil Analyses						20	20	20	20	20	20	20	20	20	20	20	20
Maximum Concentration						**0.17**	**0.049**	**0.2**	**0.53**	**0.47**	**0.84**	**0.32**	**0.54**	**1.4**	**0.12**	**2.7**	**0.21**
Number of Detections						11	3	12	14	14	16	14	15	17	13	17	8
MA3	0	-----	711252.70	1174677.60	MA-SS03-0	<0.008	<0.008	**0.011**	**0.042**	**0.047**	**0.053**	**0.046**	**0.018**	**0.055**	**0.012**	**0.068**	<0.008
MA3	3	-----	711252.70	1174677.60	MA-SB03-3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA3	6	-----	711252.70	1174677.60	MA-SB03-6	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
MA4	0	-----	711235.42	1174721.93	MA-SS04-0	**0.021**	<0.008	**0.04**	**0.099**	**0.12**	**0.15**	**0.086**	**0.039**	**0.13**	**0.023**	**0.18**	**0.012**
MA4	3	-----	711235.42	1174721.93	MA-SB04-3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA4	6	-----	711235.42	1174721.93	MA-SB04-6	**0.02**	<0.008	**0.032**	**0.054**	**0.06**	**0.082**	**0.042**	**0.025**	**0.086**	**0.013**	**0.13**	**0.018**
MA5	0	-----	711134.50	1174772.63	MA-SS05-0	<0.032	<0.032	<0.032	**0.43**	**0.25**	**0.84**	**0.31**	**0.54**	**1.4**	**0.12**	**2.7**	<0.032
MA5	3	-----	711134.50	1174772.63	MA-SB05-3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA5	6	-----	711134.50	1174772.63	MA-SB05-6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.013**	<0.010	**0.026**	<0.010
MA6	0	-----	711078.81	1174727.90	MA-SS06-0	<0.008	<0.008	<0.008	<0.008	<0.008	**0.021**	<0.008	<0.008	**0.029**	<0.008	**0.032**	<0.008
MA6	3	-----	711078.81	1174727.90	MA-SB06-3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA6	6	-----	711078.81	1174727.90	MA-SB06-6	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
MA7	0	-----	711022.19	1174717.57	MA-SS07-0	<0.008	<0.008	<0.008	<0.008	<0.008	**0.012**	<0.008	**0.0081**	**0.016**	<0.008	**0.014**	<0.008
MA7	3	-----	711022.19	1174717.57	MA-SB07-3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MA7	6	-----	711022.19	1174717.57	MA-SB07-6	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
MA15	0	-----	711000.51	1174821.90	MA-SS15-0	**0.0087**	<0.007	**0.036**	**0.16**	**0.16**	**0.18**	**0.13**	**0.15**	**0.2**	**0.042**	**0.24**	**0.0082**
MA15	6	-----	711000.51	1174821.90	MA-SB15-6	<0.009	<0.009	<0.009	**0.025**	**0.026**	**0.024**	**0.021**	**0.021**	**0.03**	<0.009	**0.041**	<0.009
MA16	0	PT45	711057.95	1174824.07	MA-SS16-0	**0.0087**	<0.007	**0.021**	**0.13**	**0.31**	**0.43**	**0.32**	**0.26**	**0.22**	**0.093**	**0.13**	<0.007
MA16	6	PT45	711057.95	1174824.07	MA-SB16-6	**0.016**	<0.008	**0.044**	**0.16**	**0.13**	**0.16**	**0.12**	**0.14**	**0.58**	**0.034**	**0.11**	<0.008
MA17	0	PT46	711138.85	1174823.59	MA-SS17-0	**0.17**	**0.0091**	**0.14**	**0.31**	**0.3**	**0.3**	**0.16**	**0.24**	**0.37**	**0.056**	**0.76**	**0.11**
MA17	6	PT46	711138.85	1174823.59	MA-SB17-6	**0.025**	**0.0093**	**0.027**	**0.086**	**0.082**	**0.075**	**0.052**	**0.066**	**0.11**	**0.017**	**0.15**	**0.019**
MA18	0	PT47	711217.88	1174839.16	MA-SS18-0	**0.16**	**0.049**	**0.17**	**0.53**	**0.47**	**0.41**	**0.31**	**0.42**	**0.77**	**0.12**	**1.2**	**0.21**
MA18	6	PT47	711217.88	1174839.16	MA-SB18-6	**0.025**	<0.009	**0.013**	**0.042**	**0.042**	**0.034**	**0.029**	**0.03**	**0.057**	**0.0089**	**0.071**	**0.022**
MA19	0	-----	711292.04	1174849.06	MA-SS19-0	**0.09**	<0.008	**0.2**	**0.5**	**0.39**	**0.41**	**0.16**	**0.3**	**0.3**	**0.061**	**1.3**	**0.12**
MA19	6	-----	711292.04	1174849.06	MA-SB19-6	**0.034**	<0.008	**0.076**	**0.22**	**0.26**	**0.28**	**0.14**	**0.2**	**0.17**	**0.051**	**0.51**	**0.052**
PT-52	2	-----	711622.43	1174282.29	PT-SB52-2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-53	1	-----	711666.58	1174289.28	PT-SB53-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-54	1	-----	711667.11	1174320.70	PT-SB54-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-55	2	-----	711674.16	1174373.52	PT-SB55-2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-56	1	-----	711706.41	1174348.47	PT-SB56-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-57	1	-----	711758.28	1174246.85	PT-SB57-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-58	1	-----	711739.11	1174204.45	PT-SB58-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-59	1	-----	711706.86	1174227.49	PT-SB59-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-60	1	-----	711706.14	1174181.82	PT-SB60-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-61	1	-----	711654.39	1174210.57	PT-SB61-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-1	0	-----	709896.36	1175723.02	PT-SS01-0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-1	6	-----	709896.36	1175723.02	PT-SB01-6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-2	0	-----	709925.93	1175664.09	PT-SS02-0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PT-2	6	-----	709925.93	1175664.09	PT-SB02-6	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007
Concentrations in mg/kg

TABLE 5-5 - Summary of PAH and TPH Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	Indeno-(1,2,3-c,d)-pyrene	Naph-thalene	Phenan-threne	Pyrene	CPAH TEQ Conc.	Diesel Range Organics	Lube Oil Range Organics	Total TPH
Total Number of Soil Analyses			20	20	20	20	20	34	34	34
Maximum Concentration			**0.3**	**0.067**	**1.1**	**1.3**	**0.6497**	**3200**	**4700**	**6000**
Number of Detections			14	10	16	16	20	6	17	17
MA3	0	-----	**0.032**	<0.008	<0.042	<0.075	**0.063**	**690**	**740**	**1430**
MA3	3	-----	-----	-----	-----	-----	-----	<31	<62	<93
MA3	6	-----	<0.008	**0.0097**	**0.0084**	<0.008	**0.013**	-----	-----	-----
MA4	0	-----	**0.065**	**0.0089**	**0.12**	**0.23**	**0.159**	**35**	**450**	**485**
MA4	3	-----	-----	-----	-----	-----	-----	**43**	**510**	**553**
MA4	6	-----	**0.032**	<0.008	**0.12**	**0.15**	**0.081**	-----	-----	-----
MA5	0	-----	**0.3**	<0.032	**0.15**	**1.1**	**0.487**	<120	<240	<360
MA5	3	-----	-----	-----	-----	-----	-----	<36	<72	<108
MA5	6	-----	<0.010	**0.049**	**0.024**	**0.012**	**0.015**	-----	-----	-----
MA6	0	-----	<0.008	<0.008	<0.008	**0.018**	**0.014**	<32	<63	<95
MA6	3	-----	-----	-----	-----	-----	-----	<35	<70	<105
MA6	6	-----	<0.009	<0.009	<0.009	<0.009	**0.014**	-----	-----	-----
MA7	0	-----	<0.008	<0.008	**0.008**	**0.015**	**0.012**	<29	<58	<87
MA7	3	-----	-----	-----	-----	-----	-----	<32	<63	<95
MA7	6	-----	<0.008	<0.008	<0.008	<0.008	**0.057**	-----	-----	-----
MA15	0	-----	**0.11**	<0.007	**0.15**	**0.26**	**0.226**	<25	**95**	**<120**
MA15	6	-----	**0.018**	<0.009	**0.042**	**0.044**	**0.036**	<32	**130**	**<162**
MA16	0	PT45	**0.3**	<0.007	**0.084**	**0.14**	**0.434**	<27	**270**	**<297**
MA16	6	PT45	**0.1**	**0.067**	**0.1**	**0.11**	**0.195**	**3200**	**2800**	**6000**
MA17	0	PT46	**0.16**	**0.053**	**0.45**	**0.8**	**0.410**	**34**	**140**	**174**
MA17	6	PT46	**0.046**	**0.02**	**0.13**	**0.17**	**0.112**	<30	**120**	**<150**
MA18	0	PT47	**0.24**	**0.065**	**1.1**	**1.3**	**0.650**	**1000**	**4700**	**5700**
MA18	6	PT47	**0.022**	**0.023**	**0.078**	**0.083**	**0.056**	<33	**130**	**<163**
MA19	0	-----	**0.17**	**0.024**	**0.97**	**1.1**	**0.537**	<31	<61	<92
MA19	6	-----	**0.15**	**0.013**	**0.33**	**0.45**	**0.352**	<31	<62	<93
PT-52	2	-----	-----	-----	-----	-----	-----	<28	**280**	**<308**
PT-53	1	-----	-----	-----	-----	-----	-----	<29	<59	<88
PT-54	1	-----	-----	-----	-----	-----	-----	<29	**180**	**<209**
PT-55	2	-----	-----	-----	-----	-----	-----	<27	<54	<81
PT-56	1	-----	-----	-----	-----	-----	-----	<29	**540**	**<569**
PT-57	1	-----	-----	-----	-----	-----	-----	<29	<57	<86
PT-58	1	-----	-----	-----	-----	-----	-----	<28	<56	<84
PT-59	1	-----	-----	-----	-----	-----	-----	<27	**89**	**<116**
PT-60	1	-----	-----	-----	-----	-----	-----	<26	**77**	**<103**
PT-61	1	-----	-----	-----	-----	-----	-----	<26	<52	<78
PT-1	0	-----	-----	-----	-----	-----	-----	<30	<60	<90
PT-1	6	-----	-----	-----	-----	-----	-----	<31	<61	<92
PT-2	0	-----	-----	-----	-----	-----	-----	<31	**110**	**<141**
PT-2	6	-----	-----	-----	-----	-----	-----	<31	<63	<94

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007
Concentrations in mg/kg

TABLE 5-6 - Summary of Other Constituent Soil Analyses - Manufacturing Area - May 2007

Sample Location	Depth (feet)	Co-Located Sample	Northing (Feet)	Easting (Feet)	Sample ID	Ethylene Glycol (mg/kg)	Asbestos (%)	Perchlorate (ug/kg)
Total Number of Soil Analyses						4	20	2
Maximum Concentration						<15	ND	<0.2
Number of Detections						0	0	0
PT1	0	-----	709896.36	1175723.02	PT-SS01-0	<14	-----	-----
PT1	6	-----	709896.36	1175723.02	PT-SB01-6	<14	-----	-----
PT2	0	-----	709925.93	1175664.09	PT-SS02-0	<15	-----	-----
PT2	6	-----	709925.93	1175664.09	PT-SB02-6	<15	-----	-----
PT17	0	TLA18	710701.05	1175300.31	PT-SS17-0	-----	ND	-----
PT17	6	TLA18	710701.05	1175300.31	PT-SB17-6	-----	ND	-----
PT17	10	TLA18	710701.05	1175300.31	PT-SB17-10	-----	ND	-----
PT18	0	TLA10	710548.87	1175255.58	PT-SS18-0	-----	ND	-----
PT18	6	TLA10	710548.87	1175255.58	PT-SB18-6	-----	ND	-----
PT19	0	TLA17	710725.75	1175374.73	PT-SS19-0	-----	ND	-----
PT19	6	TLA17	710725.75	1175374.73	PT-SB19-6	-----	ND	-----
PT19	10	TLA17	710725.75	1175374.73	PT-SB19-10	-----	ND	-----
PT20	0	MA26	710753.47	1175198.89	PT-SS20-0	-----	ND	-----
PT20	6	MA26	710753.47	1175198.89	PT-SB20-6	-----	ND	-----
PT21	0	MA25	710677.44	1175217.51	PT-SS21-0	-----	ND	-----
PT21	6	MA25	710677.44	1175217.51	PT-SB21-6	-----	ND	-----
PT22	6	TLA19	710673.90	1175263.04	PT-SB22-6	-----	ND	-----
PT23	0	TLA9	710593.09	1175209.58	PT-SS23-0	-----	ND	-----
PT23	6	TLA9	710593.09	1175209.58	PT-SB23-6	-----	ND	-----
PT24	0	TLA8	710434.16	1175279.77	PT-SS24-0	-----	ND	-----
PT24	6	TLA8	710434.16	1175279.77	PT-SB24-6	-----	ND	-----
PT25	0	TLA7	710438.46	1175319.54	PT-SB25-0	-----	ND	-----
PT25	6	TLA7	710438.46	1175319.54	PT-SS25-6	-----	ND	-----
TLA11	3.5	-----	710478.12	1175380.61	TLA-SB11-3.5	-----	ND	-----
TLA16	6	-----	710659.62	1175445.98	TLA-SB16-6	-----	-----	<0.2
MA28	6	-----	710931.76	1175058.49	MA-SB28-6	-----	-----	<0.2

Notes: Soils data source: Malcolm Pirnie Soil Data Summary Report, Former Arkema Inorganic Chemical Plant, Tacoma, Washington, October 2007
ND - Not detected

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	Collection Date	Comments	Lab I.D.	Solids (%)	pH	Eh (mV)	TOC (%)	Sulfides (mg/kg)	Sb (mg/kg)	As (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Fe (mg/kg)
B-AA	3	UA	7/22/2012		1213752-VD22A / 1220053-VN30A	82	8.97	-----	-----	-----	6 U	**12**	**14.1**	**10.7**	**10,100**
	12	FA	7/22/2012		1213753-VD22B / 1220054-VN30B	68	8.04	-----	-----	-----	7 U	7 U	**18.8**	**34.0**	**16,600**
	22	IA	7/22/2012		1213754-VD22C / 1220055-VN30C	83	7.55	-----	-----	-----	6 U	6 U	**13.9**	**9.1**	**10,700**
	34	SA	7/22/2012		1213755-VD22D / 1220056-VN30D	69	7.72	-----	-----	-----	7 U	7 U	**18.4**	**29.9**	**20,600**
B-BB	9	UA	7/22/2012		1213756-VD22E / 1220057-VN30E	79	9.24	-----	-----	-----	6 U	**29**	**13.8**	**11.3**	**9680**
	14	FA	7/22/2012		1213757-VD22F / 1220058-VN30F	58	8.01	-----	-----	-----	8 U	**11**	**21.8**	**36.8**	**18,900**
	21	IA	7/22/2012		1213758-VD22G / 1220059-VN30G	84	9.83	-----	-----	-----	6 U	**14**	**14.6**	**10.0**	**7430**
	33	SA	7/22/2012		1213759-VD22H / 1220060-VN30H	64	7.91	-----	-----	-----	8 U	8 U	**22.3**	**36.5**	**29,100**
B-C	8	UA	7/22/2012		1213760-VD22I / 1220061-VN30I	84	8.18	-----	-----	-----	6 U	**20**	**14.7**	**9.1**	**9000**
	8	UA	7/22/2012	dup. C-UA1	1213763-VD22L / 1220064-VN30L	83	8.04	-----	-----	-----	6 U	**18**	**14.3**	**10.8**	**9380**
	11	UA	7/22/2012		1213764-VD22M	82	9.83	-----	-----	-----	6 U	**30**	-----	**10.6**	**8880**
	12	FA	7/22/2012		1213761-VD22J / 1220062-VN30J	65	10.90	-----	-----	-----	8 U	**149**	**16.6**	**30.6**	**19,800**
	13.5	FA	7/22/2012		1213765-VD22N	65	10.94	-----	-----	-----	7 U	**166**	-----	**28.9**	**18,100**
	15	IA	7/22/2012		1213762-VD22K / 1220063-VN30K	66	10.10	-----	-----	-----	7 U	**2100**	**12.9**	**20.6**	**14,400**
	22	IA	7/22/2012		1213766-VD22O	80	9.16	-----	-----	-----	6 U	**1020**	-----	**8.9**	**14,400**
	29	IA	7/22/2012		1213767-VD22P / 1220065-VN30M	85	8.27	372	**0.14**	**30.4**	-----	**228**	-----	-----	**13,300**
	31	SA	7/22/2012		1213770-VD22S / 1220066-VN30N	76	8.84	279	**1.57**	**15.0**	7 U	**3260**	**19.6**	**34.6**	**12,100**
	36	SA	7/22/2012		1213768-VD22Q / 1220067-VN30O	72	7.36	352	**0.67**	**225**	-----	6 U	-----	-----	**16,400**
	38	SA	7/22/2012		1213769-VD22R / 1220068-VN30P	62	7.16	231	**3.30**	**24.4**	-----	**12**	-----	-----	**17,900**
B-D	11	UA	7/23/2012		1213950-VD63A / 1220266-VN31Q	79	7.38	-----	-----	-----	**11 J_R**	**305**	**14.1**	**12.8**	**14,900**
	13	UA	7/23/2012		1213954-VD63E	78	6.21	-----	-----	-----	**14 J_R**	**252**	-----	**16.2**	**18,300**
	15	FA	7/23/2012		1213951-VD63B / 1220267-VN31R	53	7.40	-----	-----	-----	8 U	**3240**	**23.1**	**41.3**	**30,300**
	18	FA	7/23/2012		1213955-VD63F	69	7.06	-----	-----	-----	7 U	**265**	-----	**36.8**	**22,000**
	22	IA	7/23/2012		1213952-VD63C / 1220268-VN31S	83	7.20	-----	-----	-----	6 U	**27**	**12.9**	**10.7**	**10,000**
	27	IA	7/23/2012		1213956-VD63G	74	7.43	-----	-----	-----	6 U	**13**	-----	**29.3**	**15,500**
	29	IA	7/23/2012		1213970-VD63U / 1220255-VN31F	76	8.06	249	**0.43**	**49.0**	-----	**11**	-----	-----	**15,300**
	36.5	SA	7/23/2012		1213953-VD63D / 1220265-VN31P	47	7.15	246	**13.3**	**330**	10 U	10 U	**21.0**	**42.1**	**24,900**
	37	SA	7/23/2012		1213971-VD63V / 1220256-VN31G	60	7.14	238	**2.88**	1.65 U	-----	8 U	-----	-----	**28,800**
	38	SA	7/23/2012		1213972-VD63W / 1220257-VN31H	67	7.23	202	**0.9**	**1.62**	-----	7 U	-----	-----	**22,300**
B-E	5	UA	7/23/2012		1213957-VD63H	80	11.14	-----	-----	-----	6 U	**12**	-----	**17.5**	**15,400**
	8	UA	7/23/2012		1213958-VD63I	75	11.24	-----	-----	-----	6 U	**23**	-----	**15.5**	**13,400**
	10	FA	7/23/2012		1213959-VD63J	49	8.43	-----	-----	-----	10 U	10 U	-----	**38.5**	**20,000**
	14	FA	7/23/2012		1213960-VD63K	61	8.12	-----	-----	-----	8 U	8 U	-----	**33.4**	**19,300**
	18	IA	7/23/2012		1213961-VD63L	79	8.48	-----	-----	-----	6 U	6 U	-----	**19.8**	**12,400**
	23	IA	7/23/2012		1213962-VD63M	86	10.52	-----	-----	-----	5 U	**13**	-----	**8.6**	**8000**
	26	IA	7/23/2012		1213973-VD63X / 1220258-VN31I	86	9.84	206	**0.36**	**24.2**	-----	**53**	-----	-----	**11,600**
	32	SA	7/23/2012		1213974-VD63Y / 1220259-VN31J	71	8.35	200	**0.76**	**381**	-----	7 U	-----	-----	**19,500**
	33	SA	7/23/2012		1213975-VD63Z / 1220260-VN31K	49	7.16	309	**10.4**	**115**	-----	20 U	-----	-----	**50,200**
	34	SA	7/23/2012		1213976-VD63AA / 1220261-VN31L	63	7.38	344	**1.49**	**2.77**	-----	8 U	-----	-----	**27,600**

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	Collection Date	Comments	Lab I.D.	Solids (%)	pH	Eh (mV)	TOC (%)	Sulfides (mg/kg)	Sb (mg/kg)	As (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Fe (mg/kg)
B-F	7	UA	7/23/2012		1213913-VD61B	83	10.04	-----	-----	-----	6 U	**109**	-----	**9.1**	**9460**
	12	UA	7/23/2012		1213914-VD61C	81	10.48	-----	-----	-----	6 U	**68**	-----	**10.8**	**9360**
	14	FA	7/23/2012		1213915-VD61D	57	8.10	-----	-----	-----	8 U	**25**	-----	**37.9**	**21,200**
	18	FA	7/23/2012		1213916-VD61E	64	7.78	-----	-----	-----	7 U	**10**	-----	**31.8**	**23,200**
	21	IA	7/23/2012		1213917-VD61F	72	7.65	-----	-----	-----	6 U	6 U	-----	**24.1**	**13,200**
	31	IA	7/23/2012		1213918-VD61G	75	7.40	-----	-----	-----	7 U	**17**	-----	**20.2**	**15,300**
	38	IA	7/23/2012		1213919-VD61H / 1220250-VN31A	74	7.78	339	**0.2**	**268**	-----	6 U	-----	-----	**11,800**
	38	IA	7/23/2012	dup. F-IA3	1213923-VD61L / 1220254-VN31E	75	6.99	166	**0.22**	**98.5**	-----	6 U	-----	-----	**10,600**
	40	SA	7/23/2012		1213920-VD61I / 1220251-VN31B	52	4.20	240	**4.99**	**527**	-----	**12**	-----	-----	**24,900**
	42	SA	7/23/2012		1213921-VD61J / 1220252-VN31C	65	6.82	177	**1.54**	**108**	-----	8 U	-----	-----	**24,800**
	44	SA	7/23/2012		1213922-VD61K / 1220253-VN31D	62	5.92	191	**1.60**	1.57 U	-----	**8**	-----	-----	**32,800**
B-G	10	UA	7/23/2012		1213963-VD63N	77	8.66	-----	-----	-----	6 U	**202**	-----	**14.4**	**14,800**
	10	UA	7/23/2012	dup. G-UA1	1213964-VD63O	77	9.20	-----	-----	-----	6 U	**249**	-----	**15.3**	**14,500**
	13	UA	7/23/2012		1213965-VD63P	81	10.97	-----	-----	-----	6 U	**262**	-----	**21.2**	**14,900**
	15	FA	7/23/2012		1213966-VD63Q	72	10.95	-----	-----	-----	6 U	**1380**	-----	**26.5**	**14,700**
	19	FA	7/23/2012		1213967-VD63R	59	7.92	-----	-----	-----	8 U	**2870**	-----	**37.5**	**20,800**
	21	IA	7/23/2012		1213968-VD63S	72	7.78	-----	-----	-----	6 U	**941**	-----	**26.7**	**15,200**
	28	IA	7/23/2012		1213969-VD63T	74	7.94	-----	-----	-----	6 U	6 U	-----	**16.4**	**12,300**
	32	IA	7/23/2012		1213977-VD63AB / 1220262-VN31M	77	8.30	326	**0.12**	**1.14**	-----	6 U	-----	-----	**8790**
	35	SA	7/23/2012		1213978-VD63AC / 1220263-VN31N	57	7.85	229	**4.33**	**14.0**	-----	**10**	-----	-----	**19,600**
	36.5	SA	7/23/2012		1213979-VD63AD / 1220264-VN31O	66	7.70	177	**1.05**	**199**	-----	7 U	-----	-----	**24,300**
	38	SA	7/23/2012		1213912-VD61A / 1220069-VN30Q	67	3.72	211	**0.93**	1.52 U	-----	7 U	-----	-----	**31,200**

Notes: J = estimate associated with value less than the verifiable lower quantitation limit.
J_R = estimate; due to low matrix spike recovery. Value likely biased low.
J_V = estimate; due to elevated RDP from duplicate analysis.
U = nondetected at the associated lower reporting limit.
UA - Upper Aquifer
FA - First Aquitard
IA - Intermediate Aquifer
SA - Second Aquitard

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Se (mg/kg)	Ag (mg/kg)	Zn (mg/kg)	Hexachloro-butadiene (µg/kg)	Hexachloro-benzene (µg/kg)	Vinyl chloride (µg/kg)	*cis*-1,2-Dichloro-ethene (µg/kg)	Chloroform (µg/kg)	Trichloro-ethene (µg/kg)	Tetrachloro-ethene (µg/kg)	*alpha*-BHC (µg/kg)
B-AA	3	UA	**11**	**0.10**	**8**	6 U	0.3 U	**80**	**5.0**	**4.9**	**7.8**	**9.3**	**5.7**	**4.6**	**15**	1.6 U
	12	FA	3 U	0.03 U	**12**	7 U	0.4 U	**32**	**5.8**	1.6 U	4800 U	4800 U	**580,000**	4800 U	**14,000**	1.6 U
	22	IA	2 U	0.02 U	**8**	6 U	0.3 U	**19**	**3000**	1.5 U	64 U	64 U	**2300**	**1600**	**4400**	1.5 U
	34	SA	3 U	0.03 U	**13**	7 U	0.4 U	**37**	**130**	1.6 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.6 U
B-BB	9	UA	2 U	0.02 U	**6**	6 U	0.4 U	**22**	**3.1**	**4.4**	1.2 U	**1.8**	**8.6**	**1.4**	**5.1**	1.5 U
	14	FA	3 U	0.03 U	**15**	9 U	0.5 U	**35**	**4.5**	1.6 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.6 U
	21	IA	2 U	0.02 U	**8**	6 U	0.3 U	**20**	**1.9**	1.6 U	1.1 U	**45**	**1800**	**32**	**1700**	1.6 U
	33	SA	3 U	**0.04**	**17**	7 U	0.5 U	**40**	1.6 U	1.6 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.6 U
B-C	8	UA	2 U	**0.05**	**5**	6 U	0.3 U	**19**	1.6 U	1.6 U	1.0 U	1.0 U	1.0 U	**1.5**	**2.2**	1.6 U
	8	UA	2 U	**0.03**	**5**	6 U	0.3 U	**19**	1.6 U	1.6 U	1.1 U	1.1 U	1.1 U	**3.1**	**4.8**	1.6 U
	11	UA	2 U	-----	**11**	-----	0.3 U	**23**	-----	-----	-----	-----	-----	-----	-----	-----
	12	FA	**3**	0.03 U	**14**	7 U	0.5 U	**31**	1.6 U	1.6 U	**8.0**	**19**	2.0 U	**6.2**	**3.9**	1.6 U
	13.5	FA	3 U	-----	**14**	-----	0.4 U	**33**	-----	-----	-----	-----	-----	-----	-----	-----
	15	IA	3 U	0.02 U	**10**	6 U	0.4 U	**25**	1.6 U	1.6 U	1.6 U	**2.8**	1.6 U	1.6 U	1.6 U	1.6 U
	22	IA	2 U	-----	**7**	-----	0.4 U	**20**	-----	-----	-----	-----	-----	-----	-----	-----
	29	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	31	SA	**3**	**0.04**	**15**	7 U		**30**	1.6 U	1.6 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.6 U
	36	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
B-D	11	UA	**4**	**0.23**	**11**	6 U	0.4 U	**53**	1.5 U	1.5 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.5 U
	13	UA	**7**	-----	**27**	-----	0.4 U	**35**	-----	-----	-----	-----	-----	-----	-----	-----
	15	FA	**5**	**0.14**	**19**	9 U	0.5 U	**44**	1.6 U	6.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	1.6 U
	18	FA	3 U	-----	**15**	-----	0.4 U	**37**	-----	-----	-----	-----	-----	-----	-----	-----
	22	IA	2 U	0.03 U	**8**	6 U	0.3 U	**20**	1.6 U	1.6 U	0.9 U	**24**	0.9 U	**14**	0.9 U	1.6 U
	27	IA	3 U	-----	**12**	-----	0.4 U	**30**	-----	-----	-----	-----	-----	-----	-----	-----
	29	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	36.5	SA	4 U	0.05 U	**19**	10 U	-----	**24**	1.6 U	1.6 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.6 U
	37	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
B-E	5	UA	**10**	-----	**9**	-----	0.4 U	**92**	-----	-----	-----	-----	-----	-----	-----	-----
	8	UA	**3**	-----	**16**	-----	0.4 U	**33**	-----	-----	-----	-----	-----	-----	-----	-----
	10	FA	4 U	-----	**16**	-----	0.6 U	**38**	-----	-----	-----	-----	-----	-----	-----	-----
	14	FA	3 U	-----	**15**	-----	0.5 U	**36**	-----	-----	-----	-----	-----	-----	-----	-----
	18	IA	2 U	-----	**11**	-----	0.4 U	**24**	-----	-----	-----	-----	-----	-----	-----	-----
	23	IA	2 U	-----	**7**	-----	0.3 U	**16**	-----	-----	-----	-----	-----	-----	-----	-----
	26	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	32	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	33	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	34	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Se (mg/kg)	Ag (mg/kg)	Zn (mg/kg)	Hexachloro-butadiene (µg/kg)	Hexachloro-benzene (µg/kg)	Vinyl chloride (µg/kg)	*cis*-1,2-Dichloro-ethene (µg/kg)	Chloroform (µg/kg)	Trichloro-ethene (µg/kg)	Tetrachloro-ethene (µg/kg)	*alpha*-BHC (µg/kg)
B-F	7	UA	2 U	-----	**7**	-----	0.3 U	**21**	-----	-----	-----	-----	-----	-----	-----	-----
	12	UA	2 U	-----	**9**	-----	0.4 U	**21**	-----	-----	-----	-----	-----	-----	-----	-----
	14	FA	3 U	-----	**15**	-----	0.5 U	**38**	-----	-----	-----	-----	-----	-----	-----	-----
	18	FA	3 U	-----	**13**	-----	0.4 U	**34**	-----	-----	-----	-----	-----	-----	-----	-----
	21	IA	3 U	-----	**11**	-----	0.4 U	**28**	-----	-----	-----	-----	-----	-----	-----	-----
	31	IA	3 U	-----	**10**	-----	0.4 U	**27**	-----	-----	-----	-----	-----	-----	-----	-----
	38	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	40	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	42	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	44	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
B-G	10	UA	**3**	-----	**8**	-----	0.4 U	**26**	-----	-----	-----	-----	-----	-----	-----	-----
	10	UA	**4**	-----	**8**	-----	0.4 U	**29**	-----	-----	-----	-----	-----	-----	-----	-----
	13	UA	**2**	-----	**11**	-----	0.3 U	**23**	-----	-----	-----	-----	-----	-----	-----	-----
	15	FA	**3**	-----	**13**	-----	0.4 U	**29**	-----	-----	-----	-----	-----	-----	-----	-----
	19	FA	3 U	-----	**16**	-----	0.5 U	**37**	-----	-----	-----	-----	-----	-----	-----	-----
	21	IA	3 U	-----	**13**	-----	0.4 U	**28**	-----	-----	-----	-----	-----	-----	-----	-----
	28	IA	3 U	-----	**9**	-----	0.4 U	**22**	-----	-----	-----	-----	-----	-----	-----	-----
	32	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	35	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	36.5	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: J = estimate associated with value less than the verifiable lower quantitation limit.
J_R = estimate; due to low matrix spike recovery. Value likely biased low.
J_V = estimate; due to elevated RDP from duplicate analysis.
U = nondetected at the associated lower reporting limit.
UA - Upper Aquifer
FA - First Aquitard
IA - Intermediate Aquifer
SA - Second Aquitard

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	*beta* - BHC (µg/kg)	*delta* - BHC (µg/kg)	*gamma* - BHC (µg/kg)	Heptachlor (µg/kg)	Aldrin (µg/kg)	Heptachlor epoxide (µg/kg)	Endosulfan I (µg/kg)	Dieldrin (µg/kg)	4,4'-DDE (µg/kg)	Endrin (µg/kg)	Endosulfan II (µg/kg)	4,4'-DDD (µg/kg)	Endosulfan sulfate (µg/kg)	4,4'-DDT (µg/kg)
B-AA	3	UA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	12	FA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	22	IA	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
	34	SA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
B-BB	9	UA	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
	14	FA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	21	IA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	33	SA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
B-C	8	UA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.1 U	**4.2**	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
	8	UA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.1 U	**5.0**	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
	11	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	12	FA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
	13.5	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	15	IA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	22	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	29	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	31	SA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	36	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
B-D	11	UA	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	3.1 U	**4.3**	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
	13	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	15	FA	11 U	4.2 U	6.4 U	1.6 U	3.4 U	1.6 U	1.6 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
	18	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	22	IA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	27	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	29	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	36.5	SA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
	37	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
B-E	5	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	14	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	18	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	23	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	26	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	32	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	33	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	34	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	*beta* - BHC (µg/kg)	*delta* - BHC (µg/kg)	*gamma* - BHC (µg/kg)	Heptachlor (µg/kg)	Aldrin (µg/kg)	Heptachlor epoxide (µg/kg)	Endosulfan I (µg/kg)	Dieldrin (µg/kg)	4,4'-DDE (µg/kg)	Endrin (µg/kg)	Endosulfan II (µg/kg)	4,4'-DDD (µg/kg)	Endosulfan sulfate (µg/kg)	4,4'-DDT (µg/kg)
B-F	7	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	12	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	14	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	18	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	21	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	31	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	40	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	42	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	44	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
B-G	10	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	13	UA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	15	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	19	FA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	21	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	28	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	32	IA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	35	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	36.5	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: J = estimate associated with value less than the verifiable lower quantitation limit.
J_R = estimate; due to low matrix spike recovery. Value likely biased low.
J_V = estimate; due to elevated RDP from duplicate analysis.
U = nondetected at the associated lower reporting limit.
UA - Upper Aquifer
FA - First Aquitard
IA - Intermediate Aquifer
SA - Second Aquitard

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	Methoxychlor (µg/kg)	Endrin ketone (µg/kg)	Endrin aldehyde (µg/kg)	*trans* - Chlordane (µg/kg)	*cis* - Chlordane (µg/kg)	Toxaphene (µg/kg)
B-AA	3	UA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	12	FA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	22	IA	15 U	3.1 U	3.1 U	1.5 U	1.5 U	150 U
	34	SA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
B-BB	9	UA	15 U	3.0 U	3.0 U	1.5 U	1.5 U	150 U
	14	FA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	21	IA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	33	SA	16 U	3.3 U	3.3 U	1.6 U	1.6 U	160 U
B-C	8	UA	16 U	3.1 U	3.1 U	1.6 U	1.6 U	160 U
	8	UA	16 U	3.1 U	3.1 U	1.6 U	1.6 U	160 U
	11	UA	-----	-----	-----	-----	-----	-----
	12	FA	16 U	3.3 U	3.3 U	1.6 U	1.6 U	160 U
	13.5	FA	-----	-----	-----	-----	-----	-----
	15	IA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	22	IA	-----	-----	-----	-----	-----	-----
	29	IA	-----	-----	-----	-----	-----	-----
	31	SA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	36	SA	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----
B-D	11	UA	15 U	3.1 U	3.1 U	1.5 U	1.5 U	150 U
	13	UA	-----	-----	-----	-----	-----	-----
	15	FA	16 U	3.3 U	3.3 U	1.6 U	1.6 U	160 U
	18	FA	-----	-----	-----	-----	-----	-----
	22	IA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	27	IA	-----	-----	-----	-----	-----	-----
	29	IA	-----	-----	-----	-----	-----	-----
	36.5	SA	16 U	3.2 U	3.2 U	1.6 U	1.6 U	160 U
	37	SA	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----
B-E	5	UA	-----	-----	-----	-----	-----	-----
	8	UA	-----	-----	-----	-----	-----	-----
	10	FA	-----	-----	-----	-----	-----	-----
	14	FA	-----	-----	-----	-----	-----	-----
	18	IA	-----	-----	-----	-----	-----	-----
	23	IA	-----	-----	-----	-----	-----	-----
	26	IA	-----	-----	-----	-----	-----	-----
	32	SA	-----	-----	-----	-----	-----	-----
	33	SA	-----	-----	-----	-----	-----	-----
	34	SA	-----	-----	-----	-----	-----	-----

TABLE 5-9 - Soil Boring Analytical Data - Manufacturing Area - 2012

Location/Field I.D.	Sample Depth (feet)	Unit	Methoxychlor (µg/kg)	Endrin ketone (µg/kg)	Endrin aldehyde (µg/kg)	*trans* - Chlordane (µg/kg)	*cis* - Chlordane (µg/kg)	Toxaphene (µg/kg)
B-F	7	UA	-----	-----	-----	-----	-----	-----
	12	UA	-----	-----	-----	-----	-----	-----
	14	FA	-----	-----	-----	-----	-----	-----
	18	FA	-----	-----	-----	-----	-----	-----
	21	IA	-----	-----	-----	-----	-----	-----
	31	IA	-----	-----	-----	-----	-----	-----
	38	IA	-----	-----	-----	-----	-----	-----
	38	IA	-----	-----	-----	-----	-----	-----
	40	SA	-----	-----	-----	-----	-----	-----
	42	SA	-----	-----	-----	-----	-----	-----
	44	SA	-----	-----	-----	-----	-----	-----
B-G	10	UA	-----	-----	-----	-----	-----	-----
	10	UA	-----	-----	-----	-----	-----	-----
	13	UA	-----	-----	-----	-----	-----	-----
	15	FA	-----	-----	-----	-----	-----	-----
	19	FA	-----	-----	-----	-----	-----	-----
	21	IA	-----	-----	-----	-----	-----	-----
	28	IA	-----	-----	-----	-----	-----	-----
	32	IA	-----	-----	-----	-----	-----	-----
	35	SA	-----	-----	-----	-----	-----	-----
	36.5	SA	-----	-----	-----	-----	-----	-----
	38	SA	-----	-----	-----	-----	-----	-----

Notes: J = estimate associated with value less than the verifiable lower quantitation limit.
J_R = estimate; due to low matrix spike recovery. Value likely biased low.
J_V = estimate; due to elevated RDP from duplicate analysis.
U = nondetected at the associated lower reporting limit.
UA - Upper Aquifer
FA - First Aquitard
IA - Intermediate Aquifer
SA - Second Aquitard

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-2	-----	7/19/2012	-----	0	12	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/19/2012	1214274-VD81AP	1.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	2	< 9	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/19/2012	1214275-VD81AQ	5	34	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/19/2012	1214276-VD81AR	6.5	13	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7.5-8.5'	7/19/2012	1214277-VD81AS	8	< 8	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	9	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-3	0-1'	7/17/2012	1214196-VD80X	0	14	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-3'	7/17/2012	1214197-VD80Y	1.5	< 8	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	2	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/17/2012	1214198-VD80Z	5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	6	21	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/17/2012	1214177-VD80E	7	9	< 9	74.5	**1.48**	6 U	**13**	**21.0**	**12,900**	**4**	**10**	0.4 U	**27**
	10-12'	7/17/2012	1214199-VD80AA	11	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-4	0-1'	7/17/2012	1214175-VD80C	0	49	40	93.5	**3.14**	5 U	**36**	**67.3**	**14,400**	**31**	**62**	0.3 U	**91**
	1-3'	7/17/2012	1214176-VD80D	2	< 9	< 14	91.2	**0.412**	5 U	5 U	**13.9**	**11,800**	**4**	**11**	0.3 U	**24**
	5-6'	7/17/2012	1214193-VD80U	5	< 8	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/17/2012	1214194-VD80V	6.5	< 9	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	7	8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214195-VD80W	11	44	< 20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-5	0-0.8'	7/17/2012	1214185-VD80M	0	59	20	92.9	**4.59**	5 U	**44**	**38.5**	**16,800**	**24**	**75**	0.3 U	**85**
	1.5-2.5'	7/17/2012	1214216-VD80AR	2.5	< 9	< 15	94.3	**0.220**	5 U	5 U	**15.1**	**14,500**	**3**	**14**	0.3 U	**28**
	dup NB05-B	7/17/2012	1214186-VD80N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.6'	7/17/2012	1214217-VD80AS	5	17	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	5.5	17	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/17/2012	1214218-VD80AT	8	17	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/17/2012	1214219-VD80AU	10	14	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-6	0-1'	7/18/2012	1214224-VD80AZ	0	19	46	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-3'	7/18/2012	1214225-VD80BA	2.5	< 8	< 12	84.8	**0.867**	5 U	**6**	**19.9**	**14,000**	**6**	**12**	0.3 U	**26**
	dup NB06-B	7/18/2012	1214188-VD80P	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5'	7/18/2012	1214226-VD80BB	5	31	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.5-6.5'	7/18/2012	1214227-VD80BC	6	34	< 8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	6.5	8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214228-VD80BD	10	16	42	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	11	< 9	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-7	0-1'	7/17/2012	1214220-VD80AV	0	16	50	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/17/2012	1214221-VD80AW	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/17/2012	1214187-VD80O	2.5	49	110	87.6	**1.34**	5 U	**26**	**65.3**	**15,600**	**80**	**24**	0.3 U	**71**
	5-7'	7/17/2012	1214222-VD80AX	5	34	< 15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	6.5	< 8	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/17/2012	1214223-VD80AY	10	20	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-8	0-1'	7/18/2012	1214229-VD80BE	0	22	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/18/2012	1214189-VD80Q	1.8	88	96	90.7	**0.867**	**15 J_R**	**67**	**51.9**	**20,900**	**49**	**27**	0.3 U	**196**
	2-3.5'	7/18/2012	1214230-VD80BF	2	101	109	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/18/2012	1214190-VD80R	5	11	< 12	71.6	**0.931**	7 U	**12**	**40.0**	**14,500**	**12**	**16**	0.4 U	**59**
	5.5-7.5'	7/18/2012	1214231-VD80BG	7	11	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214191-VD80S	10	< 9	< 18	83.7	**0.323**	6 U	6 U	**8.0**	**9070**	2 U	**6**	0.3 U	**21**
NB-9	0-1'	7/17/2012	1214200-VD80AB	0	27	73	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/17/2012	1214201-VD80AC	1.5	30	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/17/2012	1214202-VD80AD	2	13	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/17/2012	1214203-VD80AE	6.5	14	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214204-VD80AF	10.5	19	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-10	0-1'	7/17/2012	1214168-VD79AT	0	31	24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/17/2012	1214169-VD79AU	3	9	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/17/2012	1214170-VD79AV	5.2	< 9	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.5-5.6'	7/17/2012	1214174-VD80B	5.5	2682	9184	68.7	**4.60**	**136 J_R**	**754**	**566**	**22,600**	**2270**	**37**	**3.9**	**1770**
	5.6-6'	7/17/2012	1214141-VD79S	5.7	52	< 12	76.1	**0.381**	**41 J_R**	**66**	**14.7**	**8050**	**3**	**7**	0.4 U	**66**
	6-8'	7/17/2012	1214171-VD79AW	6	19	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	7	< 7	< 5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	8.5	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	9-10'	7/17/2012	1214172-VD79AX	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214173-VD80A	11	17	< 11	82.4	**0.255**	6 U	**10**	**8.9**	**8690**	2 U	**6**	0.3 U	**25**
NB-11	0-1'	7/16/2012	1214130-VD79H	0	57	59	92.8	**1.68**	5 U	**22**	**36.1**	**16,700**	**23**	**38**	0.3 U	**83**
	1-2'	7/16/2012	1214155-VD79AG				-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.5'	7/16/2012	1214156-VD79AH	5	16	36	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5-7'	7/16/2012	1214132-VD79J	6.5	3009	10,474	57.1	**11.2**	**224 J_R**	**1660**	**683**	**29,100**	**2620**	**89**	**5.8**	**2950**
	7-8'	7/16/2012	1214131-VD79I	7	33	< 12	76.2	**0.238**	6 U	**52**	**13.1**	**9570**	**3**	**6**	0.4 U	**27**
	10-11'	7/16/2012	1214157-VD79AI	10	9	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11-13'	7/16/2012	1214158-VD79AJ	13	82	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-12	-----	7/19/2012	-----	0	< 10	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.3-1.3'	7/19/2012	1214278-VD81AT	1	18	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.3-2.5'	7/19/2012	1214279-VD81AU	2	10	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/19/2012	1214280-VD81AV	5.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	6.5	13	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8.5'	7/19/2012	1214281-VD81AW	7.5	8	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-13	0-1'	7/16/2012	1214150-VD79AB	0	68	67	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/16/2012	1214151-VD79AC	1.5	< 8	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.2'	7/16/2012	1214152-VD79AD	5	9	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	6	628	731	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5'	7/16/2012	1214129-VD79G	6.5	705	218	73.3	**3.74**	**121 J_R**	**805**	**278**	**16,100**	**901**	**16**	**1.5**	**767**
	7-8'	7/16/2012	1214128-VD79F	8	62	< 11	70.1	**0.579**	7 U	**198**	**37.4**	**16,500**	**6**	**12**	0.4 U	**45**
	10-12'	7/16/2012	1214153-VD79AE	11	57	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	12-14'	7/16/2012	1214154-VD79AF	12	86	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	14	15	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-14	0-1'	7/17/2012	1214166-VD79AR	0	58	65	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/17/2012	1214138-VD79P	2	14	< 14	88.7	**0.324**	5 U	5 U	**16.0**	**12,800**	**6**	**14**	0.3 U	**30**
	5-6'	7/17/2012	1214139-VD79Q	5	314	82	72.3	**1.01**	**31 J_R**	**167**	**45.5**	**10,600**	**165**	**10**	**0.8**	**164**
	-----	7/17/2012	-----	6	< 9	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	6.5	151	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8'	7/17/2012	1214140-VD79R	-----	-----	-----	67.8	**1.34**	7 U	**35**	**38.3**	**17,300**	**13**	**13**	0.4 U	**42**
	10-11'	7/17/2012	1214167-VD79AS	10	14	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-15	0-1'	7/16/2012	1214159-VD79AK	0	17	37	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/16/2012	1214160-VD79AL	2.5	12	11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214161-VD79AM	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-6.5'	7/16/2012	1214135-VD79M	6.5	4653	2077	71.3	**11.6**	**325 J_R**	**2890**	**617**	**24,100**	**2740**	**58**	**5.8**	**3490**
	7-9'	7/16/2012	1214133-VD79K	8	3148	29	72.7	**0.801**	**21 J_R**	**811**	**27.2**	**13,500**	**10**	**10**	0.4 U	**72**
	-----	7/16/2012	-----	10	117	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11-12'	7/16/2012	1214134-VD79L	12	81	< 12	77.7	**0.654**	6 U	**117**	**11.7**	**8690**	**5**	**7**	0.4 U	**30**

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg) Depth (ft)	As	Pb	Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
NB-16	0-1'	7/17/2012	1214205-VD80AG	0	13	24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/17/2012	1214206-VD80AH	2	68	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.3'	7/17/2012	1214207-VD80AI	5	30	79	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.3-5.5'	7/17/2012	1214179-VD80G	5.4	1800	2588	69.1	**2.69**	**88 J_R**	**1800**	**332**	**29,300**	**1440**	**58**	**0.4**	**1230**
	5.5-6.5'	7/17/2012	1214208-VD80AJ	6	433	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8.5'	7/17/2012	1214178-VD80F	7	97	16	64.0	**1.41**	8 U	**82**	**44.2**	**21,900**	**13**	**15**	0.5 U	**40**
	-----	7/17/2012	-----	8	1211	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	8.2	31	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214209-VD80AK	10	40	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	11	23	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-17	0-1'	7/17/2012	1214162-VD79AN	0	17	29	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/17/2012	1214163-VD79AO	2	24	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/17/2012	1214164-VD79AP	5	22	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6'	7/17/2012	1214137-VD79O	6	1348	790	70.9	**3.41**	**180 J_R**	**3770**	**590**	**33,900**	**4070**	**41**	**1**	**2650**
	6-8'	7/17/2012	1214165-VD79AQ	7	706	37	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	9	264	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214136-VD79N	12	316	< 12	75.7	**0.530**	6 U	**192**	**9.1**	**7270**	**3**	**8**	0.4 U	**43**
NB-18	0-0.5'	7/17/2012	1214210-VD80AL	0	129	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.5-1.5'	7/17/2012	1214211-VD80AM	1.5	57	46	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-3'	7/17/2012	1214212-VD80AN	2	28	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/17/2012	1214180-VD80H	5	135	20	67.9	**3.11**	7 U	**170**	**47.7**	**16,500**	**42**	**14**	0.4 U	**75**
	5.5-7'	7/17/2012	1214181-VD80I	6.5	13	< 11	80.2	**0.242**	6 U	**11**	**7.6**	**8060**	2 U	**6**	0.4 U	**35**
	10-12'	7/17/2012	1214182-VD80J	10	< 8	< 13	77.6	**0.437**	6 U	**11**	**10.3**	**8180**	2 U	**7**	0.4 U	**36**
	-----	7/17/2012	-----	11	17	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-19	0-1'	7/18/2012	1214259-VD81AA	0	26	41	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/18/2012	1214260-VD81AB	1	27	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	2	< 9	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/18/2012	1214261-VD81AC	5	20	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.5-6'	7/18/2012	1214262-VD81AD	6	12	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214263-VD81AE	10	64	51	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-20	0-1'	7/17/2012	1214183-VD80K	0	43	16	70.3	**4.86**	20 U	**90**	**86.8**	**15,900**	**57**	**195**	1 U	**172**
	-----	7/17/2012	-----	0.5	34	45	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	1.5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/17/2012	1214213-VD80AO	3	20	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/17/2012	1214184-VD80L	5	39	13	61.3	**2.03**	8 U	**69**	**63.1**	**26,100**	**13**	**25**	0.5 U	**89**
	6-7.5'	7/17/2012	1214214-VD80AP	7	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214215-VD80AQ	10.5	11	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-21	0-1'	7/18/2012	1214255-VD81W	0	46	56	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2.5'	7/18/2012	1214256-VD81X	2	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	3	23	13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/18/2012	1214233-VD81A	5	30	27	58.7	**2.03**	8 U	**16**	**55.7**	**30,300**	**15**	**26**	0.5 U	**78**
	6-7.5'	7/18/2012	1214257-VD81Y	7	8	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/18/2012	1214258-VD81Z	10	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-22	0-1'	7/18/2012	1214232-VD80BH	0	< 12	32	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/18/2012	1214192-VD80T	2	76	48	74.0	**1.39**	6 U	**34**	**42.3**	**21,200**	**39**	**24**	0.4 U	**110**
	5-6'	7/18/2012	1214252-VD81T	5	62	19	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/18/2012	1214253-VD81U	6.5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	10	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11-12'	7/18/2012	1214254-VD81V	11.5	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-23	0-1'	7/16/2012	1214123-VD79A	0	17	32	97.6	**0.667**	5 U	**17**	**23.4**	**14,200**	**18**	**19**	0.3 U	**53**
	2-3.5'	7/16/2012	1214144-VD79V	2.5	11	< 13										
	5-6'	7/16/2012	1214124-VD79B	5	< 8	17	74.2	**0.501**	7 U	7 U	**21.4**	**14,000**	**7**	**12**	0.4 U	**33**
	6-7'	7/16/2012	1214145-VD79W	6.5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11.5'	7/16/2012	1214146-VD79X	10.5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-24	0-0.5'	7/16/2012	1214121-VD78BP	0	20	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/16/2012	1214072-VD78S	2	57	22	85.1	**0.418**	6 U	**19**	**29.0**	**16,500**	**32**	**23**	0.3 U	**82**
	5-7'	7/16/2012	1214122-VD78BQ	5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8.5'	7/16/2012	1214142-VD79T	7	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/16/2012	1214143-VD79U	12	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-25	0-1'	7/16/2012	1214117-VD78BL	0	18	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/16/2012	1214118-VD78BM	3	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214071-VD78R	5	1281	< 13	67.5	**0.959**	**9 J_R**	**1200**	**35.8**	**16,600**	**12**	**13**	0.4 U	**63**
	6-7.5'	7/16/2012	1214119-VD78BN	7.5	125	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/16/2012	1214120-VD78BO	10	57	58	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	12	116	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-26	0-1'	7/16/2012	1214125-VD79C	0	13	31	96.9	**1.33**	5 U	**12**	**19.0**	**12,800**	**17**	**18**	0.3 U	**67**
	2-3.5'	7/16/2012	1214147-VD79Y	3	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214148-VD79Z	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5'	7/16/2012	1214127-VD79E	6.5	2717	13	73.9	**2.24**	**66 J_R**	**1700**	**269**	**23,400**	**1260**	**40**	0.4 U	**1350**
	8-9'	7/16/2012	1214149-VD79AA	8	797	23	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/16/2012	1214126-VD79D	10	1234	19	71.1	**1.17**	**7 J_R**	**1150**	**42.7**	**12,900**	**16**	**18**	0.4 U	**85**
	-----	7/16/2012	-----	10	2603	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-27	0.5-1.5'	7/19/2012	1214243-VD81K	1	67	100	91.5	**3.42**	**6 J_R**	**43**	**40.4**	**19,200**	**39**	**30**	0.3 U	**112**
	1.5-2.5'	7/19/2012	1214282-VD81AX	2	27	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/19/2012	1214244-VD81L	5	197	< 12	66.0	**1.63**	7 U	**276**	**42.5**	**21,900**	**11**	**27**	0.4 U	**54**
	-----	7/19/2012		6.5	17	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8'	7/19/2012	1214283-VD81AY	8	< 7	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	9	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-29	0.5-1.5'	7/19/2012	1214284-VD81AZ	1	10	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-2.5'	7/19/2012	1214285-VD81BA	2	17	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2.5-3.5'	7/19/2012	1214245-VD81M	2.5	49	< 13	66.9	**1.60**	7 U	**239**	**33.6**	**17,800**	**7**	**14**	0.4 U	**37**
	-----	7/19/2012	-----	3	88	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.5'	7/19/2012	1214286-VD81BB	5	30	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5-8'	7/19/2012	1214287-VD81BC	6.5	< 7	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	8.5	7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/19/2012	1214288-VD81BD	11	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-30	0-1'	7/15/2012	1214088-VD78AI	0	14	30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	1.5	42	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/15/2012	1214089-VD78AJ	2.5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/15/2012	1214062-VD78I	6.5	302	< 13	81.1	**0.283**	**12 J_R**	**116**	**10.3**	**8470**	2 U	**6**	0.4 U	**27**
	8-10'	7/15/2012	1214090-VD78AK	9	29	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214091-VD78AL	12	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-31	0-1'	7/16/2012	1214112-VD78BG	0	16	32	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-2.5'	7/16/2012	1214113-VD78BH	1.5	11	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	4.9	452	105	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	5	1647	2973	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.3'	7/16/2012	1214070-VD78Q	-----	-----	-----	62.7	**3.63**	**225 J_R**	**2210**	**614**	**29,400**	**3120**	**53**	**1.6**	**2230**
	5.5-6'	7/16/2012	1214114-VD78BI	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/16/2012	1214115-VD78BJ	6	203	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	7	17	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11.5'	7/16/2012	1214116-VD78BK	11.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-32	0-1'	7/16/2012	1214110-VD78BE	0	26	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-2.5'	7/16/2012	1214068-VD78O	1.5	< 8	< 12	84.1	**0.944**	6 U	6 U	**23.6**	**18,300**	**4**	**23**	0.3 U	**36**
	5-6'	7/16/2012	1214069-VD78P	5	15	< 13	80.1	**1.25**	**11 J_R**	**58**	**24.8**	**10,100**	**85**	**9**	0.3 U	**94**
	6-7'	7/16/2012	1214111-VD78BF	7	< 7	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-33	0-1'	7/16/2012	1214104-VD78AY	0	19	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/16/2012	1214105-VD78AZ	2	12	< 14	82.9	**1.78**	6 U	**33**	**106**	**20,500**	**26**	**82**	0.3 U	**202**
	dup NB33-B	7/16/2012	1214067-VD78N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	3.5	12	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214106-VD78BA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8.5'	7/16/2012	1214107-VD78BB	6	27	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8.5-10'	7/16/2012	1214108-VD78BC	9	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/16/2012	1214109-VD78BD	12	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-34	0-1'	7/15/2012	1214100-VD78AU	0	13	35	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-2.5'	7/15/2012	1214066-VD78M	2	25	53	75.2	**1.49**	**37 J_R**	**456**	**87.6**	**18,000**	**610**	**16**	**0.5**	**248**
	-----	7/15/2012	-----	2.5	73	105	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/15/2012	1214101-VD78AV	7	< 8	<12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-9'	7/15/2012	1214102-VD78AW	9	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214103-VD78AX	12	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-35	0-1'	7/15/2012	1214073-VD78T	0	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	1	< 20	240	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5'	7/15/2012	1214054-VD78A	1.5	911	3724	87.9	**3.11**	**33 J_R**	**261**	**170**	**16,400**	**884**	**32**	**1.1**	**797**
	2-4'	7/15/2012	1214055-VD78B	2.5	56	20	84.6	**0.376**	6 U	**13**	**10.4**	**10,100**	2 U	**6**	0.4 U	**23**
	4-6'	7/15/2012	1214074-VD78U	4	10	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/15/2012	1214075-VD78V	6	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	7.5	12	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8-10'	7/15/2012	1214076-VD78W	8	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214077-VD78X	10	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-36	0-1'	7/15/2012	1214096-VD78AQ	0	18	34	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2'	7/15/2012	1214065-VD78L	2	124	307	83.3	**6.50**	**42 J_R**	**250**	**151**	**13,800**	**839**	**20**	**1.2**	**316**
	2-2.5'	7/15/2012	1214097-VD78AR	2.5	78	70	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	6	< 8	13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	9-10'	7/15/2012	1214098-VD78AS	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214099-VD78AT	11	8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-37	0-1'	7/15/2012	1214063-VD78J	0	15	21	78.2	**3.07**	**7 J_R**	**59**	**63.9**	**17,800**	**53**	**133**	0.4 U	**134**
	2.5'	7/15/2012	1214064-VD78K	2.5	1288	5975	79.0	**10.5**	**73 J_R**	**281**	**204**	**14,100**	**1220**	**29**	**1.4**	**882**
	2.5-3'	7/15/2012	1214092-VD78AM	3	44	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/15/2012	1214093-VD78AN	6-8	< 7	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8-9.5'	7/15/2012	1214094-VD78AO	9	11	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214095-VD78AP	10.5	< 8	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	12	< 7	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-38	0-1'	7/15/2012	1214060-VD78G	0	24	24	88.1	**2.92**	6 U	**40**	**53.6**	**17,400**	**37**	**105**	0.3 U	**115**
	-----	7/15/2012	-----	1	37	33	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	1.5	17	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/15/2012	1214086-VD78AG	3	40	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/15/2012	1214061-VD78H	6.5	10	17	75.6	**0.477**	6 U	**35**	**18.4**	**11,600**	3 U	**9**	0.4 U	**43**
	7-8'	7/15/2012	1214087-VD78AH	8	< 7	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-40	0.5-1.5'	7/19/2012	1214289-VD81BE	1	14	18	90.9	2.16	5 U	28	43.3	21,000	23	26	0.3 U	120
	dup NB40-A	7/19/2012	1214248-VD81P	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.8-2.1'	7/19/2012	1214247-VD81O	2	1286	1737	93.3	22.4	30 J_R	370	496	16,300	245	20	1.7	518
	2.1-3'	7/19/2012	1214246-VD81N	2.5	110	160	92.6	1.08	40 J_R	260	215	28,500	444	17	0.8 U	3250
	-----	7/19/2012	-----	3	< 8	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/19/2012	1214290-VD81BF	5	14	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	6.5	< 7	13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8'	7/19/2012	1214291-VD81BG	8.5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/19/2012	1214292-VD81BH	10.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-41	0.3-1.3'	7/19/2012	1214293-VD81BI	1	< 9	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.3-2.3'	7/19/2012	1214294-VD81BJ	2	193	126	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2.3-2.5'	7/19/2012	1214249-VD81Q	2.5	152	48	88.5	1.94	200 J_R	600	821	59,700	605	48	2.2	2720
	2.5-3.5'	7/19/2012	1214295-VD81BK	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/19/2012	1214296-VD81BL	5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	6.5	< 7	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7.5-8'	7/19/2012	1214297-VD81BM	8	34	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-42	-----	7/15/2012	-----	0	37	43	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.5-1.5'	7/15/2012	1214078-VD78Y	1.5	57	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2'	7/15/2012	1214056-VD78C	2	873	571	69.2	7.02	174 J_R	1730	368	25,700	1840	35	1.5	900
	2.5-3'	7/15/2012	1214079-VD78Z	3	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/15/2012	1214080-VD78AA	7	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-9'	7/15/2012	1214081-VD78AB	9	< 9	30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214082-VD78AC	10	< 9	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	12	< 7	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-43	-----	7/15/2012	-----	0	11	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.5-1.5'	7/15/2012	1214057-VD78D	1	< 9	15	89.9	0.272	5 U	9	22.1	20,100	6	31	0.3 U	48
	-----	7/15/2012	-----	1.5	55	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/15/2012	1214083-VD78AD	2	21	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	3	28	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/15/2012	1214084-VD78AE	6	24	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214058-VD78E	9.5	< 6	< 9	64.7	2.11	8 U	11	39.6	21,900	11	18	0.5 U	53
	-----	7/15/2012	-----	12	< 8	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-44	0-1'	7/15/2012	1214085-VD78AF	0	29	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/15/2012	1214059-VD78F	1	28	45	86.8	0.171	6 U	6	21.7	22,500	3	31	0.3 U	44
NB-45	0.3-1'	7/19/2012	1214298-VD81BN	0	10	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/19/2012	1214299-VD81BO	1	13	16	87.0	2.87	5 U	9	23.6	21,500	10	25	0.3 U	51
	dup NB45-B	7/19/2012	1214251-VD81S	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-2.3'	7/19/2012	1214250-VD81R	2	61	40	58.6	10.3	25 J_R	160	138	25,900	91	26	0.5 U	257
	5-6'	7/19/2012	1214300-VD81BP	5	52	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/19/2012	1214301-VD81BQ	7	34	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-46	0-1'	7/18/2012	1214273-VD81AO	0	12	21	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	1	37	73	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/18/2012	1214240-VD81H	5	100	68	69.3	2.22	8 J_R	368	77.8	21,600	78	21	0.4 U	156
	-----	7/18/2012	-----	6	141	48	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	7	154	35	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214241-VD81I	10	569	31	69.6	1.97	7 U	19	30.9	17,500	3	13	0.4 U	34
	-----	7/18/2012	-----	10.5	33	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	11	50	33	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11.5-12.5'	7/18/2012	1214242-VD81J	12	< 7	< 12	73.1	0.704	7 U	142	61.8	19,000	42	18	0.4 U	86

TABLE 5-10 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-47	0-1'	7/18/2012	1214270-VD81AL	0	37	76	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	-----	7/18/2012	-----	1.8	16	42	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	4-5'	7/18/2012	1214239-VD81G	4	123	24	62.2	**2.03**	**12 J_R**	**121**	**64.2**	**20,300**	**20**	**22**	0.4 U	**137**
NB-47	-----	7/18/2012	-----	4.5	261	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	5-6.5'	7/18/2012	1214271-VD81AM	5	31	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	-----	7/18/2012	-----	6	28	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	-----	7/18/2012	-----	8	< 5	< 8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	10-12'	7/18/2012	1214272-VD81AN	10	7	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-47	-----	7/18/2012	-----	12	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-48	0.5-1.5'	7/18/2012	1214264-VD81AF	0	64	96	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-48	1.5-2.5'	7/18/2012	1214234-VD81B	1.5	40	18	75.3	**1.37**	**24 J_R**	**199**	**83.6**	**20,700**	**305**	**50**	0.4 U	**378**
NB-48	-----	7/18/2012	-----	2	83	45	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-48	5-6'	7/18/2012	1214265-VD81AG	5	53	66	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-48	6-7.5'	7/18/2012	1214235-VD81C	6	37	< 11	79.7	**0.312**	6 U	6 U	**8.1**	**8610**	2 U	**5**	0.3 U	**16**
NB-48	-----	7/18/2012	-----	7	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-48	10-11'	7/18/2012	1214266-VD81AH	10	< 7	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-49	0.5-1.5'	7/18/2012	1214267-VD81AI	0	23	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-49	-----	7/18/2012	-----	0.8	12	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-49	1'	7/18/2012	1214238-VD81F	1	686	1592	70.8	**7.23**	**65 J_R**	**787**	**345**	**16,200**	**1850**	**40**	**1.3**	**896**
NB-49	1-2'	7/18/2012	1214236-VD81D	1.5	< 8	< 13	84.9	**0.093**	5 U	**15**	**10.5**	**9820**	**5**	**6**	0.3 U	**43**
NB-49	5-6'	7/18/2012	1214237-VD81E	5	< 10	< 6	78.4	**0.364**	6 U	**12**	**14.4**	**11,000**	2 U	**7**	0.4 U	**22**
NB-49	6-7'	7/18/2012	1214268-VD81AJ	7	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-49	7-9'	7/18/2012	1214269-VD81AK	8	13	21	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: Blue highlighted values likely affected by observed carry-down into the sample during coring.
J_R = estimate; due to low matrix spike recovery. Value likely biased low.
U = nondetected at the associated lower reporting limit.

TABLE 5-11 - Comparison of Maximum Soil Concentrations to Soil Contact Screening Levels - Manufacturing Area (1)

Constituent	Pond/Ditch Samples			MP 2007 Samples			DOF Boring Samples (5)			DOF NB Borings		
	Sample Number (N)	1989 Max. Conc. (mg/kg)	Location	Sample Number (N)	2007 Max. Conc. (mg/kg)	Location	Sample Number (N)	2008/2012 Max. Conc. (mg/kg)	Location	Sample Number (N)	2012 Max. Conc. (mg/kg)	Location
Antimony	-----	-----	-----	245	27000	PT33	22	14	B-D	77	325	NB15
Arsenic	33	150	WW4	265	25000	PT33	39	4200	BB	77	3770	NB17
Barium	33	420	CP4	245	200	PT37/38	-----	-----	-----	-----	-----	-----
Cadmium	33	9	WW6	245	14	PT33	-----	-----	-----	-----	-----	-----
Total Chromium	33	85	AP-1	245	370	PT49	9	23	B-BB	-----	-----	-----
Total Chromium	33	85	AP-1	245	370	PT49	9	23	B-BB	-----	-----	-----
Copper	33	200	AP-1	245	2000	PT33	22	41	B-D	77	821	NB41
Lead	33	290	WW5	249	1900	MA5	22	11	B-AA	77	4070	NB17
Mercury	33	2.1	AP-1	245	910	PT33	9	0.23	B-D	-----	-----	-----
Nickel	-----	-----	-----	245	420	TLA21	22	27	B-D	77	195	NB20
Selenium	33	<1	AP-1	245	71	PT33	9	<7	-----	-----	-----	-----
Silver	33	1.5	AP-1	245	14	PT33	22	<0.5	-----	77	5.8	NB11/NB15
Zinc	-----	-----	-----	245	880	SPA5	22	92	B-E	77	3490	NB15
Total PCBs	-----	-----	-----	22	0.01	PT45/46	-----	-----	-----	-----	-----	-----
4,4'-DDD	-----	-----	-----	38	3.4	MA23	9	<0.003	-----	-----	-----	-----
4.4'-DDE	-----	-----	-----	38	1.9	MA23	9	0.005	-----	-----	-----	-----
4,4-DDT	-----	-----	-----	38	30	MA23	9	<0.003	-----	-----	-----	-----
Dieldrin	-----	-----	-----	5	<0.006	-----	-----	-----	-----	-----	-----	-----
Acenaphthene	-----	-----	-----	20	0.17	MA17	-----	-----	-----	-----	-----	-----
Acenaphthylene	-----	-----	-----	20	0.05	MA18	-----	-----	-----	-----	-----	-----
Anthracene	-----	-----	-----	20	0.2	MA19	-----	-----	-----	-----	-----	-----
Benzo(g,h,i)perylene	-----	-----	-----	20	0.32	MA16	-----	-----	-----	-----	-----	-----
Fluorene	-----	-----	-----	20	0.21	MA18	-----	-----	-----	-----	-----	-----
Naphthalene	-----	-----	-----	20	0.067	MA16	-----	-----	-----	-----	-----	-----
Phenanthrene	-----	-----	-----	20	1.1	MA18	-----	-----	-----	-----	-----	-----
Pyrene	-----	-----	-----	20	1.3	MA18	-----	-----	-----	-----	-----	-----
CPAH-TEQ	-----	-----	-----	20	0.65	MA18	-----	-----	-----	-----	-----	-----
TPH (Diesel Range)	-----	-----	-----	34	3200	MA16	-----	-----	-----	-----	-----	-----
TPH (Lube Oil)	-----	-----	-----	34	4700	MA16	-----	-----	-----	-----	-----	-----
cis-1,2-DCE	-----	-----	-----	44	0.007	TLA32	9	0.019	B-C	-----	-----	-----
1,1-DCE	33	nd	-----	44	0.002	TLA32	-----	-----	-----	-----	-----	-----
2-Butanone	33	0.05	CRP-6	44	0.02	TLA12	-----	-----	-----	-----	-----	-----
Acetone	33	0.39	CRP-5	44	0.16	TLA12	-----	-----	-----	-----	-----	-----
Carbon Disulfide	33	nd	-----	44	0.009	TLA12	-----	-----	-----	-----	-----	-----
Carbon Tetrachloride	33	0.11	WW7	44	0.009	TLA20	-----	-----	-----	-----	-----	-----
Chloroform	33	0.078	CRP-7	44	0.063	TLA20	9	580	B-AA	-----	-----	-----
Ethylbenzene	33	0.048	CRP-2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Hexachlorobutadiene	-----	-----	-----	48	0.19	TLA20	9	0.006	B-AA	-----	-----	-----
Hexachlorobenzene	-----	-----	-----	-----	-----	-----	9	0.005	B-AA	-----	-----	-----

TABLE 5-11 - Comparison of Maximum Soil Concentrations to Soil Contact Screening Levels - Manufacturing Area (1)

Constituent	Pond/Ditch Samples			MP 2007 Samples			DOF Boring Samples (5)			DOF NB Borings		
	Sample Number (N)	1989 Max. Conc. (mg/kg)	Location	Sample Number (N)	2007 Max. Conc. (mg/kg)	Location	Sample Number (N)	2008/2012 Max. Conc. (mg/kg)	Location	Sample Number (N)	2012 Max. Conc. (mg/kg)	Location
Hexachloroethane	33	13 (TIC)	TL-4	-----	-----	-----	-----	-----	-----	-----	-----	-----
Methylene Chloride	33	0.021	WW-5	44	0.011	TLA27	-----	-----	-----	-----	-----	-----
p-Isopropyltoluene	-----	-----	-----	44	0.007	TLA29	-----	-----	-----	-----	-----	-----
Tetrachloroethene	33	0.44	TL-4	44	0.91	TLA20	9	14	B-AA	-----	-----	-----
Trichloroethene	33	nd	-----	44	0.5	TLA32	9	1.6	B-AA	-----	-----	-----
Vinyl chloride	-----	-----	-----	44	<0.002	-----	9	0.008	B-AA	-----	-----	-----
Xylenes	33	0.046	CRP-2	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: SL -Screening Level
COPC - Contaminant of Potential Concern
----- - Not Available/Not Analyzed/Not applicable
MTCA - Model Toxics Control Act
nd - Not Detected
TIC - Tentatively Identifed Compound
(1) - Based on samples collected from depths of 15 feet or less.
(2) - Soil contact SL based on both ingestion and dermal contact exposure assumptions
(3) - Based on unrestricted site use - applied to uncapped industrial sites
(4) - Also protective of groundwater
(5) - Based on preventing accumulation of separate phase product on water table.
(6) - 2008 and 2012 Borings - Not include North Boundary Borings (NB-series)

TABLE 5-11 - Comparison of Maximum Soil Concentrations to Soil Contact Screening Levels - Manufacturing Area (1)

Constituent	Total Number of Samples	Highest Concentration (mg/kg)	Industrial SL (mg/kg)	MTCA Method	Max. Above Industrial CUL	Soil Contact COPC
Antimony	344	27000	533	C(2)	**Yes**	Carry Fwd.
Arsenic	414	25000	33	C(2)	**Yes**	Carry Fwd.
Barium	278	420	266700	C(2)	No	No
Cadmium	278	14	2	A(4)	**Yes**	Carry Fwd.
Total Chromium	287	370	2000000	C(Cr+3)(2)	No	No
Total Chromium	287	370	4000	C(Cr+6)(2+Q50	No	No
Copper	377	2000	53330	C(2)	No	No
Lead	381	4070	1000	A	**Yes**	Carry Fwd.
Mercury	287	910	2	A(4)	**Yes**	Carry Fwd.
Nickel	344	420	26670	C(2)	No	No
Selenium	287	71	6667	C(2)	No	No
Silver	377	14	6667	C(2)	No	No
Zinc	344	3490	400000	C(2)	No	No
Total PCBs	22	0.01	1	A (3)	No	No
4,4'-DDD	47	3.4	104	C(2)	No	No
4.4'-DDE	47	1.9	73.5	C(2)	No	No
4,4-DDT	47	30	73.5	C(2)	No	No
Dieldrin	5	<0.006	1.5	C(2)	No	No
Acenaphthene	20	0.17	40000	C(2)	No	No
Acenaphthylene	20	0.05	-----	-----	-----	-----
Anthracene	20	0.2	200000	C(2)	No	No
Benzo(g,h,i)perylene	20	0.32	-----	-----	-----	-----
Fluorene	20	0.21	26670	C(2)	No	No
Naphthalene	20	0.067	13330	C(2)	No	No
Phenanthrene	20	1.1	-----	-----	-----	-----
Pyrene	20	1.3	20000	C(2)	No	No
CPAH-TEQ	20	0.65	2	A (4)	No	No
TPH (Diesel Range)	34	3200	2000	A (5)	See text	See text
TPH (Lube Oil)	34	4700	2000	A (5)	See text	See text
cis-1,2-DCE	53	0.019	2909	C(2)	No	No
1,1-DCE	77	0.002	72730	C(2)	No	No
2-Butanone	77	0.05	872700	C(2)	No	No
Acetone	77	0.39	1309000	C(2)	No	No
Carbon Disulfide	77	0.009	145500	C(2)	No	No
Carbon Tetrachloride	77	0.11	779	C(2)	No	No
Chloroform	86	580	14550	C(2)	No	No
Ethylbenzene	33	0.048	145500	C(2)	No	No
Hexachlorobutadiene	57	0.19	320	C(2)	No	No
Hexachlorobenzene	9	0.005	15.6	C(2)	No	No

TABLE 5-11 - Comparison of Maximum Soil Concentrations to Soil Contact Screening Levels - Manufacturing Area (1)

Constituent	Total Number of Samples	Highest Concentration (mg/kg)	Industrial SL (mg/kg)	MTCA Method	Max. Above Industrial CUL	Soil Contact COPC
Hexachloroethane	33	13	1455	C(2)	No	No
Methylene Chloride	77	0.021	7273	C(2)	No	No
p-Isopropyltoluene	44	0.007	-----	C(2)	-----	-----
Tetrachloroethene	53	14	8727	C(2)	No	No
Trichloroethene	53	1.6	727	C(2)	No	No
Vinyl chloride	53	0.008	4364	C(2)	No	No
Xylenes	33	0.046	290900	C(2)	No	No

Notes: SL -Screening Level

COPC - Contaminant of Potential Concern

----- - Not Available/Not Analyzed/Not applicable

MTCA - Model Toxics Control Act

nd - Not Detected

TIC - Tentatively Identifed Compound

(1) - Based on samples collected from depths of 15 feet or less.

(2) - Soil contact SL based on both ingestion and dermal contact exposure assumptions

(3) - Based on unrestricted site use - applied to uncapped industrial sites

(4) - Also protective of groundwater

(5) - Based on preventing accumulation of separate phase product on water table.

(6) - 2008 and 2012 Borings - Not include North Boundary Borings (NB-series)

TABLE 5-12 - Summary of Terrestrial Soil COPCs - Manufacturing Area

Detected Constituent	Wildlife Screening Levels (WSLs) (mg/kg)	Maximum Conc. Manufacturing Area (mg/kg)	Maximum Exceeds WSL	Maximum Exceeds 2X WSL	% of Spls. Exceed WSL (b)	UCL 95% (mg/kg) (b)	Tentatively Identified Terrestrial COPC
Antimony	-----	27000	-----	-----	-----	-----	-----
Arsenic	20 (AsIII) (a)	25000	Yes	Yes	57% (N=247)(b)	260	Yes
Barium	102	200	Yes	No	3.6% (N=247)	44.6	No
Cadmium	14	14	No	-----	-----	-----	No
Total Chromium	67	370	Yes	Yes	4.9% (N=245)	24.9	Yes
Copper	217	2000	Yes	Yes	2.0% (N=245)	27.5	Yes
Lead	118	1900	Yes	Yes	4.5% (N=245)	18.8	Yes
Mercury	5.5	910	Yes	Yes	5.7% (N=247)	2.4	Yes
Nickel	980	420	No	-----	-----	-----	No
Selenium	0.3	71	Yes	Yes	47% (N=245)	(c)	Yes
Silver	-----	-----	-----	-----	-----	-----	-----
Zinc	360	880	Yes	Yes	<1% (N=245)	69.0	No
Total PCBs	0.65	0.01	No	-----	-----	-----	No
DDD/DDE/DDT	0.75	35	Yes	Yes	5.3% (N=38)	(c)	Yes
Dieldrin	0.07	<0.006	No	-----	-----	-----	No
1-Methylnaphthalene	-----	-----	-----	-----	-----	-----	-----
2-Methylnaphthalene	-----	-----	-----	-----	-----	-----	-----
Acenaphthene	-----	0.17	-----	-----	-----	-----	-----
Acenaphthylene	-----	0.05	-----	-----	-----	-----	-----
Anthracene	-----	0.2	-----	-----	-----	-----	-----
Benzo(g,h,i)perylene	-----	0.32	-----	-----	-----	-----	-----
Fluroanthene	-----	-----	-----	-----	-----	-----	-----
Fluorene	-----	0.21	-----	-----	-----	-----	-----
Naphthalene	-----	0.057	-----	-----	-----	-----	-----
Phenanthrene	-----	1.1	-----	-----	-----	-----	-----
Pyrene	-----	1.3	-----	-----	-----	-----	-----
CPAH-TEQ	12	0.65	No	-----	-----	-----	No
TPH- (Gas Range)	5000	-----	-----	-----	-----	-----	No
TPH (Diesel Range)	6000	3200	No	-----	-----	-----	No
TPH (Lube Oil)	-----	4700	-----	-----	-----	-----	-----
cis-1,2-DCE	-----	0.007	-----	-----	-----	-----	-----
1,1-DCA	-----	-----	-----	-----	-----	-----	-----
1,1-DCE	-----	0.002	-----	-----	-----	-----	-----
2-Butanone	-----	0.02	-----	-----	-----	-----	-----
Acetone	-----	0.39	-----	-----	-----	-----	-----
Benzene	-----	-----	-----	-----	-----	-----	-----
Bromodichloromethane	-----	-----	-----	-----	-----	-----	-----
Carbon Disulfide	-----	0.009	-----	-----	-----	-----	-----
Carbon Tetrachloride	-----	0.11	-----	-----	-----	-----	-----
Chloroform	-----	0.063	-----	-----	-----	-----	-----
Ethylbenzene	-----	0.048	-----	-----	-----	-----	-----
Hexachlorobutadiene	-----	0.19	-----	-----	-----	-----	-----

TABLE 5-12 - Summary of Terrestrial Soil COPCs - Manufacturing Area

Detected Constituent	Wildlife Screening Levels (WSLs) (mg/kg)	Maximum Conc. Manufacturing Area (mg/kg)	Maximum Exceeds WSL	Maximum Exceeds 2X WSL	% of Spls. Exceed WSL (b)	UCL 95% (mg/kg) (b)	Tentatively Identified Terrestrial COPC
Hexachloroethane	-----	13	-----	-----	-----	-----	-----
Methylene Chloride	-----	0.021	-----	-----	-----	-----	-----
p-Isopropyltoluene	-----	0.007	-----	-----	-----	-----	-----
Tetrachloroethene	-----	0.91	-----	-----	-----	-----	-----
Toluene	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	0.5	-----	-----	-----	-----	-----
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
Xylenes	-----	0.046	-----	-----	-----	-----	-----

Notes: (a) - The WSL for arsenic is 7 mg/kg adjusted to 20 mg/kg based on background for Washington State.
(b) - Results not include 2008 and 2012 boring samples.
(c) - Not calculated. Large number on non-detects with varying reporting limits.
N = Total number of sample analyses.

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-122+60-0	AKM-G-122+60-0	AKM-G-124+00-0	AKM-G-124+00-0	AKM-G-124+00-0 HT	AKM-G-124+00-0 LT	AKM-G-125+50-0
Date	11/6/08	5/9/12	11/7/08	5/9/12	12/19/08	12/19/08	11/10/08
Lab Group	NY63/NZ67	UT84/UT90	NY79/NZ67	UT84/UT90	OF45	OF45	NZ19
Field Measurments							
Water Level (feet TOC)	seep	-----	seep	-----	seep (HT)	seep (LT)	seep
pH	7.2	7.5	7.1	7.8	7.1	7.2	7.2
Conductivity (uS)	35824	25263	37962	24411	39806	39360	33701
Temperature (C)	11.6	12.0	12.2	12.3	5.9(4)	6.5(4)	11.8
DO (mg/l)	4.3	6.8	3.6	7.6	5.8	6.0	4.1
ORP (mV)	-113.3	-188.3	59.6	114.8	86.7	83.4	86.3
Ferrous Iron (mg/l)	0.4	0	0.4	0	-----	-----	0.8
Turbidity (NTUs)	3.0	18.0	5.6	2.9	-----	-----	0.8
Total Metals (mg/l)							
Arsenic	0.03	-----	0.012	-----	-----	-----	0.159
Calcium	300	-----	316	-----	-----	-----	269
Iron	<0.2	-----	<0.2	-----	-----	-----	0.2
Magnesium	936	-----	998	-----	-----	-----	826
Dissolved Metals (mg/l)							
Arsenic	0.031	0.031	0.01	0.012	0.008	<0.01	0.153
Calcium	302	255	315	262	-----	-----	269
Chromium (III+VI)	0.025	0.010	0.006	<0.010	-----	-----	0.026
Chromium (VI)	-----	<0.010	-----	<0.010	-----	-----	-----
Copper	0.013	0.010	0.015	<0.010	-----	-----	0.017
Iron	<0.2	<0.100	<0.2	<0.100	<0.2	<0.2	<0.2
Lead	<0.005	-----	<0.005	-----	-----	-----	<0.005
Magnesium	937	790	973	813	-----	-----	816
Manganese	<0.005	-----	<0.005	-----	-----	-----	<0.005
Mercury	-----	<0.000020	-----	<0.000020	-----	-----	-----
Nickel	0.177	0.420	0.178	0.310	-----	-----	0.147
Zinc	<0.04	-----	<0.04	-----	-----	-----	<0.020
Silicon	3.7	-----	2.5	-----	-----	-----	5.9
Conventionals (mg/l)							
Alkalinity (as CaCO3)	115	93.7	110	90.6	-----	-----	109
TSS	2.1	2.3	3.4	1.1	-----	-----	6.5
Ferrous Iron	0.155	-----	0.194	-----	-----	-----	0.169
Chloride	14300	12100	14700	11500	15600	15200	14300
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	2020	1750	2150	1810	2090	2010	1700
Sulfide	<0.05	<0.050	<0.05	<0.050	-----	-----	<0.05
DOC	1.77	<0.200	1.65	<0.200	-----	-----	2.08
TOC	2.03	-----	2.22	-----	-----	-----	2.19
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	<0.2
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	<0.2
Trichloroethene	-----	-----	-----	-----	-----	-----	<0.2
Tetrachloroethene	-----	-----	-----	-----	-----	-----	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-122+60-0	AKM-G-122+60-0	AKM-G-124+00-0	AKM-G-124+00-0	AKM-G-124+00-0 HT	AKM-G-124+00-0 LT	AKM-G-125+50-0
Date	11/6/08	5/9/12	11/7/08	5/9/12	12/19/08	12/19/08	11/10/08
Lab Group	NY63/NZ67	UT84/UT90	NY79/NZ67	UT84/UT90	OF45	OF45	NZ19
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	<0.0008
Pesticides/PCBs (ug/l)							
4-4'DDE	<0.0008	-----	<0.0008	-----	-----	-----	<0.0008
Endosulfan II	<0.0017	-----	<0.0017	-----	-----	-----	<0.0017
4-4'-DDD	<0.0008	-----	<0.0008	-----	-----	-----	<0.0008
4-4'-DDT	<0.0008	-----	<0.0008	-----	-----	-----	<0.0008
Aroclor 1016	<0.01	-----	<0.01	-----	-----	-----	-----
Aroclor 1242	<0.01	-----	<0.01	-----	-----	-----	-----
Aroclor 1248	<0.01	-----	<0.01	-----	-----	-----	-----
Aroclor 1254	<0.01	-----	<0.01	-----	-----	-----	-----
Aroclor 1260	<0.01	-----	<0.01	-----	-----	-----	-----
Aroclor 1221	<0.01	-----	<0.01	-----	-----	-----	-----
Aroclor 1232	<0.01	-----	<0.01	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	1.1	-----	3.1	-----	-----	-----	1.4
Arsenate (5)	24.2	-----	6.5	-----	-----	-----	159
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-125+50-0 HT	AKM-G-125+50-0 LT	AKM-G-125+50-0	AKM-G-126+90-0	AKM-G-126+90-0	AKM-G-128+30-0
Date	12/19/08	12/19/08	5/3/12	11/10/08	5/2/12	11/11/08
Lab Group	OF45	OF45	US80/UT15	NZ19	US60/US66	NZ41/NZ52
Field Measurments						
Water Level (feet TOC)	seep (HT)	seep (LT)	-----	seep	-----	seep
pH	7.3	7.4	7.1	7.2	7.0	8.0
Conductivity (uS)	37370	35343	19134	34602	19954	27190
Temperature (C)	6.7(4)	7.0(4)	9.8	12.0	11.9	11.5
DO (mg/l)	7.5	8.0	8.4	3.7	7.5	6.7
ORP (mV)	78.1	86.0	35.5	51.6	-2.1	-30.5
Ferrous Iron (mg/l)	-----	-----	0	0.4	0.4	0.6
Turbidity (NTUs)	-----	-----	0.2	1.3	5.0	1.4
Total Metals (mg/l)						
Arsenic	-----	-----	-----	0.025	-----	0.028
Calcium	-----	-----	-----	259	-----	301
Iron	-----	-----	-----	0.5	-----	0.3
Magnesium	-----	-----	-----	806	-----	936
Dissolved Metals (mg/l)						
Arsenic	0.216	0.208	0.157	0.025	0.011	0.024
Calcium	-----	-----	174	273	190	305
Chromium (III+VI)	-----	-----	0.020	0.033	0.007	0.023
Chromium (VI)	-----	-----	<0.010	-----	<0.010	-----
Copper	-----	-----	0.008	0.027	0.012	0.019
Iron	<0.1	<0.1	<0.100	0.4	0.110	<0.2
Lead	-----	-----	-----	<0.005	-----	<0.005
Magnesium	-----	-----	518	853	579	920
Manganese	-----	-----	-----	0.006	-----	<0.005
Mercury	-----	-----	<0.000020	-----	<0.000020	-----
Nickel	-----	-----	0.261	0.193	0.454	0.27
Zinc	-----	-----	-----	<0.020	-----	<0.040
Silicon	-----	-----	-----	3.5	-----	4.4
Conventionals (mg/l)						
Alkalinity (as CaCO3)	-----	-----	112	95.5	89.5	103
TSS	-----	-----	1.8	6.7	<1.1	2.2
Ferrous Iron	-----	-----	-----	0.521	-----	0.378
Chloride	14000	13200	9020	13300	9420	15700
N-Nitrate	-----	-----	-----	-----	-----	-----
Sulfate	1900	1780	1060	1760	1270	1910
Sulfide	-----	-----	<0.050	<0.05	<0.050	<0.05
DOC	-----	-----	<0.20	2.37	2.09	1.71
TOC	-----	-----	-----	2.27	-----	1.61
Volatiles (ug/l)						
Vinyl Chloride	-----	-----	<0.020	<0.2	<0.020	<0.2
cis-1,2-Dichloroethene	-----	-----	<0.2	-----	<0.2	-----
Chloroform	-----	-----	<0.2	<0.2	0.1 J fb	<0.2
Trichloroethene	-----	-----	<0.2	<0.2	<0.2	<0.2
Tetrachloroethene	-----	-----	<0.2	<0.2	<0.2	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-125+50-0 HT	AKM-G-125+50-0 LT	AKM-G-125+50-0	AKM-G-126+90-0	AKM-G-126+90-0	AKM-G-128+30-0
Date	12/19/08	12/19/08	5/3/12	11/10/08	5/2/12	11/11/08
Lab Group	OF45	OF45	US80/UT15	NZ19	US60/US66	NZ41/NZ52
Semivolatiles (ug/l)						
Hexachlorobutadiene	-----	-----	<0.050	<0.0008	<0.050	<0.0008
Pesticides/PCBs (ug/l)						
4-4'DDE	-----	-----	-----	<0.0008	-----	<0.0008
Endosulfan II	-----	-----	-----	<0.0017	-----	<0.0017
4-4'-DDD	-----	-----	-----	<0.0008	-----	<0.0008
4-4'-DDT	-----	-----	-----	<0.0008	-----	<0.0008
Aroclor 1016	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----
Other (ug/l)						
Methane	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)						
Arsenite (5)	-----	-----	-----	0.78	-----	<0.09
Arsenate (5)	-----	-----	-----	22.6	-----	21.5
Other Species (5)	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-128+30-0 HT	AKM-G-128+30-0 LT	AKM-G-128+30-0	AKM-G-129+65-0	AKM-G-129+65-0	AKM-G-131+00-0	AKM-G-121+80-1
Date	12/19/08	12/19/08	5/1/12	11/12/08	5/1/12	11/12/08	11/6/08
Lab Group	OF45	OF45	US50/US55	NZ67/NZ74	US50/US55	-----	NY63/NZ67
Field Measurments							
Water Level (feet TOC)	seep (HT)	seep (LT)	-----	seep	-----	seep	8.84
pH	7.0	7.1	7.2	6.8	7.2	damaged	9.7
Conductivity (uS)	36445	35460	22635	39220	20811	damaged	2053
Temperature (C)	6.0(4)	6.5(4)	11.7	11.9	11.2	damaged	15.3
DO (mg/l)	8.8	8.3	6.0	5.0	6.2	damaged	1.9
ORP (mV)	89.8	71.7	113.4	-64.6	122.6	damaged	-161.2
Ferrous Iron (mg/l)	-----	-----	0	3	0	damaged	0
Turbidity (NTUs)	-----	-----	12.0	15.8	7.0	damaged	3.8
Total Metals (mg/l)							
Arsenic	-----	-----	-----	0.008	-----	damaged	1.86
Calcium	-----	-----	-----	313	-----	damaged	4.1
Iron	-----	-----	-----	0.4	-----	damaged	0.6
Magnesium	-----	-----	-----	976	-----	damaged	0.6
Dissolved Metals (mg/l)							
Arsenic	0.027	0.024	0.014	0.01	<0.005	damaged	1.68
Calcium	-----	-----	220	311	192	damaged	4.23
Chromium (III+VI)	-----	-----	0.033	0.01	0.050	damaged	<0.005
Chromium (VI)	-----	-----	<0.010	-----	<0.010	-----	-----
Copper	-----	-----	0.015	0.022	0.015	damaged	0.003
Iron	<0.1	<0.1	0.110	<0.1	0.510	damaged	0.22
Lead	-----	-----	-----	<0.01	-----	damaged	<0.002
Magnesium	-----	-----	669	972	589	damaged	0.58
Manganese	-----	-----	-----	<0.002	-----	damaged	0.003
Mercury	-----	-----	<0.000020	-----	<0.000020	-----	-----
Nickel	-----	-----	0.242	0.175	0.885	damaged	0.002
Zinc	-----	-----	-----	<0.04	-----	damaged	<0.01
Silicon	-----	-----	-----	3.8	-----	damaged	66.1
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	91.6	101	79.9	damaged	388
TSS	-----	-----	1.1	4.3	2.1	damaged	1.2
Ferrous Iron	-----	-----	-----	0.211	-----	damaged	0.233
Chloride	13900	13600	10900	22300	9720	damaged	385
N-Nitrate	-----	-----	-----	-----	-----	damaged	-----
Sulfate	1830	1820	1520	2170	1390	damaged	28.5
Sulfide	-----	-----	<0.050	<0.05	<0.050	damaged	1.5
DOC	-----	-----	1.90	<1.5	2.37	damaged	5.91
TOC	-----	-----	-----	2.16	-----	damaged	5.96
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	<0.020	<0.2	<0.020	damaged	-----
cis-1,2-Dichloroethene	-----	-----	<0.2	-----	<0.2	-----	-----
Chloroform	-----	-----	<0.2	<0.2	0.3	damaged	-----
Trichloroethene	-----	-----	<0.2	<0.2	<0.2	damaged	-----
Tetrachloroethene	-----	-----	<0.2	<0.2	<0.2	damaged	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-128+30-0 HT	AKM-G-128+30-0 LT	AKM-G-128+30-0	AKM-G-129+65-0	AKM-G-129+65-0	AKM-G-131+00-0	AKM-G-121+80-1
Date	12/19/08	12/19/08	5/1/12	11/12/08	5/1/12	11/12/08	11/6/08
Lab Group	OF45	OF45	US50/US55	NZ67/NZ74	US50/US55	-----	NY63/NZ67
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	<0.050	0.0016	<0.050	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	<0.0017	-----	damaged	<0.0008
Endosulfan II	-----	-----	-----	<0.0017	-----	damaged	<0.0017
4-4'-DDD	-----	-----	-----	<0.0017	-----	damaged	<0.0008
4-4'-DDT	-----	-----	-----	<0.0017	-----	damaged	<0.0008
Aroclor 1016	-----	-----	-----	-----	-----	-----	<0.01
Aroclor 1242	-----	-----	-----	-----	-----	-----	<0.01
Aroclor 1248	-----	-----	-----	-----	-----	-----	<0.01
Aroclor 1254	-----	-----	-----	-----	-----	-----	<0.01
Aroclor 1260	-----	-----	-----	-----	-----	-----	<0.01
Aroclor 1221	-----	-----	-----	-----	-----	-----	<0.01
Aroclor 1232	-----	-----	-----	-----	-----	-----	<0.01
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	damaged	-----
Ethane	-----	-----	-----	-----	-----	damaged	-----
Ethene	-----	-----	-----	-----	-----	damaged	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	<0.09	-----	-----	542
Arsenate (5)	-----	-----	-----	3.2	-----	-----	537
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-121+80-1	AKM-G-121+80-1	AKM-G-122+60-1	AKM-G-122+60-1	AKM-G-124+00-1	AKM-G-124+00-1	AKM-G-125+50-1
Date	5/4/12	1/25/13	11/6/08	5/9/12	11/7/08	5/9/12	11/10/08
Lab Group	UT14/UT18	WB48	NY63/NZ67	UT84/UT90	NY79	UT84/UT90	NZ19
Field Measurments							
Water Level (feet TOC)	7.67	8.14	2.9	3.4	2.9	3.6	7.04
pH	10.1	11.1	7.6	7.8	7.5	7.7	7.8
Conductivity (uS)	868	1640	32544	29000	21180	32200	22245
Temperature (C)	10.2	10.3	12.9	17.0	12.0	17.4	12.4
DO (mg/l)	0.6	1.5	4.3	6.0	7.0	7.8	7.6
ORP (mV)	-207.2	-208.2	-110.8	-14.7	41.0	-131.4	51.9
Ferrous Iron (mg/l)	0	-----	0.6	0.4	0.3	-----	0
Turbidity (NTUs)	5.3	-----	25.4	57.0	2.1	4.4	6.2
Total Metals (mg/l)							
Arsenic	-----	-----	0.05	-----	0.25	-----	0.16
Calcium	-----	-----	270	-----	175	-----	135
Iron	-----	-----	1.7	-----	<0.1	-----	0.06
Magnesium	-----	-----	796	-----	517	-----	423
Dissolved Metals (mg/l)							
Arsenic	1.69	-----	0.035	0.036	0.218	0.106	0.153
Calcium	2.54	-----	262	167	162	222	135
Chromium (III+VI)	<0.002	-----	0.022	0.007	0.008	0.005	<0.002
Chromium (VI)	<0.010	-----	-----	<0.010	-----	<0.010	-----
Copper	0.001 fb	-----	0.013	0.008	0.009	0.007	0.009
Iron	0.110	-----	0.2	0.160	<0.1	<0.100	<0.2
Lead	-----	-----	<0.005	-----	<0.005	-----	<0.005
Magnesium	0.210	-----	807	507	487	669	411
Manganese	-----	-----	<0.002	-----	0.009	-----	<0.005
Mercury	0.0000289	0.000025	-----	<0.000020	-----	<0.000020	-----
Nickel	<0.001	-----	0.139	0.071	0.01	0.013	0.007
Zinc	-----	-----	<0.02	-----	<0.04	-----	<0.020
Silicon	-----	-----	16.5	-----	6.1	-----	8.98
Conventionals (mg/l)							
Alkalinity (as CaCO3)	333	-----	136	134	132	129	120
TSS	2.1	-----	10.8	42.0	2.5	2.7	2.8
Ferrous Iron	-----	-----	0.22	-----	<0.04	-----	<0.04
Chloride	196	-----	12100	8120	7740	10000	6860
N-Nitrate	-----	-----	-----	-----	-----	-----	0.5
Sulfate	27.3	-----	1730	1130	1140	1530	1020
Sulfide	0.105	-----	<0.05	<0.050	<0.05	<0.050	<0.05
DOC	5.42	-----	1.73	0.204	3.14	<0.200	2.91
TOC	-----	-----	1.85	-----	3.29	-----	3.01
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	<0.2
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	<0.2
Trichloroethene	-----	-----	-----	-----	-----	-----	<0.2
Tetrachloroethene	-----	-----	-----	-----	-----	-----	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-121+80-1	AKM-G-121+80-1	AKM-G-122+60-1	AKM-G-122+60-1	AKM-G-124+00-1	AKM-G-124+00-1	AKM-G-125+50-1
Date	5/4/12	1/25/13	11/6/08	5/9/12	11/7/08	5/9/12	11/10/08
Lab Group	UT14/UT18	WB48	NY63/NZ67	UT84/UT90	NY79	UT84/UT90	NZ19
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	<0.0008
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	<0.0017	-----	<0.0008	-----	<0.0008
Endosulfan II	-----	-----	<0.0017	-----	<0.0017	-----	<0.0017
4-4'-DDD	-----	-----	<0.0017	-----	<0.0008	-----	<0.0008
4-4'-DDT	-----	-----	<0.0017	-----	<0.0008	-----	<0.0008
Aroclor 1016	-----	-----	<0.01	-----	(1)	-----	-----
Aroclor 1242	-----	-----	<0.01	-----	(1)	-----	-----
Aroclor 1248	-----	-----	<0.01	-----	(1)	-----	-----
Aroclor 1254	-----	-----	<0.01	-----	(1)	-----	-----
Aroclor 1260	-----	-----	<0.01	-----	(1)	-----	-----
Aroclor 1221	-----	-----	<0.01	-----	(1)	-----	-----
Aroclor 1232	-----	-----	<0.01	-----	(1)	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	<0.7
Ethane	-----	-----	-----	-----	-----	-----	<1.2
Ethene	-----	-----	-----	-----	-----	-----	<1.1
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	1.5	-----	38.4	-----	0.79
Arsenate (5)	-----	-----	28.1	-----	102	-----	165
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-125+50-1	AKM-G-126+90-1	AKM-G-126+90-1	AKM-G-128+30-1	AKM-G-128+30-4(-1dup)	AKM-G-128+30-1
Date	5/3/12	11/10/08	5/2/12	11/11/08	11/11/08	5/2/12
Lab Group	US80/UT15	NZ19	US60/US66	NZ41/NZ52	NZ41/NZ52	US60/US66
Field Measurments						
Water Level (feet TOC)	6.81	4.3	7.9	5.2	7.2	7.25
pH	7.7	7.7	7.1	7.9	8.1	8.1
Conductivity (uS)	18163	25132	18652	26304	25019	31900
Temperature (C)	10.8	12.0	12.6	11.9	11.9	16.4
DO (mg/l)	6.5	7.2	7.2	7.2	8.0	4.6
ORP (mV)	105.2	57.6	4.7	2.1	-9.0	-159.6
Ferrous Iron (mg/l)	0	0	0.2	0	-----	0
Turbidity (NTUs)	1.0	4.9	13.0	1.4	1.4	22.3
Total Metals (mg/l)						
Arsenic	-----	0.181	-----	0.072	0.072	-----
Calcium	-----	179	-----	196	218	-----
Iron	-----	<0.1	-----	<0.1	<0.1	-----
Magnesium	-----	547	-----	601	668	-----
Dissolved Metals (mg/l)						
Arsenic	0.092	0.202	0.183	0.072	0.068	0.062
Calcium	164	187	175	238	240	194
Chromium (III+VI)	<0.002	0.011	0.017	<0.005	<0.002	0.005
Chromium (VI)	<0.010	-----	<0.010	-----	-----	<0.010
Copper	0.006	0.011	0.010	0.014	0.013	0.005
Iron	<0.100	<0.2	0.120	<0.2	<0.2	<0.100
Lead	-----	<0.005	-----	<0.005	<0.005	-----
Magnesium	493	577	525	718	723	581
Manganese	-----	<0.005	-----	<0.005	<0.005	-----
Mercury	<0.000020	-----	0.0000282	-----	-----	<0.000020
Nickel	0.026	0.025	0.174	0.015	0.014	0.298
Zinc	-----	<0.020	-----	<0.040	<0.02	-----
Silicon	-----	9.5	-----	4.7	4.9	-----
Conventionals (mg/l)						
Alkalinity (as CaCO3)	118	139	133	110	108	130
TSS	1.6	2.2	4.0	2.1	<1.0	112
Ferrous Iron	-----	<0.04	-----	0.11	0.071	-----
Chloride	8220	8550	8710	11500	22000	9500
N-Nitrate	-----	<0.5	-----	<0.5	<2.0	-----
Sulfate	939	1230	1140	1480	1360	1200
Sulfide	<0.050	<0.05	<0.050	<0.05	<0.05	<0.050
DOC	0.299	2.8	2.71	3.08	3.04	4.93
TOC	-----	2.75	-----	3.03	3.2	-----
Volatiles (ug/l)						
Vinyl Chloride	<0.020	<0.2	<0.020	<0.2	<0.2	<0.020
cis-1,2-Dichloroethene	<0.2	-----	0.2 J	-----	-----	0.2
Chloroform	<0.2	<0.2	0.2 fb	<0.2	<0.2	0.4 fb
Trichloroethene	<0.2	<0.2	0.1 J	<0.2	<0.2	0.1 J
Tetrachloroethene	0.1 J	<0.2	0.3	<0.2	<0.2	0.2 J

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-125+50-1	AKM-G-126+90-1	AKM-G-126+90-1	AKM-G-128+30-1	AKM-G-128+30-4(-1dup)	AKM-G-128+30-1
Date	5/3/12	11/10/08	5/2/12	11/11/08	11/11/08	5/2/12
Lab Group	US80/UT15	NZ19	US60/US66	NZ41/NZ52	NZ41/NZ52	US60/US66
Semivolatiles (ug/l)						
Hexachlorobutadiene	<0.050	<0.0008	<0.050	<0.0008	<0.0008	<0.050
Pesticides/PCBs (ug/l)						
4-4'DDE	-----	<0.0008	-----	<0.0008	<0.0008	-----
Endosulfan II	-----	<0.0017	-----	<0.0017	<0.0017	-----
4-4'-DDD	-----	<0.0008	-----	<0.0008	<0.0008	-----
4-4'-DDT	-----	<0.0028	-----	<0.0008	<0.0008	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----
Other (ug/l)						
Methane	-----	<0.7	-----	29.9	5.1	-----
Ethane	-----	<1.2	-----	(1)	(1)	-----
Ethene	-----	<1.1	-----	(1)	(1)	-----
Perchlorate	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)						
Arsenite (5)	-----	0.45	-----	1.4	1.3	-----
Arsenate (5)	-----	204	-----	56.9	60.4	-----
Other Species (5)	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-129+65-1	AKM-G-129+65-1	AKM-G-131+00-1	AKM-G-131+00-1	AKM-G-2A1-1	AKM-G-1B4-1	AKM-G-1B4-1
Date	11/12/08	5/2/12	11/12/08	4/30/12	5/8/12	11/19/08	5/15/12
Lab Group	NZ67/NZ74	US60/US66	NZ67/NZ74	US29/US31	UT60/UT67	OA73	UU46/UU49
Field Measurments							
Water Level (feet TOC)	5.2	7.65	2.82	6.75	8.4	2	3.6
pH	7.4	7.9	8.6	6.0	7.6	6.9	7.3
Conductivity (uS)	27134	17961	20760	15254	3090	1670	940
Temperature (C)	12.3	10.6	12.6	14.3	13.6	14.1	15.6
DO (mg/l)	8.1	6.1	6.6	1.63 (1)	0.4	1.4	0.2
ORP (mV)	86.8	57.3	-196.7	121.1 (1)	-170.8	-19.4	-119.1
Ferrous Iron (mg/l)	0.2	0.6	0.4	-----	5.4	0.7	2.0
Turbidity (NTUs)	4.1	37.2	5.5	-----	18.0	6.3	13.0
Total Metals (mg/l)							
Arsenic	0.028	-----	0.004	-----	-----	-----	-----
Calcium	179	-----	121	-----	-----	-----	-----
Iron	1.4	-----	0.3	-----	-----	-----	-----
Magnesium	558	-----	338	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.033	0.026	<0.005	0.002	0.170	0.12	0.084
Calcium	166	159	119	124.000	113	84.7	85.2
Chromium (III+VI)	0.026	0.007	0.007	0.096	-----	<0.01	-----
Chromium (VI)	-----	<0.010	-----	<0.010	-----	-----	-----
Copper	0.018	0.013	0.012	0.040	<0.005	0.07	0.004
Iron	0.3	<0.100	<0.05	2.640	12.3	0.4	1.04
Lead	<0.01	-----	<0.01	-----	-----	<0.01	-----
Magnesium	519	501	341	337.000	74.4	84.8	64.5
Manganese	0.007	-----	0.005	-----	-----	0.211	-----
Mercury	-----	<0.000020	-----	<0.000020	<0.000020	-----	<0.000020
Nickel	0.394	0.147	0.094	1.200	0.008	0.016	0.009
Zinc	<0.04	-----	<0.04	-----	-----	<0.04	-----
Silicon	8	-----	12.9	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	116	103	124	113	779	-----	547
TSS	2.8	2.6	2	2.4	16.6	-----	2.7
Ferrous Iron	0.249	-----	<0.04	-----	-----	-----	-----
Chloride	8610	8600	6170	5880	7780	-----	9.5
N-Nitrate	<0.5	-----	-----	-----	-----	-----	-----
Sulfate	1520	1200	841	865	109	-----	17.7
Sulfide	0.086	<0.050	<0.05	<0.050	0.059	-----	<0.050
DOC	2.14	3.36	2.58	2.90	17.5	-----	16.6
TOC	2.55	-----	2.73	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.2	<0.020	-----	-----	0.1 J	-----	-----
cis-1,2-Dichloroethene	-----	<0.2	-----	-----	0.5	-----	-----
Chloroform	<0.2	0.2 J fb	-----	-----	<0.2	-----	-----
Trichloroethene	<0.2	<0.2	-----	-----	0.6	-----	-----
Tetrachloroethene	<0.2	0.1 J	-----	-----	0.1 J	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-129+65-1	AKM-G-129+65-1	AKM-G-131+00-1	AKM-G-131+00-1	AKM-G-2A1-1	AKM-G-1B4-1	AKM-G-1B4-1
Date	11/12/08	5/2/12	11/12/08	4/30/12	5/8/12	11/19/08	5/15/12
Lab Group	NZ67/NZ74	US60/US66	NZ67/NZ74	US29/US31	UT60/UT67	OA73	UU46/UU49
Semivolatiles (ug/l)							
Hexachlorobutadiene	0.002	<0.050	-----	-----	<0.050	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	<0.0017	-----	-----	-----	-----	-----	-----
Endosulfan II	<0.0017	-----	-----	-----	-----	-----	-----
4-4'-DDD	<0.0017	-----	-----	-----	-----	-----	-----
4-4'-DDT	<0.0017	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	<0.7	-----	-----	-----	-----	-----	-----
Ethane	(1)	-----	-----	-----	-----	-----	-----
Ethene	(1)	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	<0.09	-----	<0.09	-----	-----	-----	-----
Arsenate (5)	27.5	-----	2.9	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-1C3-1	AKM-G-1C3-1	AKM-G-2B1-1	AKM-G-2B1-1	AKM-G-1D1-1	AKM-G-1D1-1	AKM-G-2C1-1R
Date	11/19/08	5/14/12	11/23/08	5/8/12	11/19/08	5/11/12	11/19/08
Lab Group	OA73	UU37/UU39	OB34	UT60/UT67	OA73	UU27/UU30	OA73
Field Measurments							
Water Level (feet TOC)	3.1	3.3	8.22	7.8	5	5.1	4.42
pH	7.2	7.2	6.4	7.0	9.8	10.0	6.8
Conductivity (uS)	2930	2370	24045	33200	6330	2470	2666
Temperature (C)	15.0	15.8	14.6	16.0	14.5	10.7	14.3
DO (mg/l)	1.0	0.3	0.6	0.1	0.8	0.4	0.4
ORP (mV)	-141.0	-116.7	-68.0	-144.8	-209.0	-171.4	-58.0
Ferrous Iron (mg/l)	3.8	3.8	6	2.8	0	0	3.2
Turbidity (NTUs)	3.4	16.0	1.4	19.0	2.3	9.9	18.9
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.568	0.470	0.079	0.112	0.032	0.022	0.099
Calcium	41.2	33.8	162	84.0	3.3	1.70	14.7
Chromium (III+VI)	<0.01	-----	0.019	-----	0.03	-----	0.03
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	<0.001	0.008	0.033	0.036	0.042	0.011
Iron	17.2	13.4	40.3	42.8	0.6	0.940	5
Lead	<0.01	-----	<0.01	-----	<0.01	-----	0.02
Magnesium	54.4	39.5	106	44.4	0.1	0.160	4.8
Manganese	0.843	-----	0.5	-----	0.007	-----	0.22
Mercury	-----	<0.000020	-----	0.0000335	-----	0.0000208	-----
Nickel	<0.005	0.002	0.014	0.014	0.059	0.033	<0.005
Zinc	<0.04	-----	<0.040	-----	<0.04	-----	<0.04
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	1290	-----	642	-----	1030	-----
TSS	-----	9.6	-----	1.7	-----	13.3	-----
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	-----	407	-----	261	1110	575	-----
N-Nitrate	-----	-----	-----	-----	<2.0	-----	-----
Sulfate	-----	68.2	-----	353	52.9	71.9	-----
Sulfide	-----	<0.050	-----	<0.050	0.061	0.643	-----
DOC	-----	41.0	-----	16.6	77.1	47.5	-----
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	<0.2	<0.2	<0.2	-----	-----	-----
cis-1,2-Dichloroethene	-----	<0.2	-----	0.2 J	-----	-----	-----
Chloroform	-----	<0.2	<0.2	<0.2	-----	-----	-----
Trichloroethene	-----	<0.2	<0.2	<0.2	-----	-----	-----
Tetrachloroethene	-----	<0.2	<0.2	<0.2	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-1C3-1	AKM-G-1C3-1	AKM-G-2B1-1	AKM-G-2B1-1	AKM-G-1D1-1	AKM-G-1D1-1	AKM-G-2C1-1R
Date	11/19/08	5/14/12	11/23/08	5/8/12	11/19/08	5/11/12	11/19/08
Lab Group	OA73	UU37/UU39	OB34	UT60/UT67	OA73	UU27/UU30	OA73
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	<0.050	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	635	-----	-----
Ethane	-----	-----	-----	-----	<1.2	-----	-----
Ethene	-----	-----	-----	-----	<1.1	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-2C1-1R	AKM-G-2D1-1	AKM-G-2D1-1	AKM-G-3A3-1R	AKM-G-3A3-1R	AKM-G-3A7-1R	AKM-G-3A7-1R
Date	5/11/12	11/23/08	5/14/12	11/14/08	5/8/12	11/14/08	5/7/12
Lab Group	UU27/UU30	OB34/OA73	UU37/UU39	OA11	UT60/UT67	OA11	UT33/UT39
Field Measurments							
Water Level (feet TOC)	3.6	0	0.2	9.7	9.62	10.03	10.0
pH	7.5	7.1	7.5	6.8	7.2	7.8	7.9
Conductivity (uS)	2530	2927	2390	5946	7	1510	1090
Temperature (C)	21.2	12.3	22.0	13.8	13.8	15.1	18.4
DO (mg/l)	0.0	0.0	0.2	1.9	0.2	0.2	0.1
ORP (mV)	-175.2	-96.6	-166.4	-55.6	-106.3	-2.7	-192.2
Ferrous Iron (mg/l)	-----	2	3.6	3.8	3.4	0	0
Turbidity (NTUs)	102.0	2.6	55.0	0.7	1.3	17.0	58.0
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	0.043	-----
Calcium	-----	-----	-----	-----	-----	28.2	-----
Iron	-----	-----	-----	-----	-----	1.4	-----
Magnesium	-----	-----	-----	-----	-----	9.8	-----
Dissolved Metals (mg/l)							
Arsenic	0.463	0.019	0.049	0.028	0.030	0.043	0.029
Calcium	21.6	4.8	3.47	83.7	47.8	28.3	2.59
Chromium (III+VI)	-----	0.068	0.053	<0.005	0.008	<0.005	0.126
Chromium (VI)	-----	-----	<0.010	-----	<0.010	-----	<0.050
Copper	0.190	0.016	0.026	0.008	0.004	0.009	0.107
Iron	57.1	11.9	8.43	19	12.5	0.3	22.5
Lead	-----	<0.01	-----	<0.01	-----	<0.01	-----
Magnesium	14.5	1.8	0.710	146	117	9.6	3.60
Manganese	-----	0.417	-----	0.68	-----	0.034	-----
Mercury	0.000229	-----	<0.000020	-----	<0.000020	-----	0.0000854
Nickel	0.054	<0.005	0.004	0.006	0.004	<0.005	0.014
Zinc	-----	<0.04	-----	<0.04	-----	<0.04	-----
Silicon	-----	-----	-----	-----	-----	11	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	967	-----	530	-----	731	426	336
TSS	40.6	-----	179	-----	4.6	<2.1	4.6
Ferrous Iron	-----	-----	-----	-----	-----	0.113	-----
Chloride	650	428	567	-----	695	166	211
N-Nitrate	-----	<0.2	-----	-----	-----	0.3	-----
Sulfate	185	4.5	64.4	-----	88.9	39.1	132
Sulfide	<0.050	<0.05	<0.050	-----	<0.050	<0.05	0.357
DOC	50.5	122	26.4	-----	21.0	16.1	41.5
TOC	-----	-----	-----	-----	-----	16.7	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.2	-----	-----	<0.2	<0.2	<0.2	<0.2
cis-1,2-Dichloroethene	<0.2	-----	-----	-----	1.4	-----	0.38
Chloroform	<0.2	-----	-----	<0.2	1.1	0.8	<2.0
Trichloroethene	<0.2	-----	-----	<0.2	0.3	0.4	<0.2
Tetrachloroethene	<0.2	-----	-----	<0.2	0.5	0.3	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-2C1-1R	AKM-G-2D1-1	AKM-G-2D1-1	AKM-G-3A3-1R	AKM-G-3A3-1R	AKM-G-3A7-1R	AKM-G-3A7-1R
Date	5/11/12	11/23/08	5/14/12	11/14/08	5/8/12	11/14/08	5/7/12
Lab Group	UU27/UU30	OB34/OA73	UU37/UU39	OA11	UT60/UT67	OA11	UT33/UT39
Semivolatiles (ug/l)							
Hexachlorobutadiene	0.067	-----	-----	-----	<0.00083	-----	<0.00083
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	<0.0017	-----	<0.0017
Endosulfan II	-----	-----	-----	-----	<0.0017	-----	<0.0017
4-4'-DDD	-----	-----	-----	-----	<0.0017	-----	<0.0017
4-4'-DDT	-----	-----	-----	-----	<0.0017	-----	<0.0017
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	9340	-----	-----	-----	<0.7	-----
Ethane	-----	< 1.2	-----	-----	-----	<1.2	-----
Ethene	-----	< 1.1	-----	-----	-----	<1.1	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	1.4	-----
Arsenate (5)	-----	-----	-----	-----	-----	36.7	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3A7-1R	AKM-G-3C1-1	AKM-G-3C1-1	AKM-G-3C1-1	AKM-G-3C2-1	AKM-G-3C2-1	AKM-G-3C6-1R
Date	1/25/13	11/20/08	5/15/12	1/25/13	11/19/08	5/11/12	11/19/08
Lab Group	WB48	OA95	UU46/UU49	WB48	OA73	UU27/UU30	OA73
Field Measurments							
Water Level (feet TOC)	9.9	5.58	5.6	4.1	3.2	3.2	5.27
pH	8.9	7.6	8.6	8.7	9.6	9.8	5.9
Conductivity (uS)	1570	12519	4665	3860	2210	3312	32399
Temperature (C)	11.8	14.6	15.8	10.7	13.6	10.9	15.6
DO (mg/l)	0.1	0.2	1.6	0.01	0.4	0.3	0.2
ORP (mV)	-119.7	-11.7	-33.6	-202.0	-309.0	-169.2	-9.9
Ferrous Iron (mg/l)	colored	1.5	3.4	colored	0.2	0	2
Turbidity (NTUs)	-----	41.5	81.5	-----	9.7	7.2	1.7
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	-----	0.207	0.131	-----	0.046	0.037	0.018
Calcium	-----	8	2.21	-----	3.4	5.43	18.1
Chromium (III+VI)	-----	0.13	0.049	-----	0.006	-----	0.16
Chromium (VI)	-----	-----	<0.10	-----	-----	-----	-----
Copper	0.144	0.106	0.288	-----	0.013	0.013	0.016
Iron	-----	7.8	16.1	-----	1.4	1.14	48.3
Lead	-----	0.04	-----	-----	<0.01	-----	<0.01
Magnesium	-----	1	1.13	-----	1.8	0.840	12.2
Manganese	-----	0.383	-----	-----	0.019	-----	0.631
Mercury	0.000221	-----	0.00128	0.00031	-----	0.0000403	-----
Nickel	-----	0.065	0.033	-----	0.006	0.014	0.013
Zinc	-----	0.07	-----	-----	<0.04	-----	<0.04
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	541	-----	-----	895	-----
TSS	-----	-----	143	-----	-----	4.1	-----
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	-----	3320	549	-----	336	1050	16300
N-Nitrate	-----	<1.0	-----	-----	<1.0	-----	<2.0
Sulfate	-----	47.8	168	-----	71.3	64.1	40.1
Sulfide	-----	0.094	5.45	-----	0.148	0.627	0.17
DOC	-----	260	101	-----	23.4	56.4	228
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	4900	150	-----	0.5	120	8.2
cis-1,2-Dichloroethene	-----	-----	28	-----	-----	420	-----
Chloroform	-----	3800	29	-----	680	1400	<1
Trichloroethene	-----	920	5.4	-----	27	94	<1
Tetrachloroethene	-----	610 J	2.1	-----	5500	6900	<1

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3A7-1R	AKM-G-3C1-1	AKM-G-3C1-1	AKM-G-3C1-1	AKM-G-3C2-1	AKM-G-3C2-1	AKM-G-3C6-1R
Date	1/25/13	11/20/08	5/15/12	1/25/13	11/19/08	5/11/12	11/19/08
Lab Group	WB48	OA95	UU46/UU49	WB48	OA73	UU27/UU30	OA73
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	8.4	0.21	-----	49	46	0.13 B
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	569	-----	-----	9560	-----	9940
Ethane	-----	<1.2	-----	-----	<1.2	-----	36.1
Ethene	-----	1780	-----	-----	<1.1	-----	309
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3C6-1R	AKM-G-3C6-1R	AKM-G-3C6-1R	AKM-G-3D1-1	AKM-G-3E1-1	AKM-G-4B3-1	AKM-G-4B3-4(-1dup)
Date	5/14/12	Dup. 6	1/24/13	5/11/12	11/20/08	11/18/08	11/18/08
Lab Group	UU37/UU39	UU37/UU39	WB21	UU27/UU30	OA95	OA49	OA49
Field Measurments							
Water Level (feet TOC)	4.7	-----	4.13	3.4	2.3	3.9	-----
pH	6.9	-----	7.7	6.9	6.3	7.8	-----
Conductivity (uS)	15000	-----	14100	949	487	4659	-----
Temperature (C)	20.5	-----	10.4	15.9	12.6	14.4	-----
DO (mg/l)	0.0	-----	0.1	0.2	0.6	0.1	-----
ORP (mV)	-172.4	-----	-147.6	-187.3	27.4	41.5	-----
Ferrous Iron (mg/l)	4.2	-----	colored	4.2	2.8	0.9	-----
Turbidity (NTUs)	20.0	-----	5.1	18.0	58.9	15.9	-----
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.032	0.013	0.058	0.0809	0.09	0.181	0.182
Calcium	5.99	9.72	-----	101	0.4	0.9	0.8
Chromium (III+VI)	0.250	0.102	-----	-----	0.02	0.03	0.029
Chromium (VI)	<0.100	<0.100	-----	-----	-----	-----	-----
Copper	0.092	0.017	-----	<0.001	0.005	0.113	0.102
Iron	25.1	26.3	-----	17.9	1.5	2	1.5
Lead	-----	-----	-----	-----	<0.005	0.02	0.02
Magnesium	3.81	6.61	-----	4.43	0.6	1.5	1.3
Manganese	-----	-----	-----	-----	0.018	0.034	0.028
Mercury	0.0000835	0.000107	-----	<0.000020	-----	-----	-----
Nickel	0.021	0.008	-----	0.003	<0.002	0.024	0.023
Zinc	-----	-----	-----	-----	<0.02	<0.04	<0.04
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	583	585	-----	300	-----	-----	-----
TSS	1.2	<1.1	-----	49.2	-----	-----	-----
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	4300	4770	4260	91.4	-----	874	858
N-Nitrate	-----	-----	-----	-----	-----	<1.0	<1.0
Sulfate	518	507	-----	140	-----	151	150
Sulfide	0.234	0.293	-----	<0.050	-----	<0.05	<0.05
DOC	39.0	37.9	-----	13.9	-----	67.2	67.2
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.2	<0.2	-----	1.1	-----	40	40
cis-1,2-Dichloroethene	0.2	0.2	-----	13	-----	-----	-----
Chloroform	<0.2	<0.2	-----	<0.2	-----	5.7	5.6
Trichloroethene	<0.2	<0.2	-----	12	-----	7.5	7.5
Tetrachloroethene	<0.2	<0.2	-----	4.4	-----	4.2	4.1

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3C6-1R	AKM-G-3C6-1R	AKM-G-3C6-1R	AKM-G-3D1-1	AKM-G-3E1-1	AKM-G-4B3-1	AKM-G-4B3-4(-1dup)
Date	5/14/12	Dup. 6	1/24/13	5/11/12	11/20/08	11/18/08	11/18/08
Lab Group	UU37/UU39	UU37/UU39	WB21	UU27/UU30	OA95	OA49	OA49
Semivolatiles (ug/l)							
Hexachlorobutadiene	<0.050	<0.050	-----	0.56	-----	0.0067 B	0.0076 B
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	3220	3480
Ethane	-----	-----	-----	-----	-----	<1.2	<1.2
Ethene	-----	-----	-----	-----	-----	8.5	9.1
Perchlorate	-----	-----	-----	-----	<20	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	10.7	-----	-----	-----	-----
Arsenate (5)	-----	-----	5.69	-----	-----	-----	-----
Other Species (5)	-----	-----	0.74	-----	-----	-----	-----
Total (species sum)	-----	-----	17.1	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4B3-1	AKM-G-4B4-1	AKM-G-4B4-1	AKM-G-4C1-1	AKM-G-4C1-1	AKM-G-4C2-1	AKM-G-4C2-1
Date	5/7/12	11/14/08	5/7/12	11/20/08	5/11/12	11/18/08	5/15/12
Lab Group	UT33/UT39	OA11	UT33/UT39	OB08/OA95	UU27/UU30	OA49	UU46/UU49
Field Measurments							
Water Level (feet TOC)	3.75	6.75	6.9	2.8	3.14	3	4.0
pH	7.5	7.9	7.8	10.7	9.6	10.7	10.7
Conductivity (uS)	-----	1424	161	5040	3706	3244	2070
Temperature (C)	13.4	14.9	13.7	13.1	11.5	15.2	19.5
DO (mg/l)	-----	0.3	0.9	0.1	0.7	0.1	0.0
ORP (mV)	68.0	-33.0	-31.0	-154.0	-159.7	-213.0	-351.5
Ferrous Iron (mg/l)	0.6	0.3	1.6	0.2	0	0	0.2
Turbidity (NTUs)	133.0	44.8	1.9	4.5	5.8	7.7	10.0
Total Metals (mg/l)							
Arsenic	-----	-----	-----	0.122	-----	0.065	-----
Calcium	-----	-----	-----	6.5	-----	1.86	-----
Iron	-----	-----	-----	5.7	-----	0.41	-----
Magnesium	-----	-----	-----	0.6	-----	0.52	-----
Dissolved Metals (mg/l)							
Arsenic	0.092	0.092	0.0277	0.124	0.084	0.063	0.028
Calcium	1.13	0.7	14.8	6.3	-----	1.8	0.840
Chromium (III+VI)	-----	0.007	<0.001	<0.005	-----	<0.005	-----
Chromium (VI)	-----	-----	<0.010	-----	-----	-----	-----
Copper	0.045	0.039	0.001	<0.005	<0.010	<0.005	<0.001
Iron	11.7	1.2	1.32	1.8	-----	0.5	0.140
Lead	-----	<0.01	-----	<0.01	-----	<0.01	-----
Magnesium	2.40	0.7	5.89	0.2	-----	0.5	0.180
Manganese	-----	0.01	-----	<0.002	-----	0.005	-----
Mercury	0.000170	-----	<0.000020	-----	0.000166	-----	<0.000020
Nickel	0.014	0.006	0.001	0.007	<0.010	<0.005	<0.001
Zinc	-----	<0.04	-----	<0.04	-----	<0.04	-----
Silicon	-----	-----	-----	121	-----	84	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	205	-----	84.3	508	-----	625	637
TSS	26.7	-----	1.7	2.4	-----	1.5	<1.1
Ferrous Iron	-----	-----	-----	0.726	-----	0.225	-----
Chloride	32.3	204	20.1	1120	-----	454	349
N-Nitrate	-----	0.1	-----	-----	-----	<1.0	-----
Sulfate	47.1	56.7	5.4	128	-----	46.3	44.0
Sulfide	<0.050	<0.05	<0.050	1.83	-----	0.667	8.85
DOC	9.11	19.1	4.88	25	-----	13.2	8.30
TOC	-----	-----	-----	24	-----	13.5	-----
Volatiles (ug/l)							
Vinyl Chloride	0.3	0.7	<0.2	-----	-----	<0.2	0.13 J
cis-1,2-Dichloroethene	1.1	-----	<0.2	-----	-----	-----	1.0
Chloroform	0.2 J fb	<0.2	<0.2	-----	-----	0.3	0.2
Trichloroethene	1.5	0.3	<0.2	-----	-----	3.2	2.2
Tetrachloroethene	0.8	0.4	<0.2	-----	-----	1.3	1.6

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4B3-1	AKM-G-4B4-1	AKM-G-4B4-1	AKM-G-4C1-1	AKM-G-4C1-1	AKM-G-4C2-1	AKM-G-4C2-1
Date	5/7/12	11/14/08	5/7/12	11/20/08	5/11/12	11/18/08	5/15/12
Lab Group	UT33/UT39	OA11	UT33/UT39	OB08/OA95	UU27/UU30	OA49	UU46/UU49
Semivolatiles (ug/l)							
Hexachlorobutadiene	<0.050	-----	<0.00083	-----	-----	0.0059 B	<0.050
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	<0.0017	<0.0017	-----	-----	-----	-----
Endosulfan II	-----	<0.0017	<0.0017	-----	-----	-----	-----
4-4'-DDD	-----	<0.0017	<0.0017	-----	-----	-----	-----
4-4'-DDT	-----	<0.0017	<0.0017	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	1180	-----	-----	-----	16900	-----
Ethane	-----	<1.2	-----	-----	-----	<1.2	-----
Ethene	-----	<1.1	-----	-----	-----	<1.1	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	23.2	-----	2.3	-----
Arsenate (5)	-----	-----	-----	21.2	-----	<0.85	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4D1-1	AKM-G-4D1-1	AKM-G-4D2-1	AKM-G-4D2-1	AKM-G-4F1-1	AKM-G-4F1-1	AKM-G-4G1-1
Date	11/20/08	5/11/12	11/20/08	4/30/12	11/23/08	4/30/12	11/26/08
Lab Group	OA95	UU27/UU30	OB08/OA95	US29/US31	OB34	US29/US31	OB83
Field Measurments							
Water Level (feet TOC)	2.29	2.7	3.92	3.8	3.51	3	4.9
pH	11.4	12.1	8.6	9.4	5.4	5.7	8.9
Conductivity (uS)	17900	12	5370	2360	2810	256	1461
Temperature (C)	16.6	15.5	16.9	20.6	17.6	20.3	11.8
DO (mg/l)	0.3	0.0	0.7	0.1	0.5	0.1	0.1
ORP (mV)	-460.0	-450.2	-370.0	-266.7	-58.0	-62.4	-6.4
Ferrous Iron (mg/l)	0	0	0.4	0.4	>10	-----	0.6
Turbidity (NTUs)	1.6	24.0	17.5	10.0	45.7	4.5	3.7
Total Metals (mg/l)							
Arsenic	-----	-----	0.207	-----	-----	-----	-----
Calcium	-----	-----	8	-----	-----	-----	-----
Iron	-----	-----	1.1	-----	-----	-----	-----
Magnesium	-----	-----	10.5	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	9.91	2.65	0.292	0.219	0.01	0.0136	0.123
Calcium	<2	-----	7.41	-----	36.5	-----	5.1
Chromium (III+VI)	<0.05	-----	0.005	-----	<0.005	-----	<0.005
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	0.05	0.050	0.006	0.003	0.008	0.003	<0.005
Iron	<2	-----	0.07	-----	83.1	-----	0.2
Lead	<0.01	-----	<0.01	-----	<0.01	-----	<0.01
Magnesium	<2	-----	9.78	-----	13.9	-----	3.8
Manganese	<0.05	-----	0.013	-----	0.607	-----	0.034
Mercury	-----	0.0000736	-----	0.0000273	-----	<0.000020	-----
Nickel	0.08	0.040	<0.005	0.001	0.031	0.004	<0.005
Zinc	<0.04	-----	<0.04	-----	0.04	-----	<0.04
Silicon	-----	-----	10.4	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	557	-----	-----	-----	-----
TSS	-----	-----	4.1	-----	-----	-----	-----
Ferrous Iron	-----	-----	0.139	-----	-----	-----	-----
Chloride	-----	-----	565	-----	-----	-----	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	-----	111	-----	-----	-----	-----
Sulfide	-----	-----	<0.05	-----	-----	-----	-----
DOC	-----	-----	12.7	-----	-----	-----	-----
TOC	-----	-----	12.8	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	<0.2
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	<0.2
Trichloroethene	-----	-----	-----	-----	-----	-----	<0.2
Tetrachloroethene	-----	-----	-----	-----	-----	-----	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4D1-1	AKM-G-4D1-1	AKM-G-4D2-1	AKM-G-4D2-1	AKM-G-4F1-1	AKM-G-4F1-1	AKM-G-4G1-1
Date	11/20/08	5/11/12	11/20/08	4/30/12	11/23/08	4/30/12	11/26/08
Lab Group	OA95	UU27/UU30	OB08/OA95	US29/US31	OB34	US29/US31	OB83
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	<20	-----	<20	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	20.9	-----	-----	-----	-----
Arsenate (5)	-----	-----	221	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5B1-1R	AKM-G-5B1-1R	AKM-G-5B1-1R	AKM-G-5B1-1R	AKM-G-5C12-1	AKM-G-5C12-1	AKM-G-5C13-1
Date	11/18/08	5/3/12	Dup. 3	1/25/13	11/24/08	5/4/12	11/25/08
Lab Group	OA49	US80/UT15	US80/UT15	WB48	OB56	UT14/UT18	OB73
Field Measurments							
Water Level (feet TOC)	6.28	6.4	-----	6.22	3.2	2.7	2.81
pH	10.0	10.3	-----	11.9	11.1	11.6	9.2
Conductivity (uS)	4450	2458	-----	3750	8080	6870	3630
Temperature (C)	15.6	10.8	-----	9.8	14.6	19.6	13.2
DO (mg/l)	0.4	0.3	-----	0.04	0.8	0.0	0.3
ORP (mV)	-375.0	-324.6	-----	-286.2	-290.0	-423.9	-481.0
Ferrous Iron (mg/l)	0	0.2	-----	colored	0	0	-----
Turbidity (NTUs)	7.3	2.9	-----	-----	2.7	14.0	9.2
Total Metals (mg/l)							
Arsenic	0.972	-----	-----	-----	4	-----	0.948
Calcium	2.15	-----	-----	-----	1.05	-----	4.3
Iron	1.09	-----	-----	-----	0.51	-----	14.7
Magnesium	0.26	-----	-----	-----	0.11	-----	4.7
Dissolved Metals (mg/l)							
Arsenic	1.01	0.317	0.247	-----	3.63	1.70	0.915
Calcium	2.3	2.12	2.14	-----	0.9	5.37	5.8
Chromium (III+VI)	<0.01	0.004	0.003	-----	<0.02	-----	<0.005
Chromium (VI)	-----	<0.010	<0.010	-----	-----	-----	-----
Copper	0.012	0.006	0.004	-----	<0.005	0.001 fb	0.016
Iron	0.6	0.260	0.260	-----	<0.5	0.120	7
Lead	<0.01	-----	-----	-----	<0.01	-----	<0.01
Magnesium	0.8	0.060	0.070	-----	<0.5	1.61	6.2
Manganese	0.013	-----	-----	-----	<0.01	-----	0.046
Mercury	-----	0.0000439	0.0000419	0.000059	-----	<0.000020	-----
Nickel	0.009	0.005	0.004	-----	0.014	0.004	<0.005
Zinc	<0.04	-----	-----	-----	<0.04	-----	<0.04
Silicon	145	-----	-----	-----	828	-----	98
Conventionals (mg/l)							
Alkalinity (as CaCO3)	756	719	717	-----	2010	1240	401
TSS	<2.2	<1.1	<1.1	-----	2.6	<1.1	7.6
Ferrous Iron	0.639	-----	-----	-----	0.169	-----	3.58
Chloride	725	653	670	-----	1350	525	476
N-Nitrate	<1.0	-----	-----	-----	-----	-----	-----
Sulfate	6.9	35.3	75.7	-----	82	68.4	59.8
Sulfide	12.1	9.05	8.66	-----	<0.05	1.59	<0.05
DOC	29.7	15.9	15.6	-----	17.9	7.62	10.9
TOC	29.2	-----	-----	-----	18	-----	12.3
Volatiles (ug/l)							
Vinyl Chloride	<0.2	0.065 J	0.046 J	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	0.2	0.2 J	-----	-----	-----	-----
Chloroform	<0.2	<0.2	<0.2	-----	-----	-----	-----
Trichloroethene	<0.2	<0.2	0.1 J	-----	-----	-----	-----
Tetrachloroethene	<0.2	<0.2	<0.2	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5B1-1R	AKM-G-5B1-1R	AKM-G-5B1-1R	AKM-G-5B1-1R	AKM-G-5C12-1	AKM-G-5C12-1	AKM-G-5C13-1
Date	11/18/08	5/3/12	Dup. 3	1/25/13	11/24/08	5/4/12	11/25/08
Lab Group	OA49	US80/UT15	US80/UT15	WB48	OB56	UT14/UT18	OB73
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.00083	<0.00083	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	<0.0017	<0.0017	<0.0017	-----	-----	-----	-----
Endosulfan II	<0.0017	<0.0017	<0.0017	-----	-----	-----	-----
4-4'-DDD	<0.0017	<0.0017	<0.0017	-----	-----	-----	-----
4-4'-DDT	<0.0017	<0.0017	<0.0017	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	14800	-----	-----	-----	-----	-----	-----
Ethane	2.5	-----	-----	-----	-----	-----	-----
Ethene	<1.1	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	absent
Arsenic Speciation (ug/l)							
Arsenite (5)	134	-----	-----	-----	13	-----	101
Arsenate (5)	15.9	-----	-----	-----	2120	-----	745
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5C16-1R	AKM-G-5C16-1R	AKM-G-5D2-1R	AKM-G-5D2-1R	AKM-G-5D2-1R	AKM-G-5D5-1	AKM-G-5D7-1R
Date	11/18/08	5/4/12	11/25/08	5/9/12	DUP. 5	11/24/08	11/25/08
Lab Group	OA49	UT14/UT18	OB73	UT84/UT90	UT84/UT90	OB56	OB73
Field Measurments							
Water Level (feet TOC)	3.6	3.4	5.5	5.4	-----	3.35	4.1
pH	9.5	9.3	11.1	11.6	-----	5.6	5.4
Conductivity (uS)	1685	1570	19210	14000	-----	13013	4251
Temperature (C)	14.0	17.0	13.9	17.1	-----	14.5	13.9
DO (mg/l)	0.2	0.1	0.1	0.0	-----	0.1	0.1
ORP (mV)	26.6	-264.8	-140.6	-413.5	-----	-11.0	-77.1
Ferrous Iron (mg/l)	0.6	0	0.2	0.6	-----	>10	3.8
Turbidity (NTUs)	5.1	6.0	4.3	42.0	-----	20.0	5.5
Total Metals (mg/l)							
Arsenic	0.079	-----	22	-----	-----	6.91	47
Calcium	6.86	-----	3.1	-----	-----	49.3	35.3
Iron	0.28	-----	0.5	-----	-----	742	144
Magnesium	1.24	-----	0.1	-----	-----	44.4	16.5
Dissolved Metals (mg/l)							
Arsenic	0.08	0.082	21.5	5.08	4.86	5.59	47.4
Calcium	7.06	27.1	3.2	2.09	2.08	73.2	30.8
Chromium (III+VI)	<0.005	-----	<0.02	-----	-----	<0.005	<0.005
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	<0.001	0.015	0.048	0.027	<0.005	<0.005
Iron	<0.05	0.160	0.4	0.360	0.310	1080	120
Lead	<0.01	-----	<0.01	-----	-----	<0.01	<0.01
Magnesium	1.26	3.68	0.3	0.050	<0.050	65.1	14.2
Manganese	0.002	-----	0.005	-----	-----	3.23	0.703
Mercury	-----	<0.000020	-----	0.000133	0.000137	-----	-----
Nickel	<0.005	0.002	0.022	0.016	0.014	0.027	0.057
Zinc	<0.04	-----	<0.04	-----	-----	0.05	0.16
Silicon	17.9	-----	1580	-----	-----	38.7	37.1
Conventionals (mg/l)							
Alkalinity (as CaCO3)	230	296	3280	4490	7650	110	144
TSS	3.2	<1.1	8.3	1.6	1.2	108	77
Ferrous Iron	0.101	-----	0.390	-----	-----	835	126
Chloride	300	217	3250	1660	1540	3020	727
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	38.5	16.8	87	176	161	408	78.9
Sulfide	1.81	1.09	0.88	3.77	2.74	0.171	<0.05
DOC	9.32	9.54	71.2	12.8	13.0	14.2	5.52
TOC	9.84	-----	60.4	-----	-----	14.4	6.08
Volatiles (ug/l)							
Vinyl Chloride	<0.2	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	<0.2	-----	-----	-----	-----	-----	-----
Trichloroethene	<0.2	-----	-----	-----	-----	-----	-----
Tetrachloroethene	<0.2	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5C16-1R	AKM-G-5C16-1R	AKM-G-5D2-1R	AKM-G-5D2-1R	AKM-G-5D2-1R	AKM-G-5D5-1	AKM-G-5D7-1R
Date	11/18/08	5/4/12	11/25/08	5/9/12	DUP. 5	11/24/08	11/25/08
Lab Group	OA49	UT14/UT18	OB73	UT84/UT90	UT84/UT90	OB56	OB73
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	absent	absent
Arsenic Speciation (ug/l)							
Arsenite (5)	7.3	-----	56	-----	-----	1890	39900
Arsenate (5)	<0.85	-----	16100	-----	-----	2650	7730
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5E1-1	AKM-G-5E1-1	AKM-G-5E2-1	AKM-G-5E2-1	AKM-G-5E4-1	AKM-G-5E4-1	AKM-G-5E8-1
Date	11/20/08	4/30/12	11/24/08	4/30/12	11/24/08	5/16/12	11/24/08
Lab Group	OB08/OA95	US29/US31	OB56	US29/US31	OB56	UU57/UU73	OB56
Field Measurments							
Water Level (feet TOC)	2.49	2.4	2.92	2.5	0.7	0.9	4.2
pH	6.7	6.6	7.2	7.3	8.7	9.2	6.1
Conductivity (uS)	1390	722	6016	2240	7830	6520	1250
Temperature (C)	15.7	18.5	13.3	20.7	15.4	17.4	14.8
DO (mg/l)	0.4	0.2	0.1	0.1	0.4	0.0	0.5
ORP (mV)	-186.0	-152.1	-121.0	-231.8	-271.0	-274.2	-39.0
Ferrous Iron (mg/l)	4.2	7.0	2.5	2.8	0.6	0.0	2.6
Turbidity (NTUs)	3.6	9.0	2.7	12.0	3.2	8.1	20.1
Total Metals (mg/l)							
Arsenic	0.484	-----	0.893	-----	54.3	-----	-----
Calcium	27.6	-----	8.5	-----	17.2	-----	-----
Iron	13.8	-----	2.9	-----	4.6	-----	-----
Magnesium	6.7	-----	3.3	-----	2.7	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.503	0.469	0.83	0.331	57.3	51.2	0.094
Calcium	27.4	-----	8.4	-----	16.9	-----	5.8
Chromium (III+VI)	0.008	-----	0.046	-----	0.057	0.032	<0.01
Chromium (VI)	-----	-----	-----	-----	-----	<0.010	-----
Copper	<0.005	<0.001	0.024	0.023	0.188	0.109	<0.005
Iron	13.8	-----	2.8	-----	2.5	-----	3.5
Lead	<0.01	-----	<0.01	-----	0.06	-----	<0.01
Magnesium	6.7	-----	3.5	-----	3	-----	2.4
Manganese	0.19	-----	0.066	-----	0.071	-----	0.058
Mercury	-----	<0.000020	-----	0.000114	-----	0.000938	-----
Nickel	<0.005	<0.001	0.008	0.008	0.016	0.010	<0.005
Zinc	<0.04	-----	<0.04	-----	0.07	-----	<0.04
Silicon	32	-----	18.2	-----	19.7	-----	46.5
Conventionals (mg/l)							
Alkalinity (as CaCO3)	192	-----	313	-----	643	-----	-----
TSS	<1.1	-----	1.1	-----	24.5	-----	-----
Ferrous Iron	12.3	-----	3.06	-----	3.1	-----	-----
Chloride	249	-----	1260	-----	1960	-----	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	0.3	-----	1750	-----	820	-----	-----
Sulfide	<0.05	-----	0.563	-----	<0.05	-----	-----
DOC	<3.0	-----	67.2	-----	121	-----	-----
TOC	<3.0	-----	68	-----	120	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	-----	-----	-----	-----	-----	-----
Tetrachloroethene	-----	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5E1-1	AKM-G-5E1-1	AKM-G-5E2-1	AKM-G-5E2-1	AKM-G-5E4-1	AKM-G-5E4-1	AKM-G-5E8-1
Date	11/20/08	4/30/12	11/24/08	4/30/12	11/24/08	5/16/12	11/24/08
Lab Group	OB08/OA95	US29/US31	OB56	US29/US31	OB56	UU57/UU73	OB56
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	<0.0017	-----	-----	-----	-----	-----	-----
Endosulfan II	<0.0017	-----	-----	-----	-----	-----	-----
4-4'-DDD	0.0022	-----	-----	-----	-----	-----	-----
4-4'-DDT	<0.0017	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	absent	-----	-----	-----	absent	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	470	-----	478	-----	57800	-----	-----
Arsenate (5)	21.3	-----	113	-----	2670	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5E8-1	AKM-G-5F1-1	AKM-G-5F1-1	AKM-G-5G1-1	AKM-G-5G1-1	AKM-G-5H1-1	AKM-G-6D14-1
Date	4/30/12	11/23/08	4/30/12	12/5/08	4/25/12	11/26/08	12/1/08
Lab Group	US29/US31	OB34	US29/US31	OC69	UR96/US09	OB83	OB93
Field Measurments							
Water Level (feet TOC)	3.6	3.2	2.9	4.1	3.51	6.14	3.56
pH	7.3	6.2	6.8	8.2	6.9	7.0	4.9
Conductivity (uS)	619	18766	19400	1842	11300	1073	17840
Temperature (C)	20.3	14.6	16.5	11.5	19900.0	12.0	13.4
DO (mg/l)	0.7	0.4	0.2	0.2	0.1	0.6	0.3
ORP (mV)	-131.8	-22.2	-170.5	-156.0	-213.7	-8.5	124.0
Ferrous Iron (mg/l)	2.0	2.8	3.8	0.8	1.2	3.5	>10
Turbidity (NTUs)	11.0	2.7	6.6	31.1	16.0	2.8	4.2
Total Metals (mg/l)							
Arsenic	-----	0.229	-----	0.97	-----	-----	71.5
Calcium	-----	96.4	-----	4.1	-----	-----	325
Iron	-----	4.2	-----	9.4	-----	-----	445
Magnesium	-----	65.9	-----	2.8	-----	-----	131
Dissolved Metals (mg/l)							
Arsenic	0.137	0.224	0.196	0.971	0.464	0.081	78
Calcium	-----	104	-----	3.7	-----	33.5	337
Chromium (III+VI)	-----	0.009	-----	0.04	-----	<0.005	<0.01
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.001	<0.005	0.008	<0.150	0.020	<0.005	<0.005
Iron	-----	4	-----	6.5	-----	10.4	431
Lead	-----	<0.01	-----	0.03	-----	<0.01	<0.01
Magnesium	-----	72.9	-----	2.2	-----	17.3	135
Manganese	-----	0.463	-----	0.088	-----	2.8	7.42
Mercury	<0.000020	-----	<0.000020	-----	0.0000405	-----	-----
Nickel	<0.001	<0.005	0.006	0.016	0.004	0.017	0.404
Zinc	-----	<0.04	-----	0.06	-----	<0.04	0.27
Silicon	-----	15.7	-----	39.7	-----	-----	46.1
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	597	-----	335	-----	-----	3.9
TSS	-----	6.3	-----	26.9	-----	-----	3.5
Ferrous Iron	-----	4.4	-----	5.65	-----	-----	378
Chloride	-----	4930	-----	211	-----	-----	5760
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	11.8	-----	54.5	-----	-----	285
Sulfide	-----	0.406	-----	2.68	-----	-----	<0.05
DOC	-----	21.6	-----	22.2	-----	-----	9.38
TOC	-----	24.4	-----	22.7	-----	-----	10.5
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	0.8	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	<0.2	-----
Trichloroethene	-----	-----	-----	-----	-----	<0.2	-----
Tetrachloroethene	-----	-----	-----	-----	-----	<0.2	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5E8-1	AKM-G-5F1-1	AKM-G-5F1-1	AKM-G-5G1-1	AKM-G-5G1-1	AKM-G-5H1-1	AKM-G-6D14-1
Date	4/30/12	11/23/08	4/30/12	12/5/08	4/25/12	11/26/08	12/1/08
Lab Group	US29/US31	OB34	US29/US31	OC69	UR96/US09	OB83	OB93
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	158	-----	682	-----	-----	45300
Arsenate (5)	-----	43.6	-----	46	-----	-----	22700
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level

J - Estimated concentration

J1 - Ferrous iron - Estimated value caused by elevated background interference

fb - Detected in field blank

HT - High tide (+12.5' to +12.8' MLLW)

LT - Low tide (+3.4' to +3.7' MLLW)

(1) - Listed analysis in work plan - not completed

(2) - Sample obtained at tidal level 13.2 feet MLLW

(3) - Sample obtained at tidal level 6.2 feet MLLW

(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.

(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative

----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6D14-1	AKM-G-6D25-1	AKM-G-6D25-1	AKM-G-6E1-1	AKM-G-6E1-1	AKM-G-6E2-1	AKM-G-6E2-1
Date	5/9/12	11/25/08	5/3/12	11/25/08	5/16/12	12/1/08	5/15/12
Lab Group	UT84/UT90	OB73	US80/UT15	OB73	UU57/UU73	OB93	UU46/UU49
Field Measurments							
Water Level (feet TOC)	3.35	5.95	5.5	4.94	5.4	2.3	2.6
pH	6.0	8.8	9.6	6.5	7.3	6.2	6.7
Conductivity (uS)	11428	5720	3540	13300	1190	12342	4895
Temperature (C)	10.9	15.1	17.3	15.1	16.7	13.5	11.0
DO (mg/l)	0.5	0.4	0.0	0.5	0.0	0.3	0.5
ORP (mV)	-60.2	-283.0	-295.2	-128.0	-129.8	-3.0	-72.6
Ferrous Iron (mg/l)	8.8	0	0	>10	1.2	>10	4.2
Turbidity (NTUs)	11.2	6.6	11.0	4.7	10.0	6.6	5.9
Total Metals (mg/l)							
Arsenic	-----	6.03	-----	179	-----	12.9	-----
Calcium	-----	36.7	-----	189	-----	99.3	-----
Iron	-----	1.9	-----	89.8	-----	88.3	-----
Magnesium	-----	28.4	-----	60.4	-----	63.7	-----
Dissolved Metals (mg/l)							
Arsenic	51.7	6.55	5.15	165	33.3	12.7	8.54
Calcium	120	38.7	43.2	189	17.6	96.9	32.3
Chromium (III+VI)	-----	<0.01	-----	<0.005	-----	<0.02	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	0.012	0.001	<0.005	0.004	<0.005	<0.002
Iron	356	1.8	2.63	89.2	0.260	84.8	28.7
Lead	-----	<0.01	-----	<0.01	-----	<0.01	-----
Magnesium	58.9	30.5	27.9	59.6	12.2	61.9	25.3
Manganese	-----	0.259	-----	1.9	-----	1.72	-----
Mercury	<0.000020	-----	<0.000020	-----	0.000131	-----	<0.000020
Nickel	0.124	0.008	0.004	0.016	0.005	0.122	0.030
Zinc	-----	<0.04	-----	<0.04	-----	0.08	-----
Silicon	-----	58.3	-----	50.3	-----	26.5	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	241	655	574	363	210	344	450
TSS	43.3	2.4	<1.1	67.2	<1.1	13.6	62.9
Ferrous Iron	-----	1.48	-----	82.8	-----	149	-----
Chloride	4530	1180	650	3530	103	3970	1970
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	234	61.4	49.4	107	27.0	145	150
Sulfide	0.086	0.259	0.454	<0.05	<0.050	<0.05	<0.050
DOC	6.63	10	0.264	9.38	4.55	5.86	4.77
TOC	-----	8.6	-----	10.4	-----	6.04	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	-----	-----	-----	-----	-----	-----
Tetrachloroethene	-----	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6D14-1	AKM-G-6D25-1	AKM-G-6D25-1	AKM-G-6E1-1	AKM-G-6E1-1	AKM-G-6E2-1	AKM-G-6E2-1
Date	5/9/12	11/25/08	5/3/12	11/25/08	5/16/12	12/1/08	5/15/12
Lab Group	UT84/UT90	OB73	US80/UT15	OB73	UU57/UU73	OB93	UU46/UU49
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	absent	-----	-----	-----	absent	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	5650	-----	161000	-----	13100	-----
Arsenate (5)	-----	610	-----	8590	-----	1230	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6E5-1	AKM-G-6E6-1	AKM-G-6F2-1	AKM-G-6F2-1	AKM-G-6G1-1	AKM-G-6H1-1	AKM-G-6H1-1
Date	12/1/08	12/2/08	12/1/08	4/30/12	4/25/12	12/4/08	4/25/12
Lab Group	OB93	OC08	OB93/OB94	US29/US31	UR96/US09	OC48	UR96/US09
Field Measurments							
Water Level (feet TOC)	1.21	4	0.7	0.2	0	5.6	4.55
pH	6.6	10.7	7.3	7.1	9.6	6.4	7.4
Conductivity (uS)	12890	15298	900	717	3362	710	1281
Temperature (C)	16.1	14.1	11.0	13.4	12.8	11.7	9.9
DO (mg/l)	0.3	0.2	1.2	0.3	0.6	0.7	0.2
ORP (mV)	-95.0	-180.0	-58.2	-138.2	-213.2	-1.0	-137.7
Ferrous Iron (mg/l)	>10	0	0	2.0	-----	0	1.0
Turbidity (NTUs)	3.6	3.2	4.6	3.8	3.9	19.4	14.1
Total Metals (mg/l)							
Arsenic	116	3.76	0.259	-----	-----	-----	-----
Calcium	70.2	1.8	27.9	-----	-----	-----	-----
Iron	144	0.2	0.4	-----	-----	-----	-----
Magnesium	52.1	<0.1	9.4	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	103	3.59	0.289	0.217	0.298	0.017	0.159
Calcium	67.6	2.0	28.3	-----	-----	11.9	-----
Chromium (III+VI)	<0.005	<0.01	<0.005	-----	-----	<0.005	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	0.02	0.009	0.003	0.012	0.008	0.005
Iron	124	<0.2	0.2	-----	-----	0.1	-----
Lead	<0.01	<0.01	<0.01	-----	-----	<0.01	-----
Magnesium	49.2	<0.2	9.3	-----	-----	4.5	-----
Manganese	0.806	<0.005	0.204	-----	-----	0.027	-----
Mercury	-----	-----	-----	0.000035	0.0000765	-----	0.0000233
Nickel	<0.005	0.02	0.008	0.006	0.016	<0.005	0.004
Zinc	<0.04	<0.04	<0.04	-----	-----	<0.04	-----
Silicon	46.3	290	15.7	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	585	2070	451	-----	-----	-----	-----
TSS	87.3	1.7	2.3	-----	-----	-----	-----
Ferrous Iron	194	0.132	0.253	-----	-----	-----	-----
Chloride	3350	4130	213	-----	-----	-----	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	256	144	10.7	-----	-----	-----	-----
Sulfide	<0.05	21.7	0.193	-----	-----	-----	-----
DOC	13.1	61.9	10.6	-----	-----	-----	-----
TOC	13.2	63.7	10.6	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	0.3	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	1	-----	-----	-----	-----	-----
Trichloroethene	-----	1.3	-----	-----	-----	-----	-----
Tetrachloroethene	-----	0.5	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6E5-1	AKM-G-6E6-1	AKM-G-6F2-1	AKM-G-6F2-1	AKM-G-6G1-1	AKM-G-6H1-1	AKM-G-6H1-1
Date	12/1/08	12/2/08	12/1/08	4/30/12	4/25/12	12/4/08	4/25/12
Lab Group	OB93	OC08	OB93/OB94	US29/US31	UR96/US09	OC48	UR96/US09
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	absent	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	118000	58.9	214	-----	-----	-----	-----
Arsenate (5)	7930	747	31.7	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7E3-1	AKM-G-7E3-1	AKM-G-7E8-1	AKM-G-7E8-4(-1dup)	AKM-G-7E8-1	AKM-G-7E10-1	AKM-G-7E10-1
Date	12/2/08	5/1/12	12/2/08	12/2/08	4/27/12	12/2/08	5/1/12
Lab Group	OC08	US50/US55	OC08	OC08	US13/US14	OC08	US50/US55
Field Measurments							
Water Level (feet TOC)	3.48	2.8	2.9	-----	1.15	2.99	2.4
pH	7.2	7.7	8.8	-----	11.9	9.6	6.9
Conductivity (uS)	663	7500	8362	-----	22500	2340	20400
Temperature (C)	12.3	15.3	12.5	-----	14.2	13.7	10.6
DO (mg/l)	0.0	0.1	0.4	-----	0.0	0.0	0.0
ORP (mV)	-30.0	-218.5	-134.3	-----	-457.6	-107.0	-379.8
Ferrous Iron (mg/l)	0.8	0.6	2.6	-----	0	1.2	0.6
Turbidity (NTUs)	1.6	9.0	3.8	-----	11.0	1.1	11.0
Total Metals (mg/l)							
Arsenic	1.38	-----	3.02	3.12	-----	2.86	-----
Calcium	52.9	-----	62.2	60.0	-----	6.6	-----
Iron	0.6	-----	6.2	6.5	-----	0.1	-----
Magnesium	132	-----	24.1	23.1	-----	6.4	-----
Dissolved Metals (mg/l)							
Arsenic	1.42	2.74	3.10	2.94	4.020	2.60	4.16
Calcium	50.5	68.4	63.1	64.8	-----	6.7	-----
Chromium (III+VI)	<0.005	-----	0.006	0.007	-----	0.006	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	0.002	<0.005	<0.005	0.005	<0.005	0.004
Iron	0.5	0.270	4.1	4.8	-----	0.1	-----
Lead	<0.01	-----	<0.01	<0.01	-----	<0.01	-----
Magnesium	128	52.0	24.2	24.6	-----	6.5	-----
Manganese	0.028	-----	0.607	0.639	-----	0.006	-----
Mercury	-----	<0.000020	-----	-----	0.0000896	-----	0.0000899
Nickel	<0.005	0.004	0.030	0.031	0.045	0.023	0.044
Zinc	<0.04	-----	<0.04	<0.04	-----	<0.04	-----
Silicon	32.8	-----	46.5	47.3	-----	68.6	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	646	707	750	752	-----	1250	-----
TSS	1.1	<1.1	<1.1	<1.0	-----	<1.0	-----
Ferrous Iron	0.639	-----	7.1	7.06	-----	0.202	-----
Chloride	1680	1920	2380	2400	-----	4850	-----
N-Nitrate	<1.0	-----	<1.0	<1.0	-----	-----	-----
Sulfate	67.2	69.1	86.3	85.8	-----	149	-----
Sulfide	<0.05	<0.050	7.7	5.32	-----	1.61	-----
DOC	4.74	5.19	14.8	13.6	-----	29.4	-----
TOC	5.16	-----	13.6	17	-----	32	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.6	-----	14	12	-----	54	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	2.5	-----	30	27	-----	14000	-----
Trichloroethene	2.8	-----	82	76	-----	220	-----
Tetrachloroethene	14	-----	590	530 D	-----	3100	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7E3-1	AKM-G-7E3-1	AKM-G-7E8-1	AKM-G-7E8-4(-1dup)	AKM-G-7E8-1	AKM-G-7E10-1	AKM-G-7E10-1
Date	12/2/08	5/1/12	12/2/08	12/2/08	4/27/12	12/2/08	5/1/12
Lab Group	OC08	US50/US55	OC08	OC08	US13/US14	OC08	US50/US55
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	13	15	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	832	-----	1560	1330	-----	-----	-----
Ethane	<1.2	-----	<1.2	<1.2	-----	-----	-----
Ethene	<1.1	-----	<1.1	<1.1	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	1520	-----	1930	2090	-----	250	-----
Arsenate (5)	123	-----	146	149	-----	727	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7F2-1	AKM-G-7F2-1	AKM-G-7F3-1	AKM-G-7F3-1	AKM-G-7F4-1	AKM-G-7F4-1	AKM-G-7G1-1
Date	12/3/08	4/27/12	12/3/08	4/27/12	12/2/08	4/27/12	12/4/08
Lab Group	OC27	US13/US14	OC27/OD35	US13/US14	OC08	US13/US14	OC48
Field Measurments							
Water Level (feet TOC)	2.19	0.94	4.19	3.8	5	4.14	5.4
pH	7.1	7.0	11.5	11.7	11.2	11.7	8.9
Conductivity (uS)	4580	1163	90	34900	26540	18301	6471
Temperature (C)	11.4	9.5	12.4	12.7	14.7	10.7	11.5
DO (mg/l)	0.6	0.3	0.0	0.0	0.1	0.1	0.3
ORP (mV)	-78.0	-237.6	-426.0	-471.7	-270.6	-498.6	-176.7
Ferrous Iron (mg/l)	-----	0.4	0	-----	0	-----	0
Turbidity (NTUs)	1.8	5.3	0.2	-----	1.1	2.7	12.5
Total Metals (mg/l)							
Arsenic	0.228	-----	12.2	-----	-----	-----	0.059
Calcium	56.0	-----	2	-----	-----	-----	4.4
Iron	0.3	-----	5	-----	-----	-----	2.8
Magnesium	146	-----	<1	-----	-----	-----	1.3
Dissolved Metals (mg/l)							
Arsenic	0.220	0.0823	11.3	3.050	0.344	0.342	0.056
Calcium	55.8	-----	<20	-----	1.9	-----	4.0
Chromium (III+VI)	<0.005	-----	<1	-----	0.054	-----	0.014
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	0.015	0.001	0.07	0.027	0.012	0.013	0.014
Iron	0.3	-----	<20	-----	0.5	-----	1.0
Lead	<0.01	-----	<0.05	-----	<0.01	-----	<0.01
Magnesium	147	-----	<20	-----	<0.2	-----	1.0
Manganese	0.177	-----	<0.5	-----	<0.005	-----	0.020
Mercury	-----	<0.000020	-----	<0.0008	-----	0.000077	-----
Nickel	0.040	0.011	0.34	0.136	0.046	0.073	0.009
Zinc	<0.04	-----	<0.2	-----	<0.04	-----	<0.04
Silicon	6.1	-----	18100	-----	-----	-----	27.5
Conventionals (mg/l)							
Alkalinity (as CaCO3)	740	-----	34300	-----	-----	-----	1100
TSS	<1.0	-----	10.6	-----	-----	-----	5.3
Ferrous Iron	0.267	-----	12	-----	-----	-----	1.27
Chloride	844	-----	31000	-----	-----	-----	1140
N-Nitrate	-----	-----	<10	-----	-----	-----	-----
Sulfate	127	-----	4100	-----	-----	-----	109
Sulfide	<0.05	-----	149	-----	-----	-----	4.6
DOC	36.4	-----	1180	-----	-----	-----	12.7
TOC	38.2	-----	1130	-----	-----	-----	29.2
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	<10	-----	<1	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	<10	-----	<1	-----	-----
Trichloroethene	-----	-----	<10	-----	17	-----	-----
Tetrachloroethene	-----	-----	<10	-----	50	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7F2-1	AKM-G-7F2-1	AKM-G-7F3-1	AKM-G-7F3-1	AKM-G-7F4-1	AKM-G-7F4-1	AKM-G-7G1-1
Date	12/3/08	4/27/12	12/3/08	4/27/12	12/2/08	4/27/12	12/4/08
Lab Group	OC27	US13/US14	OC27/OD35	US13/US14	OC08	US13/US14	OC48
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	<0.0010	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	4320	-----	-----	-----	-----
Ethane	-----	-----	<1.2	-----	-----	-----	-----
Ethene	-----	-----	<1.1	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	91.5	-----	1070	-----	-----	-----	7.2
Arsenate (5)	115	-----	1250	-----	-----	-----	3.1
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7G1-1	AKM-G-7I1-1	AKM-G-7I1-1	AKM-G-8F1-1R	AKM-G-8F1-1R	AKM-G-8G2-1	AKM-G-8G2-1
Date	4/25/12	12/5/08	4/25/12	11/11/08	4/26/12	12/3/08	4/26/12
Lab Group	UR96/US09	OC69	UR96/US09	NZ41/NZ52	UR96/US09	OC27	UR96/US09
Field Measurments							
Water Level (feet TOC)	3.9	4.2	3.49	2.97	3	2.3	1.4
pH	10.2	7.1	7.3	12.0	10.7	10.8	11.9
Conductivity (uS)	4540	1848	1460	14350	14400	44000	33400
Temperature (C)	14.6	11.5	17.6	15.1	14.7	12.9	14.8
DO (mg/l)	0.1	0.7	0.4	0.1	0.0	0.0	0.0
ORP (mV)	-283.5	-80.0	-71.5	-533.0	-418.1	-309.0	-464.6
Ferrous Iron (mg/l)	0	2.4	4.0	0.6	0	0	0
Turbidity (NTUs)	10.0	2.4	9.0	5.1	17.0	1.2	17.0
Total Metals (mg/l)							
Arsenic	-----	-----	-----	0.042	-----	0.417	-----
Calcium	-----	-----	-----	13.3	-----	3.3	-----
Iron	-----	-----	-----	0.77	-----	0.5	-----
Magnesium	-----	-----	-----	2.43	-----	1.3	-----
Dissolved Metals (mg/l)							
Arsenic	0.172	<0.002	0.0007	0.05	0.0193	0.436	0.182
Calcium	-----	45.8	-----	11.4	-----	3.5	-----
Chromium (III+VI)	-----	<0.005	-----	0.1	-----	0.04	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	0.006	<0.005	<0.001	0.02	0.008	0.02	0.013
Iron	-----	3.5	-----	0.6	-----	0.4	-----
Lead	-----	<0.01	-----	<0.02	-----	<0.02	-----
Magnesium	-----	57.7	-----	1.6	-----	1.5	-----
Manganese	-----	1.52	-----	<0.005	-----	<0.005	-----
Mercury	0.0000582	-----	<0.000020	-----	<0.000020	-----	0.000221
Nickel	0.007	<0.005	0.001	0.04	0.015	0.09	0.043
Zinc	-----	<0.04	-----	<0.1	-----	<0.10	-----
Silicon	-----	-----	-----	403	-----	353	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	-----	2350	-----	2340	-----
TSS	-----	-----	-----	1.1	-----	4.3	-----
Ferrous Iron	-----	-----	-----	1.64 JI	-----	0.955	-----
Chloride	-----	-----	-----	5450	-----	11200	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	-----	-----	61.8	-----	607	-----
Sulfide	-----	-----	-----	39.4	-----	16.8	-----
DOC	-----	-----	-----	221	-----	133	-----
TOC	-----	-----	-----	188	-----	169	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	-----	-----	-----	-----	-----	-----
Tetrachloroethene	-----	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7G1-1	AKM-G-7I1-1	AKM-G-7I1-1	AKM-G-8F1-1R	AKM-G-8F1-1R	AKM-G-8G2-1	AKM-G-8G2-1
Date	4/25/12	12/5/08	4/25/12	11/11/08	4/26/12	12/3/08	4/26/12
Lab Group	UR96/US09	OC69	UR96/US09	NZ41/NZ52	UR96/US09	OC27	UR96/US09
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	2.1	-----	10.6	-----
Arsenate (5)	-----	-----	-----	22.4	-----	287	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-8H1-1	AKM-G-8H1-1	AKM-G-MW-1R-1	AKM-G-MW-2-1	AKM-G-MW-4-1	AKM-G-MW-5-1	AKM-G-MW-6-1
Date	12/4/08	4/26/12	5/17/12	5/17/12	5/18/12	5/18/12	5/18/12
Lab Group	OC48	UR96/US09	UU80/UU81	UU80/UU81	UU88/UU89	UU88/UU89	UU88/UU89
Field Measurments							
Water Level (feet TOC)	6.7	4.76	2.73	5.22	7.67	10.3	7.4
pH	5.8	6.9	6.7	6.6	7.0	7.1	6.9
Conductivity (uS)	24421	19800	962	2580	1905	10100	12600
Temperature (C)	11.9	15.0	13.0	14.1	10.7	14.9	17.3
DO (mg/l)	0.2	0.5	0.8	0.8	0.9	0.3	0.3
ORP (mV)	-48.5	-111.0	-93.5	-94.7	-51.0	-147.9	-156.5
Ferrous Iron (mg/l)	5	4.0	2.2	4.0	-----	5.4	4.2
Turbidity (NTUs)	29.3	87.0	2.4	3.5	-----	4.3	2.3
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.019	0.023	1.10	0.114	0.016	0.0017	0.0035
Calcium	183	-----	67.6	51.2	34.2	13.2	16.8
Chromium (III+VI)	0.013	-----	-----	-----	-----	0.008	0.006
Chromium (VI)	-----	-----	-----	-----	-----	<0.010	<0.010
Copper	<0.005	0.007	0.002	0.001	<0.001	<0.001	<0.001
Iron	12.3	-----	1.27	4.74	7.31	9.61	2.45
Lead	<0.01	-----	-----	-----	-----	-----	-----
Magnesium	182	-----	64.2	101	75.0	48.9	22.1
Manganese	2.02	-----	-----	-----	-----	-----	-----
Mercury	-----	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Nickel	0.017	0.014	<0.001	0.006	0.002	<0.001	<0.001
Zinc	<0.04	-----	-----	-----	-----	-----	-----
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	594	273	711	789	885
TSS	-----	-----	<1.1	6.7	24.4	1.3	2.0
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	-----	-----	82.4	780	414	3370	2130
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	-----	13.2	71.1	172	154	129
Sulfide	-----	-----	0.773	0.126	0.795	0.106	0.154
DOC	-----	-----	14.2	40.4	25.6	3.61	2.93
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	<0.2	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	<0.2	-----	-----	-----	-----
Chloroform	-----	-----	<0.2	-----	-----	-----	-----
Trichloroethene	-----	-----	<0.2	-----	-----	-----	-----
Tetrachloroethene	-----	-----	<0.2	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-8H1-1	AKM-G-8H1-1	AKM-G-MW-1R-1	AKM-G-MW-2-1	AKM-G-MW-4-1	AKM-G-MW-5-1	AKM-G-MW-6-1
Date	12/4/08	4/26/12	5/17/12	5/17/12	5/18/12	5/18/12	5/18/12
Lab Group	OC48	UR96/US09	UU80/UU81	UU80/UU81	UU88/UU89	UU88/UU89	UU88/UU89
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-MW-9-1	AKM-G-MW-14-2	AKM-G-MW-25-1	AKM-G-MW-27-1	AKM-G-MW-28-2	AKM-G-MW-29-1	AKM-G-MW-30-1
Date	5/17/12	5/17/12	5/17/12	5/17/12	5/18/12	5/18/12	5/17/12
Lab Group	UU80/UU81	UU80/UU81	UU80/UU81	UU80/UU81	UU88/UU89	UU88/UU89	UU80/UU81
Field Measurments							
Water Level (feet TOC)	3.25	9	6.6	3.5	7.71	14.46	5.0
pH	6.7	7.1	7.4	6.9	6.6	6.6	6.5
Conductivity (uS)	751	29000	685	987	758	5306	943
Temperature (C)	15.8	15.7	16.3	20300.0	11.0	13.3	18.6
DO (mg/l)	1.0	0.2	0.2	0.2	1.1	0.9	0.2
ORP (mV)	9.0	-94.0	-143.3	-151.3	-32.5	-72.5	-135.4
Ferrous Iron (mg/l)	0	5.2	4.4	5.2	3.6	5.8	5.6
Turbidity (NTUs)	6.7	26.0	21.2	12.2	27.9	8.6	10.8
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.040	0.004	0.036	0.0048	0.001	0.319	0.0158
Calcium	65.9	-----	68.3	52.9	-----	91.7	53.3
Chromium (III+VI)	-----	-----	-----	-----	-----	-----	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	0.009	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	<0.050	-----	18.5	18.7	-----	42.9	12.4
Lead	-----	-----	-----	-----	-----	-----	-----
Magnesium	43.5	-----	19.8	47.4	-----	25.3	44.9
Manganese	-----	-----	-----	-----	-----	-----	-----
Mercury	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Nickel	0.005	0.010	0.002	0.002	0.002	0.003	0.002
Zinc	-----	-----	-----	-----	-----	-----	-----
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	444	-----	329	246	-----	435	468
TSS	<1.1	-----	45.8	79.5	-----	70.8	56.5
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	24.0	-----	46.5	43.9	-----	88.0	43.5
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	44.6	-----	7.3	39.7	-----	7.5	9.8
Sulfide	<0.050	-----	0.087	0.079	-----	0.715	0.059
DOC	10.8	-----	8.82	42.5	-----	17.9	16.0
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	-----	-----	-----	-----	-----	-----
Tetrachloroethene	-----	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-MW-9-1	AKM-G-MW-14-2	AKM-G-MW-25-1	AKM-G-MW-27-1	AKM-G-MW-28-2	AKM-G-MW-29-1	AKM-G-MW-30-1
Date	5/17/12	5/17/12	5/17/12	5/17/12	5/18/12	5/18/12	5/17/12
Lab Group	UU80/UU81	UU80/UU81	UU80/UU81	UU80/UU81	UU88/UU89	UU88/UU89	UU80/UU81
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-MW-32-1	AKM-G-MW-32-1	AKM-G-MW-33-1	AKM-G-MW-34-1	AKM-G-MW-35-1	AKM-G-120+75-2	AKM-G-120+75-2
Date	5/18/12	Dup. 7	5/18/12	5/17/12	5/17/12	11/6/08	5/4/12
Lab Group	UU88/UU89	UU88/UU89	UU88/UU89	UU80/UU81	UU80/UU81	NY63	UT14/UT18
Field Measurments							
Water Level (feet TOC)	3.9	-----	4.9	6.1	4.44	5.1	10.2
pH	6.8	-----	7.2	6.3	5.9	7.4	7.8
Conductivity (uS)	2490	-----	3450	603	372	39118	30000
Temperature (C)	19.2	-----	12.1	12.6	10.6	13.6	13.1
DO (mg/l)	0.2	-----	9.3	1.2	0.7	0.1	0.1
ORP (mV)	-175.2	-----	-238.1	-102.7	-39.7	-90.6	-280.6
Ferrous Iron (mg/l)	4.6	-----	4.2	4.6	3.0	0	0.4
Turbidity (NTUs)	22.6	-----	10.6	84.8	42.8	4.1	13.0
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	1.9	-----
Calcium	-----	-----	-----	-----	-----	112	-----
Iron	-----	-----	-----	-----	-----	<0.2	-----
Magnesium	-----	-----	-----	-----	-----	255	-----
Dissolved Metals (mg/l)							
Arsenic	0.061	0.065	0.047	0.072	0.0173	1.86	0.780
Calcium	23.1	23.9	35.8	65.0	43.4	119	109
Chromium (III+VI)	-----	-----	-----	-----	-----	0.018	0.024
Chromium (VI)	-----	-----	-----	-----	-----	-----	<0.010
Copper	<0.001	<0.001	<0.001	0.001	<0.001	<0.002	<0.002
Iron	6.64	6.69	3.54	46.1	33.3	<0.1	<0.100
Lead	-----	-----	-----	-----	-----	<0.005	-----
Magnesium	12.4	12.8	45.6	17.2	10.4	271	210
Manganese	-----	-----	-----	-----	-----	0.028	-----
Mercury	<0.000020	<0.0200	<0.0200	<0.000020	<0.000020	-----	<0.000020
Nickel	0.001	<0.001	<0.001	0.001	0.001	0.007	0.004
Zinc	-----	-----	-----	-----	-----	<0.04	-----
Silicon	-----	-----	-----	-----	-----	27.4	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	290	304	384	292	173	1540	1440
TSS	27.9	10.5	21.2	174	71.7	7.9	5.2
Ferrous Iron	-----	-----	-----	-----	-----	0.077	-----
Chloride	278	196	1310	47.7	28.5	15800	12000
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	15.7	16.6	52.8	16.7	6.2	127	61.6
Sulfide	0.402	0.350	0.101	0.065	0.096	11.6	4.80
DOC	12.0	13.0	11.7	8.70	7.32	28	9.18
TOC	-----	-----	-----	-----	-----	27.6	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	-----	-----	-----	-----	-----	-----
Tetrachloroethene	-----	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-MW-32-1	AKM-G-MW-32-1	AKM-G-MW-33-1	AKM-G-MW-34-1	AKM-G-MW-35-1	AKM-G-120+75-2	AKM-G-120+75-2
Date	5/18/12	Dup. 7	5/18/12	5/17/12	5/17/12	11/6/08	5/4/12
Lab Group	UU88/UU89	UU88/UU89	UU88/UU89	UU80/UU81	UU80/UU81	NY63	UT14/UT18
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	<0.01	-----
Aroclor 1242	-----	-----	-----	-----	-----	<0.01	-----
Aroclor 1248	-----	-----	-----	-----	-----	<0.01	-----
Aroclor 1254	-----	-----	-----	-----	-----	<0.01	-----
Aroclor 1260	-----	-----	-----	-----	-----	<0.01	-----
Aroclor 1221	-----	-----	-----	-----	-----	<0.01	-----
Aroclor 1232	-----	-----	-----	-----	-----	<0.01	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	428	-----
Arsenate (5)	-----	-----	-----	-----	-----	6.3	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-121+80-2	AKM-G-121+80-2	AKM-G-122+60-2	AKM-G-122+60-2	AKM-G-124+00-2	AKM-G-124+00-2	AKM-G-124+00-2
Date	11/6/08	5/16/12	11/7/08	5/10(11)/2012	11/7/08	5/9/12	1/25/13
Lab Group	NY63	UU57/UU73	NY79/OA11	UU07/UU13	NY79/OA11	UT84/UT90	WB48
Field Measurments							
Water Level (feet TOC)	10.5	16.61	10.2	7.7	2.6	6.23	7.03
pH	7.5	9.1	10.8	9.7	8.3	8.9	9.9
Conductivity (uS)	16963	12400	4410	28600	26206	23692	33600
Temperature (C)	14.3	14.0	14.4	15.6	13.6	11.8	12.2
DO (mg/l)	0.1	0.1	0.0	0.7	0.1	0.1	0.03
ORP (mV)	-124.0	-318.1	-340.0	-285.6	-29.2	-249.2	-259.8
Ferrous Iron (mg/l)	1.6	0	0.4	0	0	0.6	colored
Turbidity (NTUs)	0.4	29.0	27.7	16.0	3.4	2.6	-----
Total Metals (mg/l)							
Arsenic	0.894	-----	18.5	-----	46.6	-----	-----
Calcium	37.4	-----	5.9	-----	55.8	-----	-----
Iron	20.3	-----	0.5	-----	0.4	-----	-----
Magnesium	52.8	-----	<0.2	-----	101	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.676	3.19	17.6	11.6	45.1	46.5	-----
Calcium	38.9	17.1	7.5	23.9	54.6	64.8	-----
Chromium (III+VI)	0.182	0.250	0.16	0.093	0.24	0.254	-----
Chromium (VI)	-----	<0.010	-----	<0.010	-----	<0.010	-----
Copper	0.014	0.022	0.011	0.006	0.018	0.017	-----
Iron	15.9	1.92	0.5	0.220	0.3	0.440	-----
Lead	<0.005	-----	<0.005	-----	<0.005	-----	-----
Magnesium	54.9	15.3	<0.1	1.29	98.4	138	-----
Manganese	0.35	-----	<0.002	-----	0.07	-----	-----
Mercury	-----	<0.000020	-----	<0.000020	-----	0.0000299	0.000038
Nickel	0.009	0.021	0.047	0.030	0.023	0.026	-----
Zinc	<0.02	-----	<0.02	-----	<0.02	-----	-----
Silicon	38.7	-----	966	-----	17	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	1100	1560	4810	3220	1890	2160	-----
TSS	6.8	8.9	43.1	23.4	5	2.0	-----
Ferrous Iron	22.6	-----	0.72	-----	0.136	-----	-----
Chloride	7120	4880	12800	11900	12500	10800	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	6.6	214	425	416	98.3	326	-----
Sulfide	2.94	5.42	31.8	1.59	18.4	18.8	-----
DOC	115	162	456	16.7	176	24.2	-----
TOC	120	-----	370	-----	192	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	-----	-----	-----
Trichloroethene	-----	-----	-----	-----	-----	-----	-----
Tetrachloroethene	-----	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-121+80-2	AKM-G-121+80-2	AKM-G-122+60-2	AKM-G-122+60-2	AKM-G-124+00-2	AKM-G-124+00-2	AKM-G-124+00-2
Date	11/6/08	5/16/12	11/7/08	5/10(11)/2012	11/7/08	5/9/12	1/25/13
Lab Group	NY63	UU57/UU73	NY79/OA11	UU07/UU13	NY79/OA11	UT84/UT90	WB48
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	<0.0017	-----	<0.0017	-----	-----
Endosulfan II	-----	-----	<0.0017	-----	<0.0017	-----	-----
4-4'-DDD	-----	-----	<0.0017	-----	<0.0017	-----	-----
4-4'-DDT	-----	-----	<0.0017	-----	<0.0017	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	415	-----	67	-----	26600	-----	-----
Arsenate (5)	34.7	-----	13700	-----	12500	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-125+50-2	AKM-G-125+50-2	AKM-G-125+50-2	AKM-G-126+90-2	AKM-G-126+90-2	AKM-G-126+90-2	AKM-G-128+30-2
Date	11/10/08	5/3/12	1/29/13	11/10/08	5/2/12	1/29/13	11/11/08
Lab Group	NZ19	US80/UT15	WB75	NZ19	US60/US66	WB75	NZ41/NZ52
Field Measurments							
Water Level (feet TOC)	8.92	13.52	8.78	1.9	8.4	6.75	7.4
pH	7.0	7.6	8.6	7.0	7.4	8.5	7.9
Conductivity (uS)	37235	16857	23100	39908	23600	34800	25743
Temperature (C)	13.9	10.5	11.1	13.9	13.2	11.4	12.8
DO (mg/l)	0.3	0.4	0.1	0.1	1.3	0.04	0.2
ORP (mV)	8.4	-217.7	-195.3	30.7	-256.0	-174.4	-51.0
Ferrous Iron (mg/l)	2	0.4	0.8	0.9	3.6	1	0
Turbidity (NTUs)	0.6	2.2	5.7	0.1	60.0	11.7	1.4
Total Metals (mg/l)							
Arsenic	0.895	-----	-----	1.43	-----	-----	1.06
Calcium	290	-----	-----	307	-----	-----	129
Iron	1.2	-----	-----	0.5	-----	-----	<0.05
Magnesium	816	-----	-----	886	-----	-----	333
Dissolved Metals (mg/l)							
Arsenic	0.892	2.31	-----	1.5	1.60	-----	1.1
Calcium	297	200	200	313	203	255	142
Chromium (III+VI)	<0.002	0.003	-----	0.003	0.004	-----	0.006
Chromium (VI)	-----	<0.010	-----	-----	<0.010	-----	-----
Copper	0.009	0.003	-----	0.01	0.004	-----	0.007
Iron	1.2	0.440	0.500	0.5	2.09	0.40	<0.1
Lead	<0.005	-----	-----	<0.005	-----	-----	<0.01
Magnesium	837	503	553	901	601	767	362
Manganese	0.098	-----	-----	0.032	-----	-----	0.015
Mercury	-----	<0.000020	-----	-----	<0.000020	-----	-----
Nickel	0.01	0.008	-----	0.011	0.008	-----	0.007
Zinc	<0.020	-----	-----	<0.020	-----	-----	<0.04
Silicon	32	-----	-----	29.7	-----	-----	22.9
Conventionals (mg/l)							
Alkalinity (as CaCO3)	122	461	-----	136	262	-----	474
TSS	8.1	1.8	-----	6.4	1.9	-----	2.5
Ferrous Iron	1.39	-----	-----	0.887	-----	-----	0.163
Chloride	11500	7970	7410	12700	10800	11800	8240
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	1660	815	1200	1800	1350	1870	910
Sulfide	2.3	1.72	0.444	0.831	0.870	0.647	9.36
DOC	<1.50	<0.20	4.76	2.39	4.78	3.37	10.0
TOC	1.56	-----	-----	2.67	-----	-----	10.6
Volatiles (ug/l)							
Vinyl Chloride	<0.2	0.14	-----	<0.2	0.076	-----	1.2
cis-1,2-Dichloroethene	-----	2.2	-----	-----	1.0	-----	-----
Chloroform	<0.2	<0.2	-----	<0.2	<0.2	-----	<0.2
Trichloroethene	<0.2	<0.2	-----	0.3	0.2	-----	0.5
Tetrachloroethene	<0.2	<0.2	-----	<0.2	0.1 J	-----	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-125+50-2	AKM-G-125+50-2	AKM-G-125+50-2	AKM-G-126+90-2	AKM-G-126+90-2	AKM-G-126+90-2	AKM-G-128+30-2
Date	11/10/08	5/3/12	1/29/13	11/10/08	5/2/12	1/29/13	11/11/08
Lab Group	NZ19	US80/UT15	WB75	NZ19	US60/US66	WB75	NZ41/NZ52
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.0500	-----	<0.0008	<0.050	-----	0.0042
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	<0.0008	-----	-----	<0.0008
Endosulfan II	-----	-----	-----	<0.0017	-----	-----	<0.0017
4-4'-DDD	-----	-----	-----	<0.0008	-----	-----	<0.0008
4-4'-DDT	-----	-----	-----	<0.0008	-----	-----	<0.0008
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	241	-----	730	961	-----	787	5.7
Arsenate (5)	6.0	-----	455	9.0	-----	311	10.5
Other Species (5)	-----	-----	4.97	-----	-----	4.87	-----
Total (species sum)	-----	-----	1190	-----	-----	1103	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-128+30-2	AKM-G-129+65-2	AKM-G-129+65-2	AKM-G-131+00-2	AKM-G-131+00-2	AKM-G-1C2-2	AKM-G-1C2-2
Date	5/1/12	11/12/08	4/26/12	11/12/08	4/26/12	11/23/08	5/14/12
Lab Group	US50/US55	NZ67/NZ74	UR96/US09	NZ67	UR96/US09	OB34	UU37/UU39
Field Measurments							
Water Level (feet TOC)	9.2	6.4	10.15	5	4.45	6.91	5.9
pH	8.1	7.9	7.3	11.7	10.2	6.1	6.5
Conductivity (uS)	17418	33584	15920	37372	26430	38300	20503
Temperature (C)	11.3	13.4	11.9	12.6	12.3	15.9	13.0
DO (mg/l)	0.1	0.1	0.2	0.2	0.1	0.7	1.3
ORP (mV)	-312.5	-317.3	-301.3	-445.7	-462.5	-74.0	-85.3
Ferrous Iron (mg/l)	0	0.2	0	0	-----	6.4	6.0
Turbidity (NTUs)	0.6	1.6	2.4	16.4	-----	1.3	6.4
Total Metals (mg/l)							
Arsenic	-----	0.052	-----	0.055	-----	-----	-----
Calcium	-----	204	-----	6.1	-----	-----	-----
Iron	-----	<0.1	-----	2.6	-----	-----	-----
Magnesium	-----	570	-----	3.4	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.746	0.052	0.037	0.06	0.028	0.006	0.007
Calcium	127	205	133	6.3	12.5	260	-----
Chromium (III+VI)	0.006	0.029	0.021	0.5	0.297	0.006	-----
Chromium (VI)	<0.010	-----	<0.010	-----	<0.050	-----	-----
Copper	<0.005	0.012	0.003	0.07	0.037	<0.005	<0.002
Iron	<0.050	<0.1	<0.050	2.3	1.43	178	-----
Lead	-----	<0.01	-----	<0.02	-----	<0.01	-----
Magnesium	360	567	360	3.6	1.80	441	-----
Manganese	-----	0.025	-----	0.009	-----	1.44	-----
Mercury	<0.000020	-----	<0.000020	-----	<0.000400	-----	<0.000020
Nickel	0.006	0.014	0.032	0.12	0.081	0.009	0.007
Zinc	-----	<0.04	-----	<0.10	-----	<0.04	-----
Silicon	-----	23.1	-----	778	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	451	871	647	6190	4200	-----	-----
TSS	<1.1	1.5	7.2	37.6	13.9	-----	-----
Ferrous Iron	-----	<0.08	-----	6.22	-----	-----	-----
Chloride	7980	10500	<2000	11400	11600	-----	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	795	1130	251	208	548	-----	-----
Sulfide	11.5	80.9	43.6	164	302	-----	-----
DOC	8.21	35.9	30.1	1570	848	-----	-----
TOC	-----	42.4	-----	2020	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	0.31	<2.0	0.11 J	-----	-----	-----	-----
cis-1,2-Dichloroethene	0.8	-----	<0.2	-----	-----	-----	-----
Chloroform	<0.2	<2.0	<0.2	-----	-----	-----	-----
Trichloroethene	0.2	<2.0	<0.2	-----	-----	-----	-----
Tetrachloroethene	<0.2	<2.0	<0.2	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-128+30-2	AKM-G-129+65-2	AKM-G-129+65-2	AKM-G-131+00-2	AKM-G-131+00-2	AKM-G-1C2-2	AKM-G-1C2-2
Date	5/1/12	11/12/08	4/26/12	11/12/08	4/26/12	11/23/08	5/14/12
Lab Group	US50/US55	NZ67/NZ74	UR96/US09	NZ67	UR96/US09	OB34	UU37/UU39
Semivolatiles (ug/l)							
Hexachlorobutadiene	<0.050	-----	<0.050	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	<0.0017	-----	-----	-----	-----	-----
Endosulfan II	-----	<0.0017	-----	-----	-----	-----	-----
4-4'-DDD	-----	<0.0017	-----	-----	-----	-----	-----
4-4'-DDT	-----	<0.0017	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	1.1	-----	3.4	-----	-----	-----
Arsenate (5)	-----	<3.4	-----	23.9	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-2B2-2	AKM-G-2B2-2	AKM-G-2C2-2	AKM-G-2D3-2	AKM-G-3A2-2R	AKM-G-3A2-2R	AKM-G-3A2-2R
Date	11/23/08	5/8/12	5/14/12	5/14/12	11/14/08	5/8/12	DUP. 4
Lab Group	OB34	UT60/UT67	UU37/UU39	UU37/UU39	OA11	UT60/UT67	UT60/UT67
Field Measurments							
Water Level (feet TOC)	11.5	10.5	5.0	5.7	10.82	11.1	-----
pH	5.4	6.2	6.1	6.0	5.7	6.5	-----
Conductivity (uS)	245495	160872	33439	55	73400	50900	-----
Temperature (C)	13.8	14.7	12.6	14.1	12.7	12.6	-----
DO (mg/l)	0.0	0.1	0.5	0.3	0.6	0.2	-----
ORP (mV)	-16.9	-92.0	-65.9	-140.6	-541.0	-159.3	-----
Ferrous Iron (mg/l)	10	4.8	5.6	>10	6	5.2	-----
Turbidity (NTUs)	0.4	21.0	4.2	26.0	3.3	160.0	-----
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	<0.01	<0.020	0.014	0.006	0.006	0.015	0.012
Calcium	237	-----	-----	-----	346	356	369
Chromium (III+VI)	<0.02	-----	-----	-----	<0.01	0.010	0.020
Chromium (VI)	-----	-----	-----	-----	-----	<0.010	<0.010
Copper	<0.02	<0.050	<0.010	<0.010	<0.01	<0.010	<0.010
Iron	32	-----	-----	-----	15.1	11.6	11.2
Lead	<0.05	-----	-----	-----	<0.02	-----	-----
Magnesium	221	-----	-----	-----	724	672	698
Manganese	2.57	-----	-----	-----	1.55	-----	-----
Mercury	-----	<0.000040	<0.000020	<0.000020	-----	<0.000020	<0.000020
Nickel	0.03	<0.050	0.020	<0.010	0.02	0.020	0.020
Zinc	<0.20	-----	-----	-----	<0.1	-----	-----
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	-----	-----	-----	1580	1590
TSS	-----	-----	-----	-----	-----	90.0	862
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	-----	-----	-----	-----	-----	31000	34700
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	-----	-----	-----	-----	451	523
Sulfide	-----	-----	-----	-----	-----	<0.050	<0.050
DOC	-----	-----	-----	-----	-----	4.44	4.54
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.2	<0.2	-----	<0.2	<0.2	<0.2	<0.2
cis-1,2-Dichloroethene	-----	<0.2	-----	<0.2	-----	0.3	0.2
Chloroform	1.58	2.1	-----	<0.2	<0.2	<0.2	<0.2
Trichloroethene	<0.2	<0.2	-----	<0.2	<0.2	<0.2	<0.2
Tetrachloroethene	<0.2	<0.2	-----	<0.2	<0.2	<0.2	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-2B2-2	AKM-G-2B2-2	AKM-G-2C2-2	AKM-G-2D3-2	AKM-G-3A2-2R	AKM-G-3A2-2R	AKM-G-3A2-2R
Date	11/23/08	5/8/12	5/14/12	5/14/12	11/14/08	5/8/12	DUP. 4
Lab Group	OB34	UT60/UT67	UU37/UU39	UU37/UU39	OA11	UT60/UT67	UT60/UT67
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.050	-----	<0.050	-----	<0.00083	<0.00083
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	<0.0017	<0.0017
Endosulfan II	-----	-----	-----	-----	-----	<0.0017	<0.0017
4-4'-DDD	-----	-----	-----	-----	-----	<0.0017	<0.0017
4-4'-DDT	-----	-----	-----	-----	-----	<0.0017	<0.0017
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3A2-2R	AKM-G-3A6-2R	AKM-G-3A6-2R	AKM-G-3A6-2R	AKM-G-3C5-2	AKM-G-3C5-2	AKM-G-3C7-2R
Date	1/24/13	11/14/08	5/7/12	1/24/13	11/19/08	5/11(16)/201	11/19/08
Lab Group	WB21	OA11	UT33/UT39	WB21	OA73	UU27/UU30	OA73
Field Measurments							
Water Level (feet TOC)	10.33	13.61	15.8	12.13	8.98	8.65	10.4
pH	7.4	5.4	6.3	6.8	5.1	5.9	6.9
Conductivity (uS)	76200	147900	102000	138000	233485	165295	59200
Temperature (C)	12.2	14.4	14.1	13.8	13.6	13.6	16.1
DO (mg/l)	0.1	0.3	0.2	0.1	0.0	0.1	0.4
ORP (mV)	-105.8	-1.5	-79.4	-59.2	-30.0	-46.8	-163.0
Ferrous Iron (mg/l)	6.4	6.2	7.8	5.4	6	9.0	6.6
Turbidity (NTUs)	4.8	5.5	8.0	32.5	3.4	55.1	0.7
Total Metals (mg/l)							
Arsenic	-----	0.008	-----	-----	-----	-----	-----
Calcium	-----	377	-----	-----	-----	-----	-----
Iron	-----	26.2	-----	-----	-----	-----	-----
Magnesium	-----	504	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.014	<0.005	0.010	0.006	<0.01	<0.020	0.01
Calcium	-----	392	345	-----	599	-----	323
Chromium (III+VI)	-----	<0.01	<0.020	-----	<0.02	-----	0.01
Chromium (VI)	-----	-----	<0.010	-----	-----	-----	-----
Copper	-----	<0.01	<0.020	-----	<0.02	<0.050	<0.005
Iron	-----	26	23.2	-----	129	-----	18.7
Lead	-----	<0.02	-----	-----	<0.05	-----	<0.01
Magnesium	-----	520	450	-----	624	-----	678
Manganese	-----	3.79	-----	-----	6.56	-----	1.11
Mercury	-----	-----	<0.000020	-----	-----	<0.000080	-----
Nickel	-----	0.04	<0.020	-----	0.04	<0.050	0.01
Zinc	-----	<0.1	-----	-----	<0.20	-----	<0.04
Silicon	-----	9	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	1110	1230	-----	-----	-----	-----
TSS	-----	102	78.4	-----	-----	-----	-----
Ferrous Iron	-----	28.2	-----	-----	-----	-----	-----
Chloride	27700	59600	59400	57500	94900	-----	43400
N-Nitrate	-----	<10.0	-----	-----	<10.0	-----	<2.0
Sulfate	-----	729	670	-----	1140	-----	72.1
Sulfide	-----	<0.05	<0.050	-----	<0.05	-----	<0.05
DOC	-----	28	5.78	-----	25.0	-----	26.4
TOC	-----	31	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	<0.2	0.2 J	-----	1.8	2.9	<0.2
cis-1,2-Dichloroethene	-----	-----	<0.2	-----	-----	0.2	-----
Chloroform	-----	120	25	-----	290	47	<0.2
Trichloroethene	-----	<0.2	<0.2	-----	<1	0.3	<0.2
Tetrachloroethene	-----	<0.2	<0.2	-----	2.3	1.5	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3A2-2R	AKM-G-3A6-2R	AKM-G-3A6-2R	AKM-G-3A6-2R	AKM-G-3C5-2	AKM-G-3C5-2	AKM-G-3C7-2R
Date	1/24/13	11/14/08	5/7/12	1/24/13	11/19/08	5/11(16)/201	11/19/08
Lab Group	WB21	OA11	UT33/UT39	WB21	OA73	UU27/UU30	OA73
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	<0.00083	-----	-----	<0.050	0.054
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	<0.0017	-----	-----	<0.0017	-----
Endosulfan II	-----	-----	<0.0017	-----	-----	<0.0017	-----
4-4'-DDD	-----	-----	<0.0017	-----	-----	<0.0017	-----
4-4'-DDT	-----	-----	<0.0017	-----	-----	<0.0017	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	2980	-----	-----	3410	-----	23700
Ethane	-----	<1.2	-----	-----	<1.2	-----	<1.2
Ethene	-----	<1.1	-----	-----	<1.1	-----	<1.1
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	1.88	1.9	-----	<0.65 U	-----	-----	-----
Arsenate (5)	2.86	<3.4	-----	2.4	-----	-----	-----
Other Species (5)	0	-----	-----	0	-----	-----	-----
Total (species sum)	4.74	-----	-----	2.4	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3C7-2R	AKM-G-3E1-2	AKM-G-3E1-2	AKM-G-4B2-2	AKM-G-4B2-2	AKM-G-4B3-2	AKM-G-4B3-2
Date	5/11/12	11/20/08	5/14/12	11/18/08	5/7/12	11/18/08	5/11/12
Lab Group	UU27/UU30	OA95	UU37/UU39	OA49	UT33/UT39	OA49	UU27/UU30
Field Measurments							
Water Level (feet TOC)	10.22	8.34	7.96	9.62	14.7	9.4	9.6
pH	6.5	6.2	6.3	5.4	6.7	6.3	6.5
Conductivity (uS)	85969	32700	18343	132000	-----	54100	39800
Temperature (C)	14.8	13.6	12.9	14.2	15.0	15.7	14.2
DO (mg/l)	0.2	0.5	1.7	0.1	-----	0.4	0.3
ORP (mV)	-75.4	-253.0	-48.3	8.3	-105.0	-134.0	-134.1
Ferrous Iron (mg/l)	4.2	3.6	3.2	9	3.6	9.8	10.0
Turbidity (NTUs)	19.3	3.9	4.5	18.0	25.9	25.5	28.0
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.008	<0.002	0.004	<0.002	0.010	<0.005	0.006
Calcium	-----	221	-----	525	-----	373	-----
Chromium (III+VI)	-----	<0.005	-----	<0.005	-----	<0.005	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.010	0.003	<0.002	<0.005	<0.010	<0.005	0.008
Iron	-----	43.5	-----	31	-----	34	-----
Lead	-----	< 0.005	-----	<0.01	-----	<0.01	-----
Magnesium	-----	463	-----	846	-----	914	-----
Manganese	-----	3.63	-----	3.05	-----	0.956	-----
Mercury	<0.000020	-----	<0.000020	-----	<0.000020	-----	<0.000020
Nickel	0.020	0.005	0.005	<0.005	0.010	0.012	0.012
Zinc	-----	<0.02	-----	<0.04	-----	<0.04	-----
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	-----	-----	-----	-----	-----
TSS	-----	-----	-----	-----	-----	-----	-----
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	-----	6580	-----	67800	-----	16900	-----
N-Nitrate	-----	<1.0	-----	<5.0	-----	<1.0	-----
Sulfate	-----	389	-----	640	-----	195	-----
Sulfide	-----	<0.05	-----	0.441	-----	<0.05	-----
DOC	-----	22.6	-----	32.2	-----	22.2	-----
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.2	-----	-----	8.8	25	0.8	160
cis-1,2-Dichloroethene	<0.2	-----	-----	-----	2.6	-----	79
Chloroform	<0.2	-----	-----	30000	8300	<0.2	68
Trichloroethene	<0.2	-----	-----	1.5	0.8	0.5	51
Tetrachloroethene	<0.2	-----	-----	24	2.9	<0.2	0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3C7-2R	AKM-G-3E1-2	AKM-G-3E1-2	AKM-G-4B2-2	AKM-G-4B2-2	AKM-G-4B3-2	AKM-G-4B3-2
Date	5/11/12	11/20/08	5/14/12	11/18/08	5/7/12	11/18/08	5/11/12
Lab Group	UU27/UU30	OA95	UU37/UU39	OA49	UT33/UT39	OA49	UU27/UU30
Semivolatiles (ug/l)							
Hexachlorobutadiene	<0.050	-----	-----	-----	<0.00083	-----	<0.050
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	<0.0017	-----	-----
Endosulfan II	-----	-----	-----	-----	<0.0017	-----	-----
4-4'-DDD	-----	-----	-----	-----	<0.0017	-----	-----
4-4'-DDT	-----	-----	-----	-----	<0.0017	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	34.6	-----	5440	-----	8260	-----
Ethane	-----	<1.2	-----	<1.2	-----	<1.2	-----
Ethene	-----	<1.1	-----	<1.1	-----	1.6	-----
Perchlorate	-----	<20	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4B4-2	AKM-G-4B4-2	AKM-G-4B4-2	AKM-G-4E1-2	AKM-G-4E1-4(-2dup)	AKM-G-4E1-2	AKM-G-4F1-2
Date	11/14/08	5/7/12	1/24/13	11/20/08	11/20/08	4/30/12	11/23/08
Lab Group	OA11	UT33/UT39	WB21	OB08/OA95	OB08/OA95	US29/US31	OB34
Field Measurments							
Water Level (feet TOC)	11.4	10.6	10.92	8.2	-----	7.85	8.95
pH	5.8	6.5	7.1	6.1	-----	6.7	6.2
Conductivity (uS)	113588	86500	121000	34871	-----	21160	34800
Temperature (C)	13.9	14.1	13.1	13.8	-----	13.6	18.3
DO (mg/l)	0.1	0.2	0.1	0.1	-----	0.2	0.5
ORP (mV)	6.2	-156.9	-127.8	-4.6	-----	-90.6	-82.0
Ferrous Iron (mg/l)	9.2	10.0	5.6	3	-----	2.8	3.8
Turbidity (NTUs)	0.0	37.0	349	4.6	-----	2.8	25.3
Total Metals (mg/l)							
Arsenic	-----	-----	-----	0.003	0.007	-----	0.088
Calcium	-----	-----	-----	213	202	-----	119
Iron	-----	-----	-----	3.3	3.7	-----	12.6
Magnesium	-----	-----	-----	543	534	-----	250
Dissolved Metals (mg/l)							
Arsenic	0.11	0.010	0.010	<0.005	<0.005	<0.002	0.073
Calcium	334	331	-----	203	200	-----	128
Chromium (III+VI)	0.02	0.030	-----	0.006	0.006	-----	0.045
Chromium (VI)	-----	<0.010	-----	-----	-----	-----	-----
Copper	<0.01	<0.020	-----	<0.005	<0.005	<0.002	0.007
Iron	19.3	23.9	-----	3.3	2.8	-----	13.5
Lead	<0.02	-----	-----	<0.01	<0.01	-----	<0.01
Magnesium	594	558	-----	531	524	-----	270
Manganese	1.99	-----	-----	0.808	0.759	-----	0.776
Mercury	-----	<0.000020	-----	-----	-----	<0.000020	-----
Nickel	0.03	<0.020	-----	0.008	0.008	0.007	0.008
Zinc	<0.1	-----	-----	<0.04	<0.04	-----	<0.04
Silicon	-----	-----	-----	23.7	22.2	-----	28.2
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	1300	-----	2660	2660	-----	1750
TSS	-----	104	-----	11.2	16.8	-----	5.8
Ferrous Iron	-----	-----	-----	3.28	1.78	-----	13.9
Chloride	68500	48200	19700	9740	19700	-----	6360
N-Nitrate	<10.0	-----	-----	-----	-----	-----	-----
Sulfate	477	459	-----	275	237	-----	84.7
Sulfide	<0.05	<0.050	-----	0.061	0.065	-----	<0.05
DOC	27.2	4.03 J	-----	30.8	34.1	-----	169
TOC	-----	-----	-----	27.7	28.1	-----	89.9
Volatiles (ug/l)							
Vinyl Chloride	2.9	1.8	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	0.7	-----	-----	-----	-----	-----
Chloroform	470	<0.2	-----	-----	-----	-----	-----
Trichloroethene	0.4	0.3	-----	-----	-----	-----	-----
Tetrachloroethene	<0.2	<0.2	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4B4-2	AKM-G-4B4-2	AKM-G-4B4-2	AKM-G-4E1-2	AKM-G-4E1-4(-2dup)	AKM-G-4E1-2	AKM-G-4F1-2
Date	11/14/08	5/7/12	1/24/13	11/20/08	11/20/08	4/30/12	11/23/08
Lab Group	OA11	UT33/UT39	WB21	OB08/OA95	OB08/OA95	US29/US31	OB34
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.00083	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	<0.0017	-----	-----	-----	-----	-----
Endosulfan II	-----	<0.0017	-----	-----	-----	-----	-----
4-4'-DDD	-----	<0.0017	-----	-----	-----	-----	-----
4-4'-DDT	-----	<0.0017	-----	-----	-----	-----	-----
Aroclor 1016	<0.01	-----	-----	-----	-----	-----	-----
Aroclor 1242	<0.01	-----	-----	-----	-----	-----	-----
Aroclor 1248	<0.01	-----	-----	-----	-----	-----	-----
Aroclor 1254	<0.01	-----	-----	-----	-----	-----	-----
Aroclor 1260	<0.01	-----	-----	-----	-----	-----	-----
Aroclor 1221	<0.01	-----	-----	-----	-----	-----	-----
Aroclor 1232	<0.01	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	5820	-----	-----	-----	-----	-----	-----
Ethane	<1.2	-----	-----	-----	-----	-----	-----
Ethene	<1.1	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	<20	<20	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	1.41	1.9	-----	-----	20.1
Arsenate (5)	-----	-----	4.26	<0.85	-----	-----	27.1
Other Species (5)	-----	-----	0	-----	-----	-----	-----
Total (species sum)	-----	-----	5.67	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4F1-2	AKM-G-4G2-2	AKM-G-5B1-2R	AKM-G-5B1-2R	AKM-G-5B1-2R	AKM-G-5C10-2R	AKM-G-5C10-2R
Date	4/30/12	11/26/08	11/18/08	5/3/12	1/24/13	12/5/08	5/4/12
Lab Group	US29/US31	OB83	OA49	US80/UT15	WB21	OC69	UT14/UT18
Field Measurments							
Water Level (feet TOC)	8.15	7.8	10.21	14.2	10.51	10.8	10.36
pH	6.2	7.0	6.5	7.0	7.7	6.7	6.8
Conductivity (uS)	16766	6075	35234	23800	36900	32128	17454
Temperature (C)	13.5	11.7	13.6	13.8	12.9	15.0	14.3
DO (mg/l)	0.4	0.1	0.2	0.2	0.1	0.1	0.2
ORP (mV)	-88.9	3.1	23.5	-191.4	-160.5	-112.3	-170.4
Ferrous Iron (mg/l)	2.8	2	3.8	6.2	5	>10	5.2
Turbidity (NTUs)	0.8	3.3	2.3	6.0	19.8	10.5	4.8
Total Metals (mg/l)							
Arsenic	-----	-----	0.035	-----	-----	2.03	-----
Calcium	-----	-----	221	-----	-----	95.3	-----
Iron	-----	-----	13.1	-----	-----	200	-----
Magnesium	-----	-----	523	-----	-----	167	-----
Dissolved Metals (mg/l)							
Arsenic	0.013	0.035	0.034	0.006	0.009	1.96	0.683
Calcium	-----	71.7	212	300	-----	95.0	72.6
Chromium (III+VI)	-----	<0.005	0.007	0.006	-----	0.020	-----
Chromium (VI)	-----	-----	-----	<0.010	-----	-----	-----
Copper	0.003	<0.005	<0.005	0.004	-----	<0.005	0.003
Iron	-----	3.1	12.9	12.2	-----	195	92.7
Lead	-----	<0.01	<0.01	-----	-----	<0.01	-----
Magnesium	-----	88.5	509	673	-----	164	139
Manganese	-----	0.342	0.201	-----	-----	1.97	-----
Mercury	<0.000020	-----	-----	<0.000020	-----	-----	<0.000020
Nickel	0.004	<0.005	0.007	0.010	-----	0.005	0.005
Zinc	-----	<0.04	<0.04	-----	-----	<0.04	-----
Silicon	-----	-----	24.8	-----	-----	34.5	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	1380	1300	-----	786	1090
TSS	-----	-----	79.4	92.0	-----	116	155
Ferrous Iron	-----	-----	13.2	-----	-----	200	-----
Chloride	-----	-----	10800	10500	11600	8320	7800
N-Nitrate	-----	-----	<1.0	-----	-----	-----	-----
Sulfate	-----	-----	280	825	-----	16.4	20.0
Sulfide	-----	-----	<0.05	0.123	-----	<0.05	<0.050
DOC	-----	-----	22.4	6.63	-----	20.6	14.5
TOC	-----	-----	22	-----	-----	20.8	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	<0.2	<0.2	<0.020	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	<0.2	-----	-----	-----
Chloroform	-----	<0.2	<0.2	<0.2	-----	-----	-----
Trichloroethene	-----	<0.2	<0.2	<0.2	-----	-----	-----
Tetrachloroethene	-----	<0.2	<0.2	<0.2	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-4F1-2	AKM-G-4G2-2	AKM-G-5B1-2R	AKM-G-5B1-2R	AKM-G-5B1-2R	AKM-G-5C10-2R	AKM-G-5C10-2R
Date	4/30/12	11/26/08	11/18/08	5/3/12	1/24/13	12/5/08	5/4/12
Lab Group	US29/US31	OB83	OA49	US80/UT15	WB21	OC69	UT14/UT18
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	<0.00083	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	<0.0017	-----	-----	-----
Endosulfan II	-----	-----	-----	<0.0017	-----	-----	-----
4-4'-DDD	-----	-----	-----	<0.0017	-----	-----	-----
4-4'-DDT	-----	-----	-----	<0.0017	-----	-----	-----
Aroclor 1016	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1242	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1248	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1254	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1260	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1221	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1232	-----	-----	<0.010	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	4240	-----	-----	-----	-----
Ethane	-----	-----	<1.2	-----	-----	-----	-----
Ethene	-----	-----	3.3	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	22.3	-----	0.75	2120	-----
Arsenate (5)	-----	-----	4.0	-----	3.76	428	-----
Other Species (5)	-----	-----	-----	-----	0	-----	-----
Total (species sum)	-----	-----	-----	-----	4.51	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5C14-2	AKM-G-5C14-2	AKM-G-5C16-2R	AKM-G-5C16-2R	AKM-G-5C21-2	AKM-G-5C21-4(-2dup)	AKM-G-5C21-2
Date	11/24/08	5/4/12	11/18/08	5/4/12	11/25/08	11/25/08	5/9/12
Lab Group	OB56	UT14/UT18	OA49	UT14/UT18	OB73	OB73	UT84/UT90
Field Measurments							
Water Level (feet TOC)	9.87	11.2	10.19	13.4	11.3	-----	11.5
pH	6.8	7.0	6.2	6.5	6.4	-----	6.9
Conductivity (uS)	38450	20762	37400	20800	39192	-----	19800
Temperature (C)	14.9	13.9	14.9	13.9	13.9	-----	14.1
DO (mg/l)	0.1	0.3	0.5	0.2	0.1	-----	0.1
ORP (mV)	-102.0	-174.7	-123.0	-149.8	-162.6	-----	-223.0
Ferrous Iron (mg/l)	10	4.4	>10	>10	>10	-----	-----
Turbidity (NTUs)	13.0	15.0	2.3	38.0	3.6	-----	24.0
Total Metals (mg/l)							
Arsenic	5.16	-----	0.767	-----	12.9	14.1	-----
Calcium	95.9	-----	123	-----	76.4	78	-----
Iron	98	-----	367	-----	70.6	71.7	-----
Magnesium	167	-----	171	-----	106	108	-----
Dissolved Metals (mg/l)							
Arsenic	8.37	3.03	0.758	0.730	12.9	12.8	13.2
Calcium	109	82.3	119	83.8	79	77.5	57.4
Chromium (III+VI)	0.17	0.181	0.009	-----	0.056	0.042	-----
Chromium (VI)	-----	<0.010	-----	-----	-----	-----	-----
Copper	0.007	0.008	<0.005	<0.002	<0.005	<0.005	0.006
Iron	132	44.0	359	147	68.9	67.4	94.3
Lead	<0.01	-----	<0.01	-----	<0.01	<0.01	-----
Magnesium	171	174	164	136	108	106	79.6
Manganese	0.633	-----	2.54	-----	1.14	1.13	-----
Mercury	-----	<0.000020	-----	<0.000020	-----	-----	<0.000020
Nickel	0.012	0.011	0.007	0.003	0.008	0.007	0.010
Zinc	<0.04	-----	<0.04	-----	<0.04	<0.04	-----
Silicon	39.4	-----	35	-----	39.9	39.9	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	1320	1450	756	716	942	938	1130
TSS	127	75.0	158	104	193	170	108
Ferrous Iron	114	-----	374	-----	76.8	69.2	-----
Chloride	8980	9170	11400	9200	9220	8850	8470
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	83.6	172	141	<20.0	113	114	162
Sulfide	0.082	<0.050	<0.05	<0.050	0.401	0.339	0.055
DOC	142	16.8	20.6	5.94 J	45.6	43.2	10.6
TOC	107	-----	19.8	-----	48.4	49.2	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	0.7	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	<0.2	-----	-----	-----	-----
Trichloroethene	-----	-----	0.2	-----	-----	-----	-----
Tetrachloroethene	-----	-----	<0.2	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5C14-2	AKM-G-5C14-2	AKM-G-5C16-2R	AKM-G-5C16-2R	AKM-G-5C21-2	AKM-G-5C21-4(-2dup)	AKM-G-5C21-2
Date	11/24/08	5/4/12	11/18/08	5/4/12	11/25/08	11/25/08	5/9/12
Lab Group	OB56	UT14/UT18	OA49	UT14/UT18	OB73	OB73	UT84/UT90
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1242	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1248	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1254	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1260	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1221	-----	-----	<0.010	-----	-----	-----	-----
Aroclor 1232	-----	-----	<0.010	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	absent	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	4710	-----	-----	203	11200	10600	-----
Arsenate (5)	1730	-----	-----	519	945	849	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Arkema Manufacturing Plant
Tacoma, Washington

Designation	AKM-G-5D8-2	AKM-G-5D8-2	AKM-G-5E1-2	AKM-G-5E1-2	AKM-G-5H2-2	AKM-G-6B19-2	AKM-G-6B19-2
Date	11/24/08	5/15/12	11/24/08	4/30/12	11/26/08	5/10/12	1/29/13
Lab Group	OB56	UU46/UU49	OB56	US29/US31	OB83	UU07/UU13	WB75
Field Measurments							
Water Level (feet TOC)	7.8	8.0	10.06	9.45	7.26	6.91	6.82
pH	6.4	6.6	6.0	6.2	6.7	6.8	7.6
Conductivity (uS)	34600	18968	29001	16305	18862	10723	14300
Temperature (C)	16.6	14.1	13.5	13.7	11.7	13.3	11.9
DO (mg/l)	0.4	0.5	0.2	0.4	0.2	0.6	0.3
ORP (mV)	-116.0	-64.9	-86.0	-108.7	26.7	-100.9	-189.7
Ferrous Iron (mg/l)	3	4.6	10	6.4	-----	-----	6.0
Turbidity (NTUs)	0.5	4.7	0.7	9.7	1.2	36.6	26.9
Total Metals (mg/l)							
Arsenic	<0.002	-----	0.007	-----	-----	-----	-----
Calcium	131	-----	190	-----	-----	-----	-----
Iron	20.2	-----	795	-----	-----	-----	-----
Magnesium	315	-----	278	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	0.015	0.006	0.006	0.088	<0.005	6.63	-----
Calcium	153	-----	194	-----	209	63.6	56.7
Chromium (III+VI)	0.007	-----	<0.005	-----	0.007	-----	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	-----
Iron	20.5	-----	809	-----	10.3	87.2	47.5
Lead	<0.01	-----	<0.01	-----	<0.01	-----	-----
Magnesium	360	-----	280	-----	310	99.0	96.5
Manganese	1	-----	5.35	-----	1.99	-----	-----
Mercury	-----	<0.000020	-----	<0.000020	-----	<0.000020	-----
Nickel	<0.005	0.005	0.007	0.004	0.005	0.003	-----
Zinc	<0.04	-----	<0.04	-----	<0.04	-----	-----
Silicon	23.9	-----	29.8	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	1620	-----	529	-----	-----	627	-----
TSS	58.7	-----	64	-----	-----	238	-----
Ferrous Iron	18.4	-----	700	-----	-----	-----	-----
Chloride	9370	-----	6400	-----	-----	4450	4230
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	175	-----	1200	-----	-----	131	96.6
Sulfide	<0.05	-----	<0.05	-----	-----	0.489	<0.078 U
DOC	25.2	-----	11	-----	-----	6.66	14.7
TOC	24.8	-----	13.7	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	-----	-----	<0.2	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	-----	-----	<0.2	-----	-----
Trichloroethene	-----	-----	-----	-----	<0.2	-----	-----
Tetrachloroethene	-----	-----	-----	-----	<0.2	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5D8-2	AKM-G-5D8-2	AKM-G-5E1-2	AKM-G-5E1-2	AKM-G-5H2-2	AKM-G-6B19-2	AKM-G-6B19-2
Date	11/24/08	5/15/12	11/24/08	4/30/12	11/26/08	5/10/12	1/29/13
Lab Group	OB56	UU46/UU49	OB56	US29/US31	OB83	UU07/UU13	WB75
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	0.61	-----	<0.34	-----	-----	-----	1410
Arsenate (5)	3.8	-----	7.7	-----	-----	-----	165
Other Species (5)	-----	-----	-----	-----	-----	-----	1.58
Total (species sum)	-----	-----	-----	-----	-----	-----	1577

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6D25-2	AKM-G-6D25-2	AKM-G-6D25-2	AKM-G-6E3-2	AKM-G-6E3-2	AKM-G-6E3-2
Date	11/25/08	5/2/12	1/25/13	12/3/08	5/15/12	1/29/13
Lab Group	OB73	US60/US66	WB48	OC27	UU46/UU49	WB75
Field Measurments						
Water Level (feet TOC)	7.56	6.05	6.08	7	7	6.8
pH	9.8	10.3	11.3	5.2	6.0	6.4
Conductivity (uS)	39600	11148	12000	39420	36800	67000
Temperature (C)	15.8	13.2	13.1	13.0	14.0	12.2
DO (mg/l)	0.2	0.2	0.02	0.1	0.3	0.9
ORP (mV)	-342.0	-402.3	-312.4	-53.6	-137.7	-39.2
Ferrous Iron (mg/l)	0	0.6	colored	>10	>10	9.6
Turbidity (NTUs)	1.4	38.8	-----	7.7	29.0	67.2
Total Metals (mg/l)						
Arsenic	113	-----	-----	31.3	-----	-----
Calcium	5.3	-----	-----	192	-----	-----
Iron	2.8	-----	-----	1160	-----	-----
Magnesium	1.4	-----	-----	241	-----	-----
Dissolved Metals (mg/l)						
Arsenic	9.43	47.9	-----	30.8	96.0	-----
Calcium	6.4	1.82	-----	209	386	568
Chromium (III+VI)	0.08	0.047	-----	0.008	-----	-----
Chromium (VI)	-----	<0.010	-----	-----	-----	-----
Copper	0.036	0.087	-----	<0.005	<0.010	-----
Iron	2.8	1.19	-----	1230	1810	2500
Lead	<0.01	-----	-----	<0.01	-----	-----
Magnesium	1.9	<0.050	-----	258	496	814
Manganese	<0.005	-----	-----	7.39	-----	-----
Mercury	-----	0.000080	0.000059	-----	<0.000020	-----
Nickel	0.044	0.021	-----	0.049	0.120	-----
Zinc	<0.04	-----	-----	0.10	-----	-----
Silicon	105	-----	-----	25.8	-----	-----
Conventionals (mg/l)						
Alkalinity (as CaCO3)	1900	1660	-----	392	504	-----
TSS	810	3.4	-----	82.4	195	-----
Ferrous Iron	3.34	-----	-----	1260	-----	-----
Chloride	9710	4760	-----	9520	16100	24100
N-Nitrate	-----	-----	-----	-----	-----	-----
Sulfate	334	143	-----	318	724	1490
Sulfide	14.6	29.8	-----	<0.05	0.168	0.096
DOC	229	86.8	-----	23.4	80.9	180
TOC	179	-----	-----	23.6	-----	-----
Volatiles (ug/l)						
Vinyl Chloride	-----	-----	-----	-----	8.8	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	22	-----
Chloroform	-----	-----	-----	-----	0.8	-----
Trichloroethene	-----	-----	-----	-----	13	-----
Tetrachloroethene	-----	-----	-----	-----	6.5	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6D25-2	AKM-G-6D25-2	AKM-G-6D25-2	AKM-G-6E3-2	AKM-G-6E3-2	AKM-G-6E3-2
Date	11/25/08	5/2/12	1/25/13	12/3/08	5/15/12	1/29/13
Lab Group	OB73	US60/US66	WB48	OC27	UU46/UU49	WB75
Semivolatiles (ug/l)						
Hexachlorobutadiene	-----	-----	-----	-----	<0.050	-----
Pesticides/PCBs (ug/l)						
4-4'DDE	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----
Other (ug/l)						
Methane	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	absent	-----	-----	absent	-----	-----
Arsenic Speciation (ug/l)						
Arsenite (5)	51300	-----	-----	10900	-----	138000
Arsenate (5)	23300	-----	-----	13600	-----	3690
Other Species (5)	-----	-----	-----	-----	-----	0
Total (species sum)	-----	-----	-----	-----	-----	141690

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6E9-2	AKM-G-6E9-2	AKM-G-6E12-2	AKM-G-6E12-2	AKM-G-6F1-2	AKM-G-6F1-2	AKM-G-6G3-2
Date	11/25/08	5/10/12	12/1/08	5/16/12	12/1/08	4/30/12	4/25/12
Lab Group	OB73	UU07/UU13	OB93	UU57/UU73	OB93	US29/US31	UR96/US09
Field Measurments							
Water Level (feet TOC)	10	10.16	12.77	13.2	8.89	8.5	7.3
pH	5.6	6.8	9.7	8.0	6.2	6.2	6.4
Conductivity (uS)	27780	15651	53825	37015	26137	24	17372
Temperature (C)	13.9	13.6	13.7	13.3	14.5	14.3	13.6
DO (mg/l)	0.1	0.2	0.1	0.2	0.3	0.1	0.2
ORP (mV)	-85.0	-113.9	-248.0	-337.2	-93.5	-85.5	-239.0
Ferrous Iron (mg/l)	>10	3.2	2	0	10	>10	2.2
Turbidity (NTUs)	22.6	9.1	5.6	25.1	10.9	20.0	13.5
Total Metals (mg/l)							
Arsenic	2.66	-----	174	-----	0.01	-----	-----
Calcium	102	-----	44.9	-----	308	-----	-----
Iron	261	-----	1.9	-----	480	-----	-----
Magnesium	97.8	-----	32.8	-----	632	-----	-----
Dissolved Metals (mg/l)							
Arsenic	2.21	1.63	184	57.0	0.008	0.004	0.0056
Calcium	94.4	46.2	43.7	130	327	340.000	-----
Chromium (III+VI)	<0.005	-----	0.12	-----	<0.005	-----	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	<0.002	0.03	0.003	<0.005	<0.005	0.002
Iron	291	60.3	1.6	<0.250	510	339.000	-----
Lead	<0.01	-----	<0.02	-----	<0.01	-----	-----
Magnesium	99	58.4	26.5	523	668	706.000	-----
Manganese	1.53	-----	<0.01	-----	4.9	-----	-----
Mercury	-----	<0.000020	-----	<0.000020	-----	<0.000020	<0.000020
Nickel	<0.005	0.004	0.08	0.014	0.007	0.006	0.006
Zinc	<0.04	-----	<0.1	-----	<0.04	-----	-----
Silicon	39.5	-----	68.2	-----	29.1	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	405	891	3410	3260	992	916	-----
TSS	116	23.4	5.7	40.5	90	97.8	-----
Ferrous Iron	262	-----	2.99	-----	376	-----	-----
Chloride	6370	6750	18100	14600	9930	11000	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	144	18.4	670	94.3	<2.0	32.7	-----
Sulfide	<0.05	0.073	0.499	64.9	<0.05	<0.050	-----
DOC	13.3	10.6	1210	69.2	14	13.9	-----
TOC	14.2	-----	1190	-----	14.5	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	56	<0.2	-----	-----	-----	<0.020
cis-1,2-Dichloroethene	-----	100	-----	-----	-----	-----	<0.2
Chloroform	-----	0.3	<0.2	-----	-----	-----	<0.2
Trichloroethene	-----	11	<0.2	-----	-----	-----	<0.2
Tetrachloroethene	-----	<0.2	<0.2	-----	-----	-----	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6E9-2	AKM-G-6E9-2	AKM-G-6E12-2	AKM-G-6E12-2	AKM-G-6F1-2	AKM-G-6F1-2	AKM-G-6G3-2
Date	11/25/08	5/10/12	12/1/08	5/16/12	12/1/08	4/30/12	4/25/12
Lab Group	OB73	UU07/UU13	OB93	UU57/UU73	OB93	US29/US31	UR96/US09
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.050	-----	-----	-----	-----	<0.050
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	1350	-----	128000	-----	<0.34	-----	-----
Arsenate (5)	942	-----	29600	-----	<0.25	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7E4-2	AKM-G-7E6-2	AKM-G-7E6-2	AKM-G-7E6-2	AKM-G-7E7-2	AKM-G-7E9-2	AKM-G-7E9-2
Date	1/29/13	12/2/08	5/1/12	(Dup. 2)	4/27/12	12/2/08	4/27/12
Lab Group	WB75	OC27/OC08	US50/US55	US50/US55	US13/US14	OC08/OC09	US13/US14
Field Measurments							
Water Level (feet TOC)	6.85	5.38	4.9	-----	8.1	6.9	7.02
pH	11.7	10.0	10.0	-----	10.1	9.1	8.5
Conductivity (uS)	18800	2130	9278	-----	9950	18983	21946
Temperature (C)	12.5	13.8	12.7	-----	12.9	12.9	12.7
DO (mg/l)	0.3	0.0	0.2	-----	0.1	0.1	0.2
ORP (mV)	-337.1	-266.0	-409.6	-----	-361.0	-190.0	-319.1
Ferrous Iron (mg/l)	0	0	0.4	-----	0	0	0
Turbidity (NTUs)	35.2	1.3	2.0	-----	13.0	5.3	4.0
Total Metals (mg/l)							
Arsenic	-----	2.03	-----	-----	-----	0.769	-----
Calcium	-----	4	-----	-----	-----	42.7	-----
Iron	-----	0.4	-----	-----	-----	0.2	-----
Magnesium	-----	0.6	-----	-----	-----	84.9	-----
Dissolved Metals (mg/l)							
Arsenic	-----	2.03	1.12	1.18	1.430	0.753	0.925
Calcium	22.3	4.2	3.69	3.67	-----	41.7	-----
Chromium (III+VI)	-----	0.052	-----	-----	-----	0.076	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	-----	0.024	0.016	0.017	0.004	<0.005	0.002
Iron	0.1	0.3	0.380	0.370	-----	<0.1	-----
Lead	-----	<0.01	-----	-----	-----	<0.01	-----
Magnesium	41.5	0.9	0.830	0.820	-----	81.7	-----
Manganese	-----	<0.002	-----	-----	-----	0.013	-----
Mercury	-----	-----	<0.000020	<0.000020	<0.000020	-----	<0.000020
Nickel	-----	0.031	0.021	0.022	0.020	0.018	0.012
Zinc	-----	<0.04	-----	-----	-----	<0.04	-----
Silicon	-----	60.6	-----	-----	-----	33.5	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	1500	1950	1810	-----	1410	-----
TSS	-----	<1.1	<1.1	<1.1	-----	<1.1	-----
Ferrous Iron	-----	0.618	-----	-----	-----	0.291	-----
Chloride	5170	4610	3160	3300	-----	5480	-----
N-Nitrate	-----	<1.0	-----	-----	-----	<1.0	-----
Sulfate	86.4	59.1	193	<100	-----	69.5	-----
Sulfide	43.5	29.6	30.8	22.5	-----	32.4	-----
DOC	143	190	-----	20.2	-----	93.2	-----
TOC	-----	171	-----	-----	-----	94.6	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	<50	260	230	680	1.6	330
cis-1,2-Dichloroethene	-----	-----	300	300	450	-----	80
Chloroform	-----	5700	2700	2200	3700	16000	4200
Trichloroethene	-----	460	470	420	260	180	83
Tetrachloroethene	-----	2500	3700	2500	2000	1400	250

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7E4-2	AKM-G-7E6-2	AKM-G-7E6-2	AKM-G-7E6-2	AKM-G-7E7-2	AKM-G-7E9-2	AKM-G-7E9-2
Date	1/29/13	12/2/08	5/1/12	(Dup. 2)	4/27/12	12/2/08	4/27/12
Lab Group	WB75	OC27/OC08	US50/US55	US50/US55	US13/US14	OC08/OC09	US13/US14
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	0.54	0.52	0.52	-----	<0.050
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	9890	-----	-----	-----	7380	-----
Ethane	-----	<1.2	-----	-----	-----	<1.2	-----
Ethene	-----	7.1	-----	-----	-----	<1.1	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	absent	-----	-----	-----	absent	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	68	43.7	-----	-----	-----	137	-----
Arsenate (5)	6.8	406	-----	-----	-----	46.4	-----
Other Species (5)	10.8	-----	-----	-----	-----	-----	-----
Total (species sum)	85.6	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7E13-2R	AKM-G-7E13-2R	AKM-G-7E13-2R	AKM-G-7E16-2	AKM-G-7F1-2	AKM-G-7F1-2	AKM-G-7G1-2
Date	11/11/08	4/26/12	(Dup-2R)	5/16/12	12/3/08	4/27/12	12/4/08
Lab Group	NZ41/NZ52	UR97/US12	UR96/US09	UU57/UU73	OC27	US13/US14	OC48
Field Measurments							
Water Level (feet TOC)	7.3	7.8	-----	2.8	12.1	12	12.6
pH	11.3	9.9	-----	7.3	8.0	8.5	5.9
Conductivity (uS)	4899	5890	-----	2454	37268	26700	32285
Temperature (C)	13.5	12.8	-----	11.1	13.5	13.5	11.8
DO (mg/l)	0.1	0.1	-----	0.3	0.0	0.0	0.3
ORP (mV)	-433.0	-374.3	-----	-136.4	-281.0	-321.5	-47.0
Ferrous Iron (mg/l)	0.4	0	-----	4.6	1	0	3
Turbidity (NTUs)	5.7	6.0	-----	3.8	2.0	15.0	4.3
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	0.312	-----	0.012
Calcium	-----	-----	-----	-----	30.4	-----	167
Iron	-----	-----	-----	-----	0.1	-----	11.6
Magnesium	-----	-----	-----	-----	33.2	-----	448
Dissolved Metals (mg/l)							
Arsenic	0.54	0.499	0.544	1.87	0.301	0.089	0.011
Calcium	7.6	9.89	9.05	41.5	31.4	-----	161
Chromium (III+VI)	0.046	-----	-----	-----	0.091	-----	0.059
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	0.018	0.032	0.029	0.005	<0.005	0.001	0.005
Iron	1.5	2.92	2.81	6.53	<0.1	-----	11.2
Lead	<0.002	-----	-----	-----	<0.01	-----	<0.01
Magnesium	0.2	0.420	0.400	51.5	34.6	-----	441
Manganese	0.036	-----	-----	-----	0.012	-----	0.703
Mercury	-----	0.0000314	<0.000020	0.000037	-----	<0.000020	-----
Nickel	0.017	0.023	0.021	0.008	0.017	0.006	0.014
Zinc	0.02	-----	-----	-----	<0.04	-----	<0.04
Silicon	-----	-----	-----	-----	30.1	-----	21.6
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	1640	1620	426	1850	-----	1910
TSS	-----	<1.1	<1.1	18.7	2.6	-----	3.7
Ferrous Iron	-----	-----	-----	-----	0.91	-----	12.9
Chloride	1330	1380	1310	1050	10100	-----	8800
N-Nitrate	<0.5	-----	-----	-----	<10	-----	-----
Sulfate	60.4	179	191	228	39.8	-----	17.7
Sulfide	17.9	32.9	32.6	<0.050	66.2	-----	<0.05
DOC	113	141	62.2	5.54	85.7	-----	56.4
TOC	-----	-----	-----	-----	92.5	-----	57.6
Volatiles (ug/l)							
Vinyl Chloride	<10	110	110	2.5	1	-----	-----
cis-1,2-Dichloroethene	-----	79	76	68	-----	-----	-----
Chloroform	11	6.0	5.8	0.9	<0.2	-----	-----
Trichloroethene	19	8.6	8.3	9.1	<0.2	-----	-----
Tetrachloroethene	<10	0.36	0.35	20	<0.2	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7E13-2R	AKM-G-7E13-2R	AKM-G-7E13-2R	AKM-G-7E16-2	AKM-G-7F1-2	AKM-G-7F1-2	AKM-G-7G1-2
Date	11/11/08	4/26/12	(Dup-2R)	5/16/12	12/3/08	4/27/12	12/4/08
Lab Group	NZ41/NZ52	UR97/US12	UR96/US09	UU57/UU73	OC27	US13/US14	OC48
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.050	<0.050	0.60	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	27600	-----	-----	-----	20700	-----	-----
Ethane	(1)	-----	-----	-----	<1.2	-----	-----
Ethene	(1)	-----	-----	-----	<1.1	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	42.1	-----	3.3
Arsenate (5)	-----	-----	-----	-----	3.0	-----	0.94
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7G1-4(-2dup)	AKM-G-7G1-2	AKM-G-7I3-2	AKM-G-7I3-2	AKM-G-8F2-2R	AKM-G-8F2-2R
Date	12/4/08	4/25/12	11/26/08	4/25/12	11/11/08	4/26/12
Lab Group	OC48	UR96/US09	OB83	UR96/US09	NZ41/NZ52	UR96/US09
Field Measurments						
Water Level (feet TOC)	-----	11.7	3.11	-----	6.9	6.98
pH	-----	6.4	6.9	6.8	10.5	10.6
Conductivity (uS)	-----	21100	3950	2360	63129	34123
Temperature (C)	-----	11.9	13.7	15.5	13.5	12.3
DO (mg/l)	-----	0.2	0.1	0.3	0.1	0.1
ORP (mV)	-----	-119.5	16.8	-128.2	-116.7	-527.3
Ferrous Iron (mg/l)	-----	4.6	4.4	-----	0.5	0
Turbidity (NTUs)	-----	9.0	7.1	-----	1.9	0.7
Total Metals (mg/l)						
Arsenic	0.010	-----	-----	-----	0.081	-----
Calcium	147	-----	-----	-----	7.4	-----
Iron	11.0	-----	-----	-----	0.9	-----
Magnesium	419	-----	-----	-----	<0.2	-----
Dissolved Metals (mg/l)						
Arsenic	0.012	0.0047	<0.002	0.0049	0.096	0.049
Calcium	165	-----	63.9	-----	8.4	-----
Chromium (III+VI)	0.066	-----	<0.005	-----	0.434	0.369
Chromium (VI)	-----	-----	-----	-----	-----	<0.050
Copper	0.006	0.002	<0.005	<0.001	0.042	0.043
Iron	11.1	-----	9.4	-----	0.8	-----
Lead	<0.01	-----	<0.01	-----	<0.01	-----
Magnesium	446	-----	46.6	-----	<0.2	-----
Manganese	0.718	-----	1.82	-----	<0.005	-----
Mercury	-----	<0.000020	-----	<0.000020	-----	<0.000800
Nickel	0.017	0.007	<0.005	0.002	0.094	0.084
Zinc	<0.04	-----	<0.04	-----	<0.04	-----
Silicon	21.1	-----	-----	-----	59.2	-----
Conventionals (mg/l)						
Alkalinity (as CaCO3)	1900	-----	-----	-----	6400	-----
TSS	3.5	-----	-----	-----	1040	-----
Ferrous Iron	12.8	-----	-----	-----	5.33 JI	-----
Chloride	9180	-----	-----	-----	24500	-----
N-Nitrate	-----	-----	-----	-----	-----	-----
Sulfate	18.2	-----	-----	-----	129	-----
Sulfide	<0.05	-----	-----	-----	206	-----
DOC	81.5	-----	-----	-----	1540	-----
TOC	81.2	-----	-----	-----	1090	-----
Volatiles (ug/l)						
Vinyl Chloride	-----	-----	-----	-----	-----	2.1
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	22
Chloroform	-----	-----	-----	-----	-----	<0.2
Trichloroethene	-----	-----	-----	-----	-----	12
Tetrachloroethene	-----	-----	-----	-----	-----	5.5

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-7G1-4(-2dup)	AKM-G-7G1-2	AKM-G-7I3-2	AKM-G-7I3-2	AKM-G-8F2-2R	AKM-G-8F2-2R
Date	12/4/08	4/25/12	11/26/08	4/25/12	11/11/08	4/26/12
Lab Group	OC48	UR96/US09	OB83	UR96/US09	NZ41/NZ52	UR96/US09
Semivolatiles (ug/l)						
Hexachlorobutadiene	-----	-----	-----	-----	-----	<0.050
Pesticides/PCBs (ug/l)						
4-4'DDE	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----
Other (ug/l)						
Methane	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	absent	-----
Arsenic Speciation (ug/l)						
Arsenite (5)	94.9	-----	-----	-----	5.1	-----
Arsenate (5)	140	-----	-----	-----	13.0	-----
Other Species (5)	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-8G3-2	AKM-G-8G3-2	AKM-G-MW-A2-2	AKM-G-MW-13R-2	AKM-G-MW-24-2	AKM-G-122+60-3	AKM-G-122+60-3
Date	12/3/08	4/26/12	5/16/12	5/17/12	5/17/12	11/7/08	5/9/12
Lab Group	OC27	UR96/US09	UU57/UU73	UU80/UU81	UU80/UU81	NY79	UT84/UT90
Field Measurments							
Water Level (feet TOC)	10.25	9	9.51	5.8	9.03	5.15	7.5
pH	8.5	9.1	9.3	7.2	6.3	7.6	7.7
Conductivity (uS)	53410	34810	26501	5120	15834	4705	4930
Temperature (C)	12.8	12.0	12.0	15.3	14.2	14.3	14.3
DO (mg/l)	0.1	0.2	0.5	0.3	0.8	0.4	0.7
ORP (mV)	-305.0	-388.7	-398.0	-115.0	-64.8	40.1	-232.8
Ferrous Iron (mg/l)	1	0.2	0	3.4	3.0	0.4	0.6
Turbidity (NTUs)	6.8	23.6	3.1	727.0	10.8	2.5	9.0
Total Metals (mg/l)							
Arsenic	0.196	-----	-----	-----	-----	0.0005	-----
Calcium	19.4	-----	-----	-----	-----	136	-----
Iron	<0.2	-----	-----	-----	-----	0.3	-----
Magnesium	12.7	-----	-----	-----	-----	191	-----
Dissolved Metals (mg/l)							
Arsenic	0.206	0.136	0.082	0.188	0.006	0.0005	0.003
Calcium	21.7	-----	13.1	-----	-----	131	155
Chromium (III+VI)	0.17	0.089	0.114	-----	-----	<0.005	-----
Chromium (VI)	-----	<0.010	<0.010	-----	-----	-----	-----
Copper	0.01	0.006	0.004	0.002	<0.002	0.0012	<0.002
Iron	<0.2	-----	0.250	-----	-----	0.15	0.070
Lead	<0.02	-----	-----	-----	-----	<0.001	-----
Magnesium	15.2	-----	11.7	-----	-----	187	233
Manganese	<0.005	-----	-----	-----	-----	0.202	-----
Mercury	-----	<0.000020	<0.000020	<0.000020	<0.000020	-----	<0.000020
Nickel	0.02	0.009	0.011	0.004	0.006	0.0016	0.005
Zinc	<0.1	-----	-----	-----	-----	<0.004	-----
Silicon	39.4	-----	-----	-----	-----	21.8	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	2650	-----	2460	-----	-----	543	715
TSS	9.5	-----	6.9	-----	-----	3.1	1.9
Ferrous Iron	2.57	-----	-----	-----	-----	0.235	-----
Chloride	14900	-----	12600	-----	-----	1240	1660
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	1190	-----	707	-----	-----	190	215
Sulfide	98.2	-----	110	-----	-----	0.22	0.366
DOC	112	-----	94.4	-----	-----	3.54	1.13
TOC	124	-----	-----	-----	-----	3.75	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	2.2	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	18	-----	-----	-----	-----	-----
Chloroform	-----	<0.2	-----	-----	-----	-----	-----
Trichloroethene	-----	5.7	-----	-----	-----	-----	-----
Tetrachloroethene	-----	<0.2	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-8G3-2	AKM-G-8G3-2	AKM-G-MW-A2-2	AKM-G-MW-13R-2	AKM-G-MW-24-2	AKM-G-122+60-3	AKM-G-122+60-3
Date	12/3/08	4/26/12	5/16/12	5/17/12	5/17/12	11/7/08	5/9/12
Lab Group	OC27	UR96/US09	UU57/UU73	UU80/UU81	UU80/UU81	NY79	UT84/UT90
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.050	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	17.2	-----	-----	-----	-----	5.2	-----
Arsenate (5)	1.1	-----	-----	-----	-----	<0.12	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-124+00-3	AKM-G-124+00-3	AKM-G-125+50-3	AKM-G-125+50-3	AKM-G-126+90-3	AKM-G-126+90-3	AKM-G-128+30-3
Date	11/7/08	5/9/12	12/3/08	5/3/12	11/10/08	5/2/12	11/11/08
Lab Group	NY79	UT84/UT90	OC27	US80/UT15	NZ19	US60/US66	NZ41/NZ52
Field Measurments							
Water Level (feet TOC)	2.41	10.85	5.8	11.3	3.75	8.8	6.47
pH	7.9	7.8	6.9	7.3	7.6	7.8	8.8
Conductivity (uS)	3160	2183	1797	1780	1152	965	2315
Temperature (C)	13.8	14.1	12.9	13.3	13.0	13.1	12.9
DO (mg/l)	0.4	0.2	0.2	0.1	0.1	0.3	0.2
ORP (mV)	26.4	-153.5	-135.0	-119.5	33.7	-173.4	-266.0
Ferrous Iron (mg/l)	1.2	0.6	1.4	1.8	0.8	0.4	1.2
Turbidity (NTUs)	14.2	18.2	6.8	23.0	4.8	15.7	28.7
Total Metals (mg/l)							
Arsenic	0.0038	-----	<0.010	-----	0.0102	-----	0.0014
Calcium	76.2	-----	60.5	-----	42.3	-----	60.2
Iron	1.4	-----	1.6	-----	0.76	-----	2.33
Magnesium	96.3	-----	78.1	-----	43.2	-----	75.5
Dissolved Metals (mg/l)							
Arsenic	0.002	<0.001	0.033	0.004	0.005	0.008	<0.001
Calcium	76.9	61.3	56.9	85.8	38.8	50.7	59.8
Chromium (III+VI)	<0.002	-----	<0.005	-----	<0.002	-----	<0.001
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.0005	<0.001	<0.005	<0.001	<0.0005	0.001	<0.001
Iron	0.84	0.640	4.5	0.960	0.69	0.360	1.1
Lead	<0.001	-----	<0.01	-----	<0.001	-----	<0.002
Magnesium	97.6	81.4	74.9	110	39.9	53.3	77.4
Manganese	0.114	-----	0.134	-----	0.051	-----	0.051
Mercury	-----	<0.000020	-----	<0.000020	-----	<0.000020	-----
Nickel	0.0022	0.002	<0.005	<0.001	0.001	<0.001	0.002
Zinc	<0.004	-----	<0.04	-----	<0.004	-----	<0.01
Silicon	19.7	-----	24.0	-----	23.4	-----	23.4
Conventionals (mg/l)							
Alkalinity (as CaCO3)	407	393	271	339	222	249	398
TSS	19.3	8.4	8.9	5.4	4.9	10.2	28.5
Ferrous Iron	1.62	-----	1.07	-----	0.738	-----	1.18
Chloride	863	693	327	542	215	257	780
N-Nitrate	-----	-----	<1.0	-----	<0.5	-----	<0.5
Sulfate	<0.1	8.0	<0.1	4.1	<0.1	2.6	<0.1
Sulfide	<0.05	0.132	<0.05	<0.050	<0.05	0.094	<0.05
DOC	5.06	2.99	3.08	<0.20	2.29	2.11	4.01
TOC	5.08	-----	3.04	-----	1.98	-----	4.17
Volatiles (ug/l)							
Vinyl Chloride	-----	-----	<0.2	-----	<0.2	-----	<0.2
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	-----	0.2	-----	<0.2	-----	<0.2
Trichloroethene	-----	-----	<0.2	-----	<0.2	-----	<0.2
Tetrachloroethene	-----	-----	<0.2	-----	<0.2	-----	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-124+00-3	AKM-G-124+00-3	AKM-G-125+50-3	AKM-G-125+50-3	AKM-G-126+90-3	AKM-G-126+90-3	AKM-G-128+30-3
Date	11/7/08	5/9/12	12/3/08	5/3/12	11/10/08	5/2/12	11/11/08
Lab Group	NY79	UT84/UT90	OC27	US80/UT15	NZ19	US60/US66	NZ41/NZ52
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	19100	-----	14500	-----	10800
Ethane	-----	-----	<1.2	-----	<1.2	-----	(1)
Ethene	-----	-----	<1.1	-----	<1.1	-----	(1)
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	3.55	-----	5.0	-----	3.9	-----	<0.09
Arsenate (5)	0.28	-----	0.42	-----	0.33	-----	74.1
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-128+30-3	AKM-G-129+65-3	AKM-G-129+65-3	AKM-G-131+00-3	AKM-G-131+00-3	AKM-G-1C1-3	AKM-G-1C1-3
Date	5/1/12	11/12/08	5/1/12	11/12/08	4/26/12	11/23/08	5/15/12
Lab Group	US50/US55	NZ67/NZ74	US50/US55	NZ67	UR96/US09	OB34	UU46/UU49
Field Measurments							
Water Level (feet TOC)	8	2.32	8.45	4.27	4.3	9.75	9.47
pH	7.5	7.7	7.6	7.6	7.9	7.7	7.7
Conductivity (uS)	1640	6058	4444	1484	2000	3270	2518
Temperature (C)	13.0	13.0	12.4	12.9	14.6	15.2	13.1
DO (mg/l)	0.2	0.5	0.2	0.3	0.1	0.4	0.4
ORP (mV)	-143.0	-240.3	-142.6	-211.0	-216.4	-177.0	-116.5
Ferrous Iron (mg/l)	1.8	1.6	0.8	1.6	1.4	1.5	1.4
Turbidity (NTUs)	182.0	0.8	5.3	5.0	28.0	0.6	3.7
Total Metals (mg/l)							
Arsenic	-----	<0.002	-----	<0.0005	-----	-----	-----
Calcium	-----	177	-----	61.9	-----	-----	-----
Iron	-----	2	-----	2.19	-----	-----	-----
Magnesium	-----	192	-----	74.3	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	<0.001	0.003	<0.001	<0.002	0.0013	<0.002	<0.001
Calcium	43.1	170	170	62.9	98.9	74.2	-----
Chromium (III+VI)	-----	<0.005	-----	<0.005	-----	<0.005	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.001	0.006	<0.001	<0.005	<0.001	<0.005	<0.001
Iron	1.19	1.8	0.740	1.5	0.800	1	-----
Lead	-----	<0.01	-----	<0.01	-----	<0.01	-----
Magnesium	53.1	184	195	76.7	114	110	-----
Manganese	-----	0.106	-----	0.124	-----	0.128	-----
Mercury	<0.000020	-----	<0.000020	-----	<0.000020	-----	<0.000020
Nickel	0.001	<0.005	0.005	<0.005	0.002	<0.005	0.001
Zinc	-----	<0.04	-----	<0.04	-----	<0.04	-----
Silicon	-----	33.9	-----	23.6	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	297	571	564	260	315	-----	-----
TSS	351	5.2	5.9	13	14.6	-----	-----
Ferrous Iron	-----	2.08	-----	1.6	-----	-----	-----
Chloride	497	1550	1840	444	583	-----	-----
N-Nitrate	-----	<0.5	-----	-----	-----	-----	-----
Sulfate	5.6	0.1	8.9	<0.1	5.3	-----	-----
Sulfide	0.186	<0.05	0.053	<0.05	<0.050	-----	-----
DOC	3.45	4.46	4.53	2.21	3.53	-----	-----
TOC	-----	4.69	-----	2.34	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	-----	<0.2	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	-----	-----	-----	-----	-----	-----	-----
Chloroform	-----	<0.2	-----	-----	-----	-----	-----
Trichloroethene	-----	<0.2	-----	-----	-----	-----	-----
Tetrachloroethene	-----	<0.2	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-128+30-3	AKM-G-129+65-3	AKM-G-129+65-3	AKM-G-131+00-3	AKM-G-131+00-3	AKM-G-1C1-3	AKM-G-1C1-3
Date	5/1/12	11/12/08	5/1/12	11/12/08	4/26/12	11/23/08	5/15/12
Lab Group	US50/US55	NZ67/NZ74	US50/US55	NZ67	UR96/US09	OB34	UU46/UU49
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	3520	-----	-----	-----	-----	-----
Ethane	-----	(1)	-----	-----	-----	-----	-----
Ethene	-----	(1)	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	<0.09	-----	<0.09	-----	-----	-----
Arsenate (5)	-----	0.87	-----	<0.85	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3A1-3R	AKM-G-3A1-3R	AKM-G-4B1-3	AKM-G-4B1-3	AKM-G-4B2-3	AKM-G-4B2-3	AKM-G-5B1-3R
Date	11/14/08	5/8/12	11/18/08	5/7/12	11/14/08	5/7/12	11/14/08
Lab Group	OA11	UT60/UT67	OA49	UT33/UT39	OA11	UT33/UT39	OA11
Field Measurments							
Water Level (feet TOC)	11.1	10.47	9.58	15.6	10.8	9.0	9.9
pH	7.4	7.7	6.9	7.2	7.2	7.4	7.3
Conductivity (uS)	3164	2355	17300	9	8880	8393	4600
Temperature (C)	13.0	13.0	15.0	13.3	14.4	13.9	13.9
DO (mg/l)	0.2	0.2	0.5	0.1	0.3	0.4	0.1
ORP (mV)	3.8	-127.4	-145.0	-219.7	-227.0	-156.3	-18.0
Ferrous Iron (mg/l)	0.7	0.6	4	4.4	1.6	2.4	1
Turbidity (NTUs)	0.5	1.5	5.0	20.0	0.8	1.8	3.0
Total Metals (mg/l)							
Arsenic	-----	-----	-----	-----	-----	-----	-----
Calcium	-----	-----	-----	-----	-----	-----	-----
Iron	-----	-----	-----	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----	-----	-----	-----
Dissolved Metals (mg/l)							
Arsenic	<0.002	0.001	<0.005	0.004	<0.005	0.004	0.002
Calcium	84.1	-----	177	-----	138	125	77.5
Chromium (III+VI)	<0.005	-----	<0.005	-----	<0.005	-----	<0.005
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005
Iron	0.4	-----	6.4	-----	1.6	1.54	0.8
Lead	<0.01	-----	<0.01	-----	<0.01	-----	<0.01
Magnesium	109	-----	273	-----	216	230	121
Manganese	0.121	-----	0.702	-----	0.246	-----	0.15
Mercury	-----	<0.000020	-----	<0.000020	-----	<0.000020	-----
Nickel	<0.005	<0.002	<0.005	0.005	<0.005	0.004	<0.005
Zinc	<0.04	-----	<0.04	-----	<0.04	-----	<0.04
Silicon	-----	-----	-----	-----	-----	-----	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	-----	-----	-----	-----	561	-----
TSS	-----	-----	-----	-----	-----	5.3	-----
Ferrous Iron	-----	-----	-----	-----	-----	-----	-----
Chloride	-----	-----	-----	-----	-----	3600	-----
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	-----	-----	-----	-----	40.0	-----
Sulfide	-----	-----	-----	-----	-----	0.104	-----
DOC	-----	-----	-----	-----	-----	1.36	-----
TOC	-----	-----	-----	-----	-----	-----	-----
Volatiles (ug/l)							
Vinyl Chloride	0.3	<0.2	<1	5.2	<0.2	<0.2	<0.2
cis-1,2-Dichloroethene	-----	<0.2	-----	34	-----	<0.2	-----
Chloroform	1	<0.2	11000	1600	<0.2	<0.2	<0.2
Trichloroethene	1.2	<0.2	3.2	11	<0.2	<0.2	<0.2
Tetrachloroethene	0.8	<0.2	35	20	<0.2	<0.2	<0.2

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-3A1-3R	AKM-G-3A1-3R	AKM-G-4B1-3	AKM-G-4B1-3	AKM-G-4B2-3	AKM-G-4B2-3	AKM-G-5B1-3R
Date	11/14/08	5/8/12	11/18/08	5/7/12	11/14/08	5/7/12	11/14/08
Lab Group	OA11	UT60/UT67	OA49	UT33/UT39	OA11	UT33/UT39	OA11
Semivolatiles (ug/l)							
Hexachlorobutadiene	-----	<0.050	-----	<0.050	-----	<0.050	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-5B1-3R	AKM-G-5D1-3	AKM-G-5D1-3	AKM-G-5G1-3	AKM-G-5G1-3	AKM-G-6E7-3	AKM-G-6E7-3
Date	5/3/12	11/24/08	5/15/12	11/26/08	4/25/12	12/2/08	5/16/12
Lab Group	US80/UT15	OB56	UU46/UU49	OB83	UR96/US09	OC08	UU57/UU73
Field Measurments							
Water Level (feet TOC)	13.94	10	13.2	9.6	10.88	10.93	12.8
pH	7.6	6.6	6.9	7.0	6.9	7.4	7.5
Conductivity (uS)	3122	49900	27400	20700	9660	3150	3380
Temperature (C)	13.5	17.7	14.3	12.9	13.3	14.2	14.3
DO (mg/l)	0.3	0.4	0.1	0.1	0.2	0.0	0.1
ORP (mV)	-152.6	-114.0	-194.0	28.4	-263.1	-64.0	-154.5
Ferrous Iron (mg/l)	-----	4	5.8	2.6	2.0	0.9	1.0
Turbidity (NTUs)	16.8	1.3	16.0	2.5	6.0	19.4	25.7
Total Metals (mg/l)							
Arsenic	-----	0.034	-----	-----	-----	0.948	-----
Calcium	-----	337	-----	-----	-----	99.0	-----
Iron	-----	5.8	-----	-----	-----	4.0	-----
Magnesium	-----	724	-----	-----	-----	140	-----
Dissolved Metals (mg/l)							
Arsenic	<0.001	0.029	0.045	<0.005	<0.001	0.87	0.365
Calcium	-----	365	-----	157	-----	93.1	102
Chromium (III+VI)	-----	<0.01	-----	0.006	-----	<0.005	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----	-----
Copper	<0.001	0.007	0.003	<0.005	0.002	<0.005	<0.001
Iron	-----	6.1	-----	2.6	-----	2.0	1.09
Lead	-----	<0.01	-----	<0.01	-----	<0.01	-----
Magnesium	-----	785	-----	410	-----	133	148
Manganese	-----	1.02	-----	0.249	-----	0.208	-----
Mercury	<0.000020	-----	<0.000020	-----	<0.000020	-----	<0.000020
Nickel	0.003	0.01	0.010	0.005	0.005	<0.005	0.003
Zinc	-----	<0.04	-----	<0.04	-----	<0.04	-----
Silicon	-----	23.7	-----	-----	-----	26.6	-----
Conventionals (mg/l)							
Alkalinity (as CaCO3)	-----	1790	-----	-----	-----	399	432
TSS	-----	40	-----	-----	-----	232	30.3
Ferrous Iron	-----	5.8	-----	-----	-----	2.28	-----
Chloride	-----	12100	-----	-----	-----	777	1070
N-Nitrate	-----	-----	-----	-----	-----	-----	-----
Sulfate	-----	1690	-----	-----	-----	<0.1	8.0
Sulfide	-----	3.51	-----	-----	-----	<0.05	<0.050
DOC	-----	20.4	-----	-----	-----	3.38	4.47
TOC	-----	19.5	-----	-----	-----	7.18	-----
Volatiles (ug/l)							
Vinyl Chloride	<0.020	-----	-----	-----	-----	-----	-----
cis-1,2-Dichloroethene	<0.2	-----	-----	-----	-----	-----	-----
Chloroform	<0.2	-----	-----	-----	-----	-----	-----
Trichloroethene	<0.2	-----	-----	-----	-----	-----	-----
Tetrachloroethene	<0.2	-----	-----	-----	-----	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Arkema Manufacturing Plant
Tacoma, Washington

Designation	AKM-G-5B1-3R	AKM-G-5D1-3	AKM-G-5D1-3	AKM-G-5G1-3	AKM-G-5G1-3	AKM-G-6E7-3	AKM-G-6E7-3
Date	5/3/12	11/24/08	5/15/12	11/26/08	4/25/12	12/2/08	5/16/12
Lab Group	US80/UT15	OB56	UU46/UU49	OB83	UR96/US09	OC08	UU57/UU73
Semivolatiles (ug/l)							
Hexachlorobutadiene	<0.0500	-----	-----	-----	-----	-----	-----
Pesticides/PCBs (ug/l)							
4-4'DDE	-----	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----	-----
Other (ug/l)							
Methane	-----	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)							
Arsenite (5)	-----	20.0	-----	-----	-----	808	-----
Arsenate (5)	-----	8.1	-----	-----	-----	47.2	-----
Other Species (5)	-----	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6E8-3	AKM-G-6G2-3	AKM-G-7E5-3	AKM-G-7E5-3	AKM-G-7I2-3	AKM-G-7I2-3
Date	5/16/12	4/25/12	12/3/08	5/1/12	12/5/08	4/25/12
Lab Group	UU57/UU73	UR96/US09	OC27	US50/US55	OC69	UR96/US09
Field Measurments						
Water Level (feet TOC)	13.3	10.46	9.99	10.3	10.9	8.48
pH	7.9	8.0	7.4	8.0	7.8	7.9
Conductivity (uS)	1300	1760	1112	831	1408	1076
Temperature (C)	13.7	13.7	13.1	13.1	12.4	12.7
DO (mg/l)	0.0	0.1	0.0	0.4	0.2	0.2
ORP (mV)	-124.4	-268.9	-163.0	-175.1	-70.1	-147.0
Ferrous Iron (mg/l)	0.6	0	0	0	0	-----
Turbidity (NTUs)	3.5	1.0	0.8	2.4	1.6	1.2
Total Metals (mg/l)						
Arsenic	-----	-----	(1)	-----	-----	-----
Calcium	-----	-----	(1)	-----	-----	-----
Iron	-----	-----	(1)	-----	-----	-----
Magnesium	-----	-----	(1)	-----	-----	-----
Dissolved Metals (mg/l)						
Arsenic	0.0028	0.001	<0.002	<0.0005	<0.002	0.0006
Calcium	85.9	121	49.8	-----	49.7	-----
Chromium (III+VI)	-----	-----	<0.005	-----	<0.005	-----
Chromium (VI)	-----	-----	-----	-----	-----	-----
Copper	<0.001	<0.001	<0.005	0.001	<0.005	0.002
Iron	0.100	0.130	0.3	-----	<0.1	-----
Lead	-----	-----	<0.01	-----	<0.01	-----
Magnesium	55.1	115	34.5	-----	56.2	-----
Manganese	-----	-----	0.022	-----	0.015	-----
Mercury	<0.000020	<0.000020	-----	<0.000020	-----	<0.000020
Nickel	0.002	0.003	<0.005	0.003	<0.005	0.002
Zinc	-----	-----	<0.04	-----	<0.04	-----
Silicon	-----	-----	(1)	-----	-----	-----
Conventionals (mg/l)						
Alkalinity (as CaCO3)	292	318	(1)	-----	-----	-----
TSS	2.5	<1.1	(1)	-----	-----	-----
Ferrous Iron	-----	-----	(1)	-----	-----	-----
Chloride	425	570	(1)	-----	-----	-----
N-Nitrate	-----	-----	(1)	-----	-----	-----
Sulfate	5.8	6.6	(1)	-----	-----	-----
Sulfide	<0.050	0.076	(1)	-----	-----	-----
DOC	3.78	3.44	(1)	-----	-----	-----
TOC	-----	-----	(1)	-----	-----	-----
Volatiles (ug/l)						
Vinyl Chloride	<0.2	-----	<0.2	<0.020	-----	-----
cis-1,2-Dichloroethene	<0.2	-----	-----	<0.2	-----	-----
Chloroform	<0.2	-----	<0.2	<0.2	-----	-----
Trichloroethene	<0.2	-----	<0.2	<0.2	-----	-----
Tetrachloroethene	<0.2	-----	<0.2	0.2	-----	-----

TABLE 5-13 - Summary of Groundwater Analytical Data - 2008, 2012 and 2013

Designation	AKM-G-6E8-3	AKM-G-6G2-3	AKM-G-7E5-3	AKM-G-7E5-3	AKM-G-7I2-3	AKM-G-7I2-3
Date	5/16/12	4/25/12	12/3/08	5/1/12	12/5/08	4/25/12
Lab Group	UU57/UU73	UR96/US09	OC27	US50/US55	OC69	UR96/US09
Semivolatiles (ug/l)						
Hexachlorobutadiene	<0.050	-----	-----	<0.050	-----	-----
Pesticides/PCBs (ug/l)						
4-4'DDE	-----	-----	-----	-----	-----	-----
Endosulfan II	-----	-----	-----	-----	-----	-----
4-4'-DDD	-----	-----	-----	-----	-----	-----
4-4'-DDT	-----	-----	-----	-----	-----	-----
Aroclor 1016	-----	-----	-----	-----	-----	-----
Aroclor 1242	-----	-----	-----	-----	-----	-----
Aroclor 1248	-----	-----	-----	-----	-----	-----
Aroclor 1254	-----	-----	-----	-----	-----	-----
Aroclor 1260	-----	-----	-----	-----	-----	-----
Aroclor 1221	-----	-----	-----	-----	-----	-----
Aroclor 1232	-----	-----	-----	-----	-----	-----
Other (ug/l)						
Methane	-----	-----	-----	-----	-----	-----
Ethane	-----	-----	-----	-----	-----	-----
Ethene	-----	-----	-----	-----	-----	-----
Perchlorate	-----	-----	-----	-----	-----	-----
Microbial Iron Reducers	-----	-----	-----	-----	-----	-----
Arsenic Speciation (ug/l)						
Arsenite (5)	-----	-----	-----	-----	-----	-----
Arsenate (5)	-----	-----	-----	-----	-----	-----
Other Species (5)	-----	-----	-----	-----	-----	-----
Total (species sum)	-----	-----	-----	-----	-----	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration
J1 - Ferrous iron - Estimated value caused by elevated background interference
fb - Detected in field blank
HT - High tide (+12.5' to +12.8' MLLW)
LT - Low tide (+3.4' to +3.7' MLLW)
(1) - Listed analysis in work plan - not completed
(2) - Sample obtained at tidal level 13.2 feet MLLW
(3) - Sample obtained at tidal level 6.2 feet MLLW
(4) - Temperature measured after water had travelled through tubing exposed to 2 degrees Centigrade air temperature.
(5) - 2008 samples collected anaerobically and preserved with EDTA; 2013 samples collected anerobically but not preserved with chemical preservative
----- - not available/not analyzed

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4G1-1	WP-G-4H1-1	WP-G-4H3-1	WP-G-5I2-1	WP-G-5H1-1	WP-G-4G2-2	WP-G-4H2-2
Date	2/13/12	2/13/12	2/13/12	2/14/12	2/14/12	2/13/12	2/13/12
ARI Lab. I.D.	122832-UI48A	122833-UI48B	122834-UI48C	122835-UI48D	122836-UI48E	122837-UI48F	122838-UI48G
Field Parameters							
Water Level (feet below TOC)	4.10	2.20	3.19	1.75	5.25	7.10	7.65
pH	6.9	9.2	11.7	11.8	6.0	6.5	6.5
Conductivity (µS)	515	1129	18368	12905	658	3453	8422
Temperature (C)	6.9	8.5	10.0	8.9	8.0	10.5	11.6
Dissolved Oxygen (mg/l)	0.8	0.2	0.14	0.06	0.2	0.3	0.2
ORP (mV)	-38.5	-15.7	-112	-269	-52.9	-13.4	-11.7
Ferrous Iron (mg/l)	0.6	0	(a)	(a)	6.4	2.8	4.8
Turbidity (NTUs)	7.2	19.4	31.5	2.3	1.6	3.0	3.8
total Petroleum Hydrocarbons (mg/l)							
Gasoline Range Organics	<0.25	<0.25	<2.5	<2.5	<0.25	<0.25	<0.25
Diesel Range Organics	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Residual Range Organics	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dissolved Metals (µg/l)							
Arsenic	**97.7**	**393**	**680**	**94**	**39.9**	**6**	**18**
Chromium (total)	**2.8**	**5.6**	<60	**100**	**1**	**10**	**14**
Chromium (hexavalent [VI])	<10 J	<10 J	R	R	<10 J	<10 J	<10 J
Copper	**4.5**	**1.7**	**16**	**33**	**1.0**	<1	<2
Iron	**730**	**140**	**770**	**1180**	**9590**	**9270**	**4600**
Mercury	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.1
Nickel	**2.3**	**5.4**	**166**	**65**	**10.0**	**3**	**3**
Volatile Organic Compounds (µg/l)							
Chloromethane	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
Bromomethane	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0
Vinyl chloride	<0.2	<0.2	<2.0	<2.0	**0.9**	<0.2	<0.2
Chloroethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Methylene chloride	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0
Acetone	<5.0	<5.0	<50	**57**	<5.0	<5.0	<5.0
Carbon disulfide	<0.2	<0.2	**3.3**	**2.8**	<0.2	<0.2	<0.2
1,1-Dichloroethene	<0.2	<0.2	<2.0	<2.0	**0.3**	<0.2	<0.2
1,1-Dichloroethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
cis-1,2-Dichloroethene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Chloroform	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,2-Dichloroethane	<0.2	<0.2	<2.0	<2.0	**0.5**	<0.2	<0.2
2-Butanone	<5.0	<5.0	<50	<50	<5.0	<5.0	<5.0
1,1,1-Trichloroethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4G1-1	WP-G-4H1-1	WP-G-4H3-1	WP-G-5I2-1	WP-G-5H1-1	WP-G-4G2-2	WP-G-4H2-2
Date	2/13/12	2/13/12	2/13/12	2/14/12	2/14/12	2/13/12	2/13/12
ARI Lab. I.D.	122832-UI48A	122833-UI48B	122834-UI48C	122835-UI48D	122836-UI48E	122837-UI48F	122838-UI48G
Carbon tetrachloride	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Vinyl acetate	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Bromodichloromethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,2-Dichloropropane	<0.2	<0.2	<2.0	<2.0	**1.2**	<0.2	<0.2
cis -1,3-Dichloropropene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Trichloroethene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Dibromochloromethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,1,2-Trichloroethane	<0.2	<0.2	<2.0	<2.0	**0.7**	<0.2	<0.2
Benzene	<0.2	**1.9**	**3.9**	**9.0**	<0.2	<0.2	<0.2
trans -1,3-Dichloropropene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
2-Chloroethylvinylether	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0
Bromoform	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
4-Methyl-2-pentanone (MIBK)	<5.0	<5.0	<50	<50	<5.0	<5.0	<5.0
2-Hexanone	<5.0	<5.0	<50	<50	<5.0	<5.0	<5.0
Tetrachloroethene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,1,2,2-Tetrachloroethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Toluene	<0.2	<0.2	**4.2**	<2.0	<0.2	<0.2	<0.2
Chlorobenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Ethylbenzene	<0.2	<0.2	<2.0	<2.0	**0.2**	<0.2	<0.2
Styrene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Trichlorofluoromethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,1,2-Trichloro-1,2,2-trifluoroethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
m,p-Xylenes	<0.4	<0.4	**5.4**	<4.0	**0.7**	<0.4	<0.4
o-Xylene	<0.2	<0.2	**2.4**	<2.0	**0.2**	<0.2	<0.2
1,2-Dichlorobenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,3-Dichlorobenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,4-Dichlorobenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Acrolein	<5.0	<5.0	<50	<50	<5.0	<5.0	<5.0
Methyl iodide	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0
Bromoethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Acrylonitrile	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0
1,1-Dichloropropene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Dibromomethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,1,1,2-Tetrachloroethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,2-Dibromo-3-chloropropane	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
1,2,3-Trichloropropane	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
trans -1,4-Dichloro-2-butene	<1.0	<1.0	<10	<10	<1.0	<1.0	<1.0

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4G1-1	WP-G-4H1-1	WP-G-4H3-1	WP-G-5I2-1	WP-G-5H1-1	WP-G-4G2-2	WP-G-4H2-2
Date	2/13/12	2/13/12	2/13/12	2/14/12	2/14/12	2/13/12	2/13/12
ARI Lab. I.D.	122832-UI48A	122833-UI48B	122834-UI48C	122835-UI48D	122836-UI48E	122837-UI48F	122838-UI48G
1,3,5-Trimethylbenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,2,4-Trimethylbenzene	<0.2	<0.2	**2.9**	<2.0	<0.2	<0.2	<0.2
Hexachlorobutadiene	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
Ethylene dibromide	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Bromochloromethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Dichlorodifluoromethane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
2,2-Dichloropropane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,3-Dichloropropane	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Isopropylbenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
n-Propylbenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
Bromobenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
2-Chlorotoluene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
4-Chlorotoluene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
tert-Butylbenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
sec-Butylbenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
4-Isopropyltoluene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
n-Butylbenzene	<0.2	<0.2	<2.0	<2.0	<0.2	<0.2	<0.2
1,2,4-Trichlorobenzene	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
Naphthalene	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
1,2,3-Trichlorobenzene	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
Methyl *tert*-butyl ether	<0.5	<0.5	<5.0	<5.0	<0.5	<0.5	<0.5
Polycyclic Aromatic Hydrocarbons [PAH's] (µg/l)							
Naphthalene	<0.10	<0.10	**0.21**	**0.59**	<0.10	<0.10	<0.10
2-Methylnaphthalene	<0.10	<0.10	<0.10	**0.42**	<0.10	<0.10	<0.10
1-Methylnaphthalene	<0.10	<0.10	**0.12**	**0.69**	<0.10	<0.10	<0.10
Acenaphthylene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	<0.10	<0.10	<0.10	**0.11**	**0.11**	<0.10	<0.10
Fluorene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluroanthene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(a)anthracene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(a)pyrene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno(1,2,3-cd)pyrene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4G1-1	WP-G-4H1-1	WP-G-4H3-1	WP-G-5I2-1	WP-G-5H1-1	WP-G-4G2-2	WP-G-4H2-2
Date	2/13/12	2/13/12	2/13/12	2/14/12	2/14/12	2/13/12	2/13/12
ARI Lab. I.D.	122832-UI48A	122833-UI48B	122834-UI48C	122835-UI48D	122836-UI48E	122837-UI48F	122838-UI48G
Dibenz(a,h)anthracene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(g,h,i)perylene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzofuran	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
total Benzofluoranthenes	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorinated Pesticides (µg/l)							
α-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
β-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
δ-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
γ-BHC (Lindane)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Heptachlor	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aldrin	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Heptachlor epoxide	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan II	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methoxychlor	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin aldehyde	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
trans-Chlordane (β & γ)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-Chlordane (α)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toxaphene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hexachlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Hexachlorobutadiene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Notes: < - Not detected at indicated reporting level
J - Estimated concentration (analysis outside of recommended holding time)
R - Unusable/rejected data due to interference
(a) - Dark coffee colored water

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4H4-2	WP-G-5H2-2	WP-G-DUP	WP-G-5H3-3	WP-G-RB	Trip Blank
Date	2/13/12	2/14/12	2/14/12	2/15/12	2/15/12	2/13/12
ARI Lab. I.D.	122839-UI48H	122840-UI48I	122843-UI48L	122841-UI48J	122842-UI48K	122844-UI48M
Field Parameters						
Water Level (feet below TOC)	6.55	6.55	-----	7.59	-----	-----
pH	6.6	6.6	-----	7.7	-----	-----
Conductivity (µS)	11565	11518	-----	2071	-----	-----
Temperature (C)	11.2	11.7	-----	12.0	-----	-----
Dissolved Oxygen (mg/l)	0.2	0.08	-----	0.04	-----	-----
ORP (mV)	-113	-97.2	-----	-30.0	-----	-----
Ferrous Iron (mg/l)	0	5.4	-----	0	-----	-----
Turbidity (NTUs)	0.7	1.5	-----	13.6	-----	-----
total Petroleum Hydrocarbons (mg/l)						
Gasoline Range Organics	<0.25	<0.25	<0.25	<0.25	<0.25	-----
Diesel Range Organics	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Residual Range Organics	<0.20	<0.20	<0.20	<0.20	<0.20	-----
Dissolved Metals (µg/l)						
Arsenic	**13**	**3**	**3**	<0.5	<0.2	-----
Chromium (total)	**25**	**9**	**10**	<1	<0.5	-----
Chromium (hexavalent [VI])	<10 J	<10 J	<10 J	<10 J	<10 J	-----
Copper	<2	<2	<2	<0.5	<0.5	-----
Iron	**60**	**7620**	**6990**	**190**	<50	-----
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	-----
Nickel	**4**	**5**	**7**	<0.5	<0.5	-----
Volatile Organic Compounds (µg/l)						
Chloromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methylene chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acetone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon disulfide	**0.3**	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-Dichloroethene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-Dichloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
cis-1,2-Dichloroethene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroform	<0.2	<0.2	<0.2	<0.2	**2.3**	<0.2
1,2-Dichloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2-Butanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4H4-2	WP-G-5H2-2	WP-G-DUP	WP-G-5H3-3	WP-G-RB	Trip Blank
Date	2/13/12	2/14/12	2/14/12	2/15/12	2/15/12	2/13/12
ARI Lab. I.D.	122839-UI48H	122840-UI48I	122843-UI48L	122841-UI48J	122842-UI48K	122844-UI48M
Carbon tetrachloride	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Vinyl acetate	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromodichloromethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichloropropane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
cis -1,3-Dichloropropene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Trichloroethene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dibromochloromethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-Trichloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans -1,3-Dichloropropene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2-Chloroethylvinylether	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4-Methyl-2-pentanone (MIBK)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-Tetrachloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	<0.2	<0.2	<0.2	<0.2	**0.4**	<0.2
Chlorobenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Styrene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Trichlorofluoromethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-Trichloro-1,2,2-trifluoroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m,p-Xylenes	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
o-Xylene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-Dichlorobenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,4-Dichlorobenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acrolein	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl iodide	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acrylonitrile	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloropropene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dibromomethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,1,2-Tetrachloroethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dibromo-3-chloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-Trichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans -1,4-Dichloro-2-butene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4H4-2	WP-G-5H2-2	WP-G-DUP	WP-G-5H3-3	WP-G-RB	Trip Blank
Date	2/13/12	2/14/12	2/14/12	2/15/12	2/15/12	2/13/12
ARI Lab. I.D.	122839-UI48H	122840-UI48I	122843-UI48L	122841-UI48J	122842-UI48K	122844-UI48M
1,3,5-Trimethylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2,4-Trimethylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromochloromethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorodifluoromethane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,2-Dichloropropane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-Dichloropropane	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Isopropylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
n-Propylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromobenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2-Chlorotoluene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4-Chlorotoluene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
tert-Butylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
sec-Butylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4-Isopropyltoluene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
n-Butylbenzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2,4-Trichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-Trichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methyl *tert*-butyl ether	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Polycyclic Aromatic Hydrocarbons [PAH's] (µg/l)						
Naphthalene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
2-Methylnaphthalene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
1-Methylnaphthalene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Acenaphthylene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Acenaphthene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Fluorene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Phenanthrene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Anthracene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Fluroanthene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Pyrene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Benzo(a)anthracene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Chrysene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Benzo(a)pyrene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Indeno(1,2,3-cd)pyrene	<0.10	<0.10	<0.10	<0.10	<0.10	-----

TABLE 5-14 - Wypenn Groundwater Analytical Data - February 2012

Location	WP-G-4H4-2	WP-G-5H2-2	WP-G-DUP	WP-G-5H3-3	WP-G-RB	Trip Blank
Date	2/13/12	2/14/12	2/14/12	2/15/12	2/15/12	2/13/12
ARI Lab. I.D.	122839-UI48H	122840-UI48I	122843-UI48L	122841-UI48J	122842-UI48K	122844-UI48M
Dibenz(a,h)anthracene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Benzo(g,h,i)perylene	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Dibenzofuran	<0.10	<0.10	<0.10	<0.10	<0.10	-----
total Benzofluoranthenes	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Chlorinated Pesticides (µg/l)						
α-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	-----
β-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	-----
δ-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	-----
γ-BHC (Lindane)	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Heptachlor	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Aldrin	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Heptachlor epoxide	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Endosulfan I	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10	-----
4,4'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Endrin	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Endosulfan II	<0.10	<0.10	<0.10	<0.10	<0.10	-----
4,4'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Endosulfan sulfate	<0.10	<0.10	<0.10	<0.10	<0.10	-----
4,4'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Methoxychlor	<0.50	<0.50	<0.50	<0.50	<0.50	-----
Endrin ketone	<0.10	<0.10	<0.10	<0.10	<0.10	-----
Endrin aldehyde	<0.10	<0.10	<0.10	<0.10	<0.10	-----
trans-Chlordane (β & γ)	<0.050	<0.050	<0.050	<0.050	<0.050	-----
cis-Chlordane (α)	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Toxaphene	<5.0	<5.0	<5.0	<5.0	<5.0	-----
Hexachlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	-----
Hexachlorobutadiene	<0.050	<0.050	<0.050	<0.050	<0.050	-----

Notes: < - Not detected at indicated reporting level
J - Estimated concentration (analysis outside of recommended holding time)
R - Unusable/rejected data due to interference
(a) - Dark coffee colored water

TABLE 5-15 - East Channel Ditch Water Analytical Data - 2012/2013

Sample Designation	Type	Northing (feet) (c)	Easting (feet) (c)	Collection Date	Lab. Spl. I.D.	Field Parameters pH	Conductivity (µmhos)	Temp. (C)	Dissolved Oxygen (mg/l)	ORP (mV)	Ferrous Iron (mg/l)	Turbidity (NTU)
AKM-SW-ECD-0+00	Ditch Water	710591	1175808	04/05/12	126032-UP37A/126047-UP37P	8.2	1611	9.29	10	6.2	0	20
AKM-SW-ECD-0+50	Ditch Water	710546	1175780	04/05/12	126033-UP37B/126048-UP37Q	8.3	1152	9.2	10	9.5	0	10.7
AKM-SW-ECD-1+00	Ditch Water	710498	1175778	04/05/12	126034-UP37C/126049-UP37R	8.2	907	9.2	10	10.8	0	2.5
AKM-SW-ECD-1+50	Ditch Water	710447	1175779	04/05/12	126035-UP37D/126050-UP37S	8.1	706	8.9	7.9	11.9	0	2.6
AKM-SW-ECD-2+00	Ditch Water	710397	1175774	04/05/12	126036-UP37E/126051-UP37T	9.3	624	8.8	6	3	-----	3.2
AKM-SW-ECD-2+50	Ditch Water	710350	1175772	04/05/12	126037-UP37F/126052-UP37U	8.4	631	8.6	4.7	5.9	-----	2.6
AKM-SW-ECD-2+50	Blind Dup.	710350	1175772	04/05/12	126046-UP37O/126061-UP37AD	-----	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-3+00	Ditch Water	710298	1175769	04/05/12	126038-UP37G/126053-UP37V	8.0	545	9.9	5.7	9.1	0	2.9
AKM-SW-ECD-3+50	Ditch Water	710253	1175768	04/05/12	126039-UP37H/126054-UP37W	7.8	498	10.1	5.1	9.6	0	3.7
AKM-SW-ECD-4+00	Ditch Water	710202	1175766	04/05/12	126040-UP37I/126055-UP37X	7.6	489	9.9	4.3	10.8	0	3.5
AKM-SW-ECD-0+00	Ditch Water	710588	1175806	01/18/13	131402-WA38C	9.3	7010	5.6	8.7	-1	0	14.5
AKM-SW-ECD-0+20	Ditch Water	710578	1175796	01/18/13	131403-WA38D	9.4	6060	5.3	8.6	14	0	7.7
AKM-SW-ECD-0+45	Ditch Water	710559	1175785	01/18/13	131404-WA38E	9.3	5150	5	8.9	4.1	0	5.8
AKM-SW-ECD-0+60	Ditch Water	710535	1175779	01/18/13	131405-WA38F	9.1	4350	4.6	8	5.4	0	7.9
AKM-SW-ECD-4+50	Ditch Water	710150	1175766	01/22/13	131630-WA69A	7.1	1030	4.6	2.1	27.2	2.4	9.9
AKM-SW-ECD-5+25	Ditch Water	710075	1175758	01/22/13	131631-WA69B	7.0	881	3.6	0.7	34.2	0.6	14
AKM-SW-ECD-7+15	Ditch Water	709885	1175747	01/22/13	131632-WA69C	7.2	334	3.3	0.3	-3.5	3.8	132
AKM-SW-ECD-9+00	Ditch Water	709708	1175752	01/22/13	131633-WA69D	6.9	462	3.6	1.9	4.5	5	28.4
AKM-G-ECD-SEEP1	GW Seep	710580	1175791	04/05/12	126041-UP37J/126056-UP37Y	9.4	6152	18.4	7.4	-14.4	0.2	26.8
AKM-G-ECD-SEEP1	GW Seep	710577	11755791	01/18/13	131400-WA38A	9.6	6840	5.4	7.9	91.5	0	452
AKM-G-ECD-SEEP2	GW Seep	710556	1175781	04/05/12	126042-UP37K/126057-UP37Z	9.4	23128	12.1	5.8	-16.4	-----	18.3
AKM-G-ECD-SEEP2	GW Seep	710556	1175780	01/18/13	131401-WA38B	9.6	6320	4.3	7.9	60.3	0	96.4
AKM-G-ECD-SEEP3	GW Seep	710514	1175776	04/05/12	126043-UP37L/126058-UP37AA	10.4	11325	11.8	1.0	-29.9	0	12.4
AKM-G-ECD-SEEP4	GW Seep	710492	1175772	04/05/12	126044-UP37M/126059-UP37AB	8.1	4756	10.3	5.9	-4.1	0	16.6
AKM-G-ECD-RB	Rinsate	-----	-----	04/05/12	126045-UP37N/126060-UP37AC	-----	-----	-----	-----	-----	-----	-----

Notes: (a) - nonfiltered samples
(b) - field-filtered samples
(c) - Sample coordinate locations - Trimble GPS - US State Plane Coordinates 1983, Washington South 4602, NAD 1983 (CONUS) CORS96.

TABLE 5-15 - East Channel Ditch Water Analytical Data - 2012/2013

Sample Designation	Type	Total Arsenic (a) (µg/l)	Dissolved Arsenic (b) (µg/l)	Dissolved Arsenite (b) (ug/l)	Dissolved Arsenate (b) (ug/l)	Dissolved Other As Species (b) (ug/l)	Dissolved Arsenic Species (b) (sum-ug/l)	Sulfide (a) mg/l	DOC (b) mg/l
AKM-SW-ECD-0+00	Ditch Water	39	34	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-0+50	Ditch Water	36.4	32.4	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-1+00	Ditch Water	33.9	28.9	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-1+50	Ditch Water	33.6	30.2	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-2+00	Ditch Water	28.6	24.9	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-2+50	Ditch Water	31.7	26.6	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-2+50	Blind Dup.	30.8	25.5	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-3+00	Ditch Water	38.3	23.4	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-3+50	Ditch Water	41.6	23.3	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-4+00	Ditch Water	41.2	32.9	-----	-----	-----	-----	-----	-----
AKM-SW-ECD-0+00	Ditch Water	-----	-----	1.50 J	62.9	1.17	65.6	<0.050	15.6
AKM-SW-ECD-0+20	Ditch Water	-----	-----	1.45 J	53.9	0	55.4	<0.050	13.6
AKM-SW-ECD-0+45	Ditch Water	-----	-----	1.80 J	53.0	0	54.8	<0.050	15.6
AKM-SW-ECD-0+60	Ditch Water	-----	-----	2.20	60.2	0	62.4	<0.050	13.7
AKM-SW-ECD-4+50	Ditch Water	-----	-----	15.8	30.2	4.09	50.1	<0.050	19.6
AKM-SW-ECD-5+25	Ditch Water	-----	-----	5.72	14.5	1.63	21.9	<0.050	13.1
AKM-SW-ECD-7+15	Ditch Water	-----	-----	72.8	12.3	1.92	87.0	<0.050	16.5
AKM-SW-ECD-9+00	Ditch Water	-----	-----	8.35	2.38	0	10.7	<0.050	13.2
AKM-G-ECD-SEEP1	GW Seep	184	183	-----	-----	-----	-----	<0.050	24.8
AKM-G-ECD-SEEP1	GW Seep	-----	-----	6.44	268	7.1	282	<0.050	22.8
AKM-G-ECD-SEEP2	GW Seep	153	174	-----	-----	-----	-----	<0.050	8.24
AKM-G-ECD-SEEP2	GW Seep	-----	-----	<0.65	256	2.18	258	<0.050	22.1
AKM-G-ECD-SEEP3	GW Seep	200	194	-----	-----	-----	-----	0.470	18.3
AKM-G-ECD-SEEP4	GW Seep	256	250	-----	-----	-----	-----	<0.050	8.65
AKM-G-ECD-RB	Rinsate	<0.2	<0.2	-----	-----	-----	-----	<0.050	<1.50

Notes: (a) - nonfiltered samples
(b) - field-filtered samples
J - Estimated concentration

TABLE 5-16 - Shoreline Porewater Analytical Data

Field I.D. / Location	Matrix	Collection Date	Comments	Lab I.D.	pH	Cond. (mS/cm)	Temp. (C)	DO (mg/L)	Eh (mV)	Ferrous Iron [field] (mg/L)	TSS (mg/L)	DOC (mg/L)
AKM-Pore-Subcap-High	interstitial/pore water	12/17/2008	Subtidal Cap - High Tide - 13.2 feet MLLW	OE78	7.1	52.2	-----	3.3	103 (ORP)	-----	-----	-----
AKM-Pore-Subcap-Low	interstitial/pore water	12/17/2008	Subtidal Cap - Low Tide - 6.2 feet MLLW	OE78	7.3	47.9	-----	-----	107 (ORP)	-----	-----	-----
AKM-PW-119+25	interstitial/pore water	9/23/2012		1218309-VK54A	7.8	36.5	15.3	1.2	385.5	0	**26.8**	**2.92**
AKM-PW-120+75	interstitial/pore water	9/25/2012		1218522-VK85A	7.8	34.5	13.0	0.3	253.9	0.4	**60.4**	**2.75**
AKM-PW-DUPL1	interstitial/pore water	9/25/2012	dup. 120+75	1218523-VK85B	-----	-----	-----	-----	-----	-----	**591**	**2.18**
AKM-PW-123+25	interstitial/pore water	9/24/2012		1218426-VK74A	7.8	36.6	14.8	3.7	377.8	1.6	**1240**	**2.06**
AKM-PW-125+00	interstitial/pore water	9/24/2012		1218427-VK74B	7.8	35.9	14.0	4.4	408.1	0	**26.5**	**2.06**
AKM-PW-126+80	interstitial/pore water	9/24/2012		1218428-VK74C	7.5	35.5	14.0	4.3	433.8	0	**85.6**	**2.38**
AKM-WC-126+80-UP	estuarine water	9/24/2012	mid-channel	1218429-VK74D	7.9	31.8	15.4	7.5	378.5	0	**6.8**	**2.03**
AKM-WC-126+80-DWN	estuarine water	9/24/2012	mid-channel	1218430-VK74E	7.8	37.1	14.8	5.3	368.1	0	**116**	**2.12**
AKM-PW-128+50	interstitial/pore water	9/23/2012		1218310-VK54B	7.9	35.6	13.8	4.7	408.0	0	**18.3**	**2.27**
AKM-PW-130+75	interstitial/pore water	9/23/2012		1218311-VK54C	7.4	34.7	13.2	5.5	441.2	0	**15.9**	**2.56**

Notes: *J = estimate associated with value less than the verifiable lower quantitation limit.*

J_R = estimate; due to low matrix spike recovery. Value likely biased low.

J_V = estimate; due to elevated RDP from duplicate analysis.

U = nondetected at the associated lower reporting limit.

TABLE 5-16 - Shoreline Porewater Analytical Data

Field I.D. / Location	Matrix	Chloride (mg/L)	Sulfate (mg/L)	Sulfides (mg/L)	Alkalinity (mgCaCO3/L)	diss. As (µg/L)	Arsenite (µg/L)	Arsenate (µg/L)	As (other species) (µg/L)	diss. Ca (µg/L)	diss. Fe (µg/L)	diss. Mg (µg/L)	Hardness (mg/L)
AKM-Pore-Subcap-High	interstitial/pore water	16700	2130	-----	-----	21	-----	-----	-----	-----	-----	-----	-----
AKM-Pore-Subcap-Low	interstitial/pore water	16500	2120	-----	-----	21	-----	-----	-----	-----	-----	-----	-----
AKM-PW-119+25	interstitial/pore water	**16,900**	**2360**	0.05 U	**117**	**15**	**4.67**	**8.04**	-----	**331,000**	250 U	**1,070,000**	5233
AKM-PW-120+75	interstitial/pore water	**17,100**	**2320**	0.05 U	**128**	**39**	**17.2**	**10.3**	**0.82**	**345,000**	**1460**	**1,070,000**	5268
AKM-PW-DUPL1	interstitial/pore water	**17,100**	**2250**	0.05 U	**124**	**38**	**20.0**	**8.91**	**1.02**	**345,000**	**1540**	**1,090,000**	5350
AKM-PW-123+25	interstitial/pore water	**17,200**	**2380**	0.05 U	**110**	**7**	**3.31**	**1.30 J**	-----	**353,000**	**980**	**1,090,000**	5370
AKM-PW-125+00	interstitial/pore water	**17,100**	**2430**	0.05 U	**111**	**6**	0.31 U	**1.91 J**	-----	**355,000**	250 U	**1,120,000**	5499
AKM-PW-126+80	interstitial/pore water	**17,100**	**2360**	0.05 U	**108**	**7**	**0.43 J**	**1.78 J**	-----	**354,000**	250 U	**1,120,000**	5496
AKM-WC-126+80-UP	estuarine water	**14,200**	**1920**	0.05 U	**105**	**9**	0.31 U	0.76 U	-----	**289,000**	100 U	**921,000**	4514
AKM-WC-126+80-DWN	estuarine water	**17,500**	**2410**	0.05 U	**110**	**7**	0.31 U	0.76 U	-----	**356,000**	250 U	**1,130,000**	5542
AKM-PW-128+50	interstitial/pore water	**17,500**	**2390**	0.05 U	**108**	**8**	0.31 U	0.76 U	-----	**344,000**	250 U	**1,120,000**	5471
AKM-PW-130+75	interstitial/pore water	**17,600**	**2430**	0.05 U	**109**	**12**	0.31 U	**1.49 J**	-----	**330,000**	250 U	**1,070,000**	5230

Notes: *J = estimate associated with value less than the verifiable lower quantitation limit.*

J_R = estimate; due to low matrix spike recovery. Value likely biased low.

J_V = estimate; due to elevated RDP from duplicate analysis.

U = nondetected at the associated lower reporting limit.

TABLE 5-17 - Groundwater Screening Levels

Constituent	Malcolm Pirnie 2006		Ch. 173-201A		EPA Recommended Criteria (d)		National Toxics Rule		MTCA - Method B		Screening Level
	MP-SL (ug/l)	Source	SL (ug/l)	Route	SL (ug/l)	Route	SL (ug/l)	Route	SL (ug/l)	Route	(ug/l)
VOCs											
Chloroform	815	(a)	-----	-----	470	(e)	470	(e)	6900	(e)	470
Tetrachloroethene	45	(a)	-----	-----	3.3	(e)	8.9	(e)	100	(e)	3.3
Trichloroethene	1940	(a)	-----	-----	30	(e)	81	(e)	13	(e)	13
Vinyl Chloride	-----	-----	-----	-----	2.4	(e)	530	(e)	6600	(e)	2.4
SVOCs											
Hexachlorobutadiene	0.3	(a)	-----	-----	18	(e)	50	(e)	30	(e)	18
Pesticides											
4-4'-DDD	0.001	(b)	0.001	(f)	0.00031	(e)	0.00084	(e)	0.0005	(e)	0.0008 (i)
4-4'-DDE	0.001	(b)	0.001	(f)	0.00022	(e)	0.00059	(e)	0.0004	(e)	0.0008 (i)
4-4'-DDT	0.001	(b)	0.001	(f)	0.00022	(e)	0.00059	(e)	0.0004	(e)	0.0008 (i)
Endosulfan II (h)	0.0087	(b)	0.0087	(f)	-----	-----	0.0087	(f)	58	(e)	0.0087
Dissolved Metals											
Arsenic	36	(b)	36	(f)	0.14	(e)	0.14	(e)	0.098	(e)	5 (g)
Chromium (as Cr VI)	50	(b)	50	(f)	50	(f)	50	(f)	490	(e)	50
Copper	3.1	(b)	3.1	(f)	3.1	(f)	2.4	(f)	2900	(e)	2.4
Lead	8.1	(b)	8.1	(f)	8.1	(f)	8.1	(f)	-----	(e)	8.1
Mercury	-----	-----	0.025	(f)	0.025	(f)	0.025	(f)	-----	-----	0.025
Nickel	8.2	(b)	8.2	(f)	8.2	(f)	8.2	(f)	1100	(e)	8.2
Zinc	81	(b)	81	(f)	81	(f)	81	(f)	17000	(e)	81
Conventionals											
pH	7-8.5	(c)	6.5-9	-----	6.5-8.5	-----	-----	-----	-----	-----	6.5-8.5

Notes: (a) - EPA Region 3 - 2005 BTAG Marine Screening Benchmark
(b) - Aquatic Life Marine Chronic - Ch. 173-201A
(c) - Class B water classification
(d) - From CLARC (Ecology's On-Line Database)
(e) - Human health - consumption of aquatic organism
(f) - Protection of marine organism (marine chronic)
(g) - Adjusted to Washington State background
(h) - Criteria for endosulfan
(i) - Adjusted to the practical quantitation limit (PQL)

TABLE 7-1 - Penite Area Analytical Data - May 2007

Sample Location	Depth (feet)	Metals (mg/kg)				
		Arsenic	Copper	Lead	Nickel	Zinc
Total Number of Soil Analyses		**20**	**20**	**20**	**20**	**20**
MA28	6	600	19J	7.8	10	25
MA31	6	770	120	150	100	270
MA34	10	570	13	12	7.1	30
MA36	6	630	11	<6.3	6.8	17
MA36	9	700	9.5	<6.3	5.3	13
MA37	6	550	10	<6.3	5.8	17
MA44	6	1,300	21	<6.0	9.1	16
MA45	9	810	14	<6.4	4	97
MA46	8	720	12	<6.6	6.5	16
MA47	8	810	7	<6.4	3.6	11
MA48	9.5	880	10	<6.4	5	15
MA52	8.5	1,200	11	<6.8	5.1	14
PT32	0	720	59	28	14	41
PT33	0	4,200	510	340	11	49
PT33	6	25,000	2000	1800	30	120
PT34	6	550	51	15	14	72
PT35	6	3,300	210	330	9.8	170
PT36	6	630	38	27	7.8	53
PT37A	6	1,100	20	7.4	14	87
PT38A	6	570	19	17	5.6	35
Mean Concentration		2281	158	140	14	58

TABLE 7-2 - Bark Sediment Analytical Data

Location	As (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Zn (mg/kg)
BSL-2	14.7	40.5	21.2	112	75.8
BSL-3	22.4	43.6	27.4	132	82.2
BSL-3D	24.3	43.1	28.7	148	81.5
BSL-4	14.7	94.7	24.6	81.2	75.2
BSL-6	11.8	31.6	20.2	98	71.5
BSL-7	14.2	25.6	12.7	145	52.6
BSL-8	22	37.6	28.2	102	74.8
BSL-10	25.1	44.2	26.4	122	79.8
BSL-11	22.9	37.9	25.6	98.7	72.6
BSL-11D	33.9	52.9	34.2	167	99.6
BSL-12	24	43.1	27	130	79.2
BSL-13	29.1	159	36	85.4	103
BSL-17	20.8	49.6	24.6	119	77.8
BSL-18	14.7	51.3	27.4	128	87.3
BSL-22	31.1	43.2	22.8	102	74.9
BSL-24	23.4	48.5	28.3	132	78.6
BSL-25	25.7	53.3	31.2	145	86.4
BSL-28	38.7	82.1	30.4	161	101
BSL-32	29.1	54.4	29.4	161	103
BSL-32D	50.8	43.3	26.6	99.1	75.8
BSL-34	27.9	52.4	19.5	117	74.1
BSL-40	24	56.8	33.2	164	96.2
BSL-41	38.1	53.1	34	130	86.7
BSL-41D	39.4	55	35.9	134	91.9
BSL-42	4.03	53.6	31.7	137	91.8
BSL-43	38.8	59.3	32.4	120	97.8
BSL-45	26.6	47.6	27.8	147	80.3
BSL-46	25.8	52.9	26.6	145	83.4
BSL-50	39	51	27.4	153	91.4
BSL-51	31.8	59.4	32.9	200	103
BSL-52	36.5	45.8	26.3	145	82.9
BSL-55	27.5	43.9	26.4	148	89.4
BSL-55D	35.5	35.8	22.1	124	69.7
BSL-56	41.8	46.2	29.3	168	93.8
BSL-57	30.4	45.7	26.4	150	84.8
Mean Concentration	27	53	28	133	84

Source: Boateng (1990)

TABLE 7-3 - Taylor Lake Sediment Analytical Data

Sample Location	Depth (feet)	Metals (mg/kg)				
		Arsenic	Copper	Lead	Nickel	Zinc
TLA10	6	**21**	**59**	**41**	**97**	**100**
TLA11	6	**12**	**28**	**20**	**180**	**61**
TLA12	6	7.3	22	13	160	42
TLA13	6	13	24	21	180	54
TLA15	6	100	26	20	84	63
TLA16	6	15	32	23	300	75
TLA17	6	15	41	48	92	110
TLA18	6	25	29	16	130	76
Mean Concentration		26	33	26	153	73

TABLE 7-4 - USG Pre-Remediation Soil Data (MW-9 Area)

Sample Location	Depth (feet)	Metals (mg/kg)				
		Arsenic	Copper	Lead	Nickel	Zinc
HA-15	1.25	15000	1700	6400	na	5400
HA-1	1	14000	2800	10000	na	11000
B24	3	7700	920	3200	na	3300
HA-4	1.3	6900	2200	4200	na	7800
HA-9	.5-1.3	4400	1400	2600	na	3300
HA-2	0.5	4300	1900	3100	na	6800
B23	1	4100	1500	2500	na	2200
HA-12	.75-1	3800	2700	2300	na	4500
HA-13	0.75	3500	1400	2200	na	3600
HA-28	3	2900	22	10	na	26
HA-8	.75-1	2400	7000	1600	na	3200
HA-15	2.25	2300	310	620	na	1000
HA-20	1	2100	1900	1600	na	1400
HA-20	1.5	2100	2200	1400	na	1800
HA-29	3	1900	49	100	na	210
HA-3	0.75	1700	1600	1700	na	8700
B25	1	1700	200	620	na	740
HA-11	.5-1.5	1600	350	1100	na	1900
HA-18	.75-1	1400	2200	1900	na	7700
HA-2	1.65	1100	110	220	na	530
HA-5	.5-1.5	1100	520	1000	na	1400
HA-10	.5-1.5	1100	130	230	na	690
B23	1.5	1100	840	940	na	3700
HA-16	0.75	810	620	720	na	3100
HA-12	2.5	740	310	300	na	550
HA-21	.75-1	720	130	280	na	570
B26	1.5	630	2200	630	na	4400
Mean Concentration		3374	1378	1906	na	3315

Source: Kennedy/Jenks (2002) - Appendix K

TABLE 8-1 Shoreline Porewater Analytical Data

Field I.D. / Location	Matrix	Collection Date	Comments	Lab I.D.	pH	Cond. (mS/cm)	Temp. (C)	DO (mg/L)	Eh (mV)	Ferrous Iron [field] (mg/L)	TSS (mg/L)	DOC (mg/L)
AKM-Pore-Subcap-High	interstitial/pore water	12/17/2008	Subtidal Cap - High Tide - 13.2 feet MLLW	OE78	7.1	52.2	-----	3.3	103 (ORP)	-----	-----	-----
AKM-Pore-Subcap-Low	interstitial/pore water	12/17/2008	Subtidal Cap - Low Tide - 6.2 feet MLLW	OE78	7.3	47.9	-----	-----	107 (ORP)	-----	-----	-----
AKM-PW-119+25	interstitial/pore water	9/23/2012		1218309-VK54A	7.8	36.5	15.3	1.2	385.5	0	**26.8**	**2.92**
AKM-PW-120+75	interstitial/pore water	9/25/2012		1218522-VK85A	7.8	34.5	13.0	0.3	253.9	0.4	**60.4**	**2.75**
AKM-PW-DUPL1	interstitial/pore water	9/25/2012	dup. 120+75	1218523-VK85B	-----	-----	-----	-----	-----	-----	**591**	**2.18**
AKM-PW-123+25	interstitial/pore water	9/24/2012		1218426-VK74A	7.8	36.6	14.8	3.7	377.8	1.6	**1240**	**2.06**
AKM-PW-125+00 (a)	interstitial/pore water	9/24/2012		1218427-VK74B	7.8	35.9	14.0	4.4	408.1	0	**26.5**	**2.06**
AKM-PW-126+80 (a)	interstitial/pore water	9/24/2012		1218428-VK74C	7.5	35.5	14.0	4.3	433.8	0	**85.6**	**2.38**
AKM-WC-126+80-UP	estuarine water	9/24/2012	mid-channel	1218429-VK74D	7.9	31.8	15.4	7.5	378.5	0	**6.8**	**2.03**
AKM-WC-126+80-DWN	estuarine water	9/24/2012	mid-channel	1218430-VK74E	7.8	37.1	14.8	5.3	368.1	0	**116**	**2.12**
AKM-PW-128+50	interstitial/pore water	9/23/2012		1218310-VK54B	7.9	35.6	13.8	4.7	408.0	0	**18.3**	**2.27**
AKM-PW-130+75	interstitial/pore water	9/23/2012		1218311-VK54C	7.4	34.7	13.2	5.5	441.2	0	**15.9**	**2.56**

Notes: *J = estimate associated with value less than the verifiable lower quantitation limit.*

J_R = estimate; due to low matrix spike recovery. Value likely biased low.

J_V = estimate; due to elevated RDP from duplicate analysis.

U = nondetected at the associated lower reporting limit.

(a) - From subtidal cap

(b) - Sample may be biased high because of chloride interference

TABLE 8-1 Shoreline Porewater Analytical Data

Field I.D. / Location	Matrix	Chloride (mg/L)	Sulfate (mg/L)	Sulfides (mg/L)	Alkalinity (mgCaCO3/L)	diss. As (µg/L) (b)	Arsenite (µg/L)	Arsenate (µg/L)	As (other species) (µg/L)	diss. Ca (µg/L)	diss. Fe (µg/L)	diss. Mg (µg/L)	Hardness (mg/L)
AKM-Pore-Subcap-High	interstitial/pore water	16700	2130	-----	-----	21	-----	-----	-----	-----	-----	-----	-----
AKM-Pore-Subcap-Low	interstitial/pore water	16500	2120	-----	-----	21	-----	-----	-----	-----	-----	-----	-----
AKM-PW-119+25	interstitial/pore water	**16,900**	**2360**	0.05 U	**117**	**15**	**4.67**	**8.04**	-----	**331,000**	250 U	**1,070,000**	5233
AKM-PW-120+75	interstitial/pore water	**17,100**	**2320**	0.05 U	**128**	**39**	**17.2**	**10.3**	**0.82**	**345,000**	**1460**	**1,070,000**	5268
AKM-PW-DUPL1	interstitial/pore water	**17,100**	**2250**	0.05 U	**124**	**38**	**20.0**	**8.91**	**1.02**	**345,000**	**1540**	**1,090,000**	5350
AKM-PW-123+25	interstitial/pore water	**17,200**	**2380**	0.05 U	**110**	**7**	**3.31**	**1.30 J**	-----	**353,000**	**980**	**1,090,000**	5370
AKM-PW-125+00 (a)	interstitial/pore water	**17,100**	**2430**	0.05 U	**111**	**6**	0.31 U	**1.91 J**	-----	**355,000**	250 U	**1,120,000**	5499
AKM-PW-126+80 (a)	interstitial/pore water	**17,100**	**2360**	0.05 U	**108**	**7**	**0.43 J**	**1.78 J**	-----	**354,000**	250 U	**1,120,000**	5496
AKM-WC-126+80-UP	estuarine water	**14,200**	**1920**	0.05 U	**105**	**9**	0.31 U	0.76 U	-----	**289,000**	100 U	**921,000**	4514
AKM-WC-126+80-DWN	estuarine water	**17,500**	**2410**	0.05 U	**110**	**7**	0.31 U	0.76 U	-----	**356,000**	250 U	**1,130,000**	5542
AKM-PW-128+50	interstitial/pore water	**17,500**	**2390**	0.05 U	**108**	**8**	0.31 U	0.76 U	-----	**344,000**	250 U	**1,120,000**	5471
AKM-PW-130+75	interstitial/pore water	**17,600**	**2430**	0.05 U	**109**	**12**	0.31 U	**1.49 J**	-----	**330,000**	250 U	**1,070,000**	5230

Notes: *J = estimate associated with value less than the verifiable lower quantitation limit.*

J_R = estimate; due to low matrix spike recovery. Value likely biased low.

J_V = estimate; due to elevated RDP from duplicate analysis.

U = nondetected at the associated lower reporting limit.

(a) - From subtidal cap

(b) - Sample may be biased high because of chloride interference

TABLE 8-2 - Shoreline Sediment Analytical Data - 2008

Designation	AKM-SE-123+30-IC	AKM-SE-125+60-IC	AKM-SE-128+60-IC	AKM-Sed-125+00	AKM-Sed-127+00	AKM-Sed-133+00
Sample Type	Intertidal Cap	Intertidal Cap	Intertidal Cap	Subtidal Cap	Subtidal Cap	Reference
Interval (cm)	0-10	0-10	0-10	0-10	0-10	0-10
Date	9/24/08	9/24/08	9/24/08	12/17/08	12/17/08	12/17/08
Lab Group	NQ78	NQ78	NQ78	OE78	OE78	OE78
Conventionals						
Total Solids (%)	85.3	84.2	85.0	80.7	76.1	65.9
Total Preserved Solids (%)	78.0	87.2	74.7	85.5	85.9	51.5
Sulfide (mg/kg)	13.4	<1.11	<1.30	17.4	2.16	39.2
TOC (%)	0.313	0.204	0.209	0.549	0.089	1.0
Total Metals (mg/kg-dry)						
Arsenic	7	20	<6	6	<6	<7
Iron	21700	17700	21900	15200	13400	17700

Notes: < - Not detected at indicated reporting level
J - Estimated concentration

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	Collection Date	Comments	Lab I.D.	Solids (%)	TOC (%)	Sulfides (mg/kg)	As (mg/kg)	Ca (mg/kg)	Fe (mg/kg)
Intertidal Samples										
AKM-SE-112+75 (IT)	+4/0-10	8/31/2012	N711922 / E1174435	1216677-VH91A	70	**2.04**	**98.5**	20 U	**5040**	**25,500**
AKM-SE-114+75 (IT)	+4/0-10	8/31/2012	N711790 / E1174566	1216678-VH91B	63	**3.45**	**318**	**14**	**12,600**	**19,000**
AKM-SE-116+50 (IT)	+4/0-10	8/31/2012	N711659 / E1174694	1216679-VH91C	80	**0.933**	**1.40**	**13**	**4940**	**25,100**
AKM-SE-119+25 (IT)	+3/0-10	8/31/2012	N711495 / E1174931	1216680-VH91D	82	**1.17**	**17.4**	**14**	**4370**	**18,500**
AKM-SE-120+75 (IT)	+3/0-10	8/31/2012	N711389 / E1175065	1216681-VH91E	80	**2.07**	**7.51**	**11**	**8520**	**20,400**
AKM-SE-123+25 (IT)	+3/0-10	8/31/2012	N711202 / E1175231	1216682-VH91F	85	**0.337**	1.25 U	**8**	**5730**	**25,500**
AKM-SE-125+75 (IT)	+3/0-10	8/31/2012	N711035 / E1175411	1216683-VH91G	75	**2.32**	1.24 U	**19**	**27,000**	**19,100**
AKM-SE-128+50 (IT)	+3/0-10	8/31/2012	N711839 / E1175617	1216684-VH91H	89	**0.476**	1.18 U	**7**	**5940**	**19,100**
AKM-SE-130+75 (IT)	+3/0-10	8/31/2012	N711717 / E1175743	1216685-VH91I	89	**0.393**	**5.08**	**6**	**5300**	**20,300**
AKM-SE-132+25 (IT)	+3/0-10	8/31/2012	N710604 / E1175853	1216686-VH91J	74	**1.58**	1.34 U	6 U	**6090**	**17,600**
Subtidal Samples										
AKM-SE-112+75-ST1	-5/0-10	9/23/2012		1218370-VK59A / 1218447-VK76A	77	**0.892**	**172**	**21 J_V**	**13,800**	**15,700**
AKM-CORE-112+75-ST1	-5/20-30	9/23/2012		1218444-VK64A / 1218447-VK76A	80	**0.204**	-----	**9.1**	-----	-----
AKM-SE-112+75-ST2	-25/0-10	9/23/2012		1218371-VK59B	59	**1.68**	**82.7**	**11.8**	**5990**	**17,400**
AKM-SE-114+75-ST1	-5/0-10	9/23/2012		1218372-VK59C	69	**0.636**	**52.6**	**4.7**	**15,100**	**12,900**
AKM-SE-114+75-ST2	-25/0-10	9/23/2012		1218373-VK59D	61	**1.32**	**156**	**16.6**	**6300**	**23,100**
AKM-SE-116+50-ST1	-5/0-10	9/23/2012		1218374-VK59E / 1218448-VK76B	63	**1.08**	**309**	**6.5**	**14,700**	**15,700**
AKM-CORE-116+50-ST1	-5/20-30	9/23/2012		1218445-VK64B / 1218448-VK76B	80	**0.747**	-----	**9.1**	-----	-----
AKM-SE-116+50-ST2	-25/0-10	9/23/2012		1218375-VK59F	60	**1.40**	**248**	**11.7**	**6680**	**20,300**
AKM-SE-119+25-ST1	-5/0-10	9/23/2012		1218376-VK59G	71	**0.869**	**288**	**7.9**	**5720**	**14,700**
AKM-SE-119+25-ST2	-25/0-10	9/23/2012		1218377-VK59H	59	**1.18**	**365**	**6.3**	**5750**	**16,100**
AKM-SE-120+75-ST1	-5/0-10	9/25/2012		1218524-VK86A / 1218532-VK88A	76	**0.531**	**203**	**6.3**	**6170**	**15,100**
AKM-SE-120+75-ST2	-25/0-10	9/25/2012		1218525-VK86B	57	**2.38**	**459**	**16.8**	**15,600**	**23,700**
AKM-SE-DUP3	0-10	9/25/2012	dup. 120+75-ST2	1218526-VK86C	67	**2.09**	**518**	**15.8**	**15,100**	**19,400**
AKM-CORE-120+75-ST1	-5/20-30	9/25/2012		1218531-VK87A	71	**1.96**	-----	**5.3**	-----	-----
AKM-SE-123+25-ST1	-5/0-10	9/24/2012		1218450-VK77A / 1218464-VK79A	69	**0.925**	**885**	**35.7**	**7450 J_V**	**14,500**
AKM-CORE-123+25-ST1	-5/20-30	9/24/2012		1218459-VK87A	76	**0.117**	-----	**2.1**	-----	-----
AKM-SE-123+25-ST2	-25/0-10	9/24/2012		1218451-VK77B	58	**1.56**	**221**	**19.8**	**6030**	**20,100**
AKM-SE-125+00-ST1	-5/0-10	9/24/2012		1218452-VK77C	77	**1.91**	**10.0**	**9.3**	**5810**	**13,000**
AKM-SE-125+00-ST2	-25/0-10	9/24/2012		1218453-VK77D / 1218465-VK79B	51	**1.95**	**166**	**21.7**	**11,400**	**22,200**
AKM-CORE-125+00-ST2	-5/20-30	9/24/2012		1218460-VK78B	68	**1.26**	-----	**14.1**	-----	-----
AKM-SE-126+80-ST1	-5/0-10	9/24/2012		1218454-VK77E	84	**1.59**	**9.85**	**6.7**	**5330**	**15,800**
AKM-SE-126+80-ST2	-25/0-10	9/24/2012		1218455-VK77F	54	**2.16**	**161**	**19.2**	**15,700**	**21,200**
AKM-SE-128+50-ST1	-5/0-10	9/23/2012		1218378-VK59I / 1218449-VK76C	31	**4.42**	**6.24**	**17.5**	**8160**	**16,800**
AKM-CORE-128+50-ST1	-5/20-30	9/23/2012		1218446-VK64C / 1218449-VK76C	71	**0.333**	-----	**3.5**	-----	-----
AKM-SE-128+50-ST2	-25/0-10	9/23/2012		1218379-VK59J	59	**2.78**	**1180**	**28.5**	**10,600**	**15,100**
AKM-SE-130+75-ST1	-5/0-10	9/23/2012		1218380-VK59K	68	**0.473**	1.45 U	**2.2**	**4610**	**11,100**
AKM-SE-130+75-ST2	-25/0-10	9/23/2012		1218381-VK59L	85	**0.302**	1.22 U	**3.6**	**3790**	**15,400**
AKM-SE-132+25-ST1	-5/0-10	9/24/2012		1218456-VK77G / 1218466-VK79C	60	**1.19**	16.4 U	**3.8**	**5850**	**13,800**
AKM-SE-DUP2	0-10	9/24/2012	dup. 132+25-ST1	1218458-VK77I / 1218467-VK79D	62	**1.27**	16.5 U	**2.8**	**5710**	**14,000**
AKM-CORE-132+25-ST1	-5/20-30	9/24/2012		1218461-VK78C	72	**0.428**	-----	**1.4**	-----	-----
AKM-CORE-DUP1	20-30	9/24/2012	dup. 132+25-ST1	1218462-VK78D	71	**0.424**	-----	**1.4**	-----	-----
AKM-SE-132+25-ST2	-25/0-10	9/24/2012		1218457-VK77H	57	**2.60**	**81.4**	**4.9**	**5680**	**27,100**
AKM-SE-ECD	0-10	9/24/2012		1218463-VK78E	69	**2.14**	-----	**27.7**	-----	-----

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	Mg (mg/kg)	Phenol (µg/kg)	*bis* -(2-Chloroethyl) ether (µg/kg)	2-Chloro-phenol (µg/kg)	1,3-Dichloro-benzene (µg/kg)	1,4-Dichloro-benzene (µg/kg)	Benzyl alcohol (µg/kg)	1,2-Dichloro-benzene (µg/kg)	2-Methyl-phenol (µg/kg)	2,2'-Oxy*bis* (1-chloropropane) (µg/kg)
Intertidal Samples											
AKM-SE-112+75 (IT)	+4/0-10	**5030**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	**4580**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	**4290**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	**4390**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	**4800**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	**4620**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	**3940**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	**4530**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	**4440**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	**4430**	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples											
AKM-SE-112+75-ST1	-5/0-10	**3930**	**22**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-112+75-ST1	-5/20-30	-----	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-112+75-ST2	-25/0-10	**4710**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	**3280**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	**5030**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	**5800**	**10 J**	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-CORE-116+50-ST1	-5/20-30	-----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-SE-116+50-ST2	-25/0-10	**5290**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	**3810**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	**4500**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	**3800**	**100**	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-120+75-ST2	-25/0-10	**5670**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	**5680**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	-----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**13 J**	19 U
AKM-SE-123+25-ST1	-5/0-10	**3680**	**23**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
AKM-CORE-123+25-ST1	-5/20-30	-----	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-123+25-ST2	-25/0-10	**5520**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	**4100**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	**6820**	**71**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-125+00-ST2	-5/20-30	-----	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
AKM-SE-126+80-ST1	-5/0-10	**4730**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	**6840**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	**9940**	**49**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-128+50-ST1	-5/20-30	-----	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-128+50-ST2	-25/0-10	**12,900**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	**3540**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	**4190**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	**4990**	**39**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-SE-DUP2	0-10	**4940**	**60**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-132+25-ST1	-5/20-30	-----	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-DUP1	20-30	-----	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-132+25-ST2	-25/0-10	**6410**	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	-----	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U	99 U

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	4-Methyl-phenol (µg/kg)	N-Nitroso-di-N-propylamine (µg/kg)	Hexachloro-ethane (µg/kg)	Nitro-benzene (µg/kg)	Isophorone (µg/kg)	2-Nitro-phenol (µg/kg)	2,4-Dimethyl-phenol (µg/kg)	Benzoic acid (µg/kg)	*bis* (2-Chloroethoxy) methane (µg/kg)	2,4-Dichloro-phenol (µg/kg)
Intertidal Samples											
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples											
AKM-SE-112+75-ST1	-5/0-10	37 U	19 U	19 U	19 U	19 U	94 U	19 U	370 U	19 U	190 U
AKM-CORE-112+75-ST1	-5/20-30	37 U	18 U	18 U	18 U	18 U	92 U	18 U	370 U	18 U	180 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	36 U	18 U	18 U	18 U	18 U	91 U	18 U	360 U	18 U	180 U
AKM-CORE-116+50-ST1	-5/20-30	39 U	19 U	19 U	19 U	19 U	96 U	19 U	390 U	19 U	190 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	37 U	18 U	18 U	18 U	18 U	92 U	18 U	370 U	18 U	180 U
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	**59**	19 U	19 U	19 U	19 U	94 U	**310**	380 U	19 U	190 U
AKM-SE-123+25-ST1	-5/0-10	39 U	20 U	20 U	20 U	20 U	98 U	**41**	390 U	20 U	200 U
AKM-CORE-123+25-ST1	-5/20-30	36 U	18 U	18 U	18 U	18 U	90 U	18 U	360 U	18 U	180 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	**25 J**	19 U	19 U	19 U	19 U	95 U	19 U	**240 J**	19 U	190 U
AKM-CORE-125+00-ST2	-5/20-30	39 U	20 U	20 U	20 U	20 U	98 U	20 U	390 U	20 U	200 U
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	38 U	19 U	19 U	19 U	19 U	95 U	19 U	380 U	19 U	190 U
AKM-CORE-128+50-ST1	-5/20-30	37 U	18 U	18 U	18 U	18 U	92 U	18 U	370 U	18 U	180 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	38 U	19 U	19 U	19 U	19 U	94 U	19 U	380 U	19 U	190 U
AKM-SE-DUP2	0-10	38 U	19 U	19 U	19 U	19 U	96 U	19 U	380 U	19 U	190 U
AKM-CORE-132+25-ST1	-5/20-30	37 U	19 U	19 U	19 U	19 U	93 U	19 U	370 U	19 U	190 U
AKM-CORE-DUP1	20-30	37 U	18 U	18 U	18 U	18 U	92 U	18 U	370 U	18 U	180 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	200 U	99 U	99 U	99 U	99 U	490 U	99 U	2000 U	99 U	990 U

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	1,2,4-Trichloro-benzene (µg/kg)	Naphthalene (µg/kg)	4-Chloro-aniline (µg/kg)	Hexachloro-butadiene (µg/kg)	4-Chloro-3-methylphenol (µg/kg)	2-Methyl-naphthalene (µg/kg)	1-Methyl-naphthalene (µg/kg)	Hexachloro-cyclopenta-diene (µg/kg)	2,4,6-Trichloro-phenol (µg/kg)
Intertidal Samples										
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples										
AKM-SE-112+75-ST1	-5/0-10	19 U	**20**	250 U	4.9 U	94 U	**11 J**	**9.4 J**	370 U	94 U
AKM-CORE-112+75-ST1	-5/20-30	18 U	18 U	250 U	0.97 U	92 U	18 U	18 U	370 U	92 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	18 U	**12 J**	240 U	4.9 U	91 U	**10 J**	**14 J**	360 U	91 U
AKM-CORE-116+50-ST1	-5/20-30	19 U	19 U	260 U	0.97 U	96 U	19 U	19 U	390 U	96 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	18 U	**42**	250 U	0.93 U	92 U	18 U	18 U	370 U	92 U
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	19 U	**61**	260 U	0.98 U	94 U	19 U	**10 J**	380 U	94 U
AKM-SE-123+25-ST1	-5/0-10	20 U	**16 J**	260 U	4.7 U	98 U	20 U	20 U	390 U	98 U
AKM-CORE-123+25-ST1	-5/20-30	18 U	18 U	240 U	0.95 U	90 U	18 U	18 U	360 U	90 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	19 U	**69**	260 U	**4.5 J**	95 U	**36**	**23**	380 U	95 U
AKM-CORE-125+00-ST2	-5/20-30	20 U	**22**	260 U	0.95 U	98 U	20 U	20 U	390 U	98 U
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	19 U	**24**	260 U	**5.4 J_P**	95 U	19 U	19 U	380 U	95 U
AKM-CORE-128+50-ST1	-5/20-30	18 U	**36**	250 U	0.97 U	92 U	**12 J**	**10 J**	370 U	92 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	19 U	19 U	250 U	0.96 U	94 U	19 U	19 U	380 U	94 U
AKM-SE-DUP2	0-10	19 U	19 U	260 U	0.98 U	96 U	19 U	19 U	380 U	96 U
AKM-CORE-132+25-ST1	-5/20-30	19 U	19 U	250 U	0.97 U	93 U	19 U	19 U	370 U	93 U
AKM-CORE-DUP1	20-30	18 U	18 U	250 U	0.97 U	92 U	18 U	18 U	370 U	92 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	99 U	99 U	1300 U	4.9 U	490 U	99 U	99 U	2000 U	490 U

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	2,4,5-Trichloro-phenol (µg/kg)	2-Chloro-naphthalene (µg/kg)	2-Nitro-aniline (µg/kg)	Dimethyl-phthalate (µg/kg)	Acenaph-thylene (µg/kg)	3-Nitro-aniline (µg/kg)	Acenaph-thene (µg/kg)	2,4-Dinitro-phenol (µg/kg)	4-Nitro-phenol (µg/kg)	Dibenzo-furan (µg/kg)
Intertidal Samples											
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples											
AKM-SE-112+75-ST1	-5/0-10	94 U	19 U	94 U	19 U	19 U	94 U	**36**	800 U	94 U	**13 J**
AKM-CORE-112+75-ST1	-5/20-30	92 U	18 U	92 U	18 U	18 U	92 U	18 U	790 U	92 U	18 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	91 U	18 U	91 U	18 U	18 U	91 U	18 U	770 U	91 U	18 U
AKM-CORE-116+50-ST1	-5/20-30	96 U	19 U	96 U	19 U	19 U	96 U	19 U	820 U	96 U	19 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	92 U	18 U	92 U	18 U	18 U	92 U	**19**	780 U	92 U	18 U
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	94 U	19 U	94 U	19 U	19 U	94 U	19 U	800 U	94 U	19 U
AKM-SE-123+25-ST1	-5/0-10	98 U	20 U	98 U	20 U	20 U	98 U	20 U	840 U	98 U	20 U
AKM-CORE-123+25-ST1	-5/20-30	90 U	18 U	90 U	18 U	18 U	90 U	18 U	760 U	90 U	18 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	95 U	19 U	95 U	19 U	**20**	95 U	**20**	810 U	95 U	**35**
AKM-CORE-125+00-ST2	-5/20-30	98 U	20 U	98 U	20 U	20 U	98 U	20 U	830 U	98 U	20 U
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	95 U	19 U	95 U	19 U	19 U	95 U	19 U	810 U	95 U	19 U
AKM-CORE-128+50-ST1	-5/20-30	92 U	18 U	92 U	18 U	18 U	92 U	18 U	780 U	92 U	18 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	94 U	19 U	94 U	19 U	19 U	94 U	19 U	800 U	94 U	19 U
AKM-SE-DUP2	0-10	96 U	19 U	96 U	19 U	19 U	96 U	19 U	810 U	96 U	19 U
AKM-CORE-132+25-ST1	-5/20-30	93 U	19 U	93 U	19 U	19 U	93 U	19 U	790 U	93 U	19 U
AKM-CORE-DUP1	20-30	92 U	18 U	92 U	18 U	18 U	92 U	18 U	780 U	92 U	18 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	490 U	99 U	490 U	99 U	99 U	490 U	99 U	4200 U	490 U	99 U

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	2,6-Dinitro-toluene (µg/kg)	2,4-Dinitro-toluene (µg/kg)	Diethyl-phthalate (µg/kg)	4-Chlorophenyl-phenylether (µg/kg)	Fluorene (µg/kg)	4-Nitro-aniline (µg/kg)	4,6-Dinitro-2-methylphenol (µg/kg)	N-Nitroso-diphenyl-amine (µg/kg)	4-Bromophenyl-phenylether (µg/kg)
Intertidal Samples										
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples										
AKM-SE-112+75-ST1	-5/0-10	94 U	94 U	47 U	19 U	**34**	94 U	190 U	19 U	19 U
AKM-CORE-112+75-ST1	-5/20-30	92 U	92 U	46 U	18 U	18 U	92 U	180 U	18 U	18 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	91 U	91 U	**210**	18 U	18 U	91 U	180 U	18 U	18 U
AKM-CORE-116+50-ST1	-5/20-30	96 U	96 U	**40 J**	19 U	19 U	96 U	190 U	19 U	19 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	92 U	92 U	46 U	18 U	18 U	92 U	180 U	18 U	18 U
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	94 U	94 U	47 U	19 U	19 U	94 U	190 U	19 U	19 U
AKM-SE-123+25-ST1	-5/0-10	98 U	98 U	49 U	20 U	20 U	98 U	200 U	20 U	20 U
AKM-CORE-123+25-ST1	-5/20-30	90 U	90 U	45 U	18 U	18 U	90 U	180 U	18 U	18 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	95 U	95 U	48 U	19 U	**25**	95 U	190 U	19 U	19 U
AKM-CORE-125+00-ST2	-5/20-30	98 U	98 U	49 U	20 U	20 U	98 U	200 U	20 U	20 U
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	95 U	95 U	48 U	19 U	19 U	95 U	190 U	19 U	19 U
AKM-CORE-128+50-ST1	-5/20-30	92 U	92 U	46 U	18 U	18 U	92 U	180 U	18 U	18 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	94 U	94 U	47 U	19 U	19 U	94 U	190 U	19 U	19 U
AKM-SE-DUP2	0-10	96 U	96 U	48 U	19 U	19 U	96 U	190 U	19 U	19 U
AKM-CORE-132+25-ST1	-5/20-30	93 U	93 U	**57**	19 U	19 U	93 U	190 U	19 U	19 U
AKM-CORE-DUP1	20-30	92 U	92 U	**82**	18 U	18 U	92 U	180 U	18 U	18 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	490 U	490 U	250 U	99 U	99 U	490 U	990 U	99 U	99 U

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	Hexachloro-benzene (µg/kg)	Pentachloro-phenol (µg/kg)	Phenanthrene (µg/kg)	Carbazole (µg/kg)	Anthracene (µg/kg)	Di-n-butyl-phthalate (µg/kg)	Fluoranthene (µg/kg)	Pyrene (µg/kg)	Butylbenzyl-phthalate (µg/kg)
Intertidal Samples										
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples										
AKM-SE-112+75-ST1	-5/0-10	4.9 U	190 U	**410**	**30**	**70**	19 U	**380**	**420**	**10 J**
AKM-CORE-112+75-ST1	-5/20-30	0.97 U	180 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	4.9 U	180 U	**53**	18 U	**13 J**	18 U	**58**	**69**	18 U
AKM-CORE-116+50-ST1	-5/20-30	0.97 U	190 U	19 U	19 U	19 U	19 U	19 U	**9.6 J**	19 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	0.93 U	180 U	**15 J**	18 U	18 U	18 U	**36**	**49**	18 U
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	0.98 U	190 U	**12 J**	19 U	19 U	19 U	19 U	19 U	19 U
AKM-SE-123+25-ST1	-5/0-10	4.7 U	200 U	**47**	20 U	**13 J**	20 U	**120**	**140**	20 U
AKM-CORE-123+25-ST1	-5/20-30	0.95 U	180 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	**7.2**	190 U	**110**	**22**	**60**	19 U	**190**	**280**	**26**
AKM-CORE-125+00-ST2	-5/20-30	0.95 U	200 U	**28**	20 U	**11 J**	20 U	**120**	**310**	20 U
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	0.98 U	190 U	**18 J**	19 U	19 U	19 U	**31**	**40**	19 U
AKM-CORE-128+50-ST1	-5/20-30	0.97 U	180 U	**16 J**	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	0.96 U	190 U	**13 J**	19 U	19 U	19 U	19 U	19 U	19 U
AKM-SE-DUP2	0-10	0.98 U	190 U	**12 J**	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-132+25-ST1	-5/20-30	0.97 U	190 U	**10 J**	19 U	19 U	19 U	19 U	19 U	19 U
AKM-CORE-DUP1	20-30	0.97 U	180 U	**10 J**	18 U	18 U	18 U	18 U	18 U	18 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	4.9 U	990 U	**74 J**	99 U	**79 J**	99 U	**200**	**210**	99 U

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	3,3'-Dichloro-benzidine (µg/kg)	Benzo(a) anthracene (µg/kg)	*bis* (2-Ethylhexyl) phthalate (µg/kg)	Chrysene (µg/kg)	Di-n-octyl phthalate (µg/kg)	total Benzo-fluoranthenes (µg/kg)	Benzo(a) pyrene (µg/kg)	Indeno(1,2,3-cd)pyrene (µg/kg)	Dibenz(a,h) anthracene (µg/kg)	Benzo(g,h,i) perylene (µg/kg)
Intertidal Samples											
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples											
AKM-SE-112+75-ST1	-5/0-10	140 U	**150**	**68**	**200**	19 U	**270**	**150**	**75**	**31**	**94**
AKM-CORE-112+75-ST1	-5/20-30	140 U	18 U	23 U	18 U	18 U	37 U	18 U	18 U	18 U	18 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	140 U	**32**	**89**	**63**	18 U	**86**	**34**	**18**	18 U	**23**
AKM-CORE-116+50-ST1	-5/20-30	140 U	19 U	**31 J_B**	19 U	19 U	**9.6 J**	19 U	19 U	19 U	19 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	140 U	**16 J**	**64 J_B**	**26**	18 U	**49**	**17 J**	18 U	18 U	**10 J**
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	140 U	19 U	**42 J_B**	19 U	19 U	38 U	19 U	19 U	19 U	19 U
AKM-SE-123+25-ST1	-5/0-10	150 U	**90**	**58 J_B**	**110**	20 U	**170**	**80**	**47**	**17 J**	**54**
AKM-CORE-123+25-ST1	-5/20-30	140 U	18 U	22 U	18 U	18 U	36 U	18 U	18 U	18 U	18 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	140 U	**110**	**160**	**270**	19 U	**490**	**160**	**95**	**31**	**110**
AKM-CORE-125+00-ST2	-5/20-30	150 U	**32**	**34 J_B**	**79**	20 U	**160**	**41**	**22**	**12 J**	**29**
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	140 U	**14 J**	**85**	**32**	19 U	**57**	**18 J**	**11 J**	19 U	**13 J**
AKM-CORE-128+50-ST1	-5/20-30	140 U	18 U	**25 J_B**	18 U	18 U	37 U	18 U	18 U	18 U	18 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	140 U	19 U	**40 J_B**	19 U	19 U	38 U	19 U	19 U	19 U	19 U
AKM-SE-DUP2	0-10	140 U	19 U	**34 J_B**	19 U	19 U	38 U	19 U	19 U	19 U	19 U
AKM-CORE-132+25-ST1	-5/20-30	140 U	19 U	**25 J_B**	19 U	19 U	37 U	19 U	19 U	19 U	19 U
AKM-CORE-DUP1	20-30	140 U	18 U	**23 J_B**	18 U	18 U	37 U	18 U	18 U	18 U	18 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	740 U	**200**	**240 J_B**	**650**	99 U	**870**	**250**	**160**	**74 J**	**170**

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	4,4'-DDE (µg/kg)	4,4'-DDD (µg/kg)	4,4'-DDT (µg/kg)	Aroclor 1016 (µg/kg)	Aroclor 1242 (µg/kg)	Aroclor 1248 (µg/kg)	Aroclor 1254 (µg/kg)	Aroclor 1260 (µg/kg)	Aroclor 1221 (µg/kg)	Aroclor 1232 (µg/kg)	Aroclor 1262 (µg/kg)	Aroclor 1268 (µg/kg)	total PCB's (µg/kg)
Intertidal Samples														
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples														
AKM-SE-112+75-ST1	-5/0-10	4.9 U	4.9 U	4.9 U	8.4 U	8.4 U	21 U	**55**	**24 J_P**	8.4 U	8.4 U	8.4 U	8.4 U	**79**
AKM-CORE-112+75-ST1	-5/20-30	0.97 U	0.97 U	0.97 U	8.6 U	17 U	8.6 U	**6.6 J**	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	4.9 U	4.9 U	4.9 U	8.4 U	8.4 U	17 U	**30**	**14 J_P**	8.4 U	8.4 U	8.4 U	8.4 U	**44**
AKM-CORE-116+50-ST1	-5/20-30	0.97 U	0.97 U	0.97 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	0.93 U	2.1 U	2.9 U	8.4 U	8.4 U	13 U	**30**	8.4 U	8.4 U	8.4 U	8.4 U	8.4 U	**30**
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	0.98 U	0.98 U	0.98 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U
AKM-SE-123+25-ST1	-5/0-10	4.7 U	4.7 U	16 U	9.7 U	9.7 U	34 U	**87**	**71**	9.7 U	9.7 U	9.7 U	9.7 U	**158**
AKM-CORE-123+25-ST1	-5/20-30	0.95 U	0.95 U	0.95 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	4.8 U	4.8 U	**17**	8.9 U	8.9 U	67 U	**140**	8.9 U	8.9 U	8.9 U	**56**	8.9 U	**196**
AKM-CORE-125+00-ST2	-5/20-30	**3.7**	**12**	**3.6**	9.3 U	9.3 U	19 U	28 U	14 U	9.3 U	9.3 U	9.3 U	9.3 U	28 U
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	0.98 U	0.98 U	0.98 U	9.2 U	9.2 U	28 U	**67**	18 U	9.2 U	9.2 U	9.2 U	9.2 U	**67**
AKM-CORE-128+50-ST1	-5/20-30	0.97 U	0.97 U	0.97 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	0.96 U	0.96 U	0.96 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U
AKM-SE-DUP2	0-10	0.98 U	0.98 U	0.98 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U
AKM-CORE-132+25-ST1	-5/20-30	0.97 U	0.97 U	0.97 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U	9.6 U
AKM-CORE-DUP1	20-30	0.97 U	0.97 U	0.97 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	4.9 U	4.9 U	4.9 U	9.0 U	9.0 U	**17**	**24**	**9.8**	9.0 U	9.0 U	9.0 U	9.0 U	**50.8**

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	gravel > 2000 µm %	v. coarse sand 2000 - 1000 µm %	coarse sand 1000 - 500 µm %	medium sand 500 - 250 µm %	fine sand 250 - 125 µm %	v. fine sand 125 - 62 µm %	coarse silt 62.5 - 31.0 µm %	medium silt 31.0 - 15.6 µm %
Intertidal Samples									
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples									
AKM-SE-112+75-ST1	-5/0-10	36.9	8.2	15.2	18.2	8.6	4.3	2.4	1.3
AKM-CORE-112+75-ST1	-5/20-30	18.8	2.5	16.7	38.6	18.3	3.5	< 1.6	< 1.6
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	39.5	2.9	6.5	16.6	15.5	6.7	1.9	2.3
AKM-CORE-116+50-ST1	-5/20-30	2.5	2.6	13.5	21.7	16.2	7.7	4.3	4.5
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	21.7	8.4	15.8	17.4	9.7	6.0	5.7	4.5
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	3.0	2.6	5.2	12.6	36.6	26.0	2.8	3.0
AKM-SE-123+25-ST1	-5/0-10	6.6	5.0	8.9	10.2	18.8	19.1	10.3	4.8
AKM-CORE-123+25-ST1	-5/20-30	0.1	0.1	0.1	1.5	19.9	36.9	27.0	8.2
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	0.9	1.8	3.6	9.9	10.3	8.9	8.1	10.8
AKM-CORE-125+00-ST2	-5/20-30	2.5	1.9	11.9	32.4	19.8	8.5	4.1	4.0
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	19.6	8.3	18.2	16.9	4.8	2.4	1.3	7.2
AKM-CORE-128+50-ST1	-5/20-30	22.1	6.3	10.7	10.9	5.6	9.6	12.1	8.1
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	5.6	2.4	1.7	1.2	1.5	4.9	15.0	23.4
AKM-SE-DUP2	0-10								
AKM-CORE-132+25-ST1	-5/20-30	0.2	0.9	2.0	1.9	7.0	25.3	9.8	29
AKM-CORE-DUP1	20-30								
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	33.5	5.1	10.7	19.4	12.8	5.0	2.5	3.4

TABLE 8-3 - Shoreline Sediment Analytical Data - 2012

Location / Field I.D.	Sample Elevation (a)/ Depth (cm)	fine silt 15.6 - 7.8 µm %	v. fine silt 7.8 - 3.9 µm %	total silt 62.5 - 3.9 µm %	clay 3.9 - 2.0 µm %	clay 2.0 - 1.0 µm %	clay < 1.0 µm %	total fines < 62 µm %
Intertidal Samples								
AKM-SE-112+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50 (IT)	+4/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-123+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25 (IT)	+3/0-10	-----	-----	-----	-----	-----	-----	-----
Subtidal Samples								
AKM-SE-112+75-ST1	-5/0-10	1.1	0.7	5.5	0.7	0.7	1.7	8.6
AKM-CORE-112+75-ST1	-5/20-30	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	1.6
AKM-SE-112+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-114+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-116+50-ST1	-5/0-10	2.3	1.5	8.0	1.1	1.3	2.1	12.3
AKM-CORE-116+50-ST1	-5/20-30	7.5	6.7	23.0	3.9	3.0	5.8	35.8
AKM-SE-116+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-119+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-120+75-ST1	-5/0-10	3.2	2.1	15.5	1.3	1.2	2.8	21.0
AKM-SE-120+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-DUP3	0-10	-----	-----	-----	-----	-----	-----	-----
AKM-CORE-120+75-ST1	-5/20-30	2.2	1.6	9.6	1.0	0.9	2.5	14.0
AKM-SE-123+25-ST1	-5/0-10	4.9	3.2	23.2	2.2	2.1	3.9	31.4
AKM-CORE-123+25-ST1	-5/20-30	2.7	1.0	38.9	0.6	0.2	1.6	41.4
AKM-SE-123+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-125+00-ST2	-25/0-10	11.4	10.4	40.7	6.6	5.9	11.4	64.6
AKM-CORE-125+00-ST2	-5/20-30	4.3	3.1	15.5	1.7	1.7	4.1	23.0
AKM-SE-126+80-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-126+80-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-128+50-ST1	-5/0-10	6.9	4.0	19.4	2.2	2.4	5.9	29.8
AKM-CORE-128+50-ST1	-5/20-30	5.9	3.1	29.2	1.6	1.1	2.9	34.8
AKM-SE-128+50-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST1	-5/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-130+75-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-132+25-ST1	-5/0-10	16.0	10.7	65.1	5.7	4.1	7.8	82.7
AKM-SE-DUP2	0-10							
AKM-CORE-132+25-ST1	-5/20-30	10.6	5.2	54.6	2.3	1.8	4.0	62.7
AKM-CORE-DUP1	20-30							
AKM-SE-132+25-ST2	-25/0-10	-----	-----	-----	-----	-----	-----	-----
AKM-SE-ECD	0-10	2.3	1.5	9.7	1.0	0.8	1.9	13.5

Notes:
J = estimate associated with value less than the verifiable lower quantitation limit.
J_P = estimate; due to high variability associated with dual-column analysis.
U = nondetected at the associated lower reporting limit.
(a) feet MLLW

TABLE 8-4 - Wedge Material Constituents Above SQOs

Former Arkema Manufacturing Plant
Tacoma, Washington

Constituent	SQO (a)	Highest Exceedance Factor (EF)(c)			Maximum Concentration	Soil Contact CUL (d)
		4' to 8' (b)	12' to 16'	20' to 24'		
Arsenic	57	52.6 (AT9)	40.4 (AT12)	5.3 (AT8)	3000	20
Nickel	140	13.6 (AT7)	none	none	1900	7000
Mercury	0.59	37.3 (AT8)	none	none	22	NA
Phenanthrene	1500	1.7 (AT9)	none	none	2550	NA
Benzo(ghi)perylene	720	1.1 (AT9/AT13*)	none	none	790	NA
Dibenzo(ah)anthracene	230	1.7 (AT13*)	none	none	390	18000
DDE	9	10.9 (AT9)	none	none	98	390000
DDT	34	23.5 (AT13*)	none	none	800	390000
DDD	16	4.0 (AT13*)	none	none	64	550000
Hexachlorobenzene	22	4.3 (AT9)	none	none	95	82000
Hexachlorobutadiene	11	40.9 (AT13*)	none	42.7 (AT14)	470	1700000
Tetrachloroethene	57	17.5 (AT16)	19.3 (AT14)	1.4 (AT13*)	1100	21000000

Notes: SQO - Sediment Quality Objective

(a) - Metal values in mg/kg; Organics values in ug/kg

(b) - The upper half (2 feet) of soil represented by the sample was remove by excavation

(b) - Exceedance factor calculated by dividing the sample concentration by the SQO

(c) - Ingestion only

* - Sample interval 5 to 8 feet. The upper foot of soil represented by the sample was removed by excavation.

NA - Not available

Data Source: DOF(2003)

TABLE 10-1 - Groundwater Elevation Data - 6-6-13

Arkema Manufacturing Plant
Tacoma, Washington

WELL ID	EASTING (ft)	NORTHING (ft)	ELEV. TOP OF CASTING (DOF 06/05/2013) (ft)	ELEV. TOP OF CASTING (INV. DATABASE) (ft)	Deviation from database	DEPTH TO WATER (ft)	CALCULATED* WATER ELEV. (ft)
4F1-1	1174667	710634	18.73	18.73	0.00	4.23	14.50
4G1-1	1174784	710311	18.59	18.57	0.02	5.28	13.29
4H1-1	1174767	710153	16.95	16.96	-0.01	3.23	13.73
4H3-1	1174766	710032	16.36	16.35	0.01	4.12	12.23
5F1-1*	1174894	710658	-	18.65	-	3.55	15.10
5G1-1	1175028	710416	19.04	19.03	0.01	4.42	14.61
5H1-1	1175023	710134	17.69	17.68	0.01	6.39	11.29
5H4-1	1175014	710140	17.20	17.17	0.03	6.06	11.11
5I2-1	1175099	709929	16.45	16.47	-0.02	3.31	13.16
6F2-1	1175194	710559	-	17.22		1.1	16.12
6G1-1	1175180	710423	16.06	16.21	-0.15	0.83	15.38
6H1-1	1175305	710160	20.00	20.02	-0.02	5.96	14.06
7G1-1	1175477	710302	-	20.15	-	5.68	14.47
7I1-1	1175501	709904	17.16	17.29	-0.13	4.6	12.69
8H1-1	1175644	710141	-	20.15	-	6.41	13.74
EPA-9SR	1175016	709886	18.15	18.18	-0.03	4.65	13.53
HC-11SR**	1174598	709793	-	-	-	18.93	-
HC-15SR	1175379	709365	18.37	18.44	-0.07	7.76	10.68
HC-16S	1175540	709651	15.14	15.24	-0.10	4.21	11.03
HC-26S	1175353	709827	17.42	17.45	-0.03	5.68	11.77
HC-4S	1174686	709951	-	17.65		3.85	13.80
MW-1	1175331	710909	-	19.96	-	3.69	16.27
MW-D	1175774	709691	15.22	15.31	-0.09	2.75	12.56
MW-J	1175970	709409	15.91	15.93	-0.02	4.59	11.34
MW-RRI-B-147S	1176053	709755	-	17.97	-	4.69	13.28

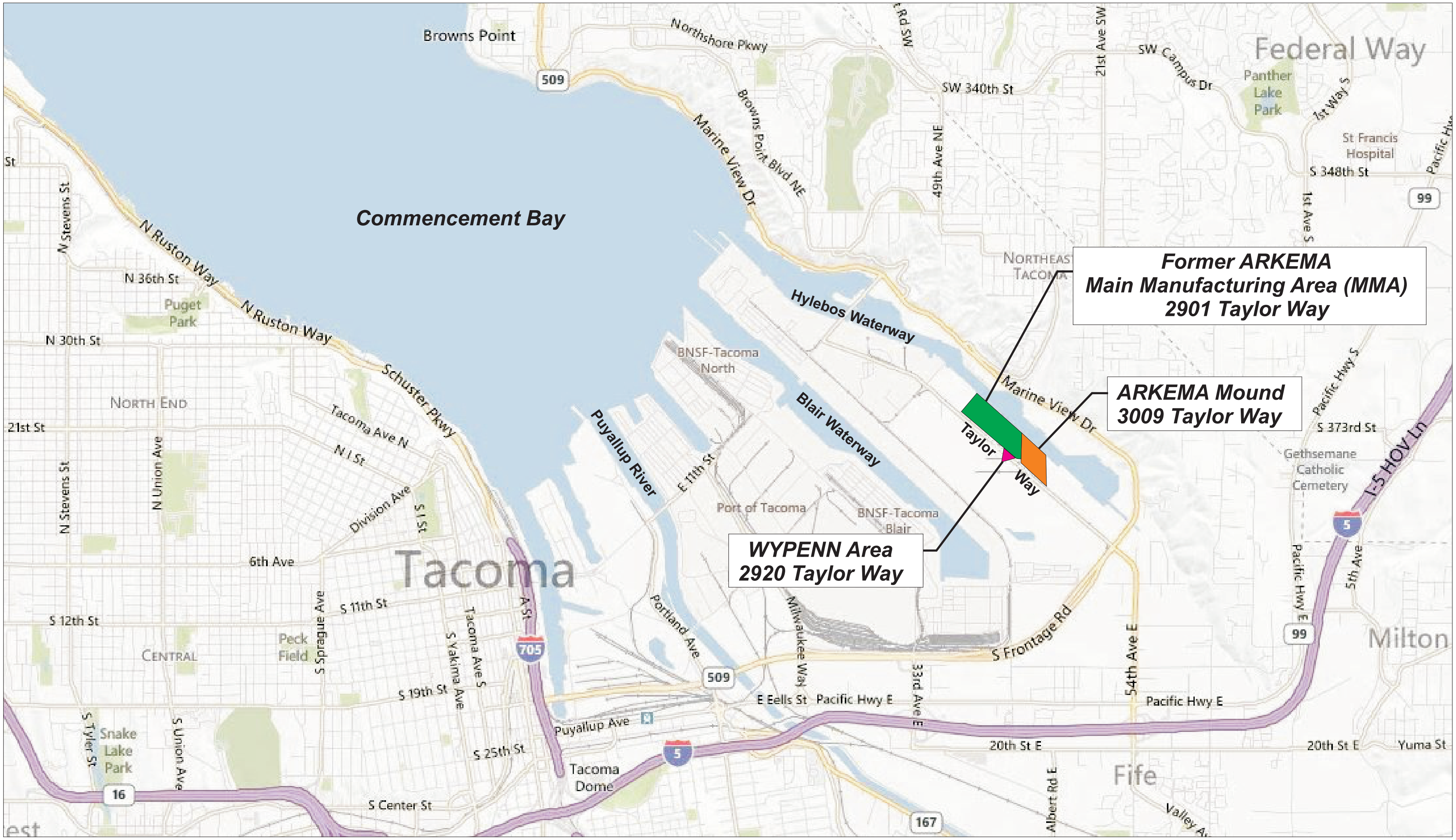
*CALC WATER ELEV. DETERMINED USING ELEV. TOP OF CASTING FROM INVENTORY DATABASE.

**WATER ELEV. UNABLE TO BE MEASURED. CASING COMPROMISED. FULL OF MUD

NOTES:

(1)DOF MEASURED ELEVATIONS RELATIVE TO 4F1-1

(2)W.L. MEASUREMENT TAKEN AT LOW TIDE OF -1.2' AT 10:31 AM ON 06/06/2013



Map Source: Bing Maps

True North

Site North

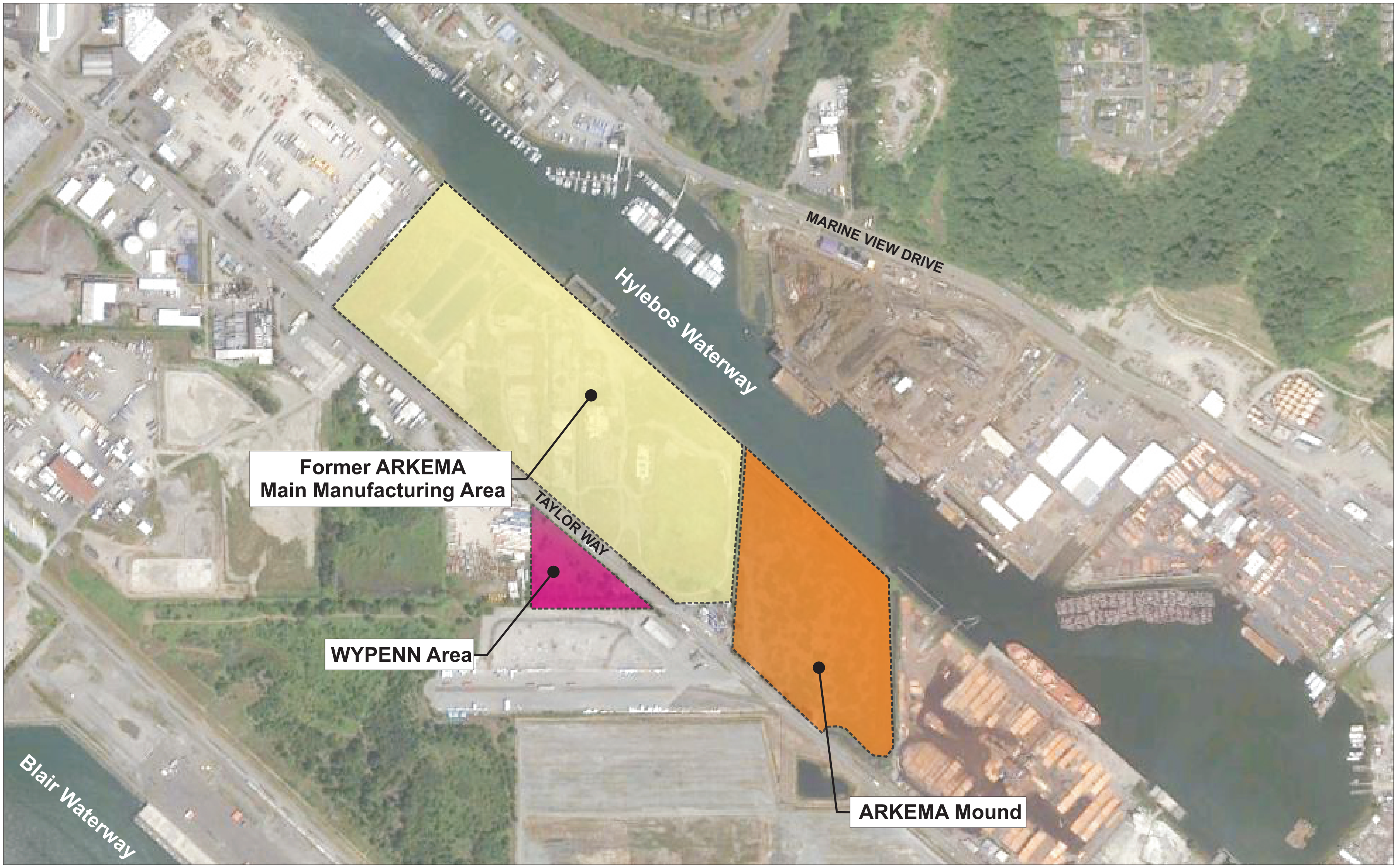
Former Arkema Manufacturing Plant
Tacoma, Washington

Vicinity Map

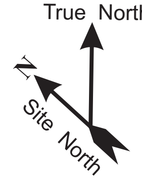
POT-001-00 **FIGURE 1-1** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Vicinity Map 3-2013.cdr



Map Source: Google Earth



0 1000
Scale in Feet

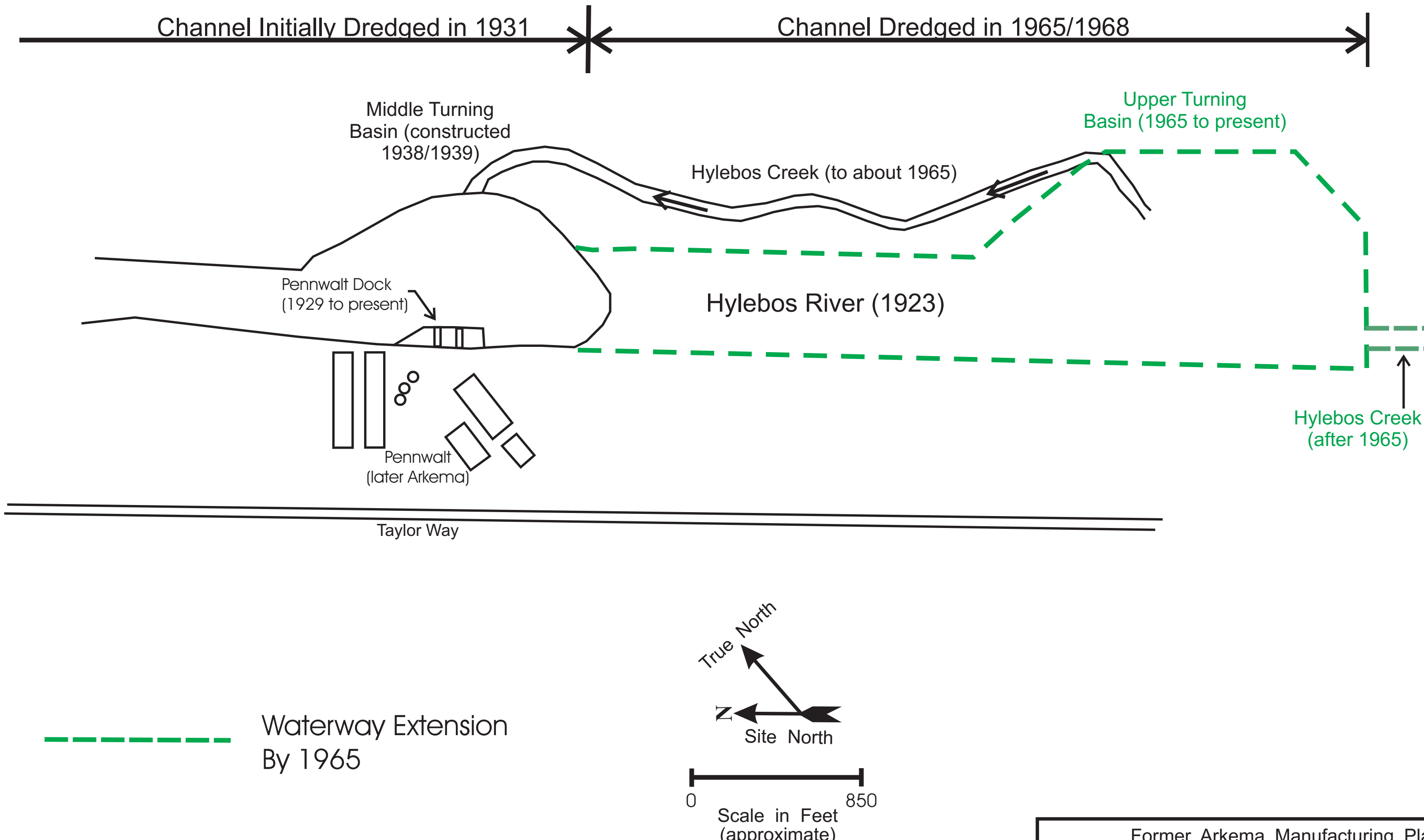
Ref: Site Vicinity Map F1-2 3-2013.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Site Vicinity Map

POT-001-00 **FIGURE 1-2** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



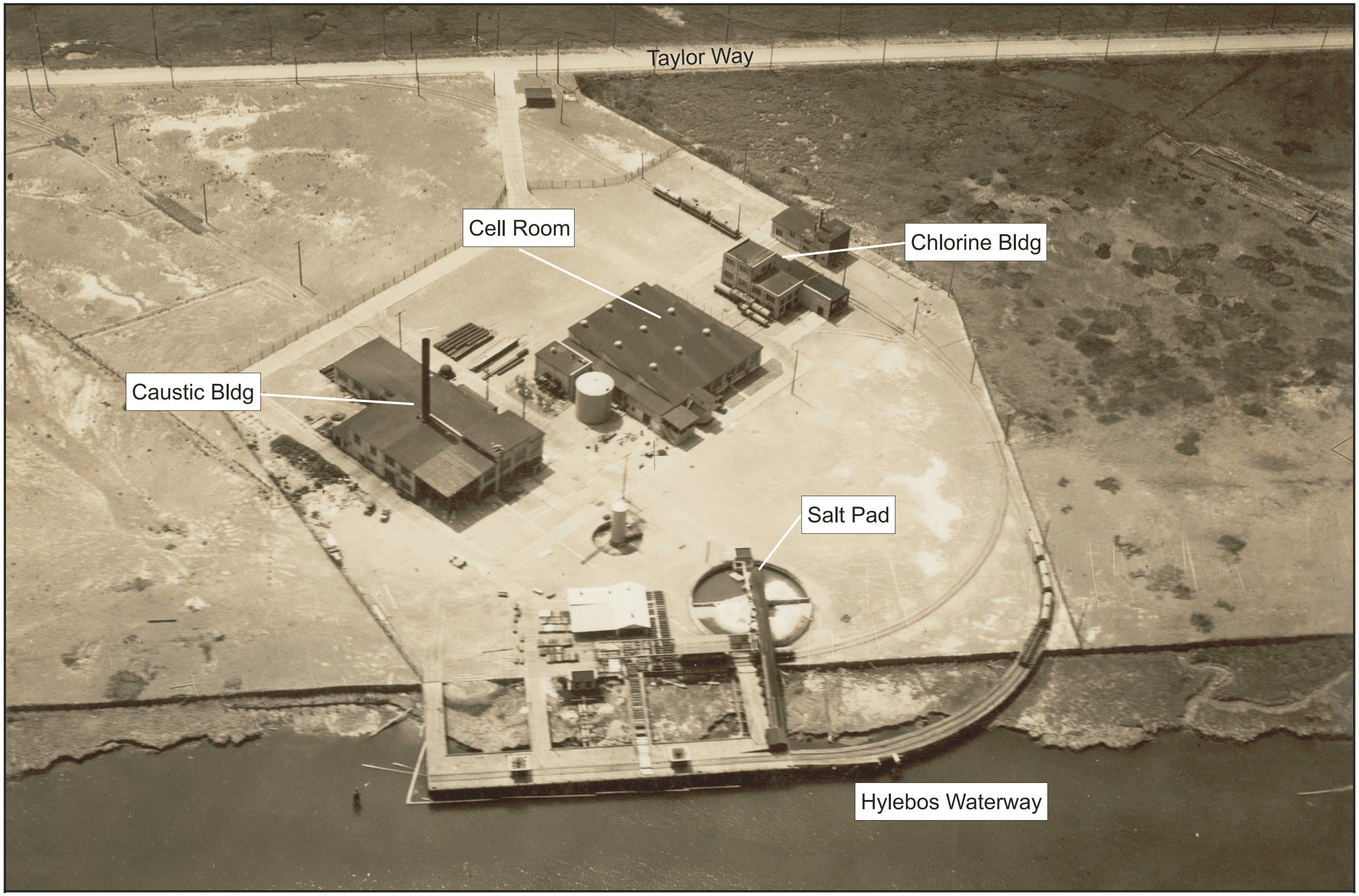
Former Arkema Manufacturing Plant
Tacoma, Washington

Hylebos Waterway Configuration

POT-001-00 **FIGURE 1-3** July 2011

Dalton, Olmsted & Fuglevand, Inc.

Ref: Trace 1959 w overlay 1.cdr



From: Malcolm Pirnie 2006

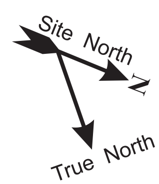
Ref: Arkema Photo 1940.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Facility 1940

POT-001-00 **FIGURE 1-4** July 2011

Dalton, Olmsted & Fuglevand, Inc.



From: Malcolm Pirnie 2006

Ref: Arkema Photo 1956.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Facility 1956

POT-001-00 **FIGURE 1-5** July 2011
Dalton, Olmsted & Fuglevand, Inc.

True North

N

Site North

From: Malcolm Pirnie 2006

Ref: Arkema Photo 1972.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Facility 1972

POT-001-00 **FIGURE 1-6** July 2011

Dalton, Olmsted & Fuglevand, Inc.

True North

N

Site North

From: Malcolm Pirnie 2006

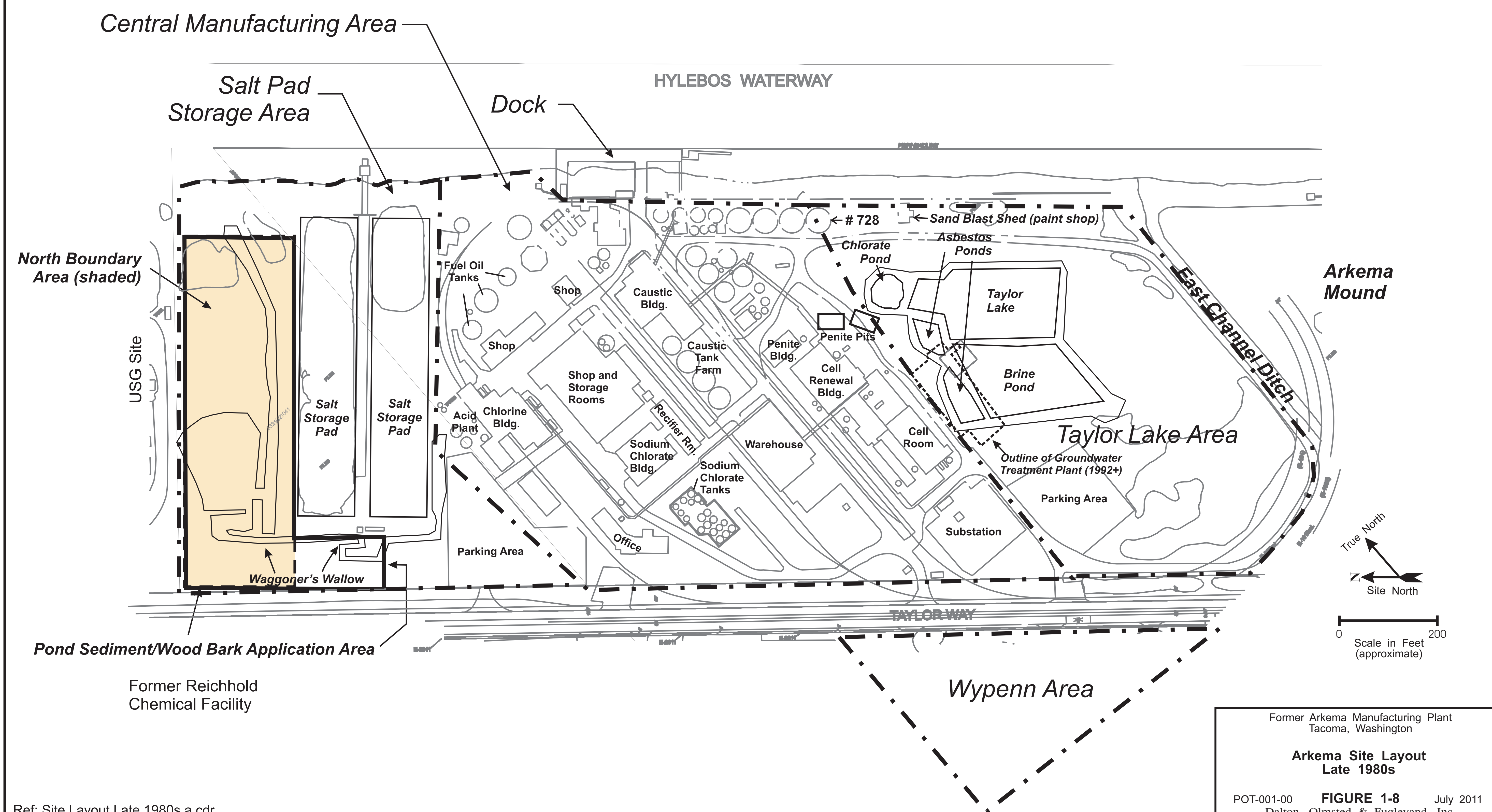
Ref: Arkema Photo 1990.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Facility 1990

POT-001-00 **FIGURE 1-7** July 2011

Dalton, Olmsted & Fuglevand, Inc.

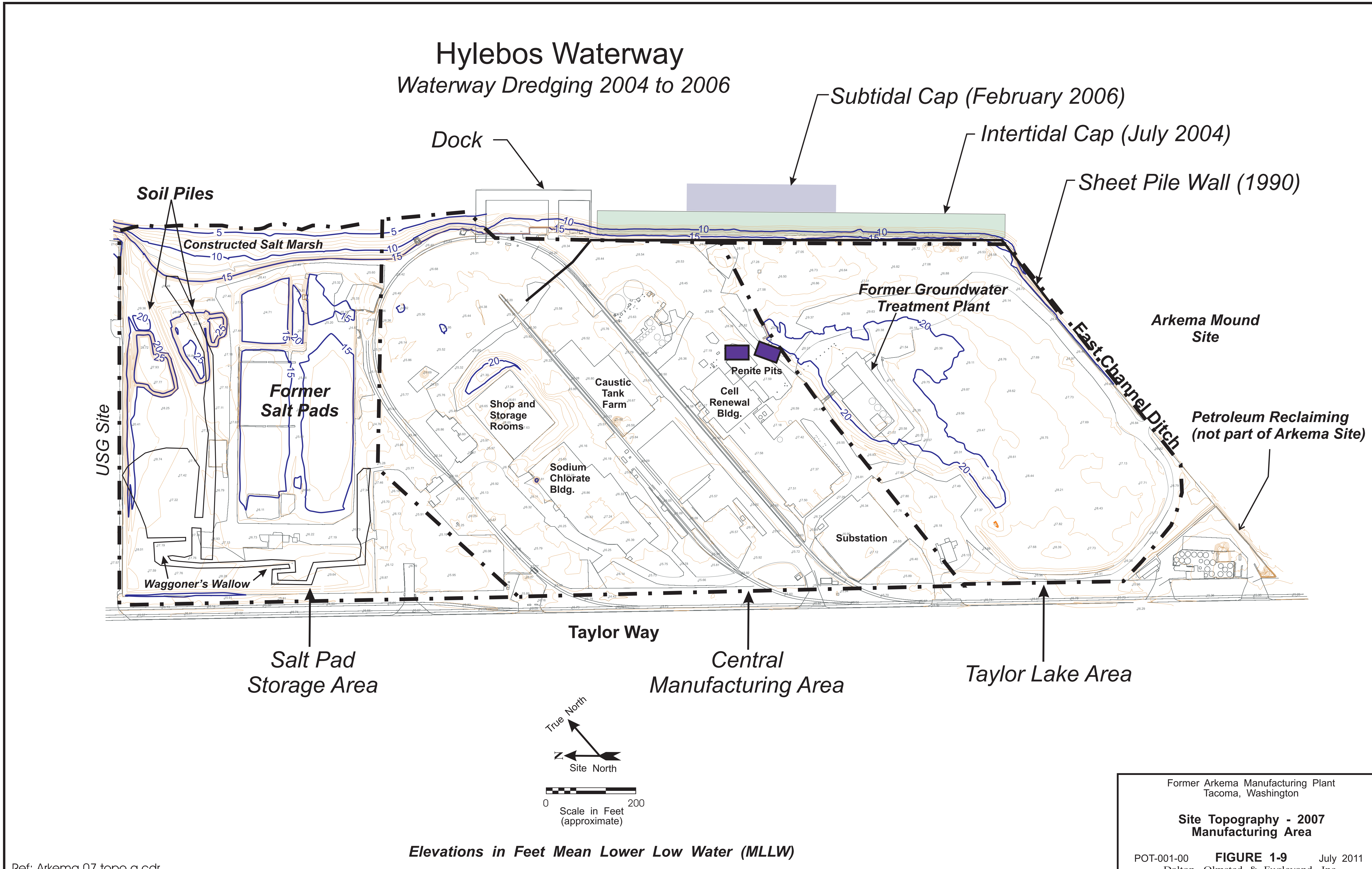


Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Site Layout
Late 1980s

POT-001-00 **FIGURE 1-8** July 2011

Dalton, Olmsted & Fuglevand, Inc.

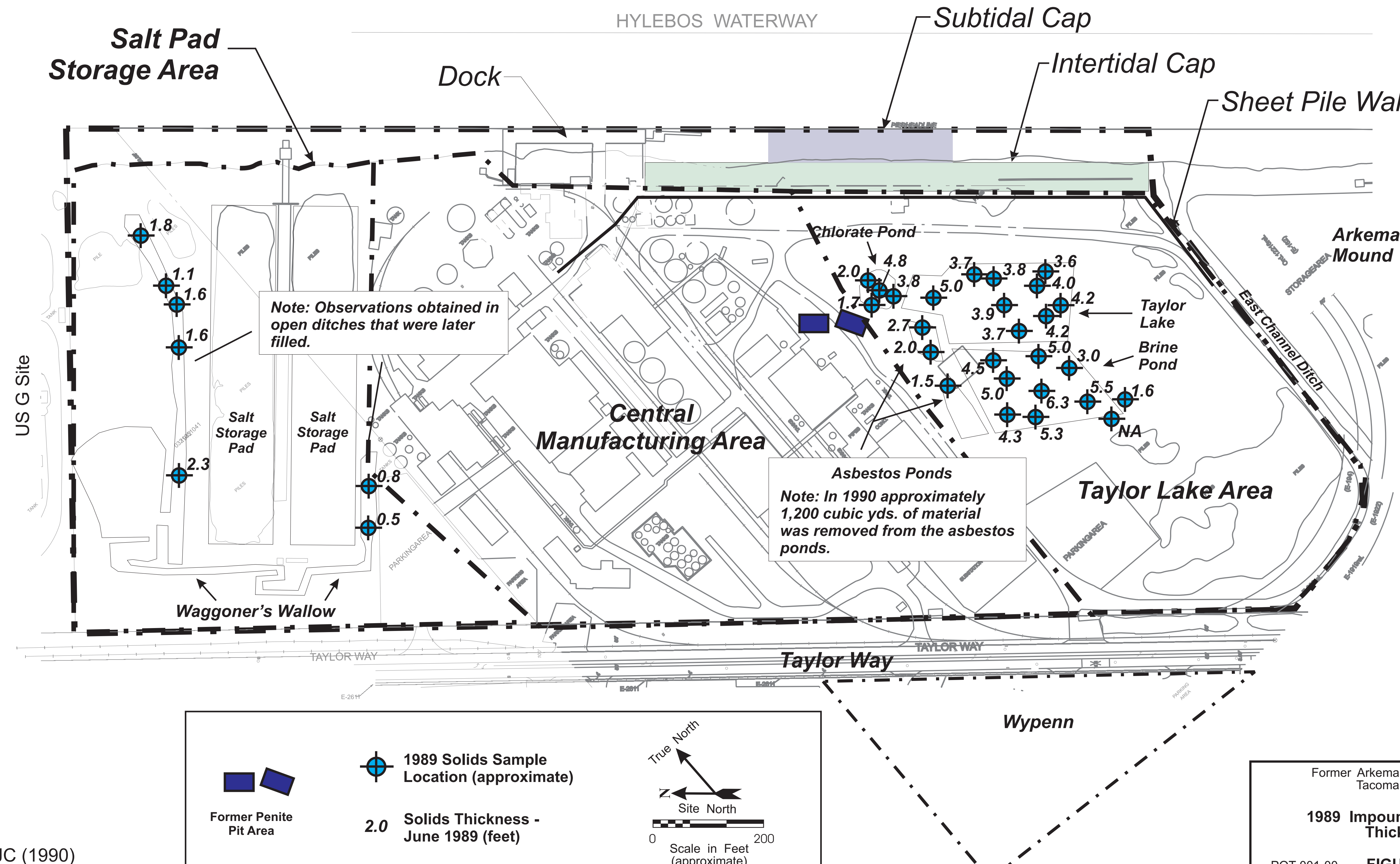


Former Arkema Manufacturing Plant
Tacoma, Washington

Site Topography - 2007
Manufacturing Area

POT-001-00 **FIGURE 1-9** July 2011

Dalton, Olmsted & Fuglevand, Inc.



Source: KJC (1990)

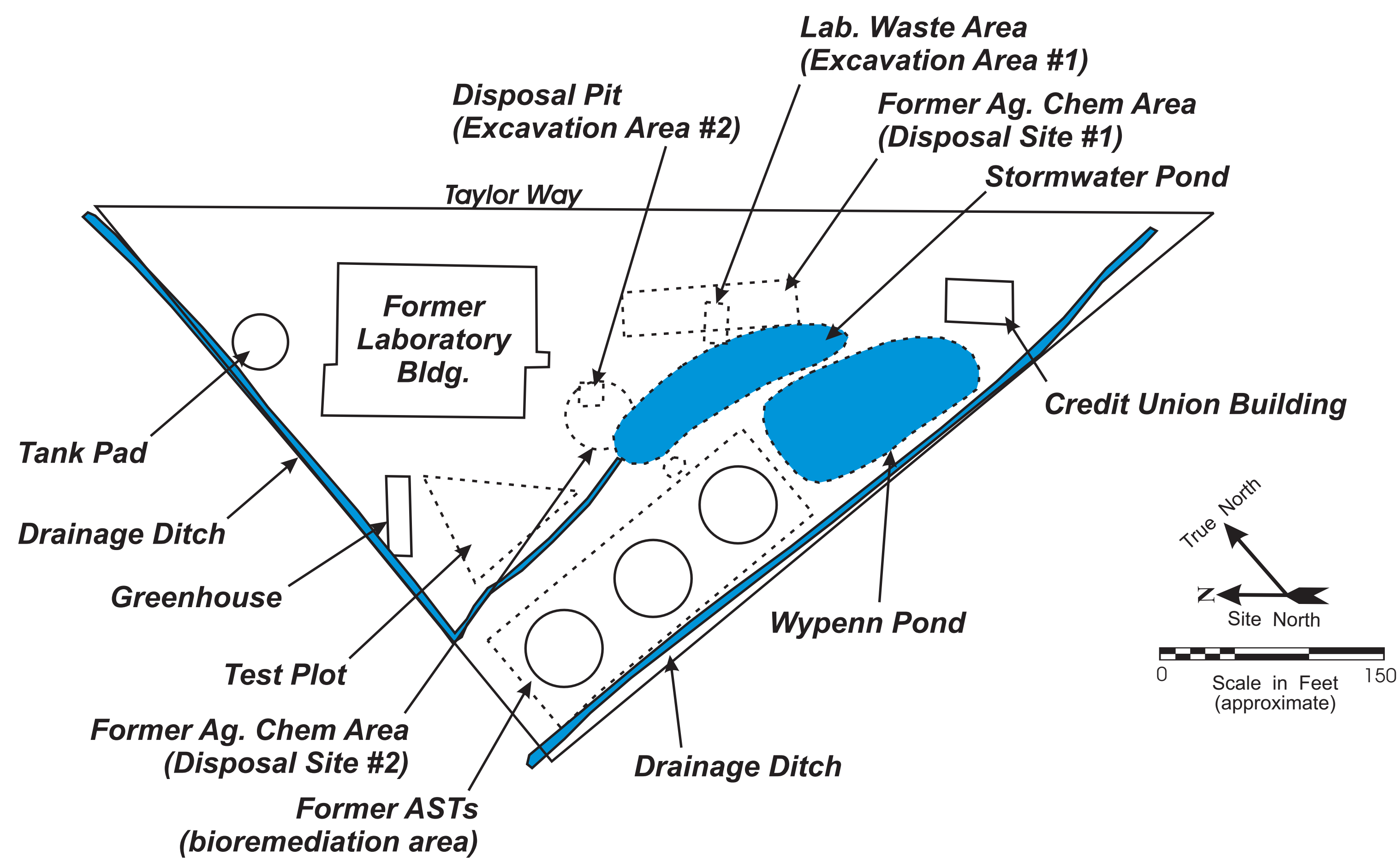
Ref: Sludge Thickness on base a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

1989 Impoundment Deposit Thicknesses

POT-001-00 **FIGURE 1-10** July 2011

Dalton, Olmsted & Fuglevand, Inc.



Former Arkema Manufacturing Plant
Tacoma, Washington

Former Layout - Wypenn Area

POT-001-00 **FIGURE 1-11** July 2011

Dalton, Olmsted & Fuglevand, Inc.

Ref: Wypenn Layout a.cdr

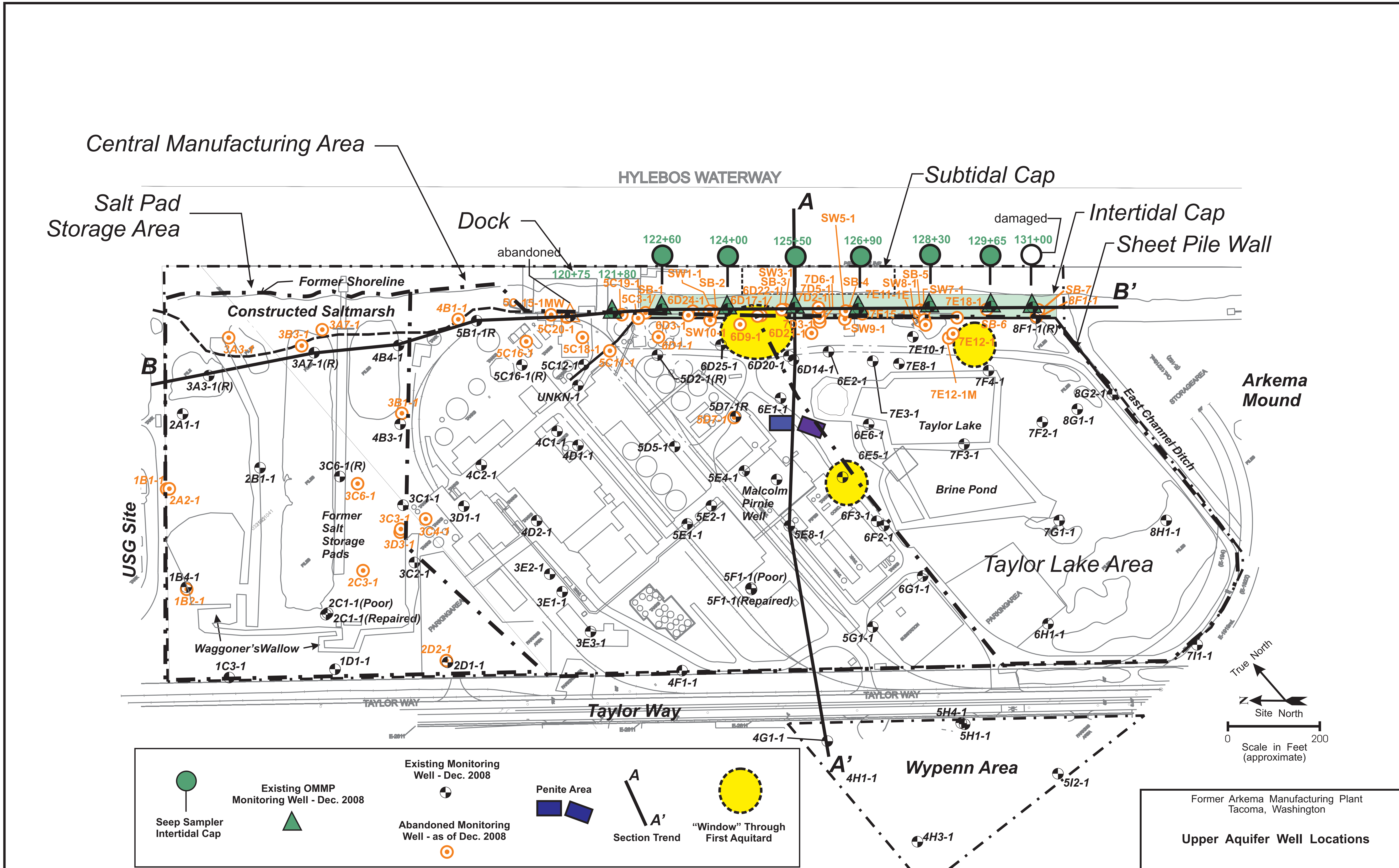
0 400
Scale in Feet (approximate)

True North
Site North

Air photograph
November 9, 2007

Ref: Air Photo Adjacent Properties.cdr

Former Arkema Manufacturing Plant	FIGURE 1-12
Adjacent Properties	
POT-001 July 2011	
Dalton, Olmsted & Fuglevand, Inc.	



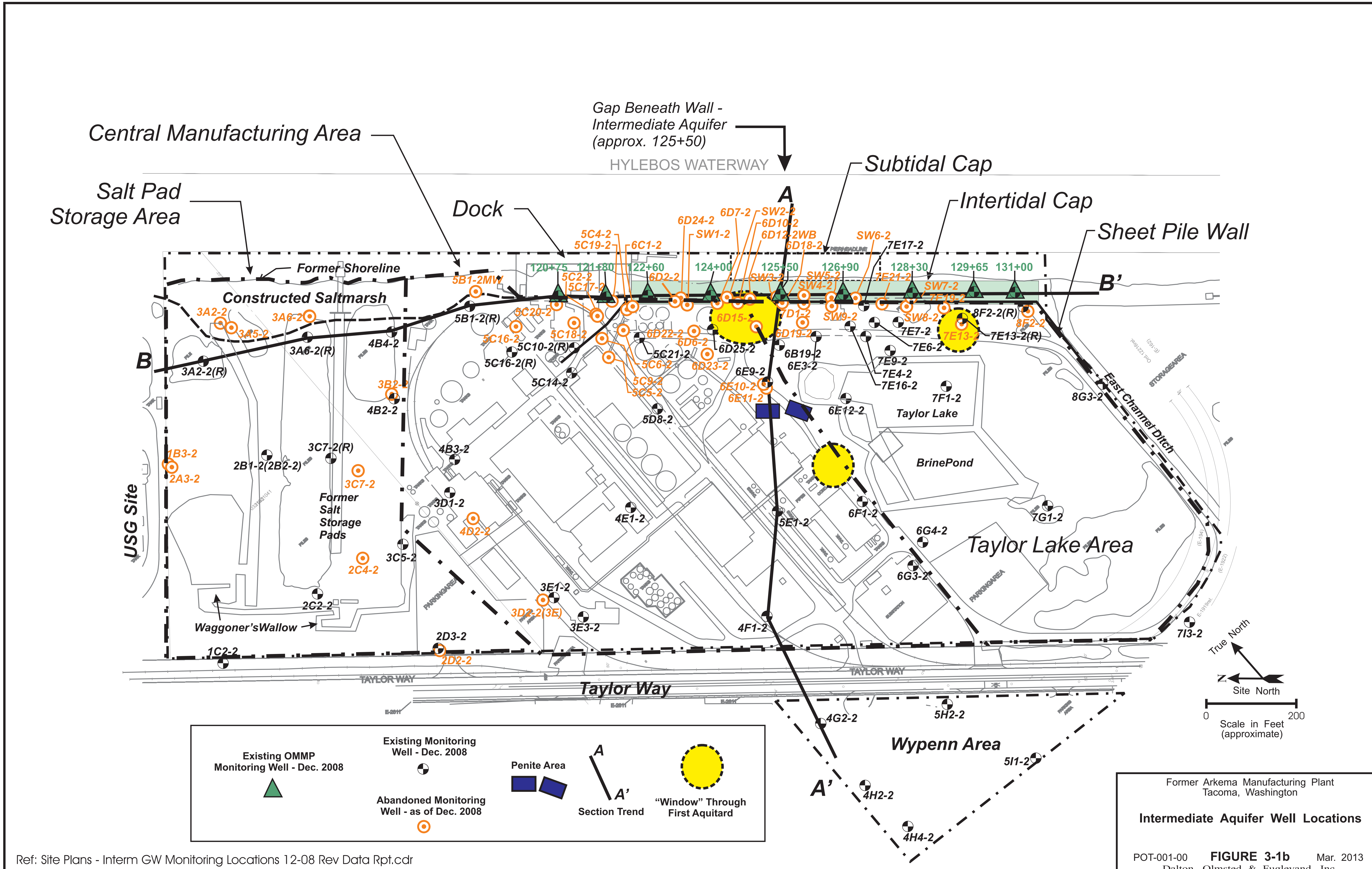
Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer Well Locations

POT-001-00 **FIGURE 3-1a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Site Plans - Upper GW Monitoring Locations 12-08 Rev Data Rpt.cdr

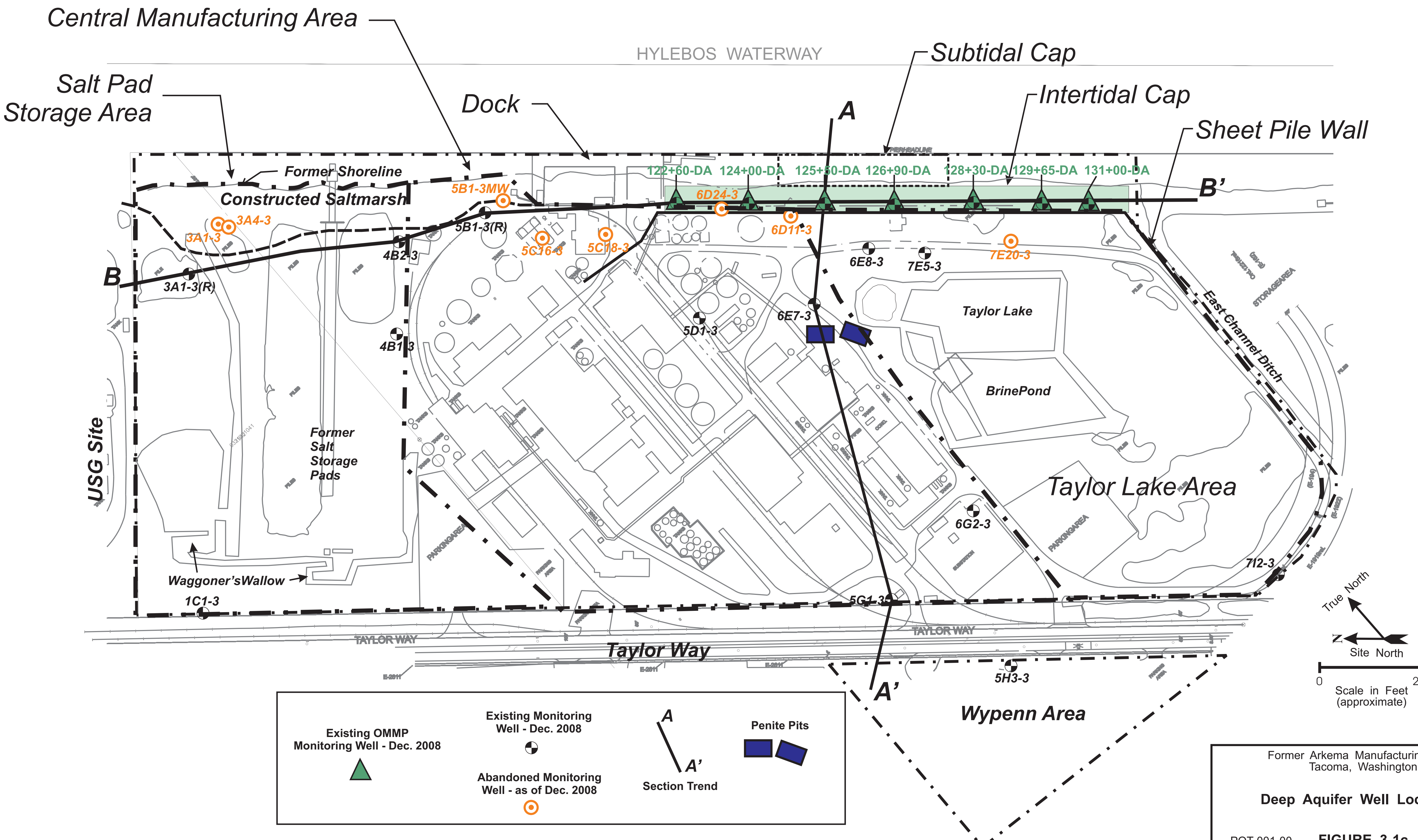


Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Well Locations

POT-001-00 **FIGURE 3-1b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



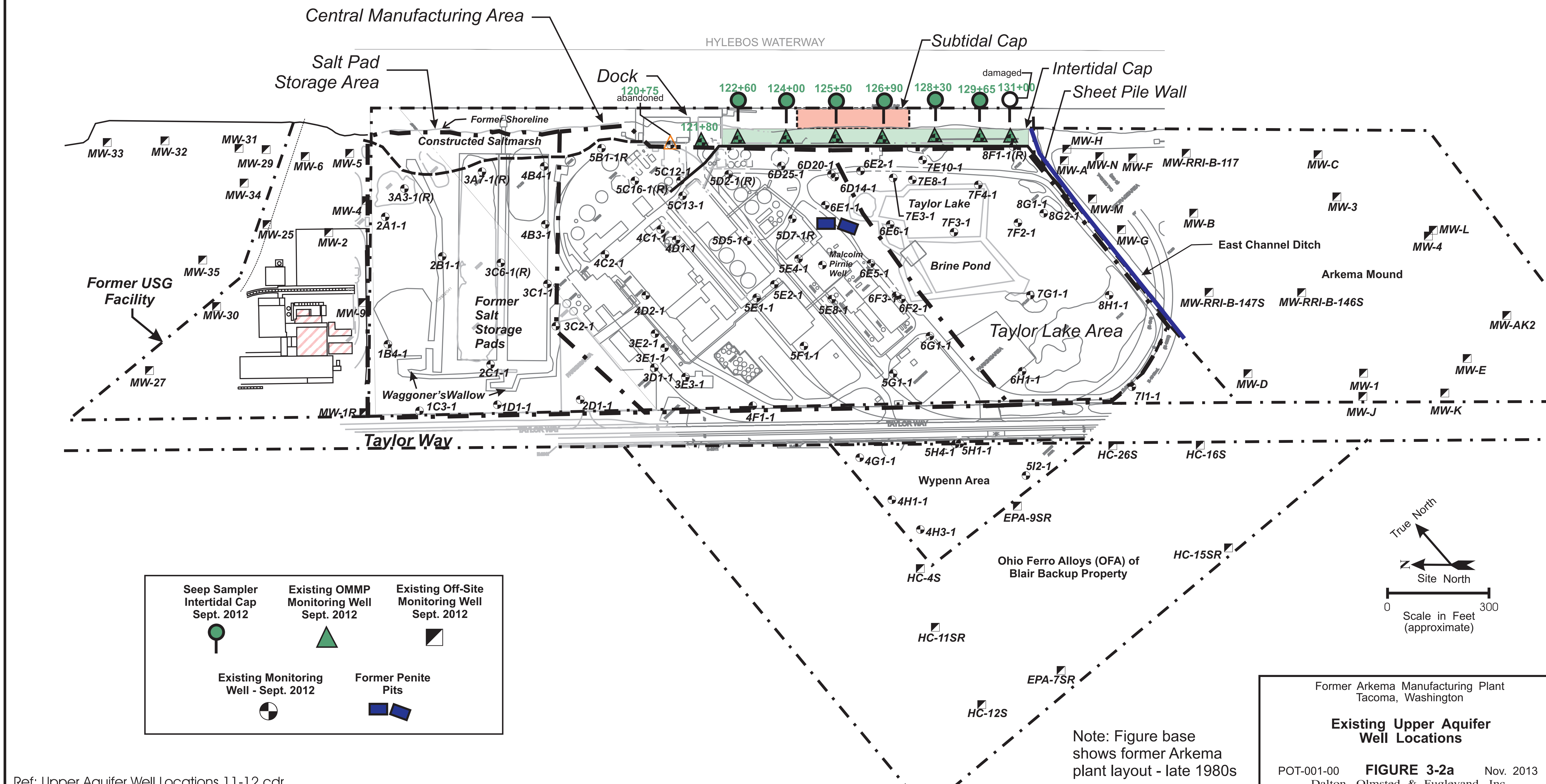
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Well Locations

POT-001-00 FIGURE 3-1c Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Site Plans - Deep GW Monitoring 12-08 Rev Data Rpt.cdr



Note: Figure base shows former Arkema plant layout - late 1980s

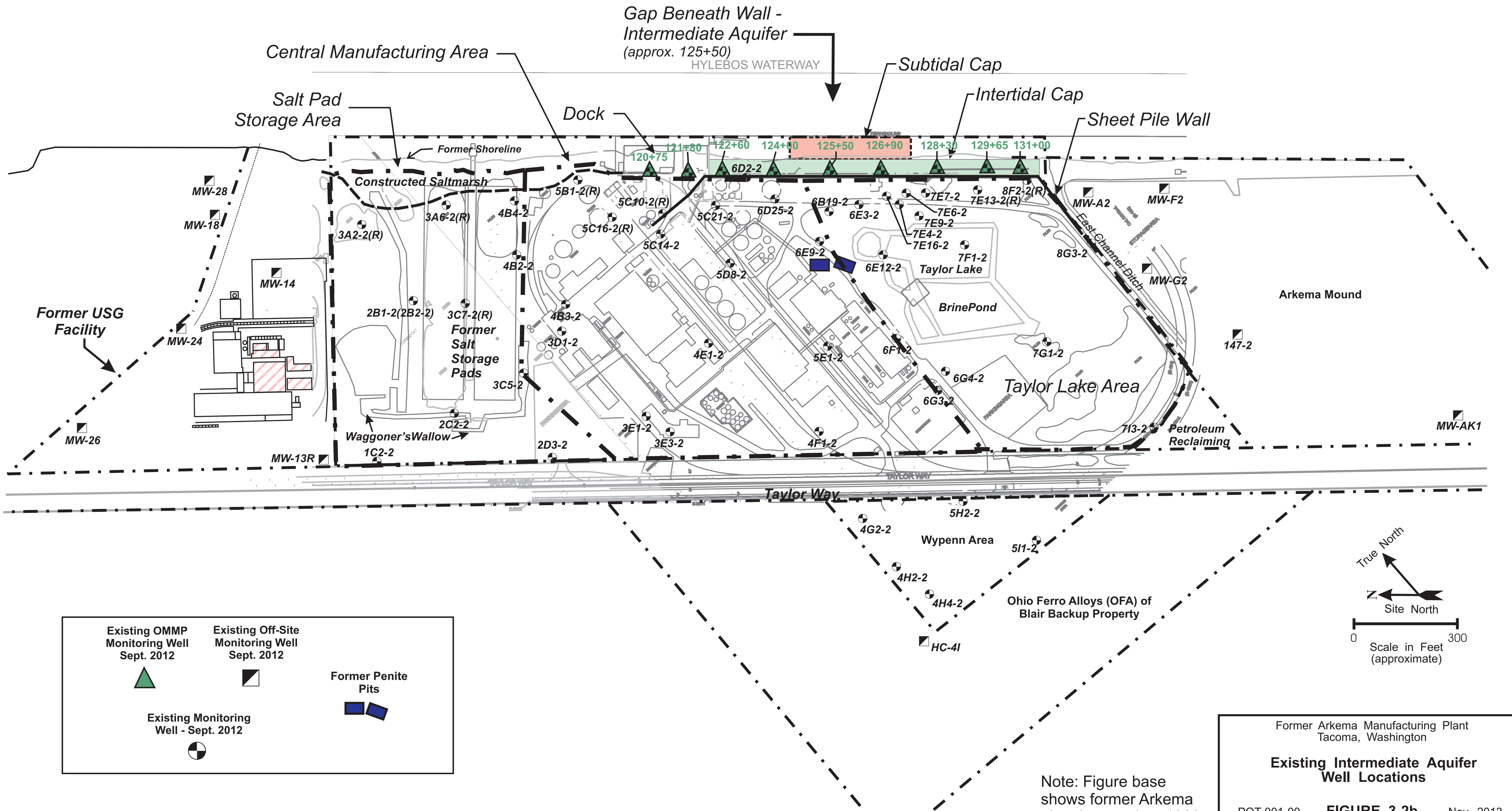
Ref: Upper Aquifer Well Locations 11-12.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Existing Upper Aquifer Well Locations

POT-001-00 **FIGURE 3-2a** Nov. 2013

Dalton, Olmsted & Fuglevand, Inc.



Note: Figure base shows former Arkema plant layout - late 1980s

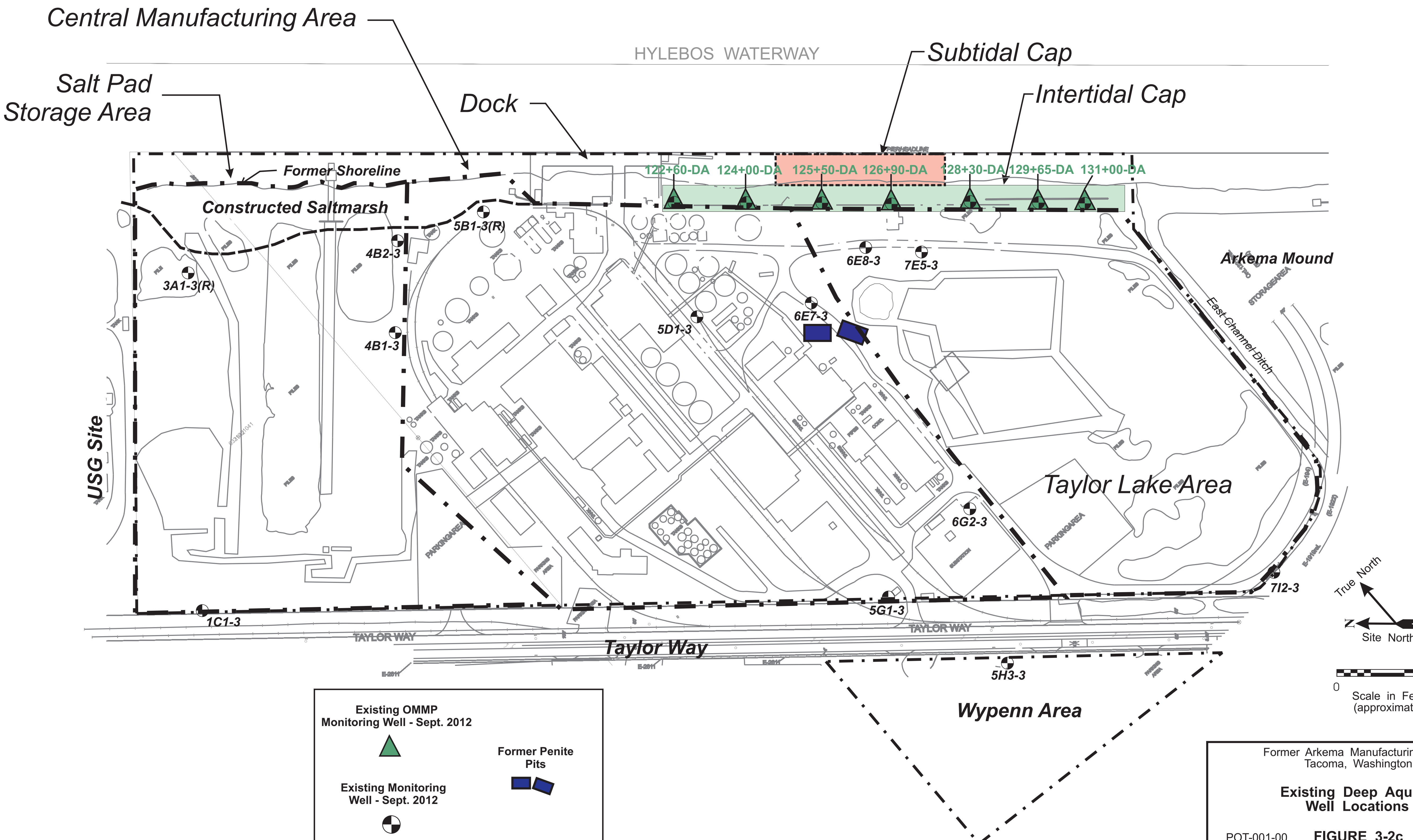
Former Arkema Manufacturing Plant
Tacoma, Washington

Existing Intermediate Aquifer Well Locations

POT-001-00 **FIGURE 3-2b** Nov. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Interim Aquifer Well Locations 11-12.cdr



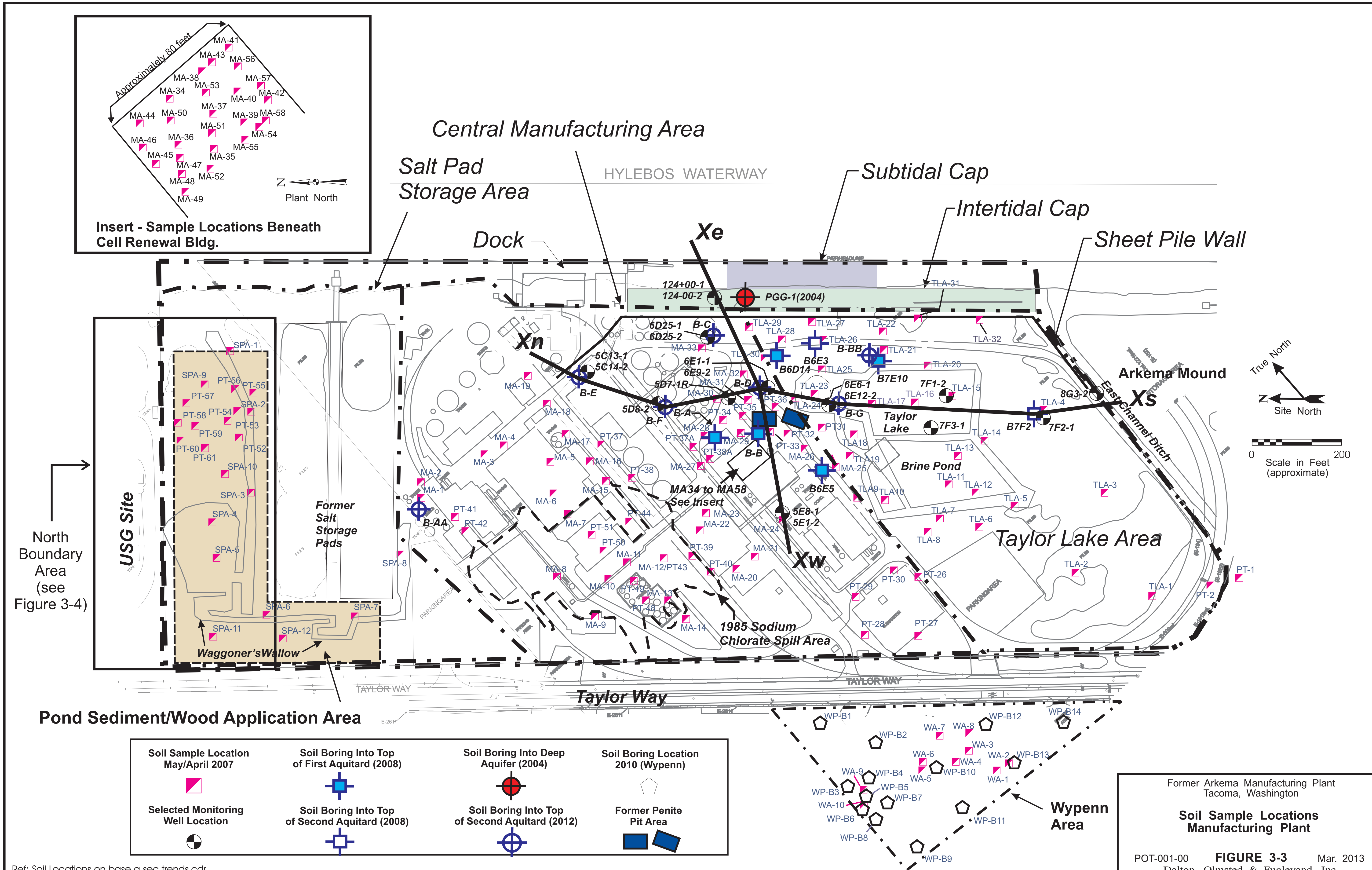
Ref: Deep Aquifer Well Locations 11-12.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Existing Deep Aquifer Well Locations

POT-001-00 **FIGURE 3-2c** Nov. 2013

Dalton, Olmsted & Fuglevand, Inc.

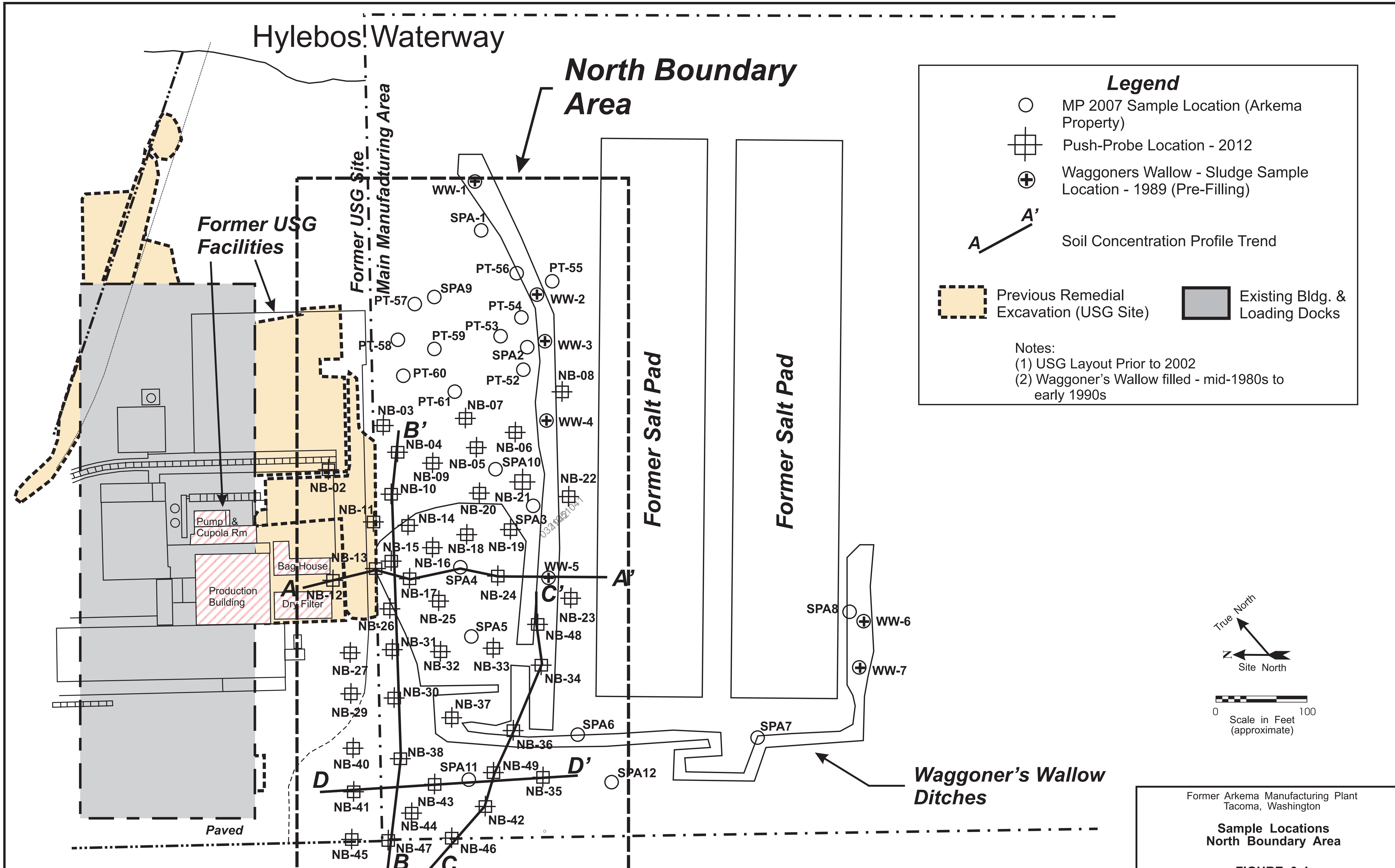


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations Manufacturing Plant

POT-001-00 **FIGURE 3-3** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



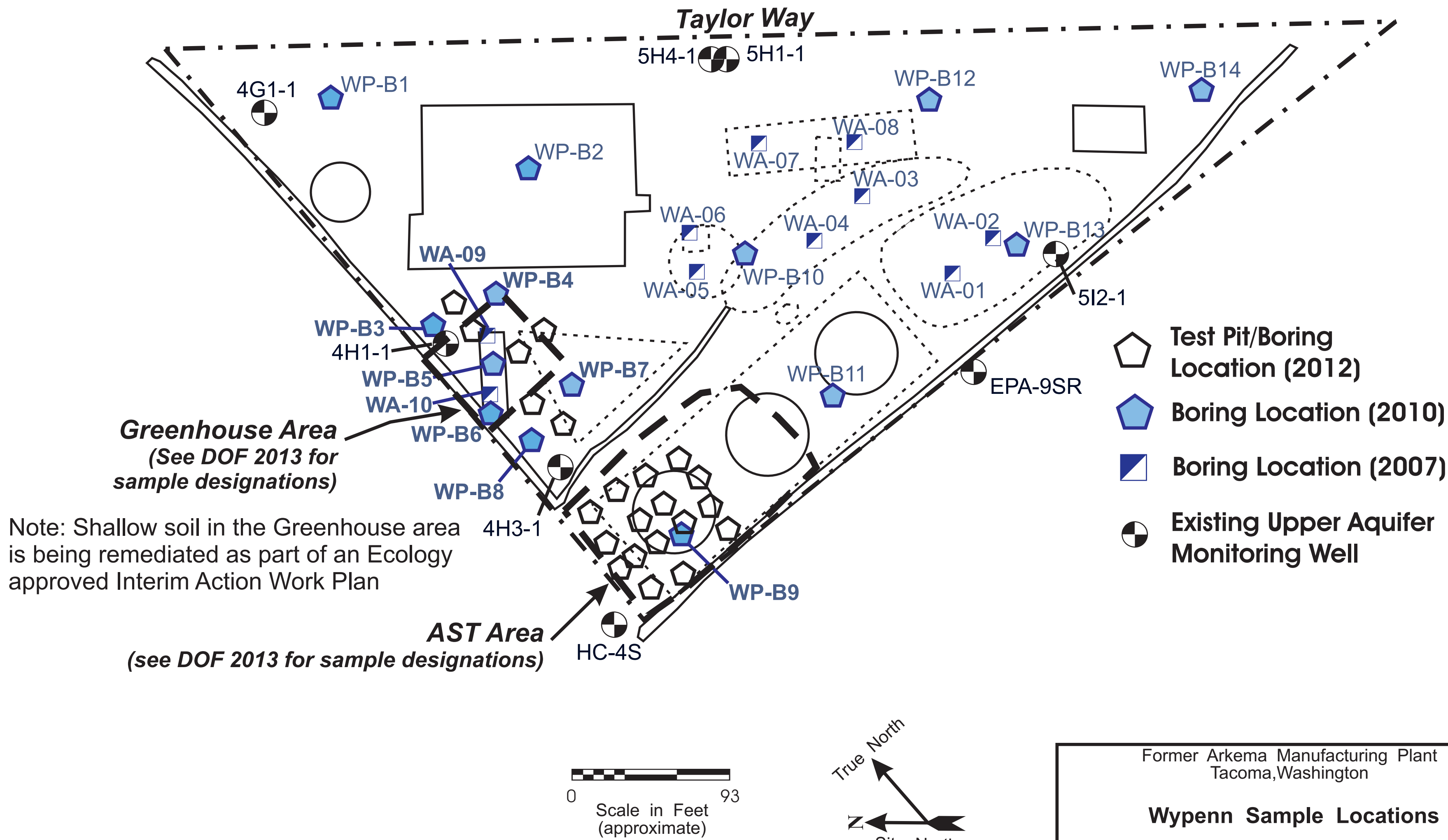
Ref: USG Arkema Site Expanded w New Probe Locations.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Sample Locations
North Boundary Area

POT-001-00 **FIGURE 3-4** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Note: Shallow soil in the Greenhouse area is being remediated as part of an Ecology approved Interim Action Work Plan

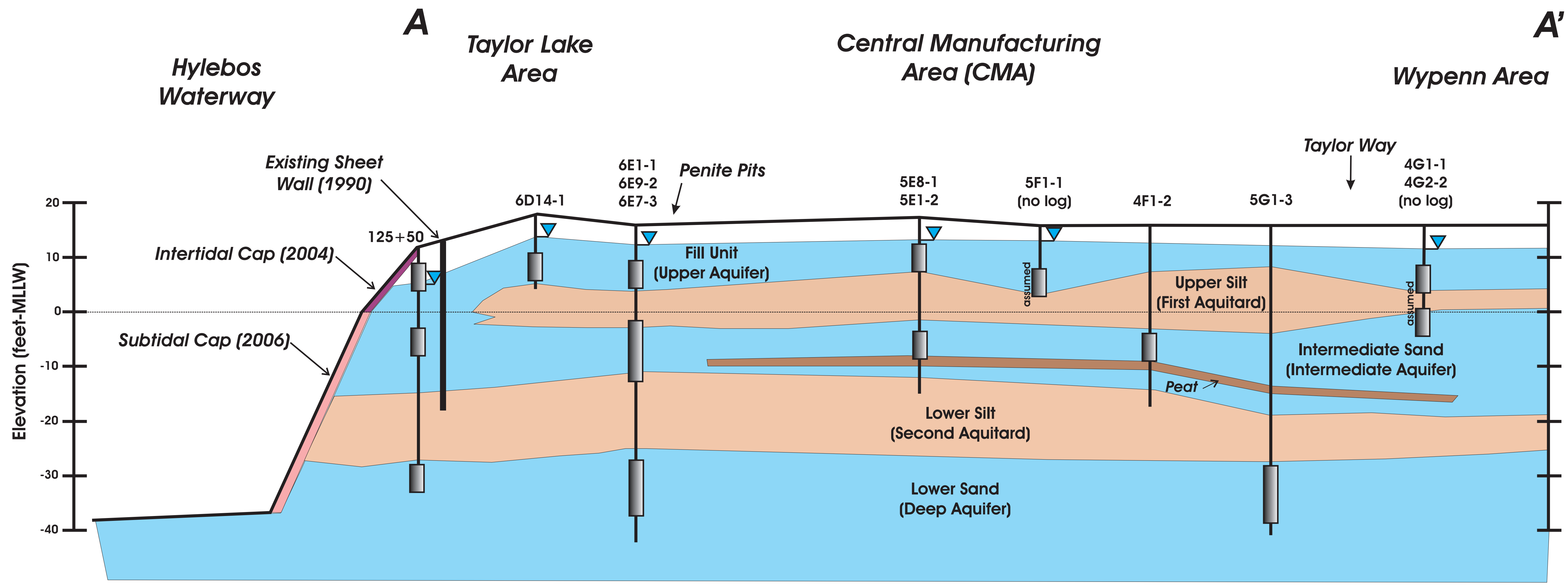
Former Arkema Manufacturing Plant
Tacoma, Washington

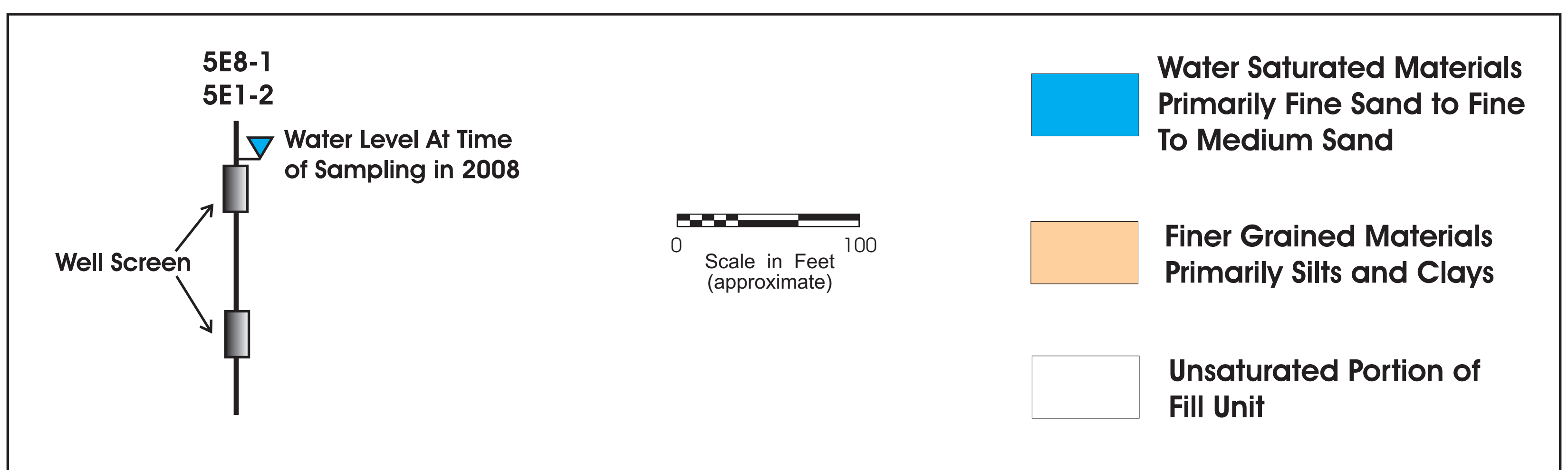
Wypenn Sample Locations

POT-001-01 **FIGURE 3-5** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Wypenn Spl Locations IAWP 2012 rev.cdr





Note: Section trends are shown on Figures 3-1a to 3-1c

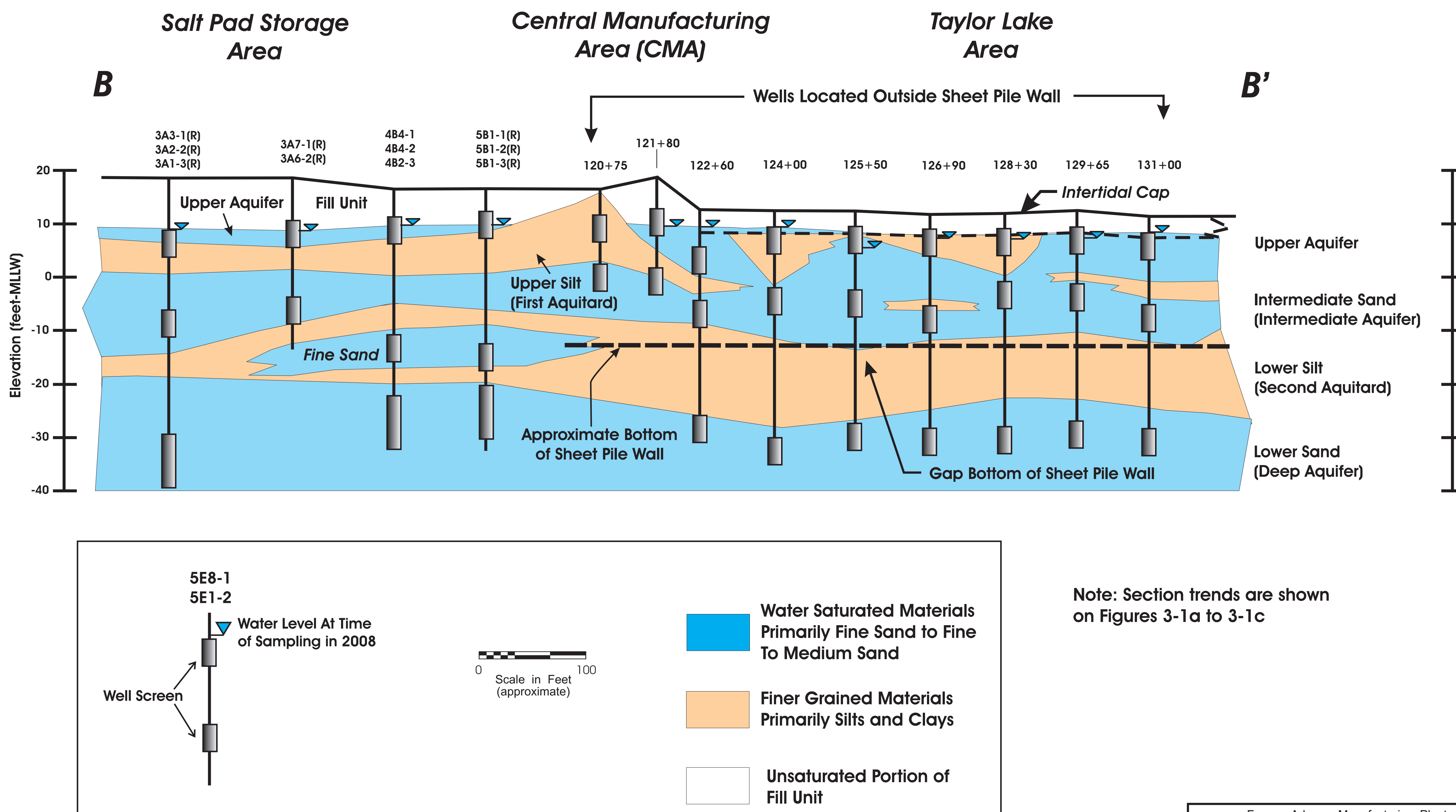
Ref: Section A-A' former D-D'.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Section A-A'

POT-001-00 **FIGURE 3-6** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Note: Section trends are shown on Figures 3-1a to 3-1c

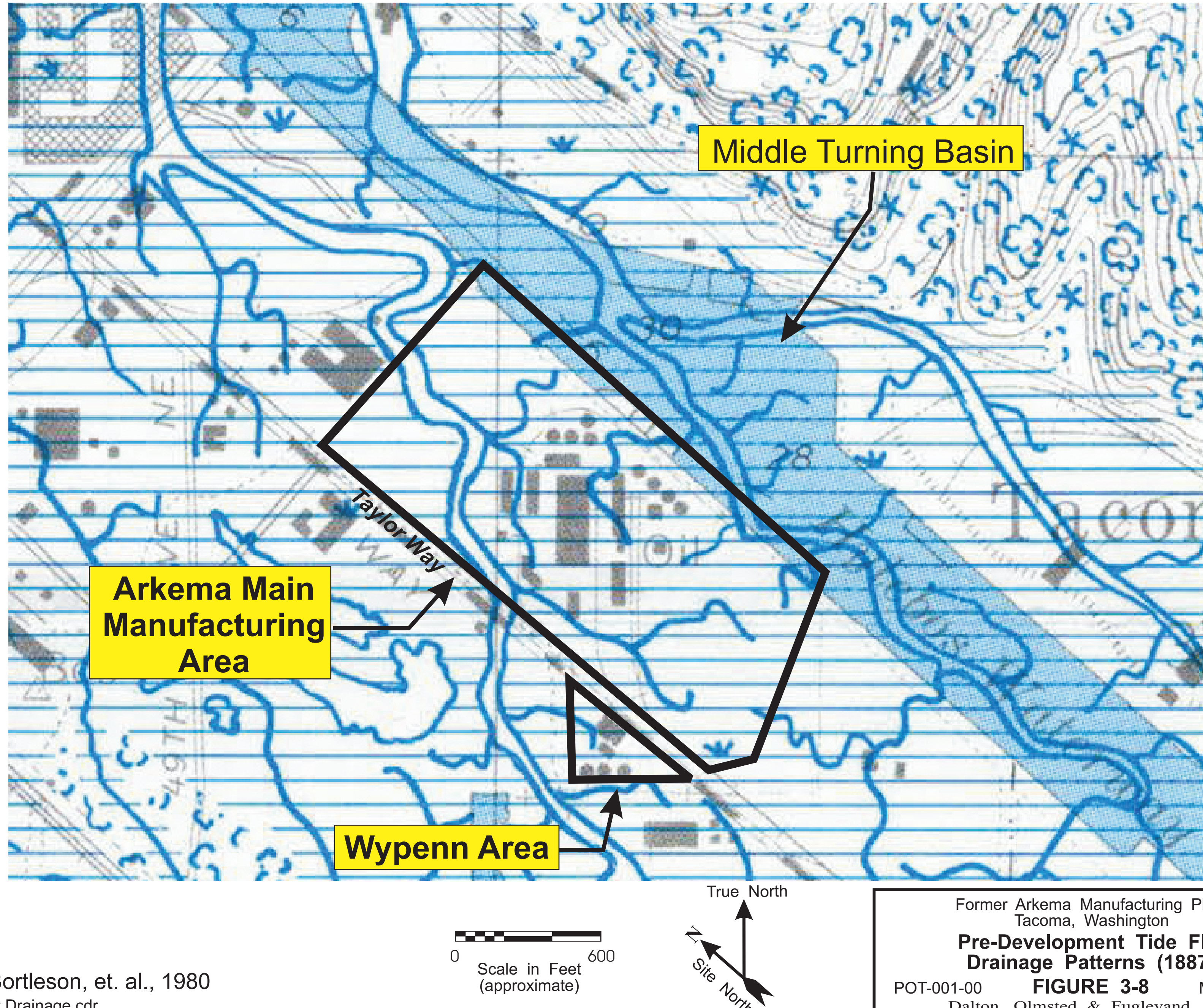
Former Arkema Manufacturing Plant
Tacoma, Washington

Section B-B'
Shoreline Section

POT-001-00 **FIGURE 3-7** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Section B-B' Shoreline Compress.cdr



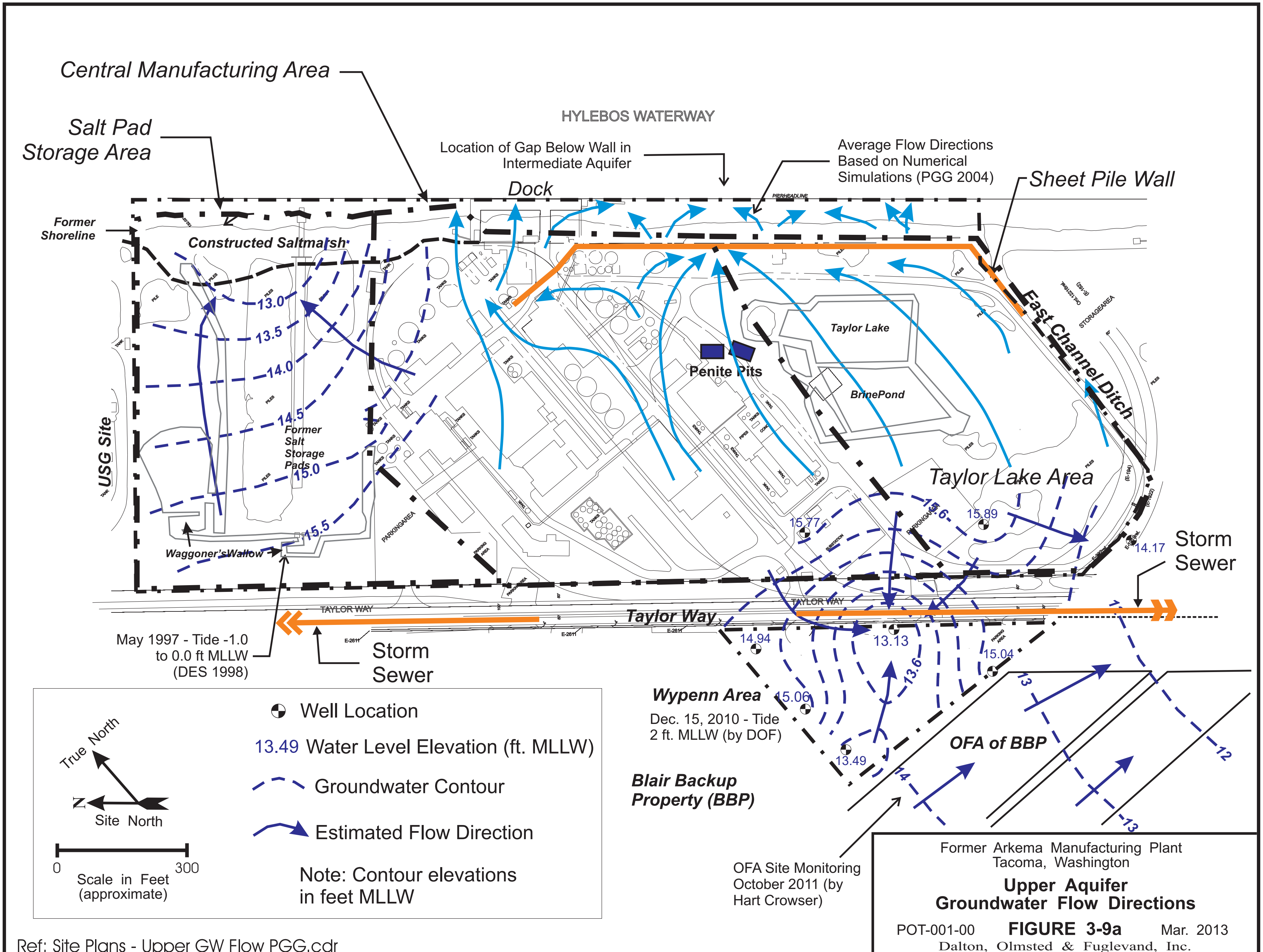
Source: Bortleson, et. al., 1980
Ref: Tide Flat Drainage.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Pre-Development Tide Flat Drainage Patterns (1887)

POT-001-00 **FIGURE 3-8** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

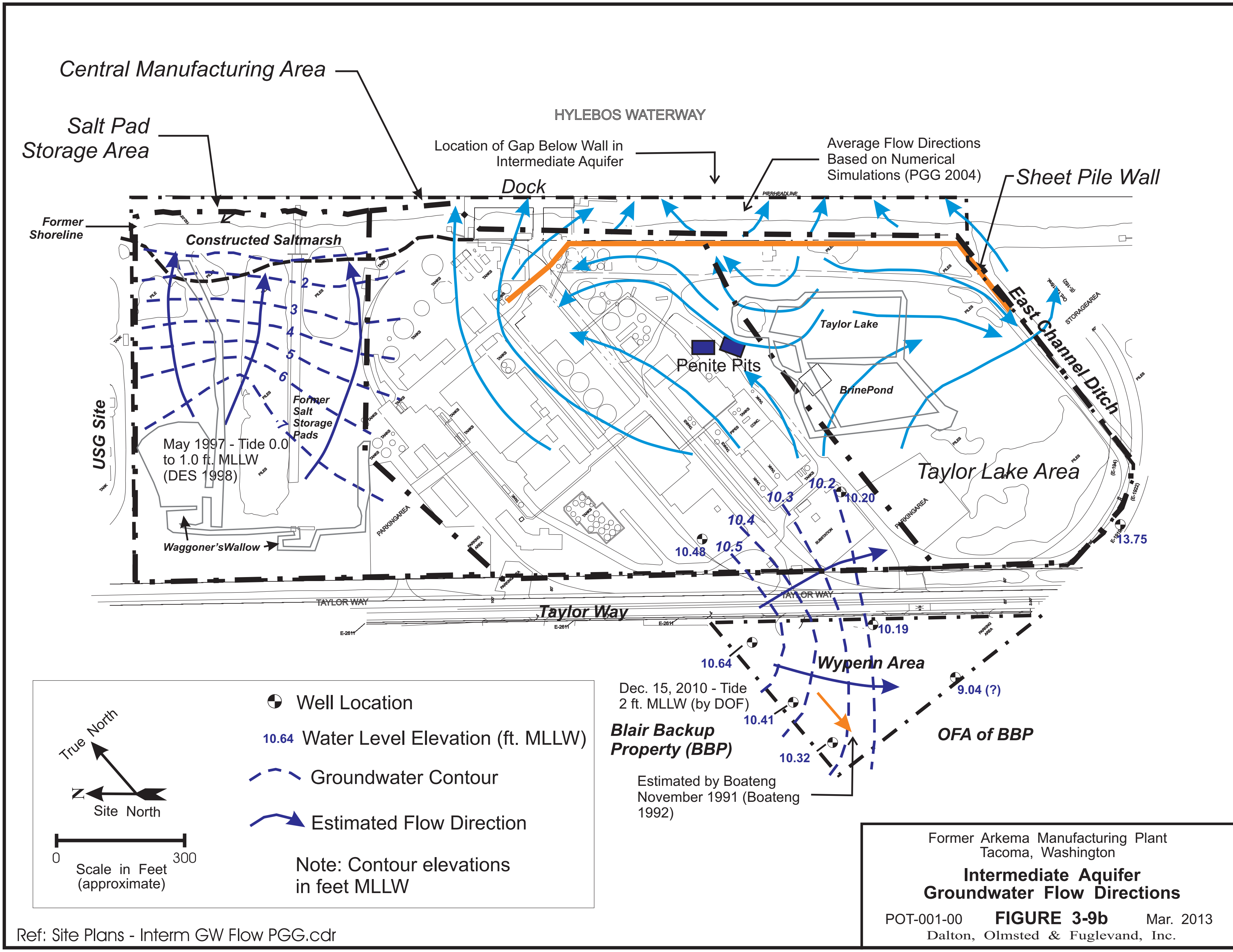


Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer
Groundwater Flow Directions

POT-001-00 **FIGURE 3-9a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

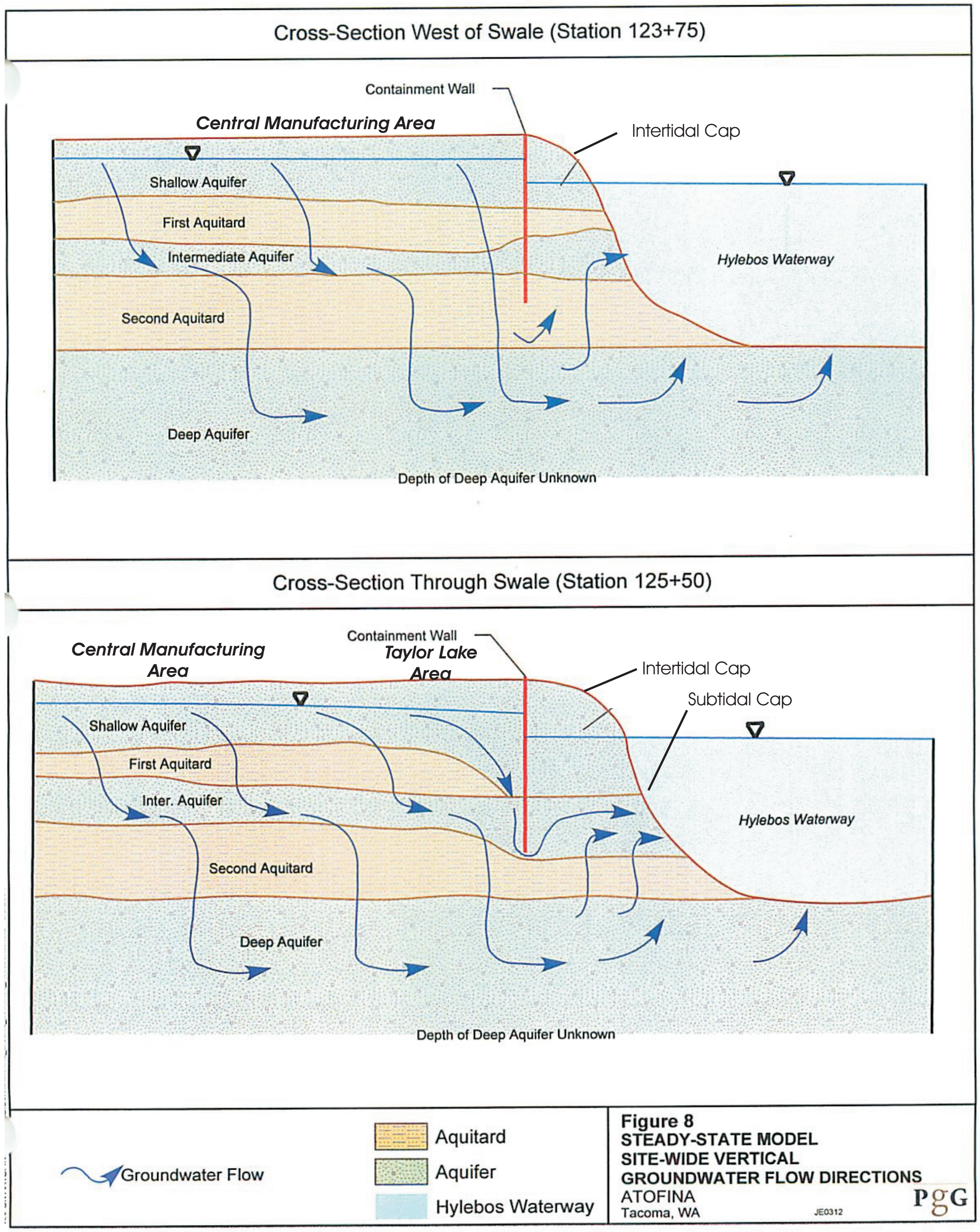


Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Groundwater Flow Directions

POT-001-00 **FIGURE 3-9b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Source: PGG (2004)

Former Arkema Manufacturing Plant
Tacoma, WA

Conceptual Groundwater Flow Directions

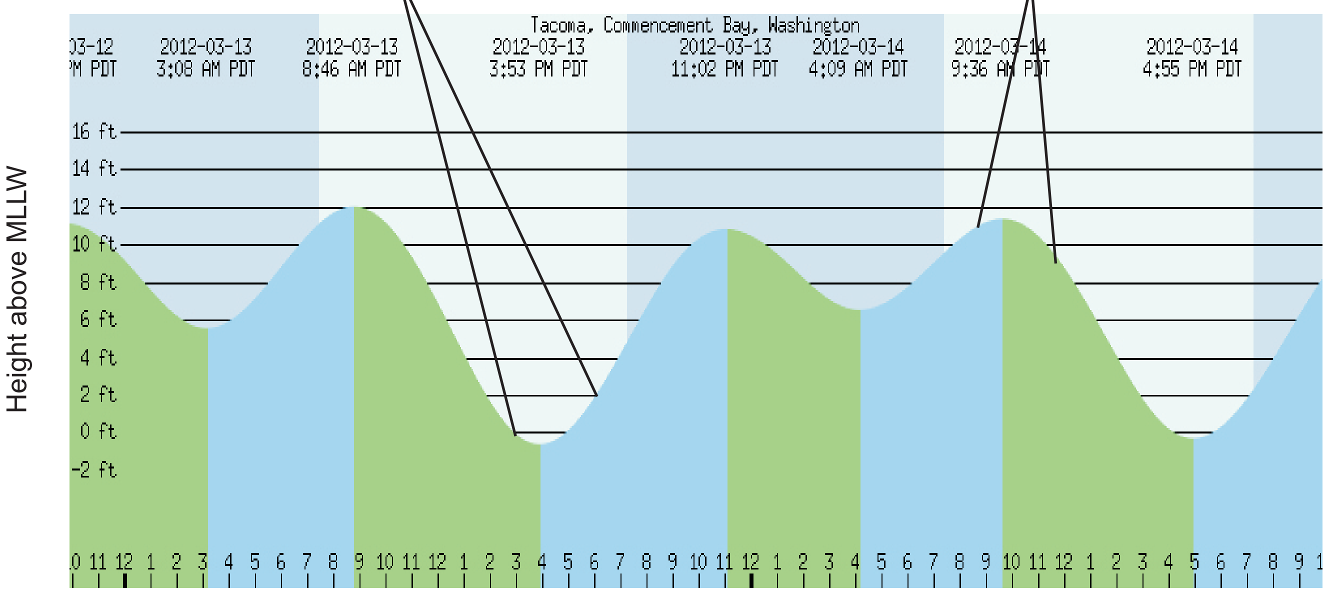
POT-001-00 **FIGURE 3-10** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: PGG Flow Section 2004

Approximate Position of Tidal Cycle
When Water Level Measurements Were
Made in Monitoring Wells
on Mar.13, 2012 from 1500 to 1809 hrs.

Approximate Position of Tidal Cycle
When Water Level Measurements Were
Made in Monitoring Wells
on Mar.14, 2012 from 0851 to 1155 hrs.



March 2012

Notes: The tide charts shown above are predicted tides for Tacoma - Commencement Bay
Tidal heights are relative to the NOAA chart datum
Mean Lower Low Water (MLLW)

Source:http://www.mobilegeographics.com:81/locations.html

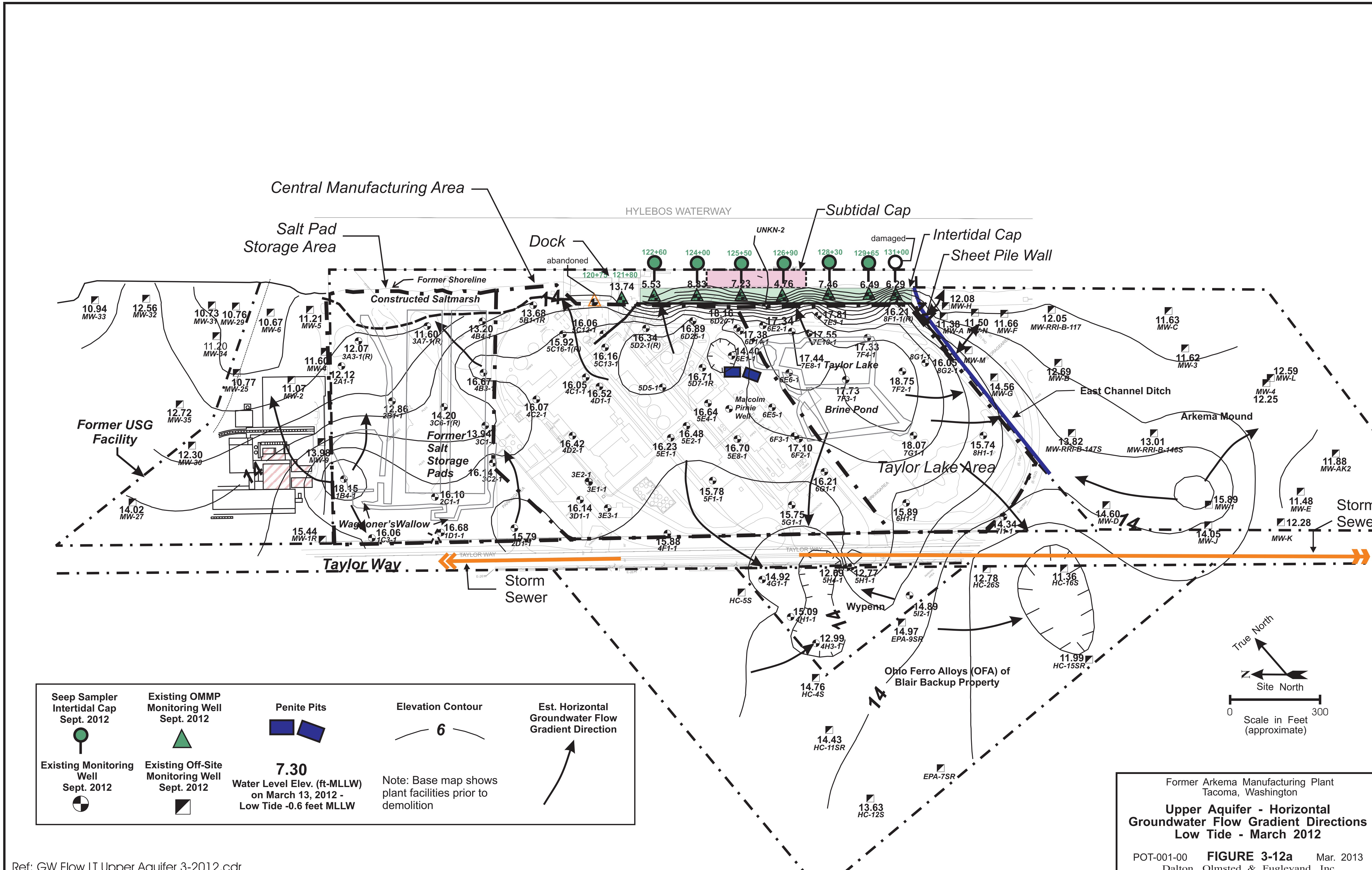
Ref: WL Tide charts 3-12a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

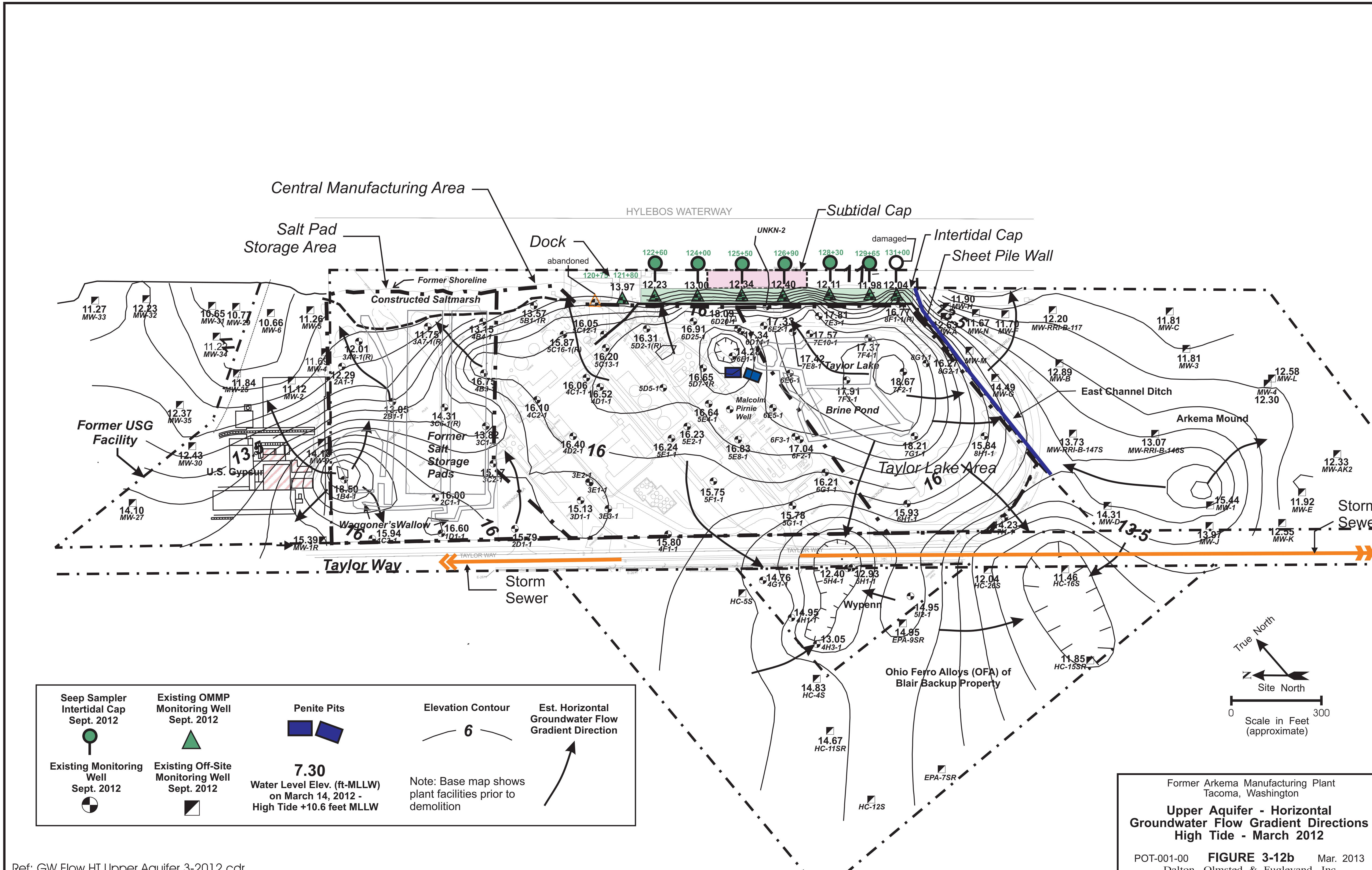
Tidal Stages When Well Water Levels Were Measured (March 2012)

POT-001-00 **FIGURE 3-11** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Central Manufacturing Area
Salt Pad Storage Area
Dock
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
UNKN-2
damaged
abandoned
Former Shoreline
Constructed Saltmarsh
Former USG Facility
Former Salt Storage Pads
Waggoner's Wallow
Taylor Lake
Brine Pond
Malcolm Pirnie Well
Taylor Lake Area
East Channel Ditch
Arkema Mound
Taylor Way
Storm Sewer
Storm Sewer
Wypenn
Ohio Ferro Alloys (OFA) of Blair Backup Property
True North
Site North
Scale in Feet (approximate)
0
300
Seep Sampler Intertidal Cap Sept. 2012
Existing OMMP Monitoring Well Sept. 2012
Penite Pits
Elevation Contour
6
Est. Horizontal Groundwater Flow Gradient Direction
Existing Monitoring Well Sept. 2012
Existing Off-Site Monitoring Well Sept. 2012
7.30
Water Level Elev. (ft-MLLW) on March 13, 2012 - Low Tide -0.6 feet MLLW
Note: Base map shows plant facilities prior to demolition
Ref: GW Flow LT Upper Aquifer 3-2012.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer - Horizontal Groundwater Flow Gradient Directions
Low Tide - March 2012
POT-001-00
FIGURE 3-12a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



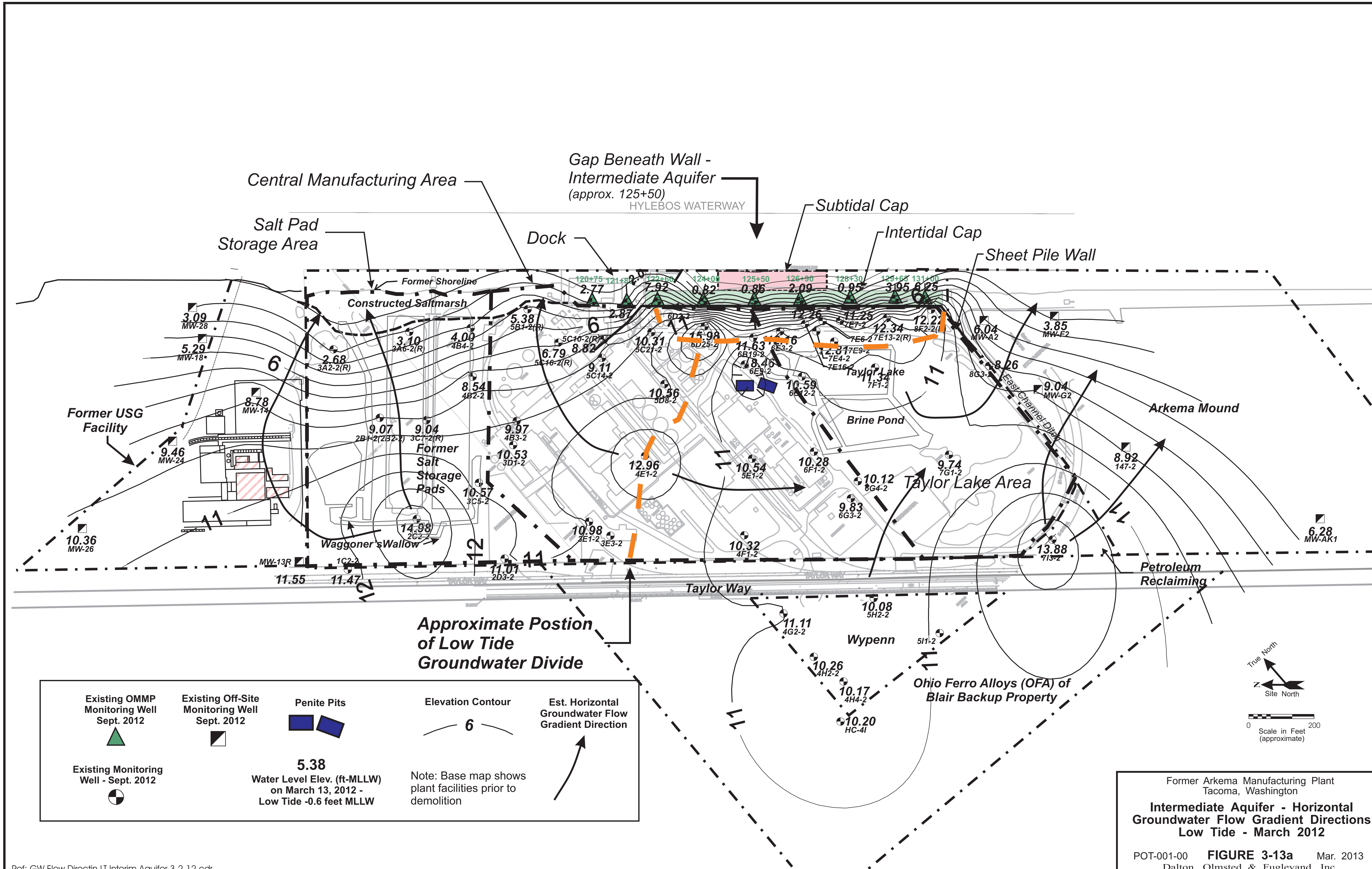
Ref: GW Flow HT Upper Aquifer 3-2012.cdr

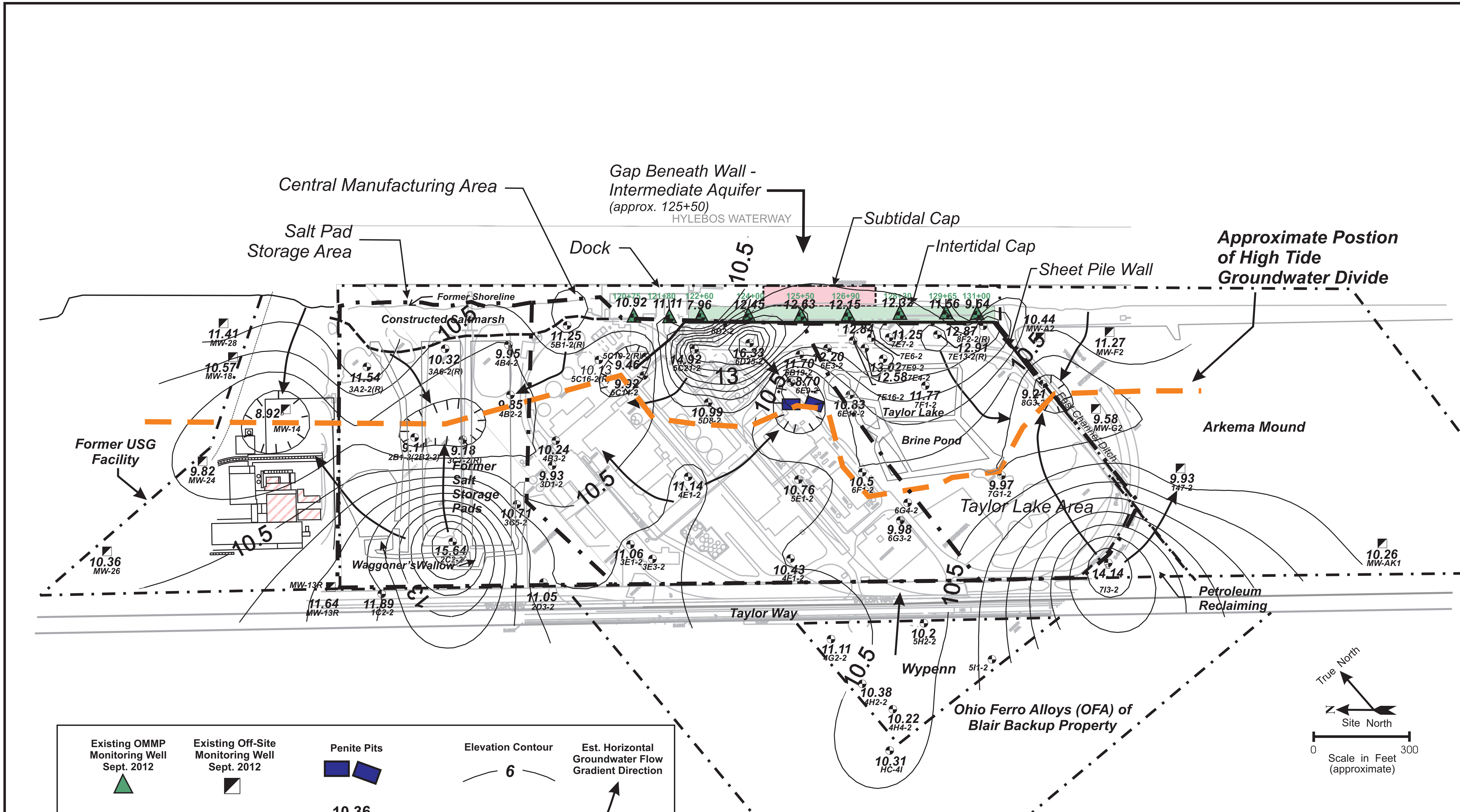
Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer - Horizontal Groundwater Flow Gradient Directions High Tide - March 2012

POT-001-00 **FIGURE 3-12b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.


Gap Beneath Wall -
Intermediate Aquifer
(approx. 125+50)
HYLEBOS WATERWAY
Central Manufacturing Area
Salt Pad
Storage Area
Dock
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Former Shoreline
Constructed Saltmarsh
Former USG
Facility
Former
Salt
Storage
Pads
Waggoner's Wallow
Taylor Lake
Brine Pond
Taylor Lake Area
Arkema Mound
East Channel Ditch
Petroleum
Reclaiming
Taylor Way
Wypenn
Ohio Ferro Alloys (OFA) of
Blair Backup Property
Approximate Postion
of Low Tide
Groundwater Divide
Existing OMMP
Monitoring Well
Sept. 2012
Existing Off-Site
Monitoring Well
Sept. 2012
Penite Pits
Elevation Contour
Est. Horizontal
Groundwater Flow
Gradient Direction
Existing Monitoring
Well - Sept. 2012
5.38
Water Level Elev. (ft-MLLW)
on March 13, 2012 -
Low Tide -0.6 feet MLLW
Note: Base map shows
plant facilities prior to
demolition
True North
Site North
Scale in Feet
(approximate)
0
200
Former Arkema Manufacturing Plant
Tacoma, Washington
Intermediate Aquifer - Horizontal
Groundwater Flow Gradient Directions
Low Tide - March 2012
POT-001-00
FIGURE 3-13a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: GW Flow Directin LT Interim Aquifer 3-2-12.cdr

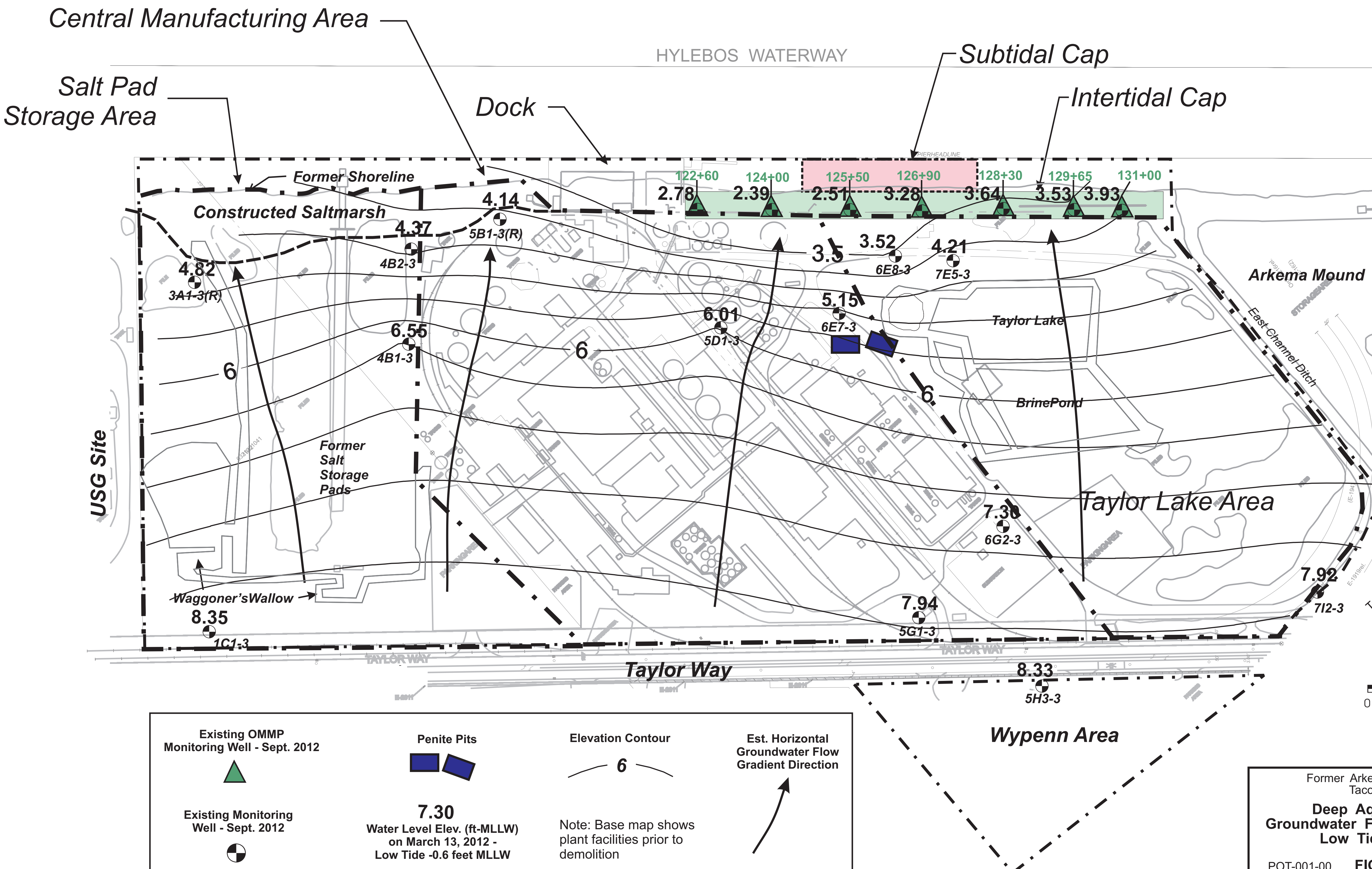


Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer - Horizontal Groundwater Flow Gradient Directions High Tide - March 2012

POT-001-00 **FIGURE 3-13b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Existing OMMP Monitoring Well - Sept. 2012

Existing Monitoring Well - Sept. 2012

Penite Pits

7.30 Water Level Elev. (ft-MLLW) on March 13, 2012 - Low Tide -0.6 feet MLLW

Elevation Contour

6

Note: Base map shows plant facilities prior to demolition

Est. Horizontal Groundwater Flow Gradient Direction

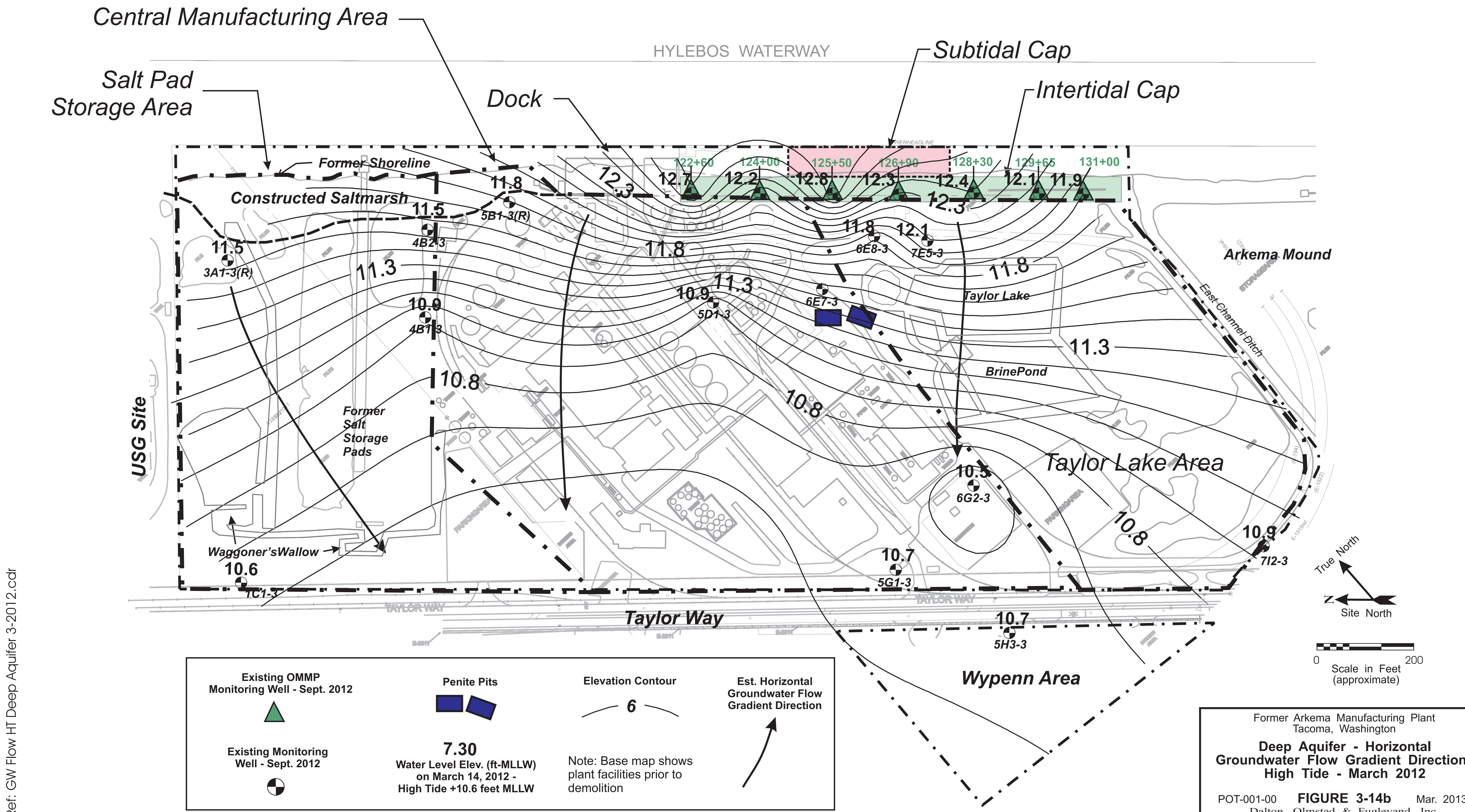
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer - Horizontal Groundwater Flow Gradient Directions Low Tide - March 2012

POT-001-00 **FIGURE 3-14a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: GW Flow LT Deep Aquifer 3-2012.cdr

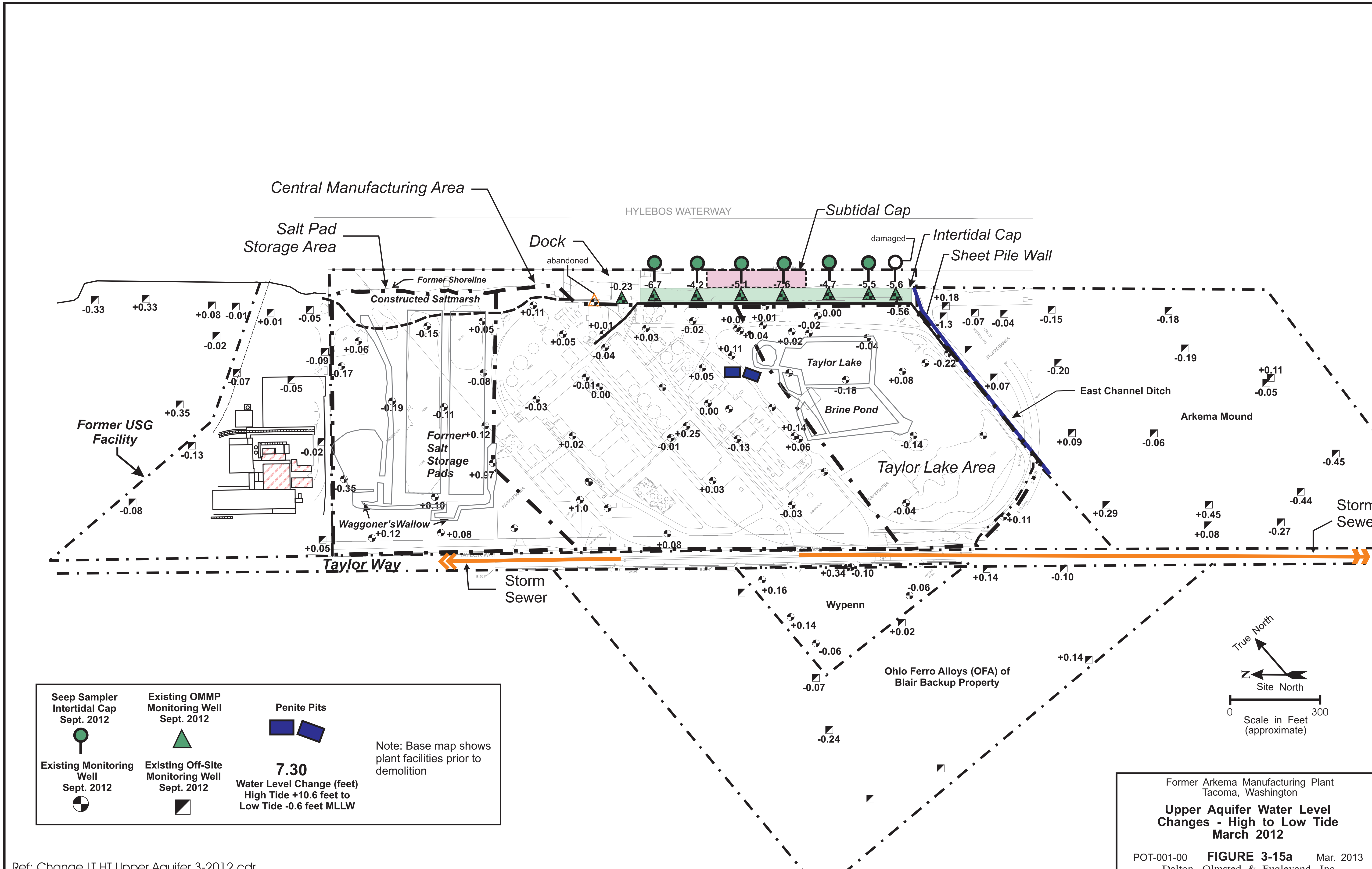


Former Arkema Manufacturing Plant
Tacoma, Washington

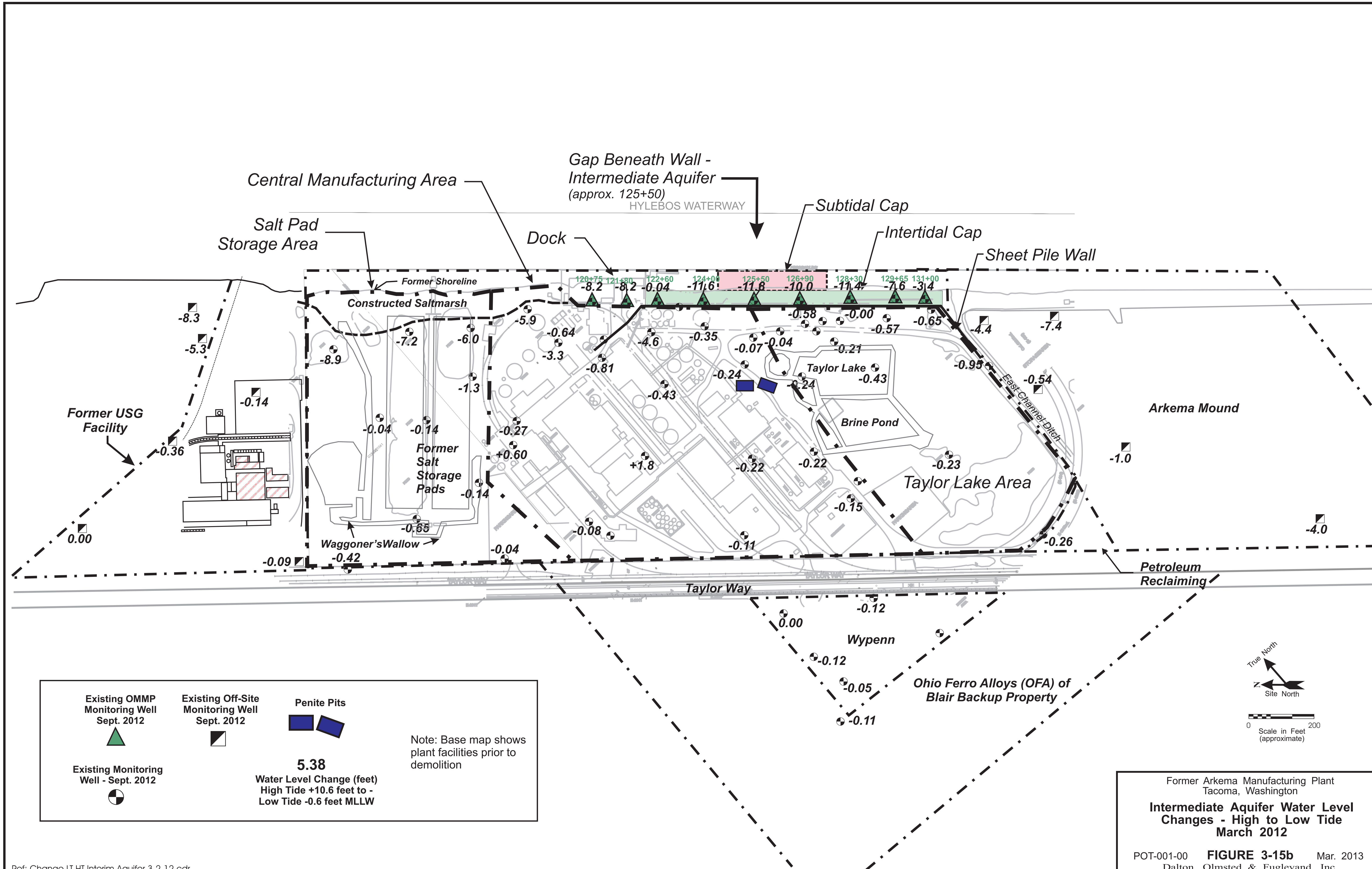
Deep Aquifer - Horizontal Groundwater Flow Gradient Directions High Tide - March 2012

POT-001-00 **FIGURE 3-14b** Mar. 2013

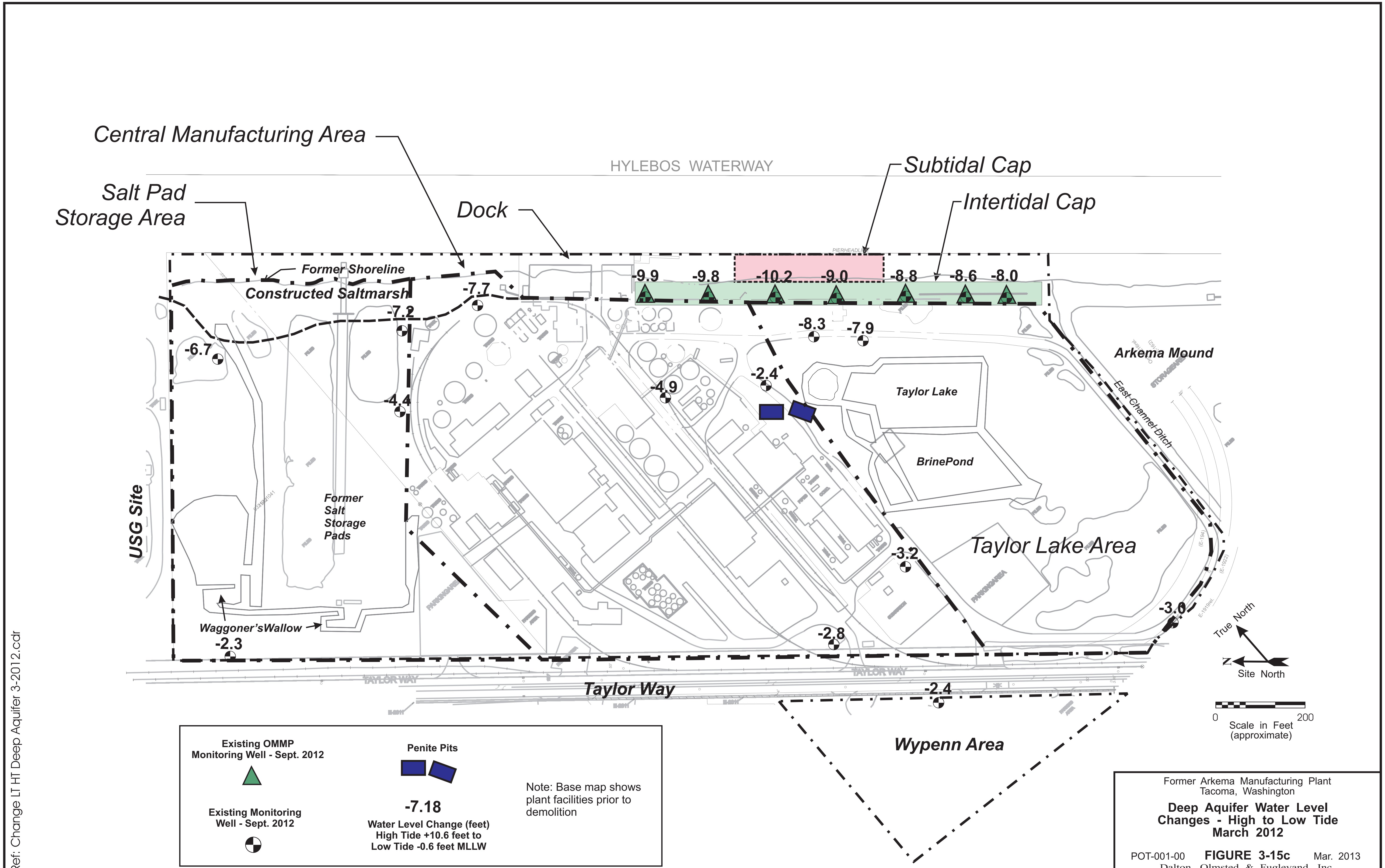
Dalton, Olmsted & Fuglevand, Inc.



Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Salt Pad Storage Area
Dock
damaged
Intertidal Cap
Sheet Pile Wall
abandoned
Former Shoreline
Constructed Saltmarsh
Taylor Lake
Brine Pond
East Channel Ditch
Arkema Mound
Former USG Facility
Former Salt Storage Pads
Taylor Lake Area
Waggoner's Wallow
Taylor Way
Storm Sewer
Storm Sewer
Wypenn
Ohio Ferro Alloys (OFA) of Blair Backup Property
True North
Site North
0
300
Scale in Feet (approximate)
Seep Sampler Intertidal Cap Sept. 2012
Existing OMMP Monitoring Well Sept. 2012
Penite Pits
Existing Monitoring Well Sept. 2012
Existing Off-Site Monitoring Well Sept. 2012
7.30
Water Level Change (feet) High Tide +10.6 feet to Low Tide -0.6 feet MLLW
Note: Base map shows plant facilities prior to demolition
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer Water Level Changes - High to Low Tide March 2012
POT-001-00
FIGURE 3-15a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Change LT HT Upper Aquifer 3-2012.cdr



Central Manufacturing Area
Gap Beneath Wall - Intermediate Aquifer
(approx. 125+50)
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Dock
Former Shoreline
Constructed Saltmarsh
Former USG Facility
Former Salt Storage Pads
Waggoner'sWallow
Taylor Lake
Brine Pond
Taylor Lake Area
East Channel Ditch
Arkema Mound
Petroleum Reclaiming
Taylor Way
Wypenn
Ohio Ferro Alloys (OFA) of Blair Backup Property
120+75 121+80 122+60 124+00 125+50 126+90 128+30 129+65 131+00
-8.2 -8.2 -0.04 -11.6 -11.8 -10.0 -11.4 -7.6 -3.4
-8.3
-5.3
-8.9
-7.2
-6.0
-5.9
-0.64
-3.3
-0.81
-4.6
-0.35
-0.58
-0.00
-0.57
-0.65
-4.4
-7.4
-0.07
-0.04
-0.21
-0.43
-0.24
-0.24
-0.43
-0.95
-0.54
-1.3
-0.14
-0.36
-0.04
-0.14
-0.27
+0.60
+1.8
-0.22
-0.22
-0.23
-1.0
-0.14
-0.15
-0.65
-0.08
-0.11
-0.26
-4.0
0.00
-0.09
-0.42
-0.04
-0.12
0.00
-0.12
-0.05
-0.11
Existing OMMP Monitoring Well Sept. 2012
Existing Off-Site Monitoring Well Sept. 2012
Penite Pits
Existing Monitoring Well - Sept. 2012
5.38
Water Level Change (feet)
High Tide +10.6 feet to - Low Tide -0.6 feet MLLW
Note: Base map shows plant facilities prior to demolition
True North
Site North
Z
0 200
Scale in Feet (approximate)
Former Arkema Manufacturing Plant
Tacoma, Washington
Intermediate Aquifer Water Level Changes - High to Low Tide
March 2012
POT-001-00
FIGURE 3-15b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Change LT HT Interim Aquifer 3-2-12.cdr



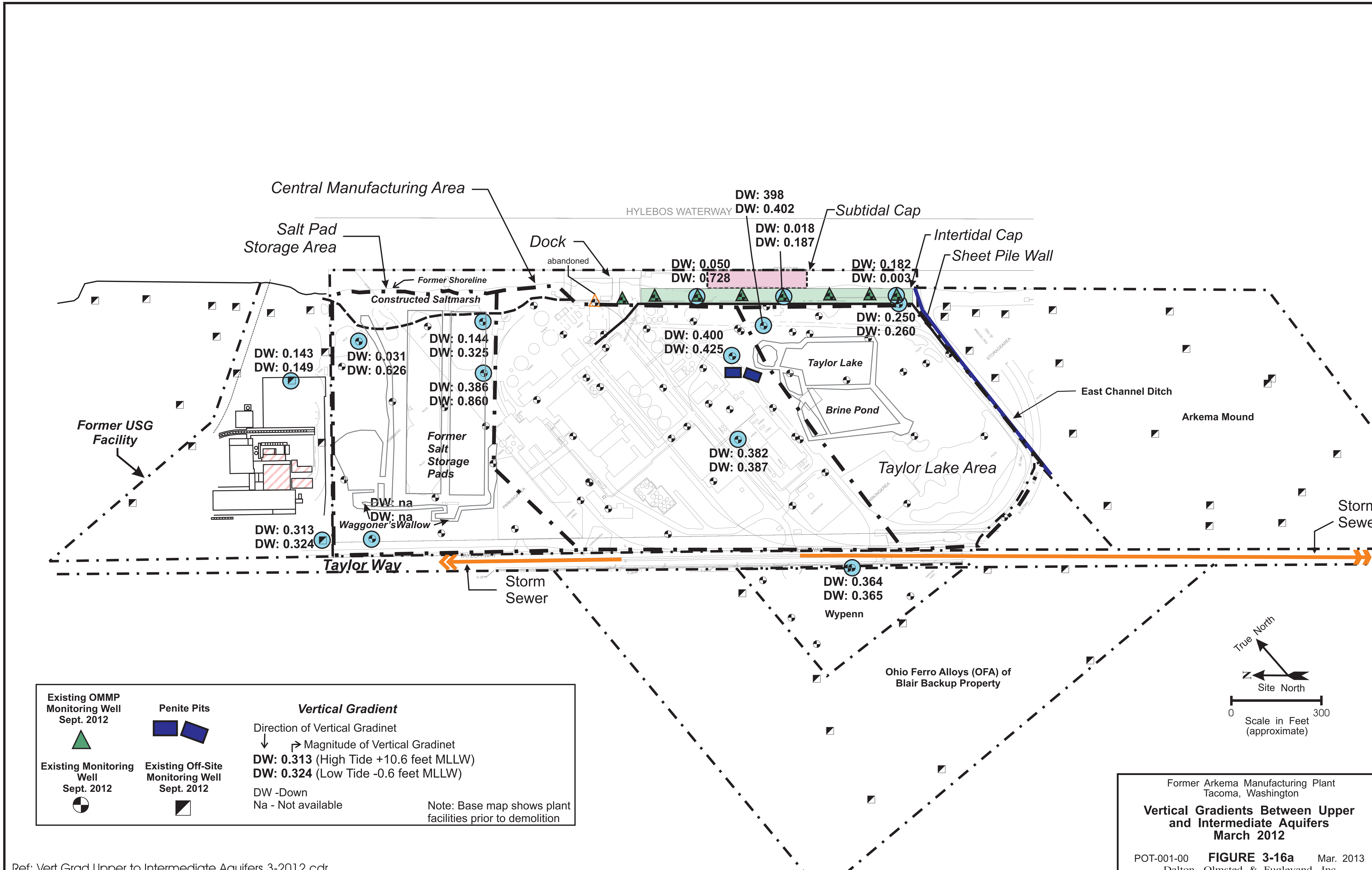
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Water Level Changes - High to Low Tide March 2012

POT-001-00 **FIGURE 3-15c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Change LT HT Deep Aquifer 3-2012.cdr



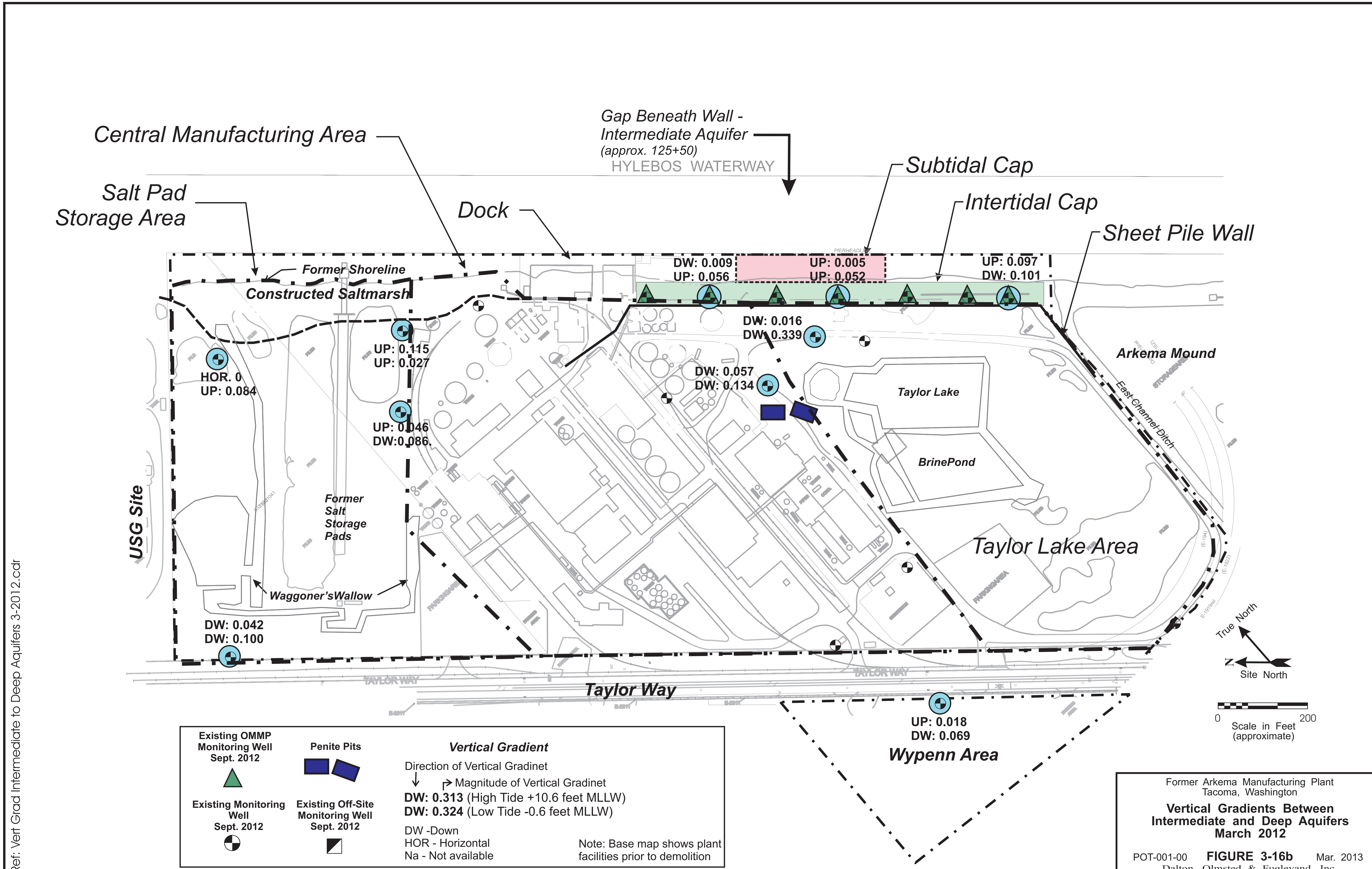
Ref: Vert Grad Upper to Intermediate Aquifers 3-2012.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Vertical Gradients Between Upper and Intermediate Aquifers March 2012

POT-001-00 **FIGURE 3-16a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

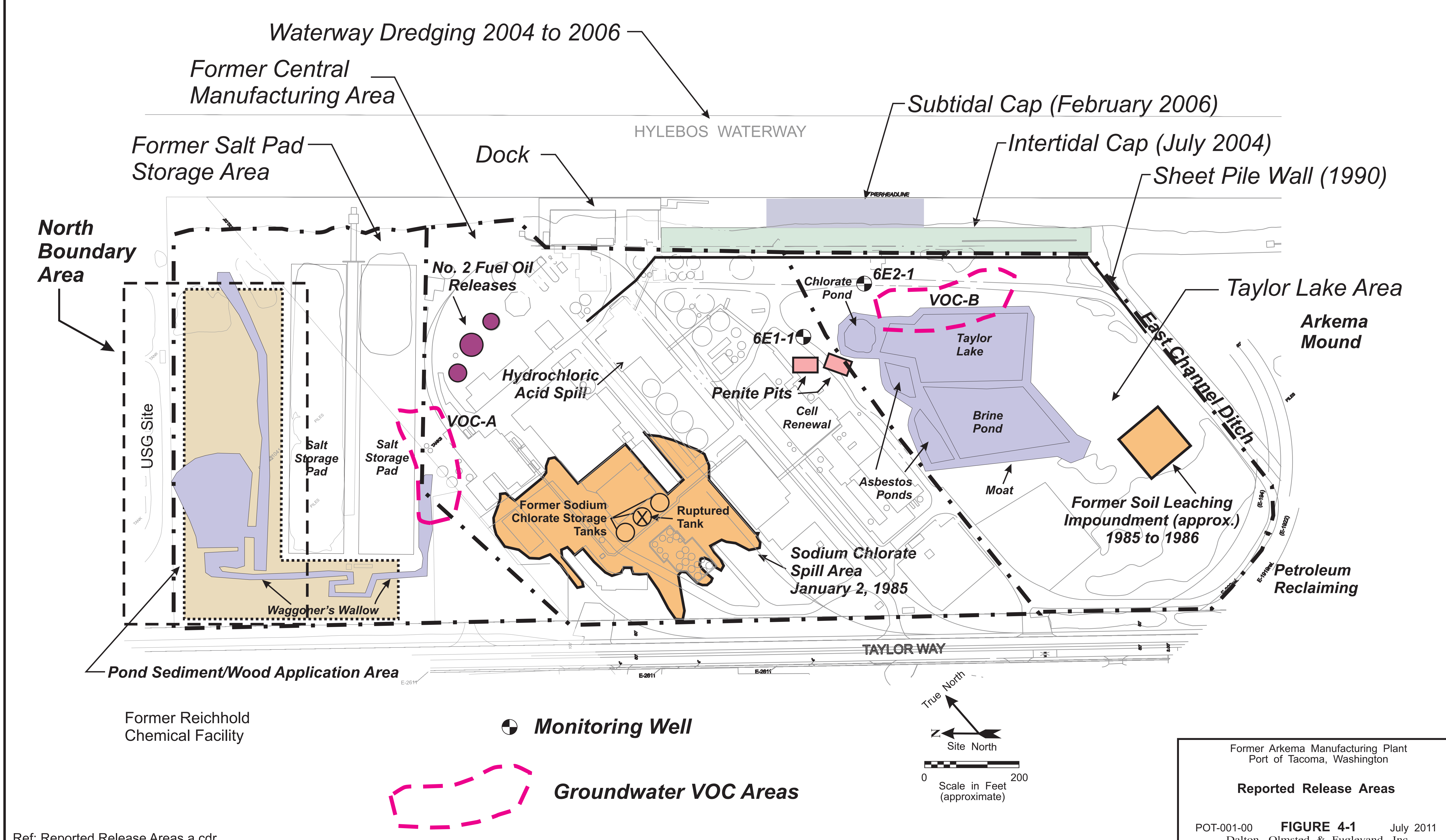


Former Arkema Manufacturing Plant
Tacoma, Washington

Vertical Gradients Between Intermediate and Deep Aquifers March 2012

POT-001-00 **FIGURE 3-16b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

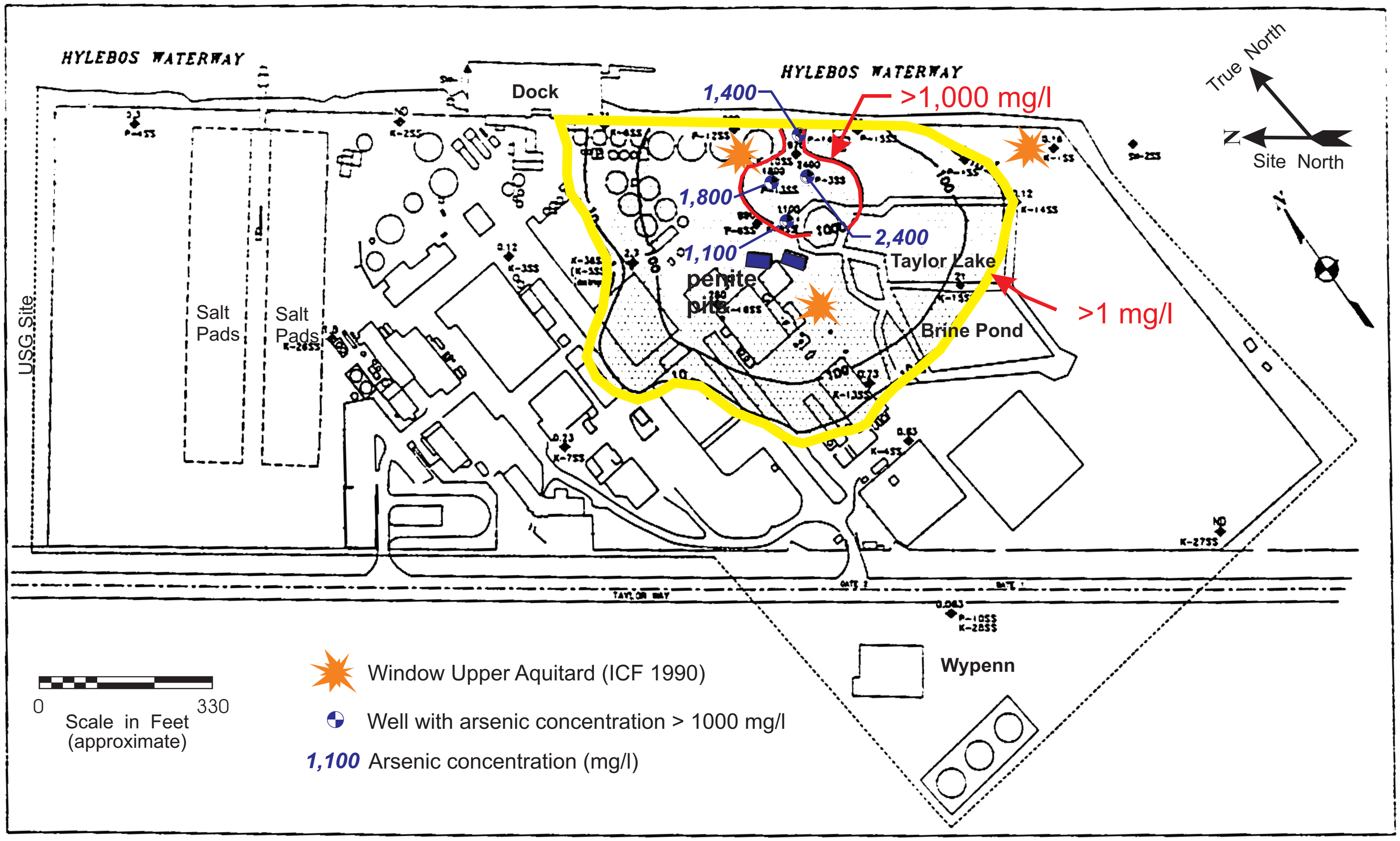


Former Arkema Manufacturing Plant
Port of Tacoma, Washington

Reported Release Areas

POT-001-00 **FIGURE 4-1** July 2011

Dalton, Olmsted & Fuglevand, Inc.



Adapted Figure 2-2(KJC 1990)

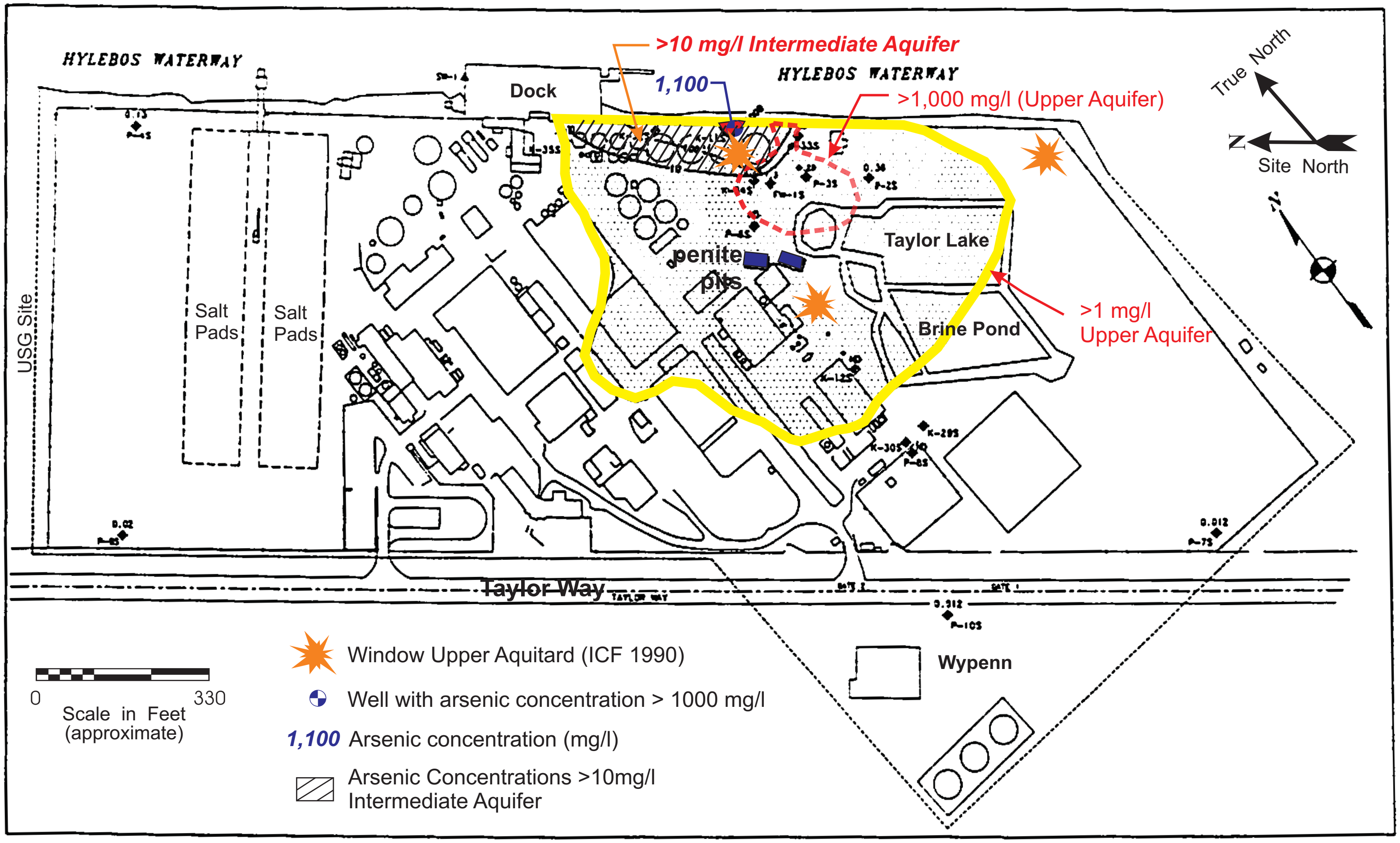
Former Arkema Manufacturing Plant
Tacoma,Washington

Arsenic Concentrations Upper Aquifer Groundwater - 1990

FIGURE 4-2 July 2011

Dalton, Olmsted & Fuglevand, Inc.

Ref: 1990UA AsConc KJC.cdr



Adapted Figures 2-2 and 2-3(KJC 1990)

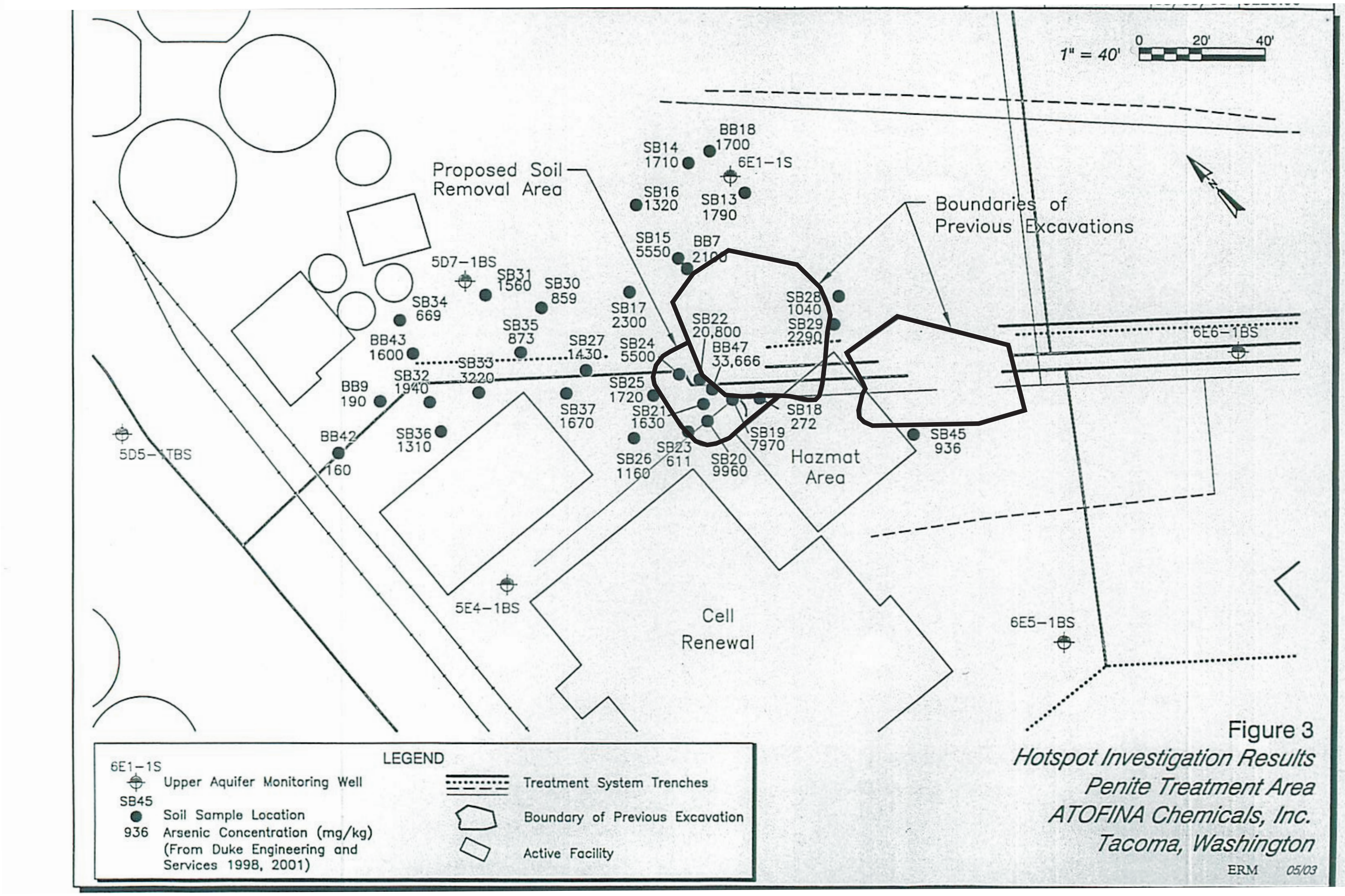
Former Arkema Manufacturing Plant
Tacoma,Washington

Comparison of Arsenic Concentrations Upper/Intermediate Aquifers 1990

FIGURE 4-3 Mar 2013

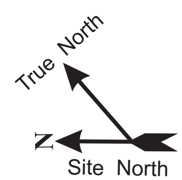
Dalton, Olmsted & Fuglevand, Inc.

Ref: 1990IA AsConc KJC.cdr



After Figure 3 - ERM 2003

See Figure 4-1 for general location of Penite pits in the Central Manufacturing Area



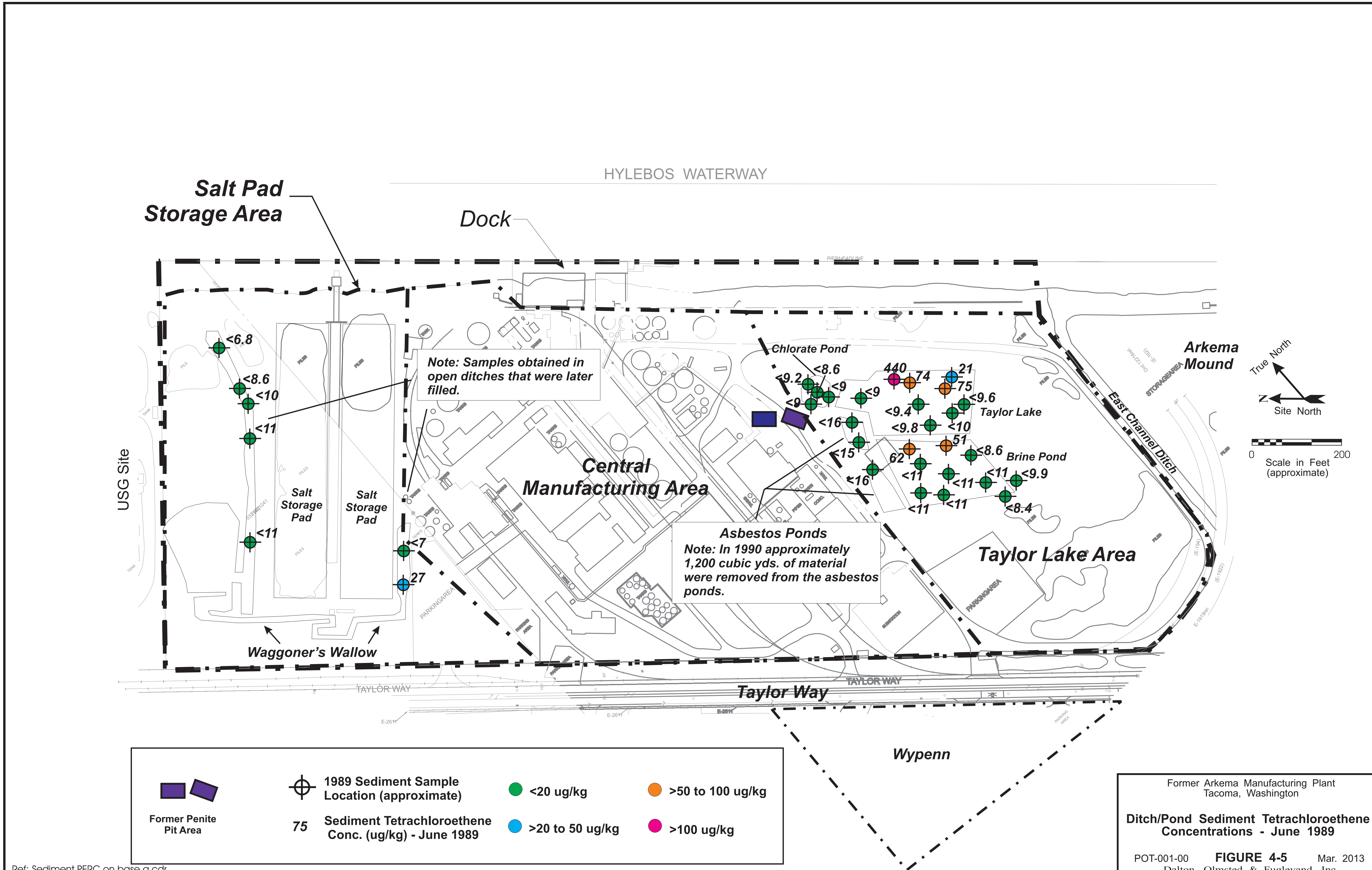
Former Arkema Manufacturing Plant
Tacoma, Washington

Penite Pit Excavations

POT-001-00 **FIGURE 4-4** July 2011

Dalton, Olmsted & Fuglevand, Inc.

Ref: Penite Pit Excavation 2003.cdr



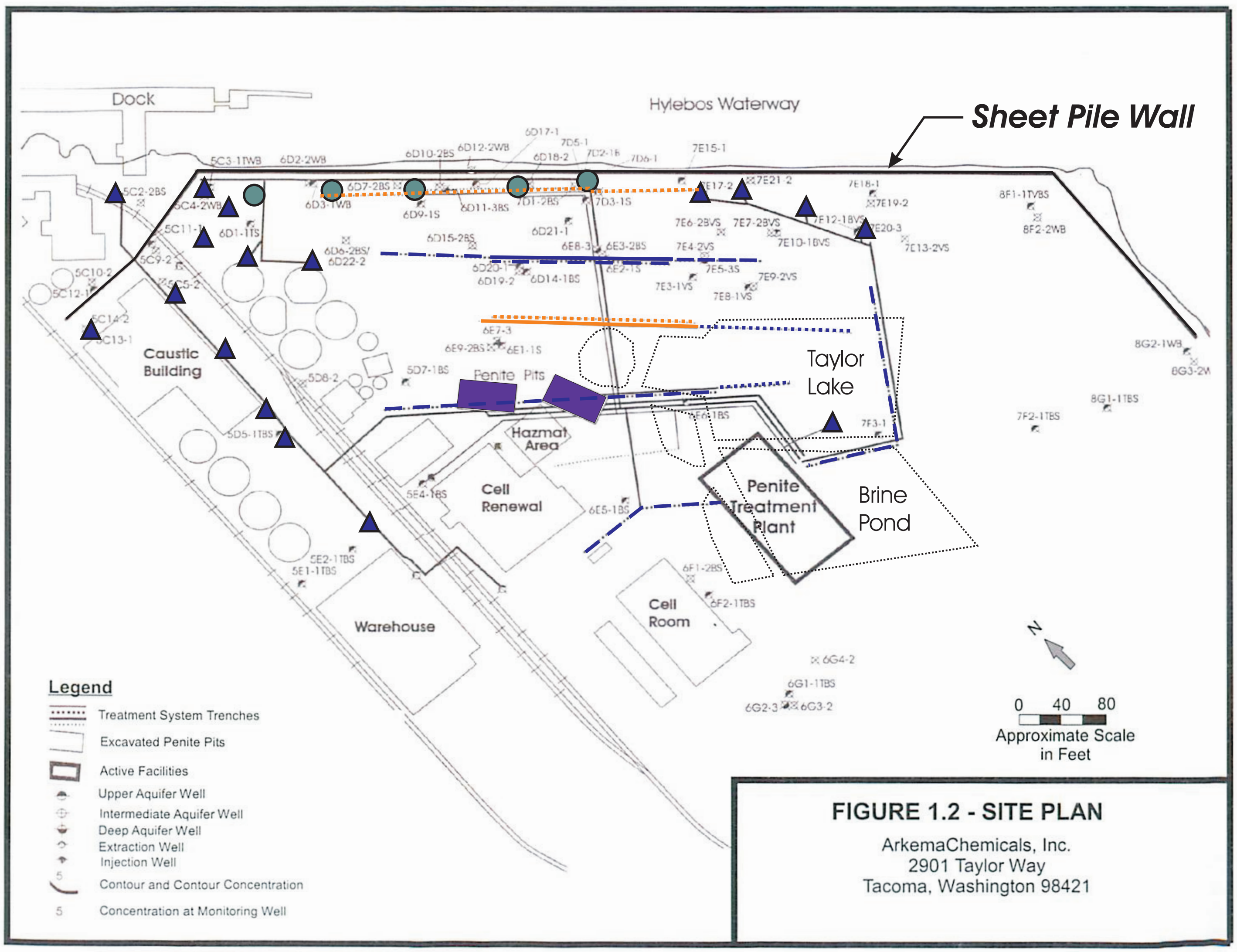
Ref: Sediment PERC on base a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Ditch/Pond Sediment Tetrachloroethene Concentrations - June 1989

POT-001-00 **FIGURE 4-5** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



After Figure 1.2 Boateng (2007)

True North

Site North

Penite Pits

Upper Aquifer Extraction Well

Intermediate Aquifer Extraction Well

Infiltration Trench

Extraction Trench

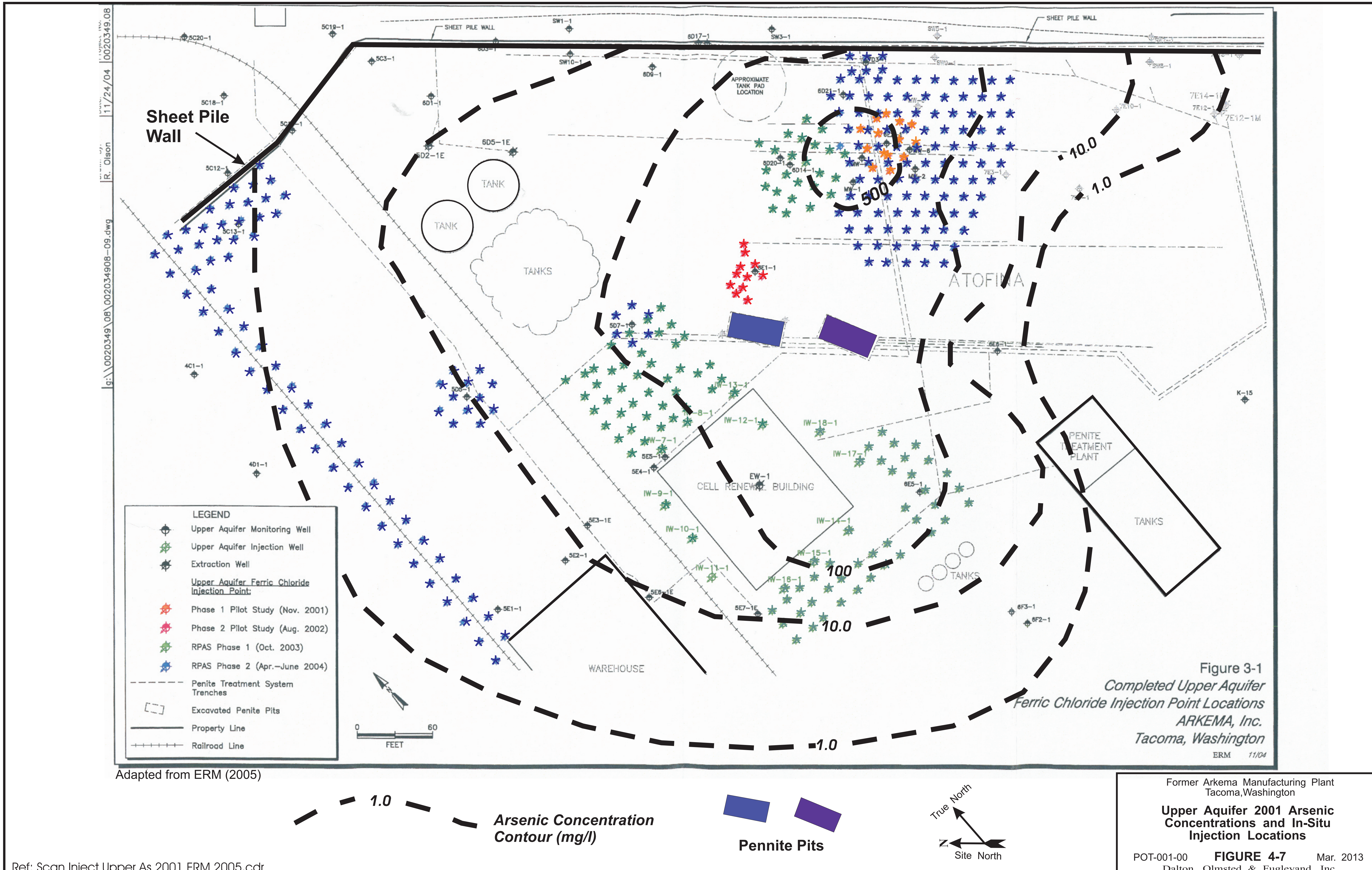
Former Arkema Manufacturing Plant
Tacoma, Washington

Layout - Pump and Treat System

POT-001-00 **FIGURE 4-6** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: P T System.cdr

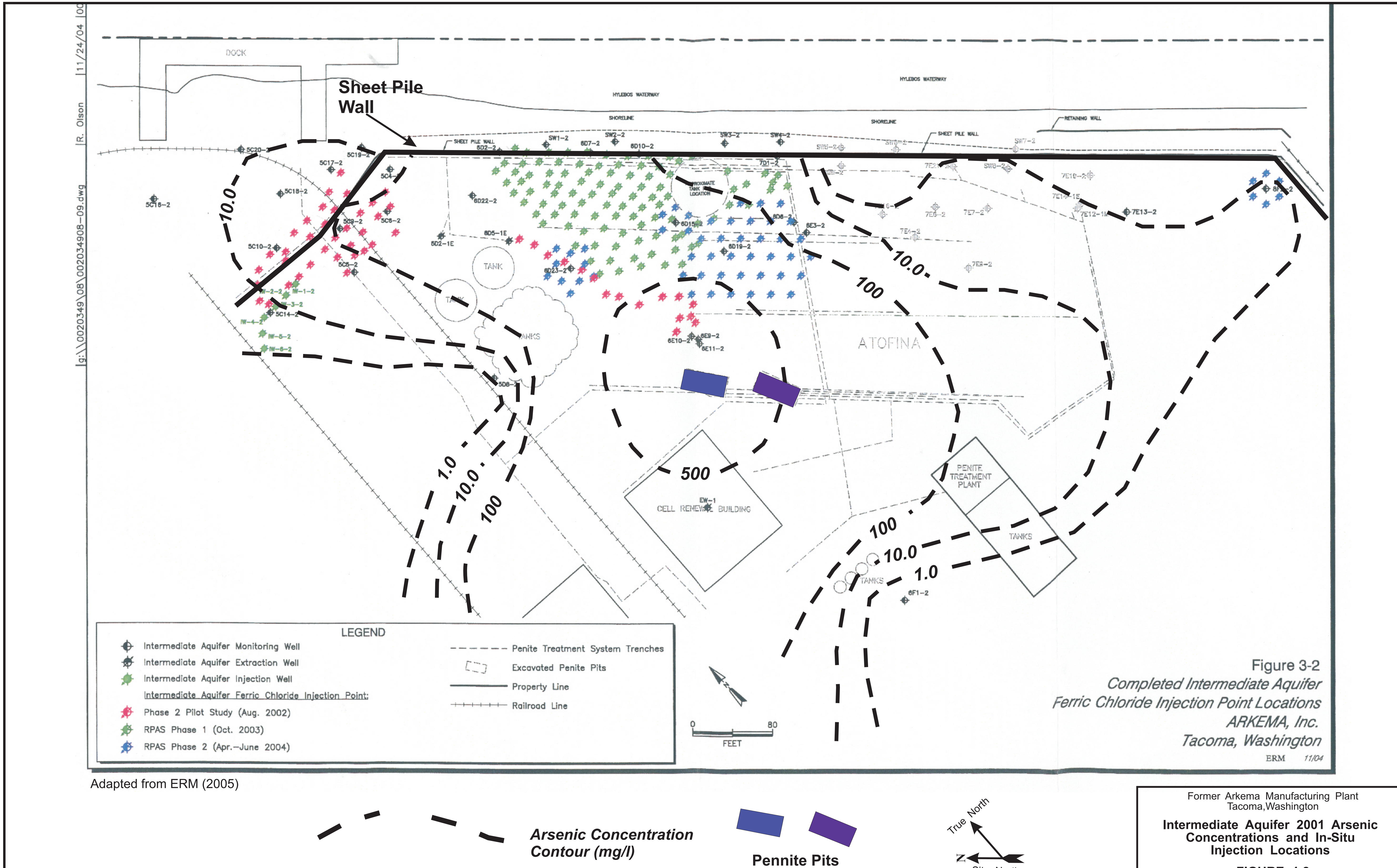


Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer 2001 Arsenic Concentrations and In-Situ Injection Locations

POT-001-00 **FIGURE 4-7** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



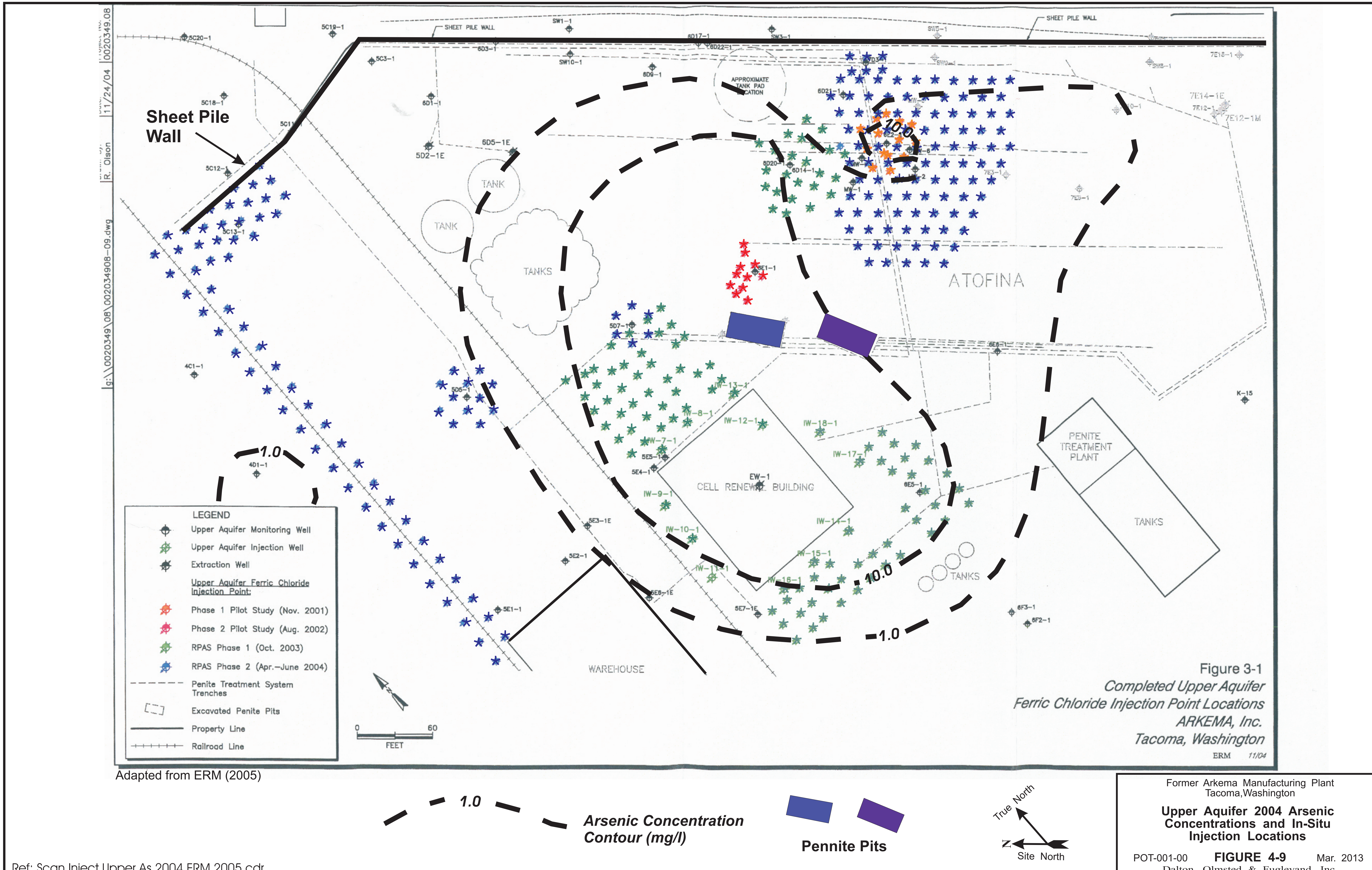
Ref: Scan Inject Interm As 2001 ERM 2005.cdr

Former Arkema Manufacturing Plant
Tacoma,Washington

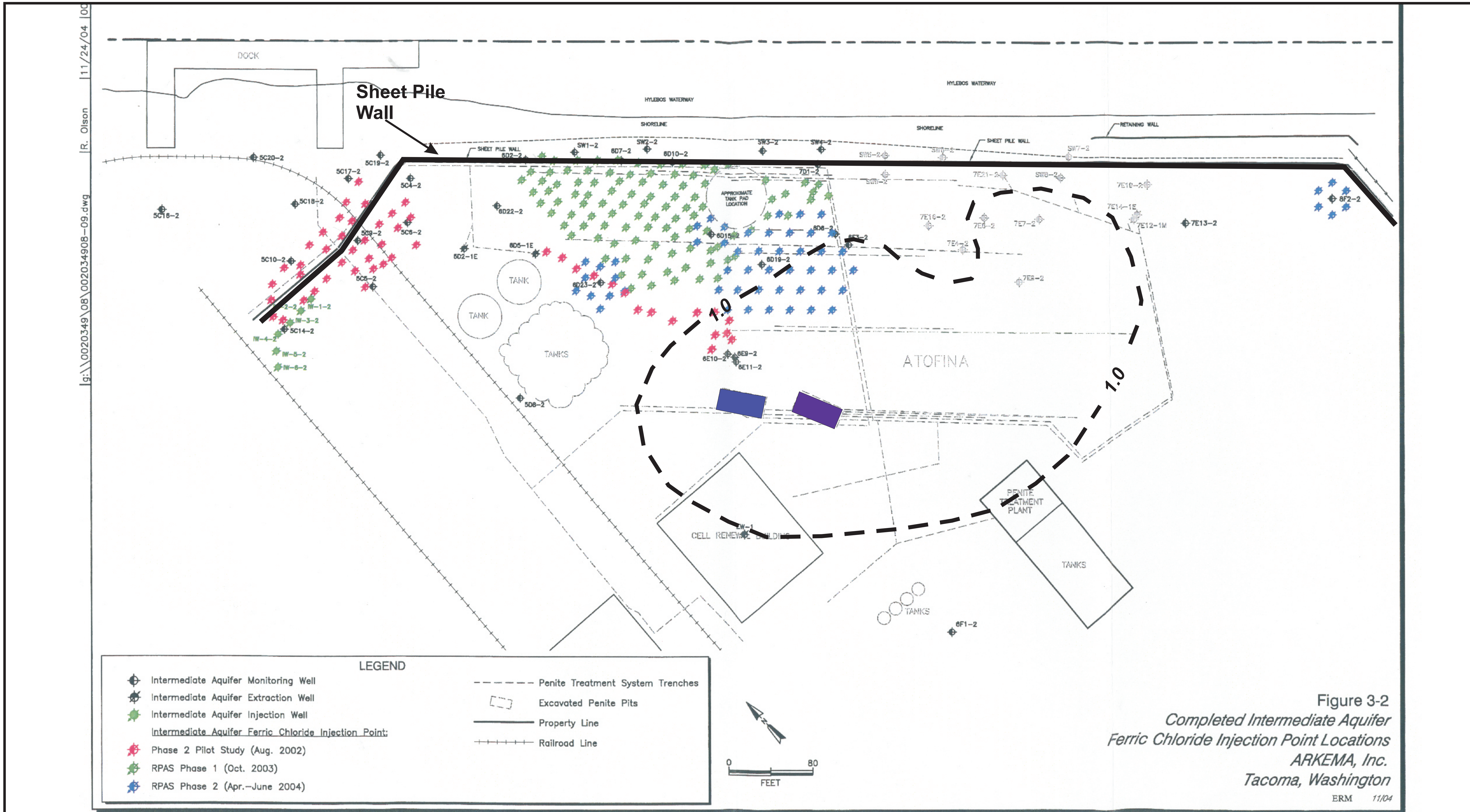
Intermediate Aquifer 2001 Arsenic Concentrations and In-Situ Injection Locations

POT-001-00 **FIGURE 4-8** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Sheet Pile Wall
SHEET PILE WALL
APPROXIMATE TANK PAD LOCATION
TANK
TANK
TANKS
ATOFINA
CELL RENEWAL BUILDING
PENITE TREATMENT PLANT
TANKS
TANKS
WAREHOUSE
10.0
10.0
1.0
1.0
1.0
LEGEND
Upper Aquifer Monitoring Well
Upper Aquifer Injection Well
Extraction Well
Upper Aquifer Ferric Chloride Injection Point:
Phase 1 Pilot Study (Nov. 2001)
Phase 2 Pilot Study (Aug. 2002)
RPAS Phase 1 (Oct. 2003)
RPAS Phase 2 (Apr.–June 2004)
Penite Treatment System Trenches
Excavated Penite Pits
Property Line
Railroad Line
0
60
FEET
Figure 3-1
Completed Upper Aquifer
Ferric Chloride Injection Point Locations
ARKEMA, Inc.
Tacoma, Washington
ERM 11/04
Adapted from ERM (2005)
1.0
Arsenic Concentration Contour (mg/l)
Pennite Pits
True North
Site North
Former Arkema Manufacturing Plant
Tacoma,Washington
Upper Aquifer 2004 Arsenic Concentrations and In-Situ Injection Locations
POT-001-00
FIGURE 4-9
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Scan Inject Upper As 2004 ERM 2005.cdr



Adapted from ERM (2005)

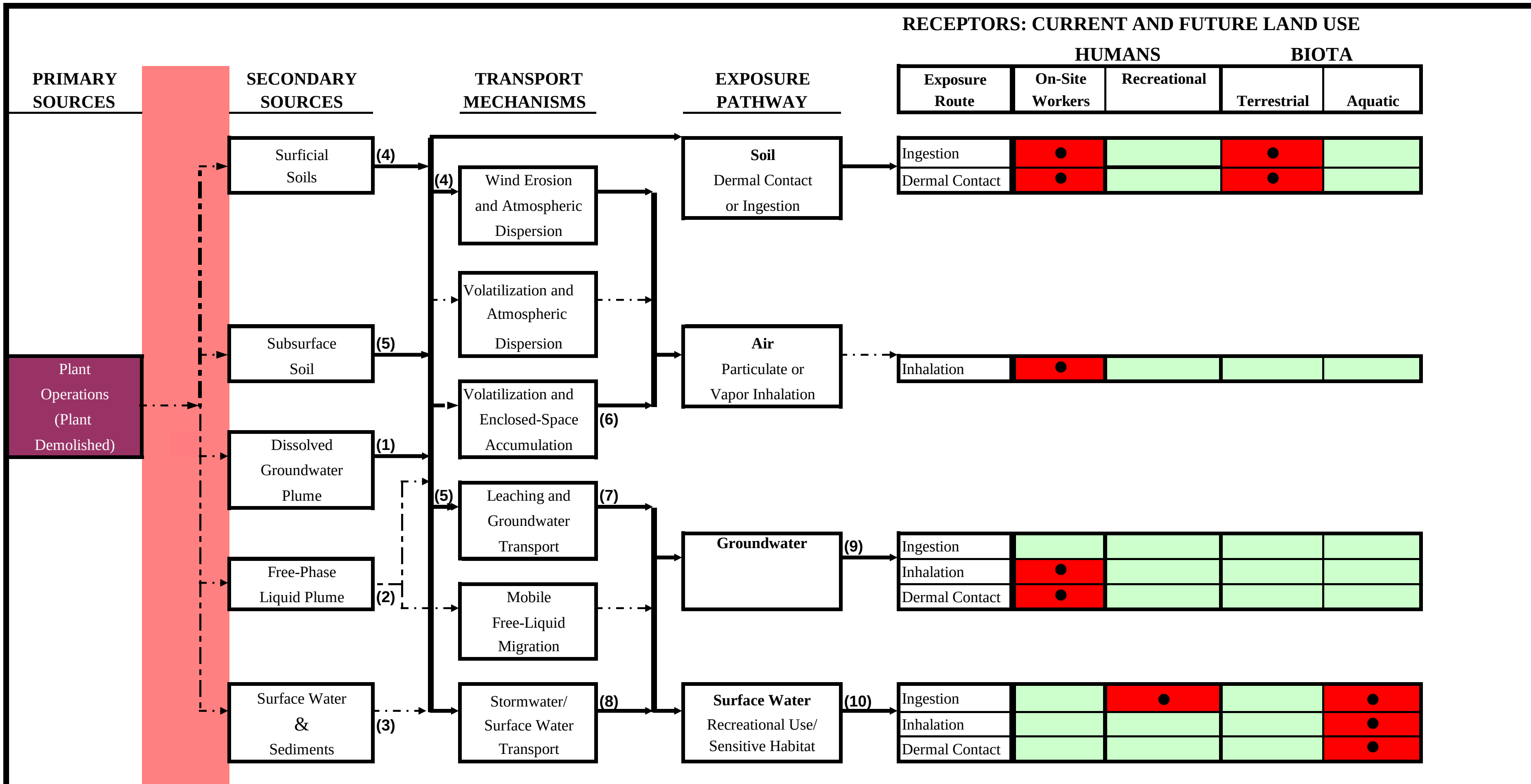
Former Arkema Manufacturing Plant
Tacoma,Washington

Intermediate Aquifer 2004 Arsenic Concentrations and In-Situ Injection Locations

POT-001-00 **FIGURE 4-10** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Scan Inject Interm As 2004 ERM 2005.cdr



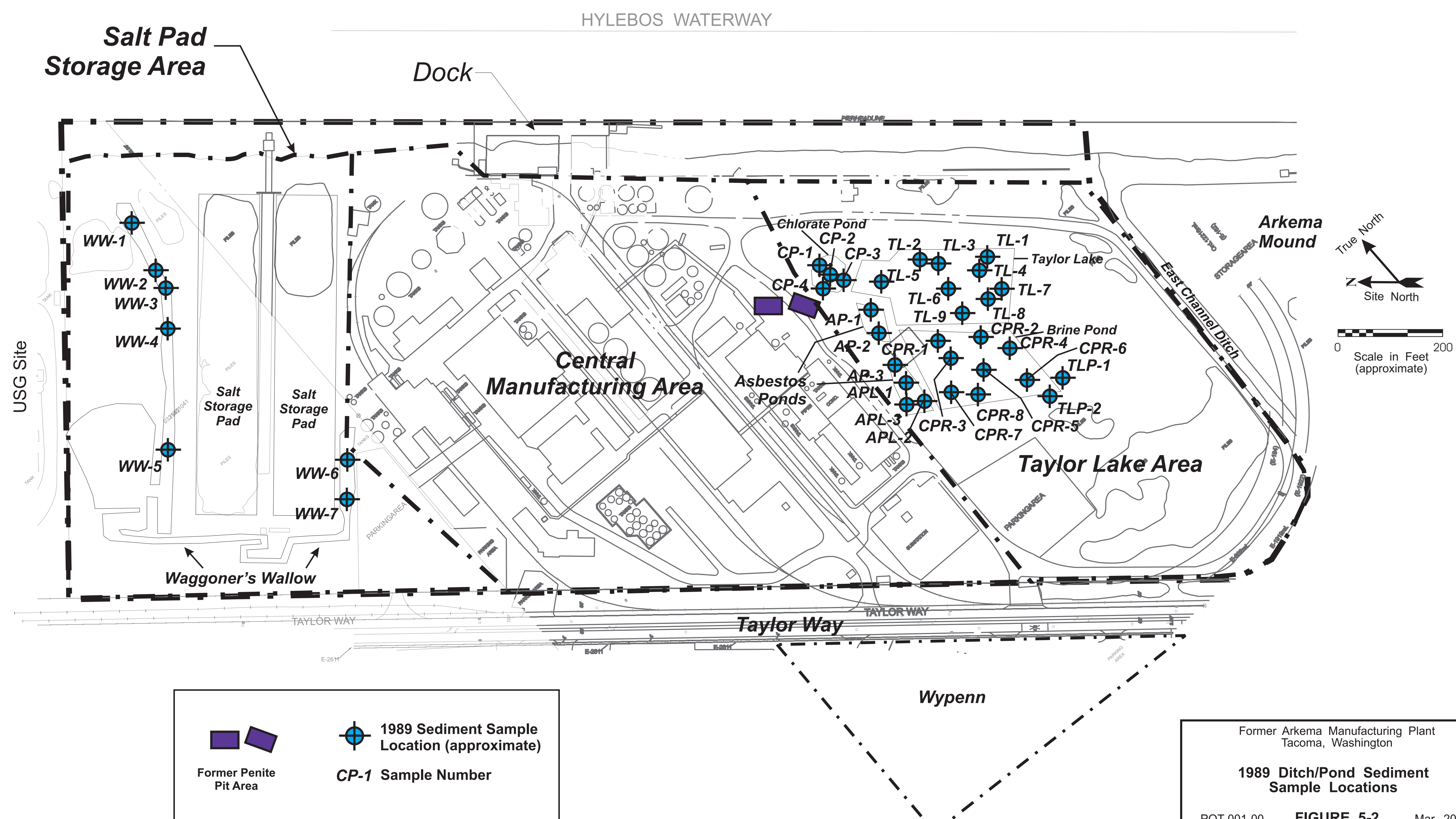
(Dotted or dashed arrows indicate incomplete/broken pathways or insignificant risk/exposure.)

= Plant demolished/above ground waste materials removed

= absent/insignificant exposure
= complete exposure pathway

(1) = Multiple constituents dissolved in groundwater (metals VOCs)
(2) = No free-phase hydrocarbons encountered in any of site investigations.
(3) = Surface water not a source/contaminated sediments have been capped
(4) = Arsenic in surficial soil exceeds screening levels
(5) = Arsenic in subsurface soil exceeds screening levels
(6) = No structures on site; future potential risk - localized areas of site
(7) = Groundwater discharge to surface water
(8) = Possible erosion East Channel Ditch
(9) = Groundwater drinking water use unlikely
(10) = Recreational Harvesting - Fish/Shell Fish Ingestion

FIGURE 5-1
Exposure Pathway Analysis



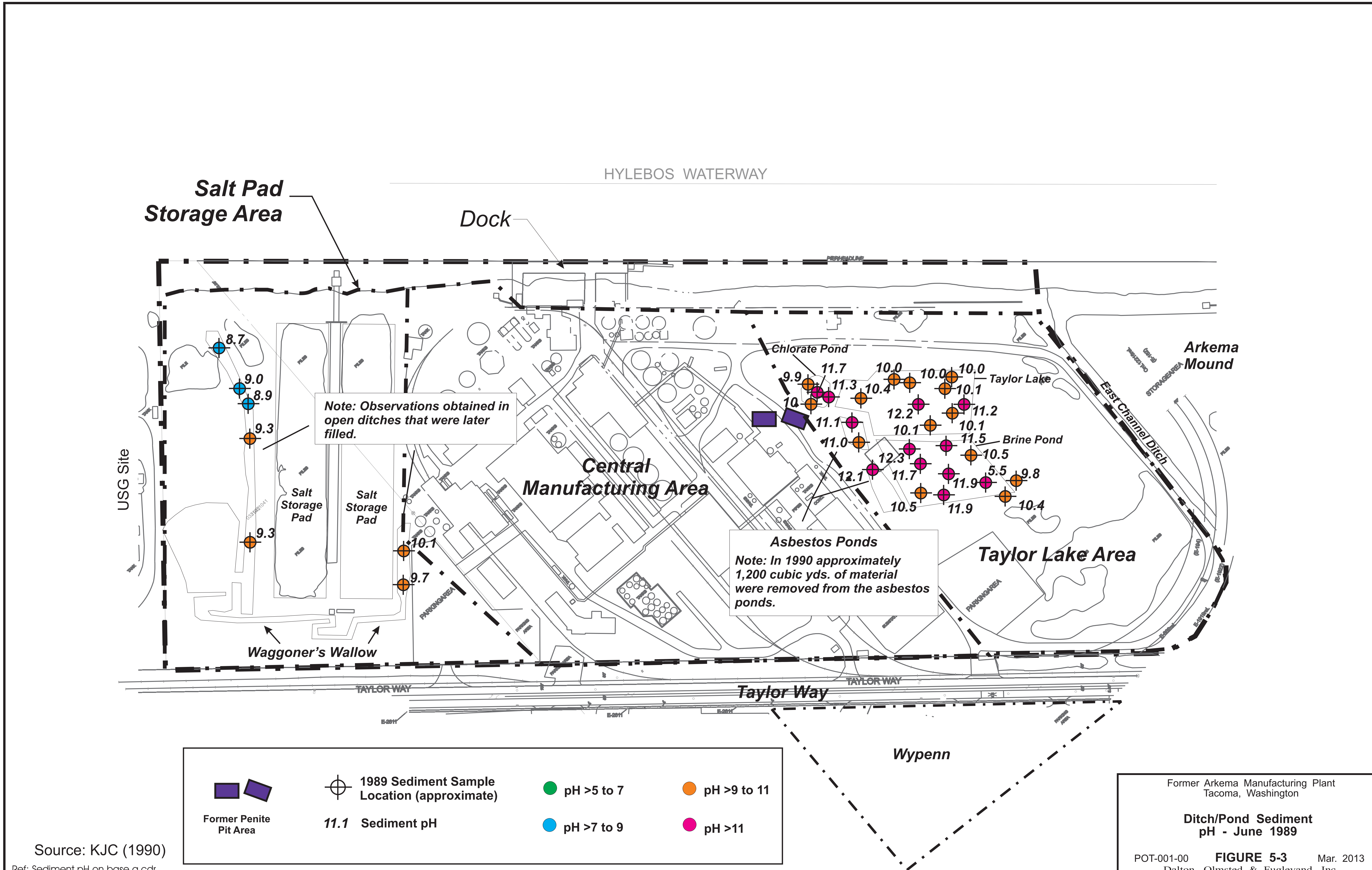
Ref: Sediment Spl Locations on base a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

1989 Ditch/Pond Sediment Sample Locations

POT-001-00 **FIGURE 5-2** Mar. 2013

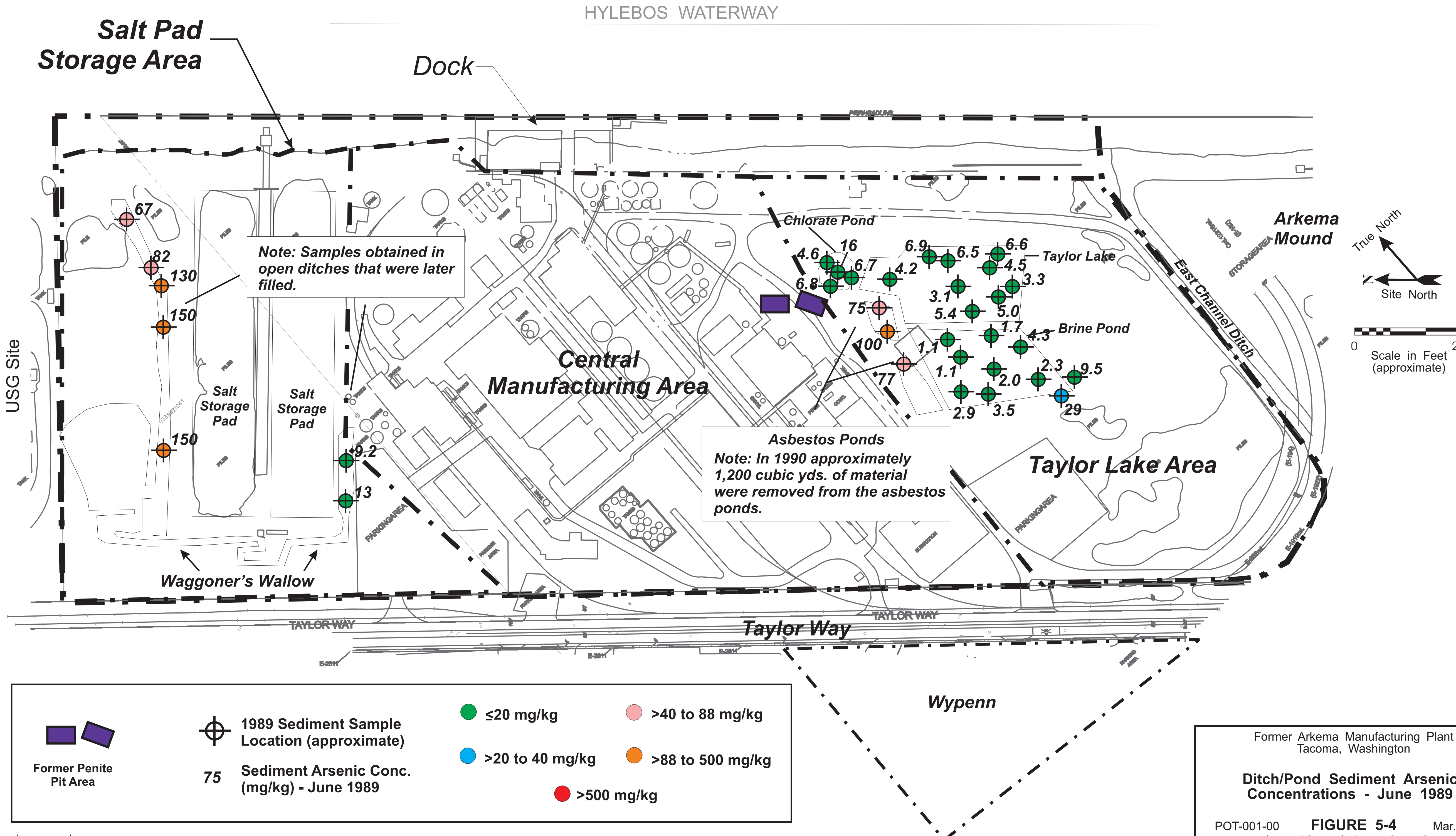
Dalton, Olmsted & Fuglevand, Inc.



Former Arkema Manufacturing Plant
Tacoma, Washington

Ditch/Pond Sediment
pH - June 1989

POT-001-00 **FIGURE 5-3** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Former Arkema Manufacturing Plant
Tacoma, Washington

Ditch/Pond Sediment Arsenic Concentrations - June 1989

POT-001-00 **FIGURE 5-4** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

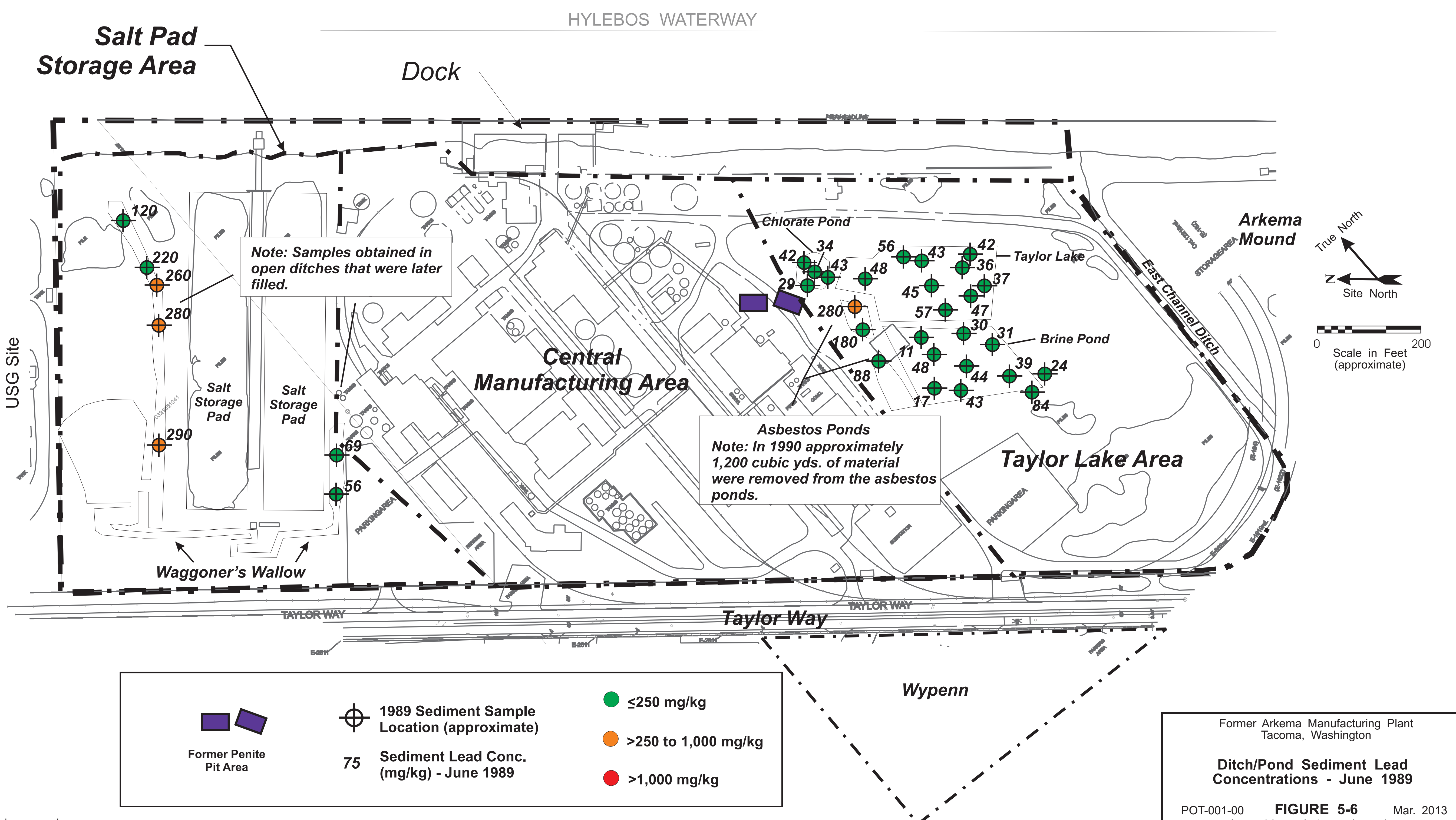
Ref: Sediment TChromium on base a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Ditch/Pond Sediment Total Chromium Concentrations - June 1989

POT-001-00 **FIGURE 5-5** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



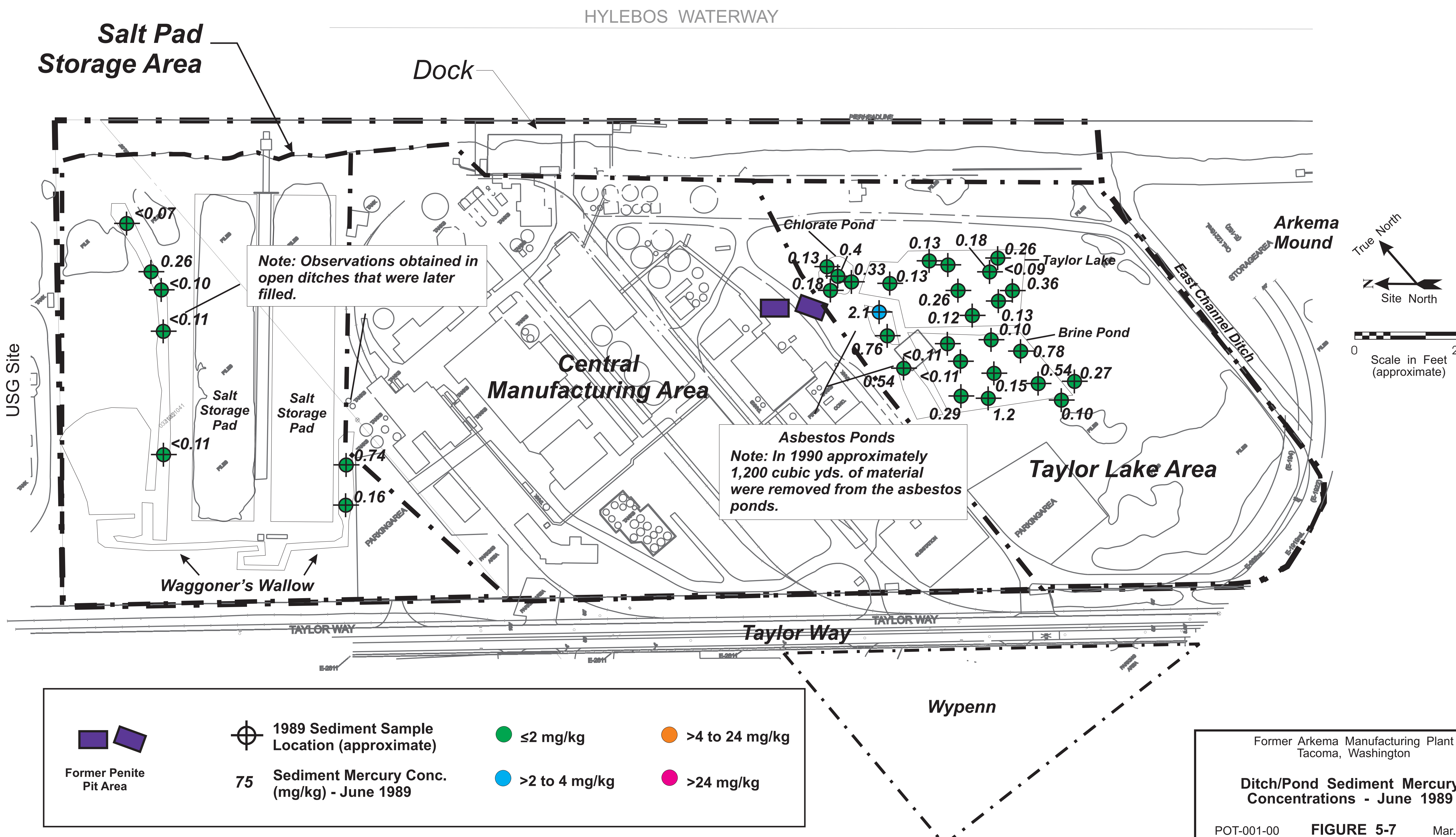
Ref: Sediment Lead on base a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Ditch/Pond Sediment Lead Concentrations - June 1989

POT-001-00 FIGURE 5-6 Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



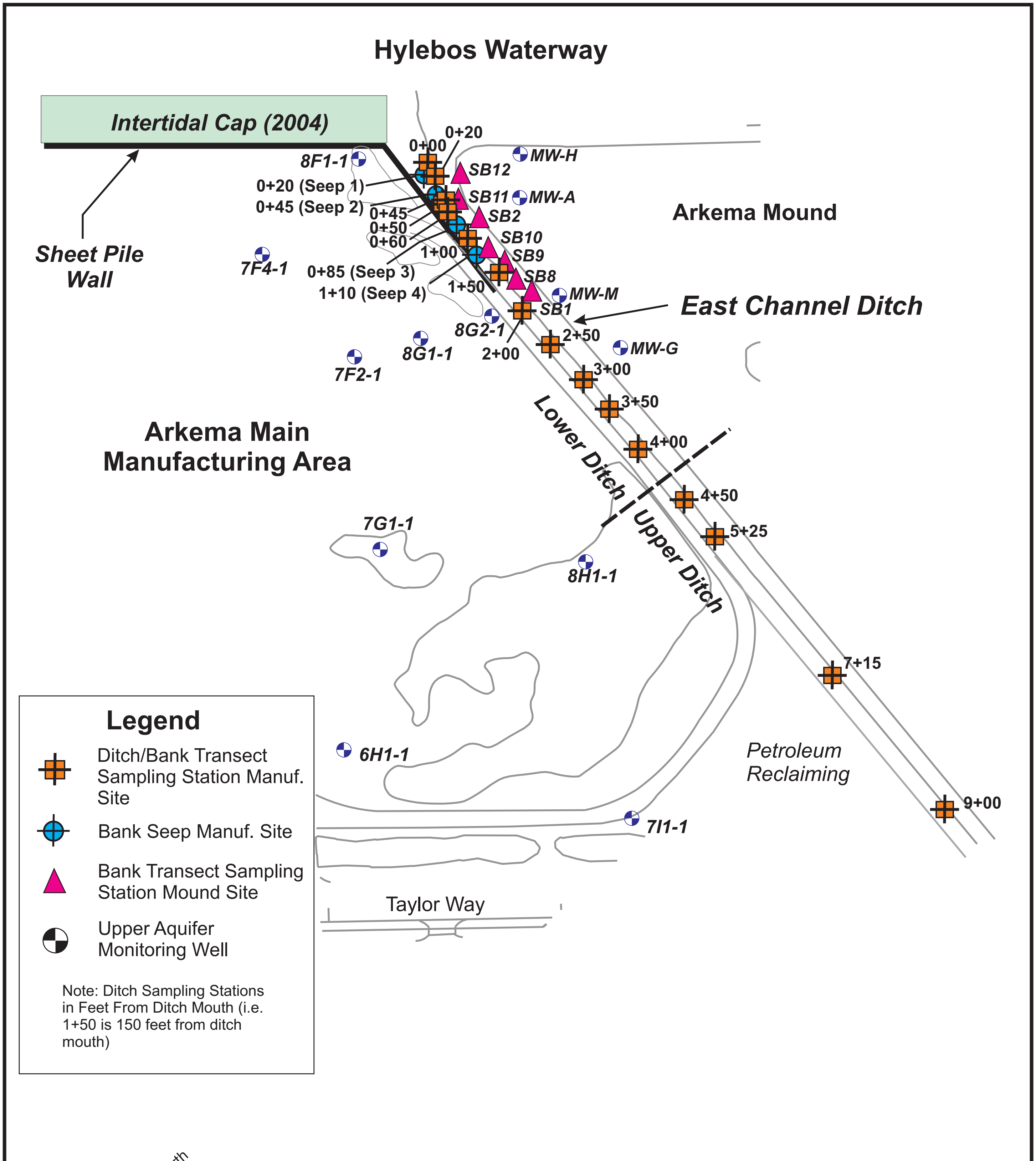
Ref: Sediment Mercury on base a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Ditch/Pond Sediment Mercury Concentrations - June 1989

POT-001-00 FIGURE 5-7 Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

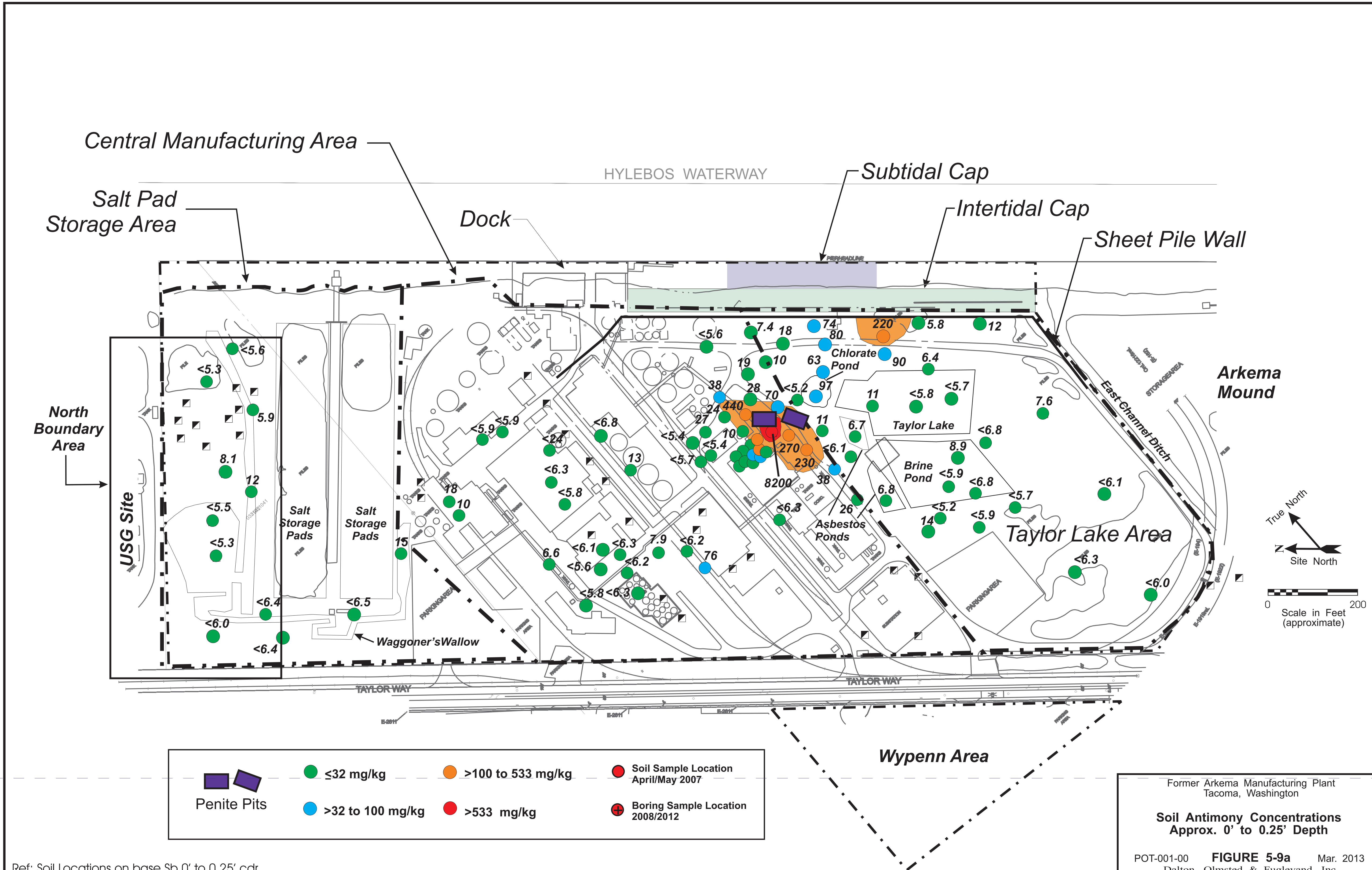


Former Arkema Manufacturing Plant
Tacoma, Washington

Sample Locations
East Channel Ditch

POT-001-01 **FIGURE 5-8** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



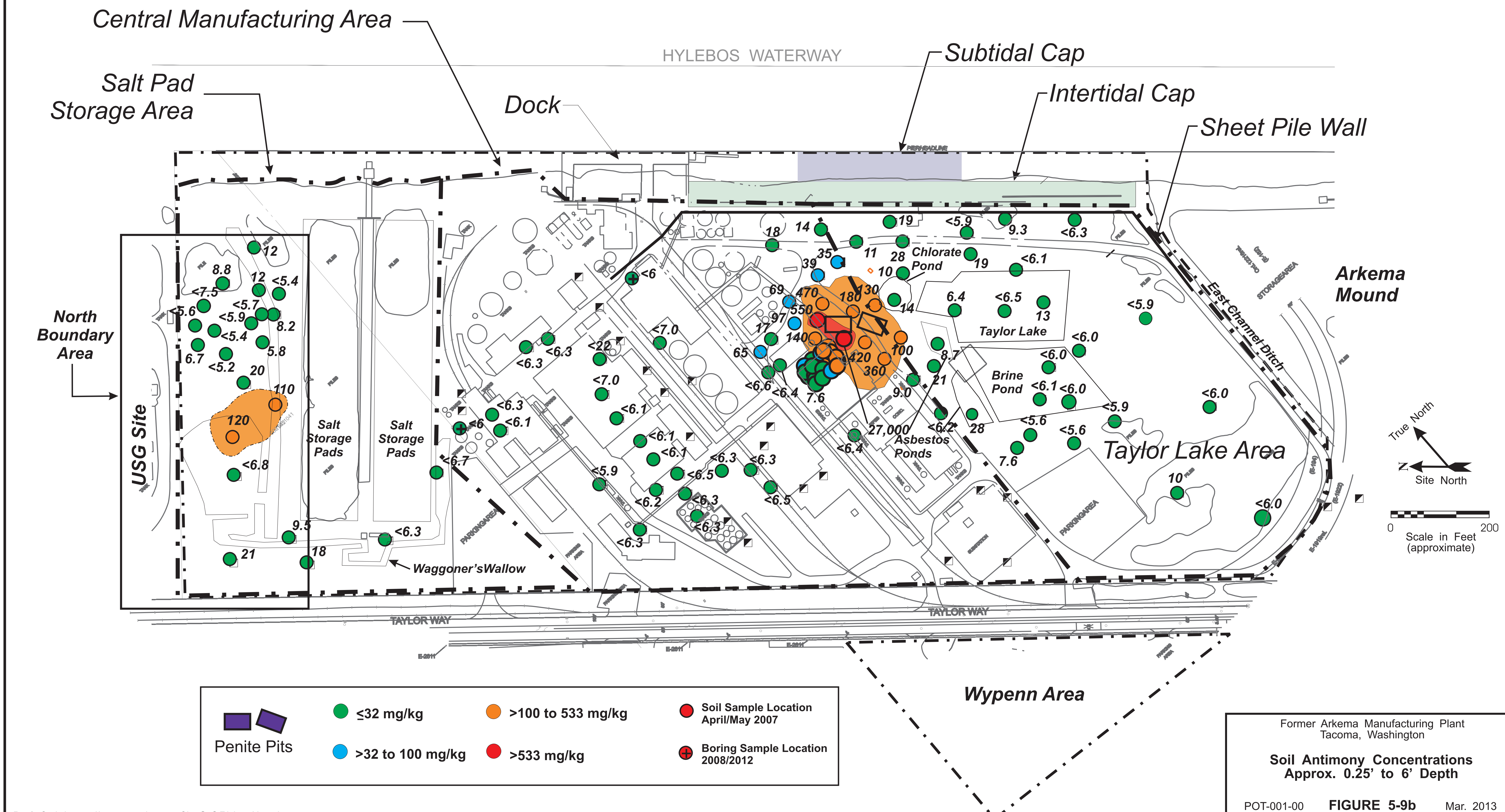
Ref: Soil Locations on base Sb 0' to 0.25'.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Antimony Concentrations
Approx. 0' to 0.25' Depth

POT-001-00 **FIGURE 5-9a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



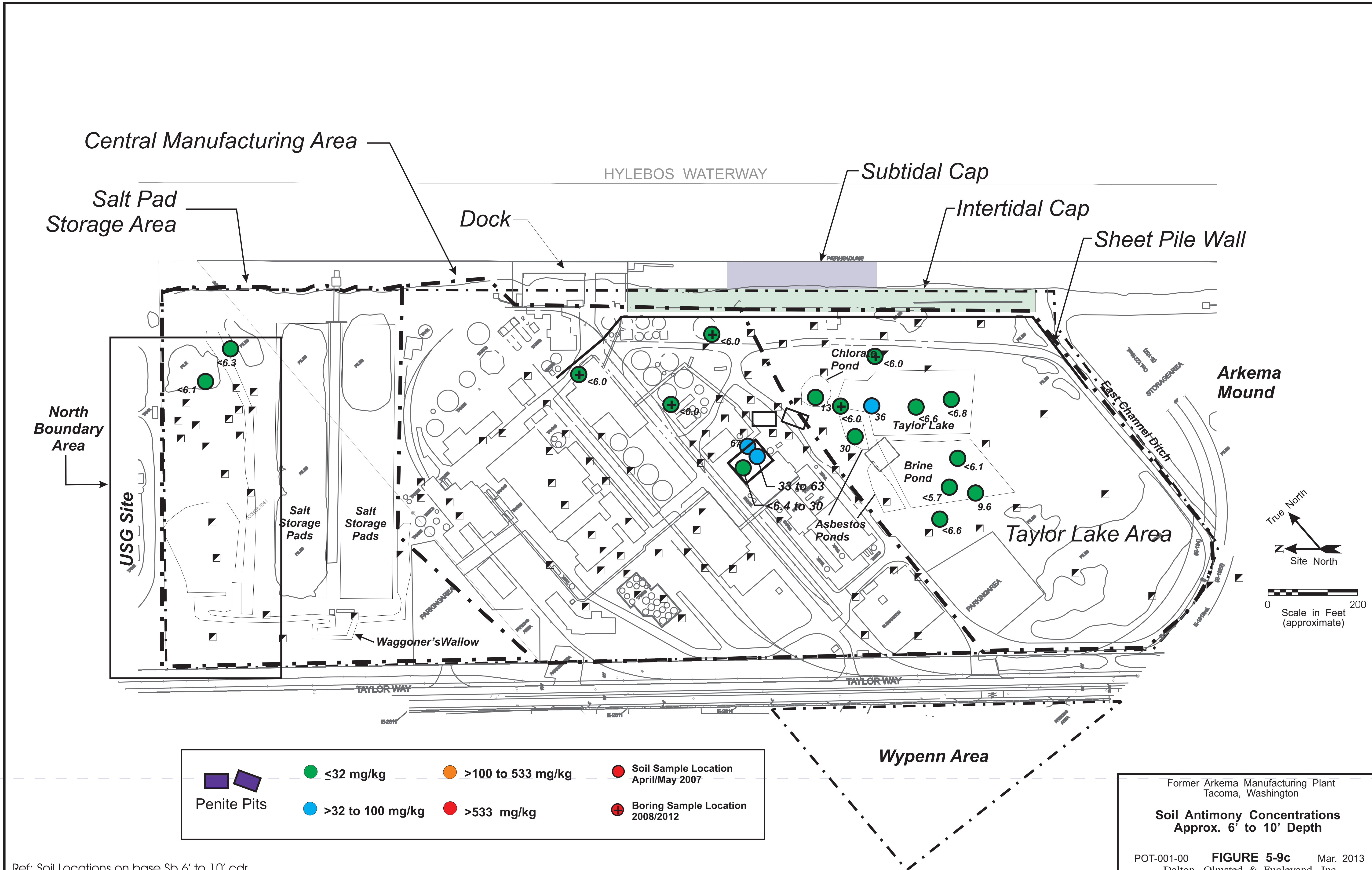
Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Antimony Concentrations
Approx. 0.25' to 6' Depth

POT-001-00 **FIGURE 5-9b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

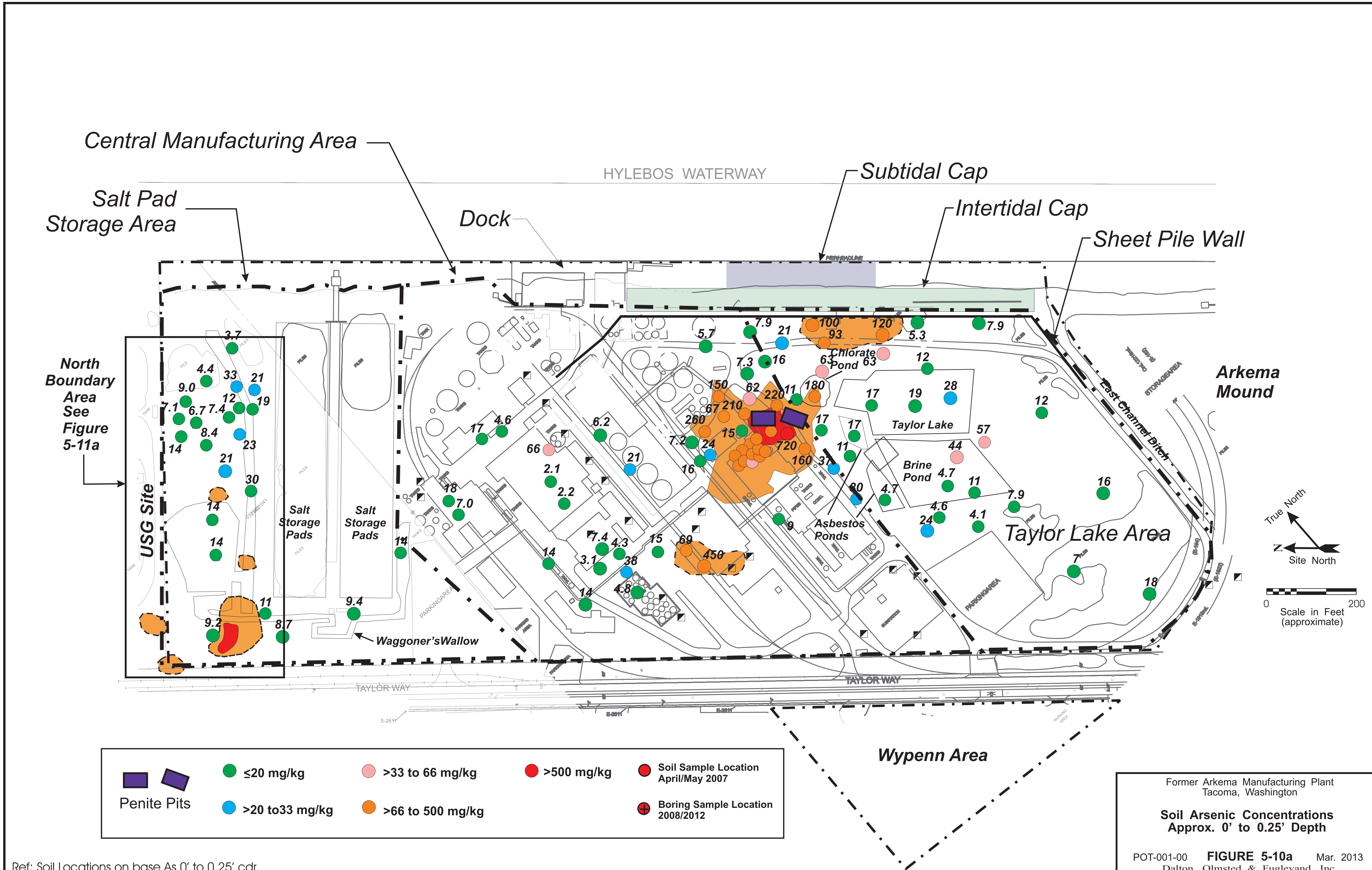
Ref: Soil Locations on base Sb 0.25' to 6'.cdr

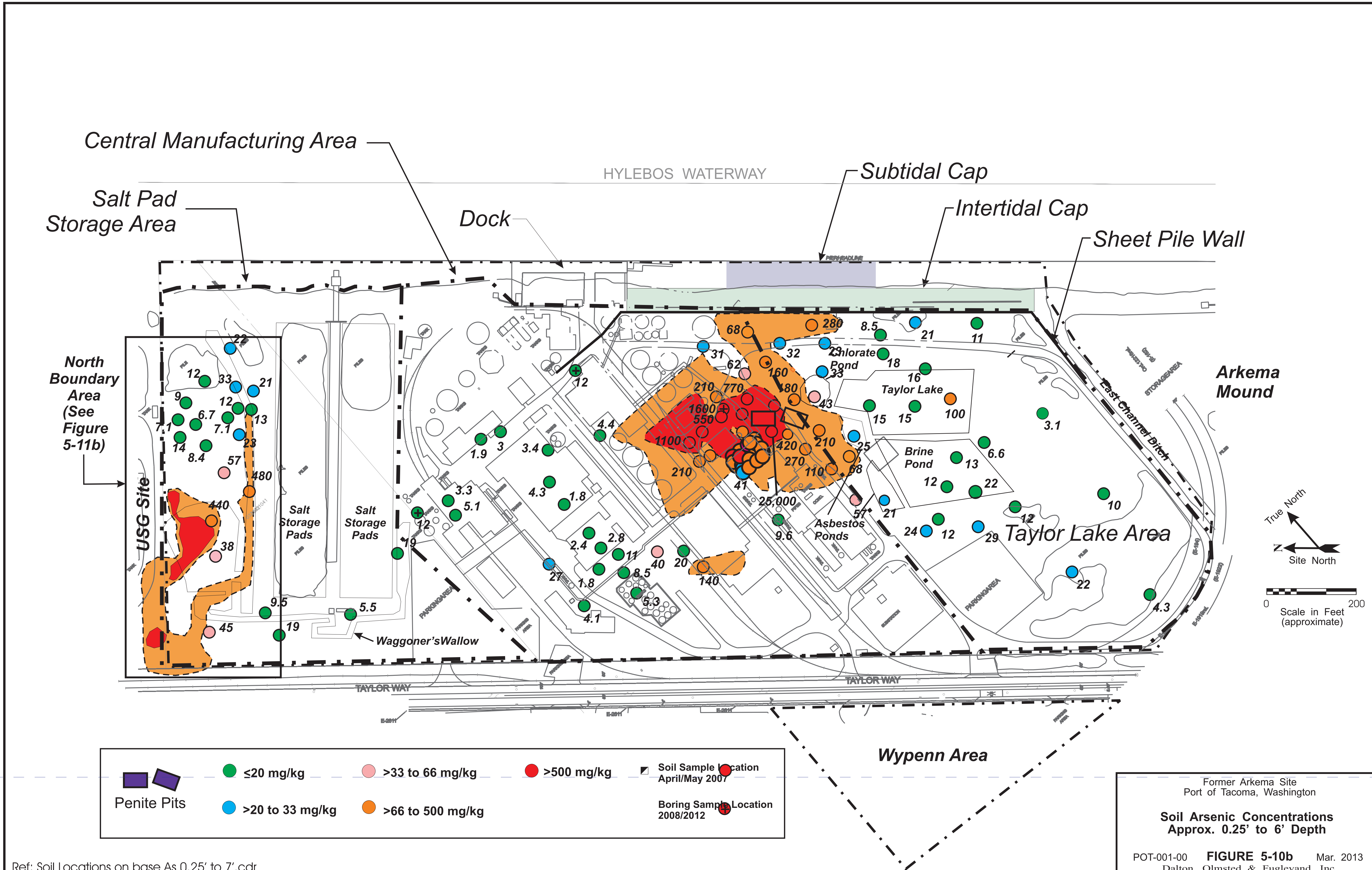


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Antimony Concentrations
Approx. 6' to 10' Depth

POT-001-00 **FIGURE 5-9c** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.


Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Salt Pad
Storage Area
Dock
Intertidal Cap
Sheet Pile Wall
North
Boundary
Area
See
Figure
5-11a
USG Site
Chlorate
Pond
Taylor Lake
Arkema
Mound
East Channel Ditch
Brine
Pond
Salt
Storage
Pads
Salt
Storage
Pads
Asbestos
Ponds
Taylor Lake Area
Waggoner'sWallow
TAYLOR WAY
Wypenn Area
True North
Site North
0
200
Scale in Feet
(approximate)
Penite Pits
≤20 mg/kg
>20 to33 mg/kg
>33 to 66 mg/kg
>66 to 500 mg/kg
>500 mg/kg
Soil Sample Location
April/May 2007
Boring Sample Location
2008/2012
Ref: Soil Locations on base As 0' to 0.25'.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Soil Arsenic Concentrations
Approx. 0' to 0.25' Depth
POT-001-00
FIGURE 5-10a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



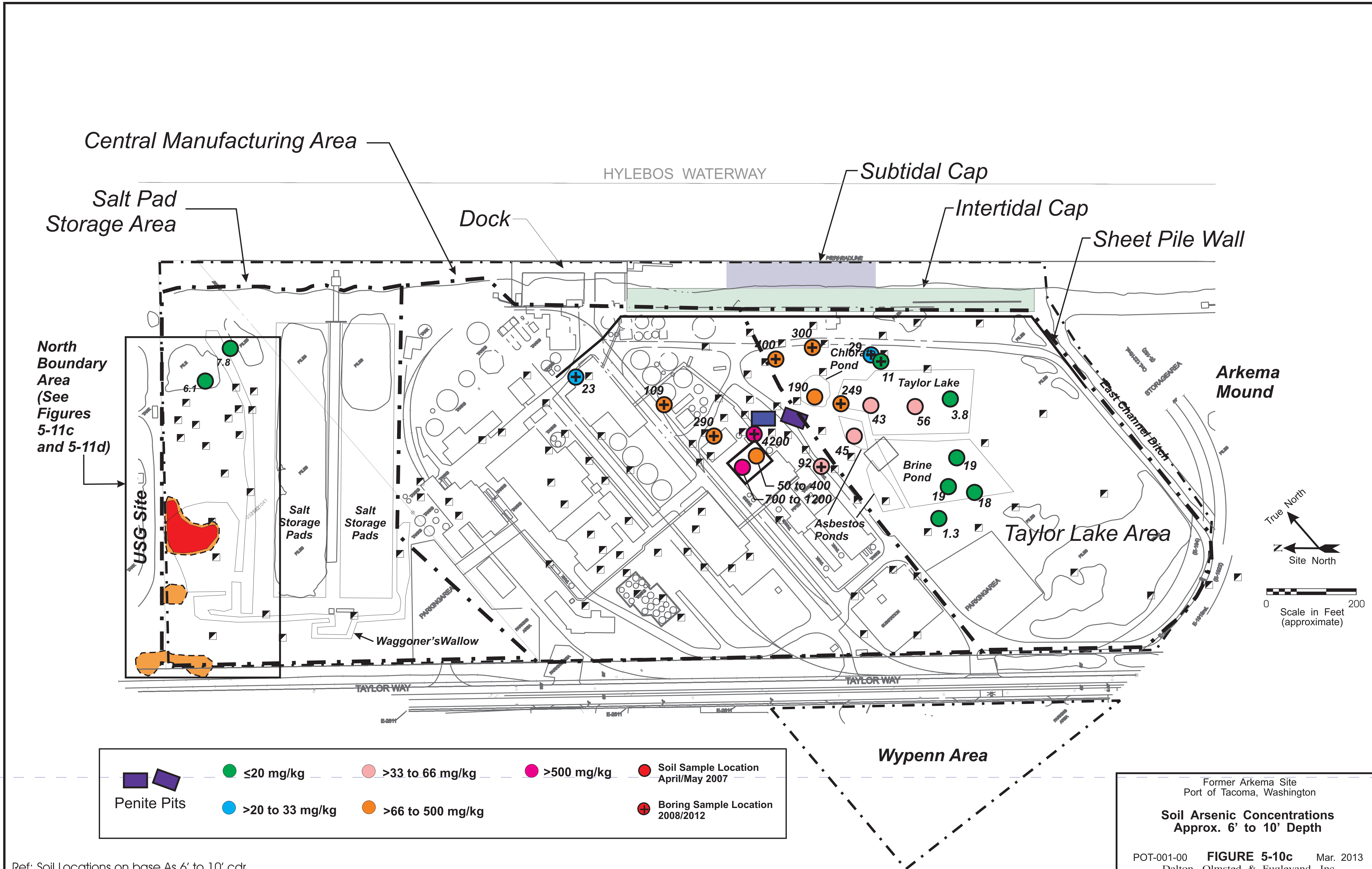
Former Arkema Site
Port of Tacoma, Washington

Soil Arsenic Concentrations
Approx. 0.25' to 6' Depth

POT-001-00 **FIGURE 5-10b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Soil Locations on base As 0.25' to 7'.cdr

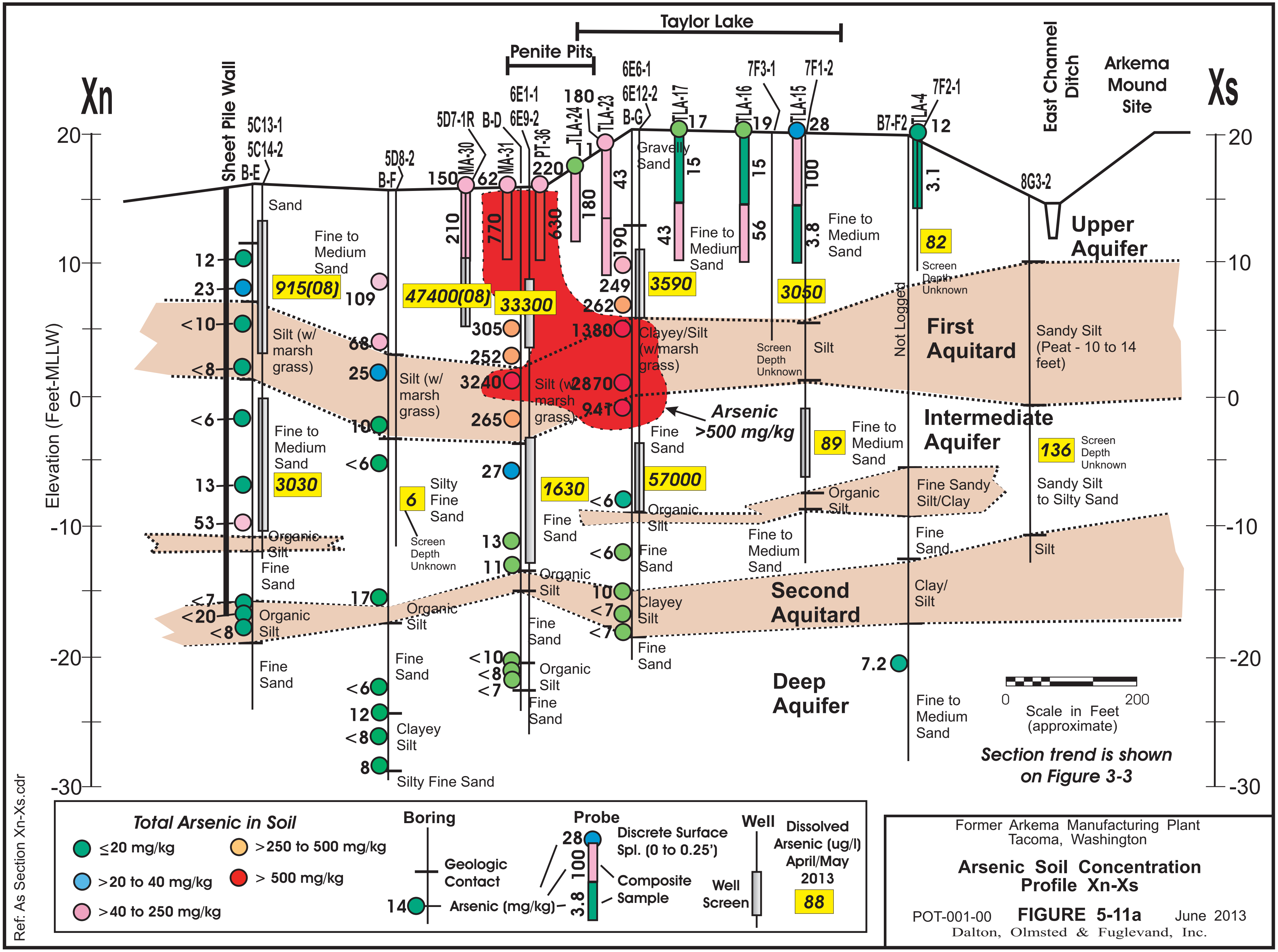


Former Arkema Site
Port of Tacoma, Washington

Soil Arsenic Concentrations
Approx. 6' to 10' Depth

POT-001-00 **FIGURE 5-10c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

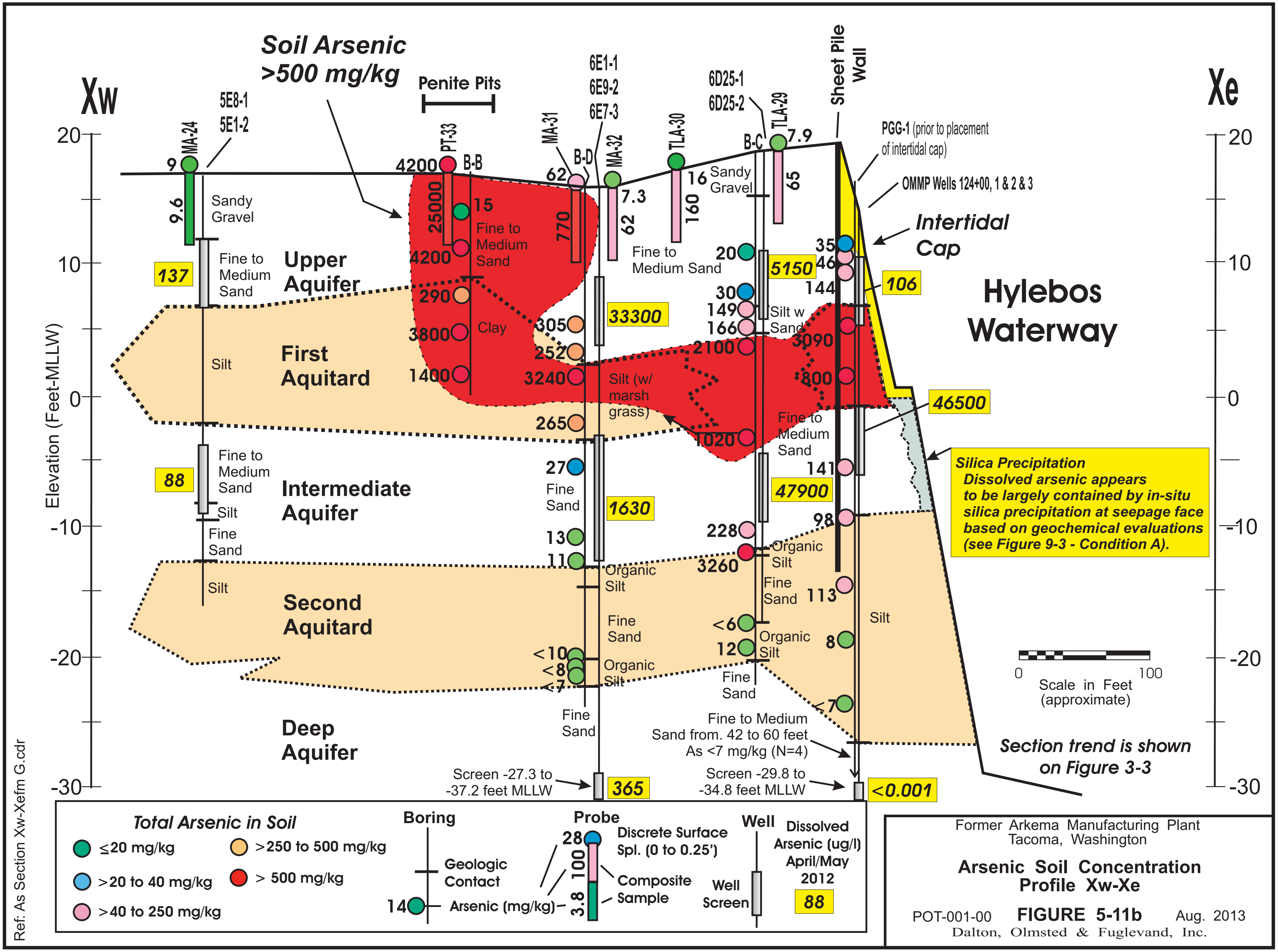


Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Soil Concentration Profile Xn-Xs

POT-001-00 **FIGURE 5-11a** June 2013

Dalton, Olmsted & Fuglevand, Inc.

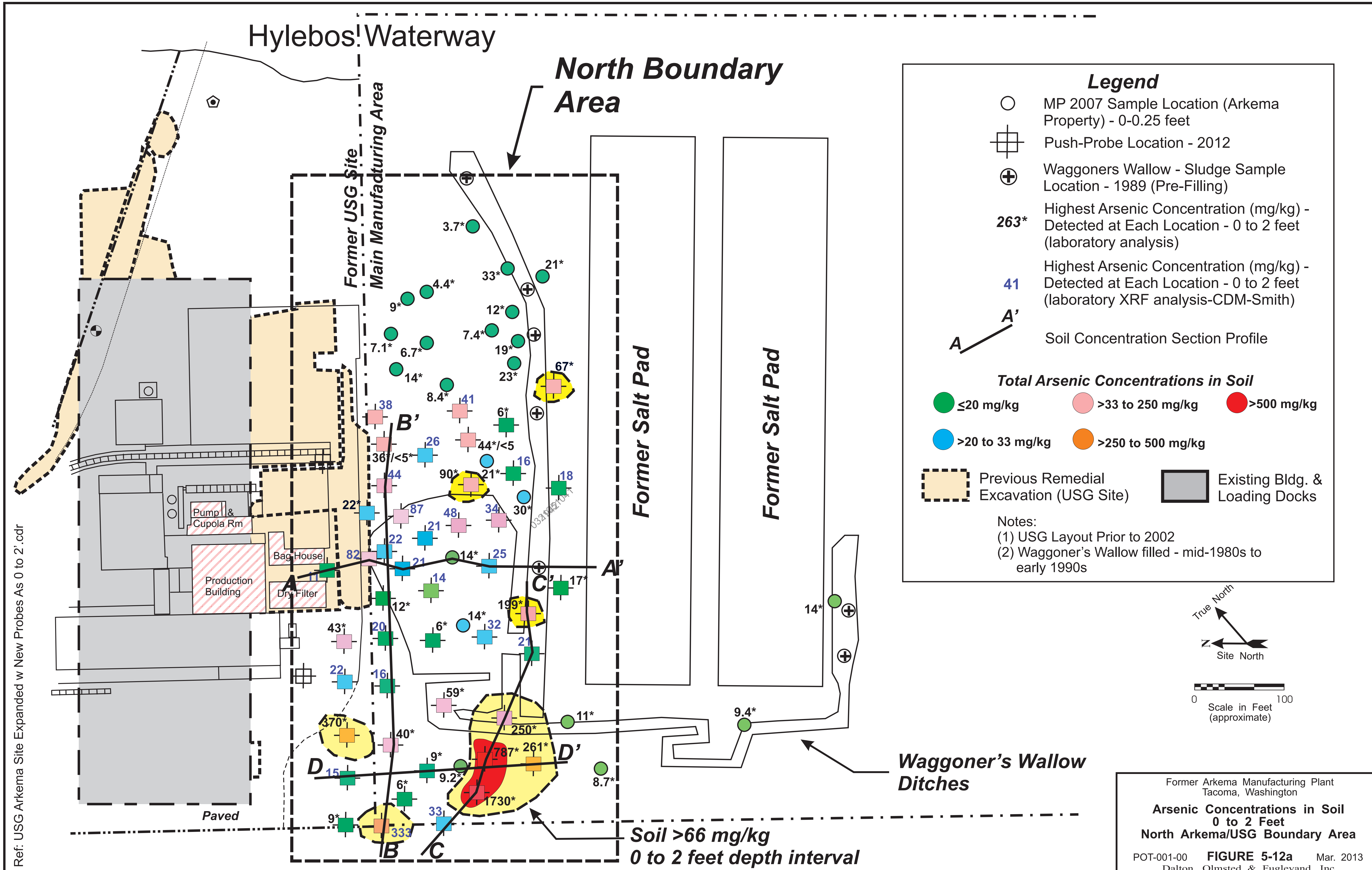


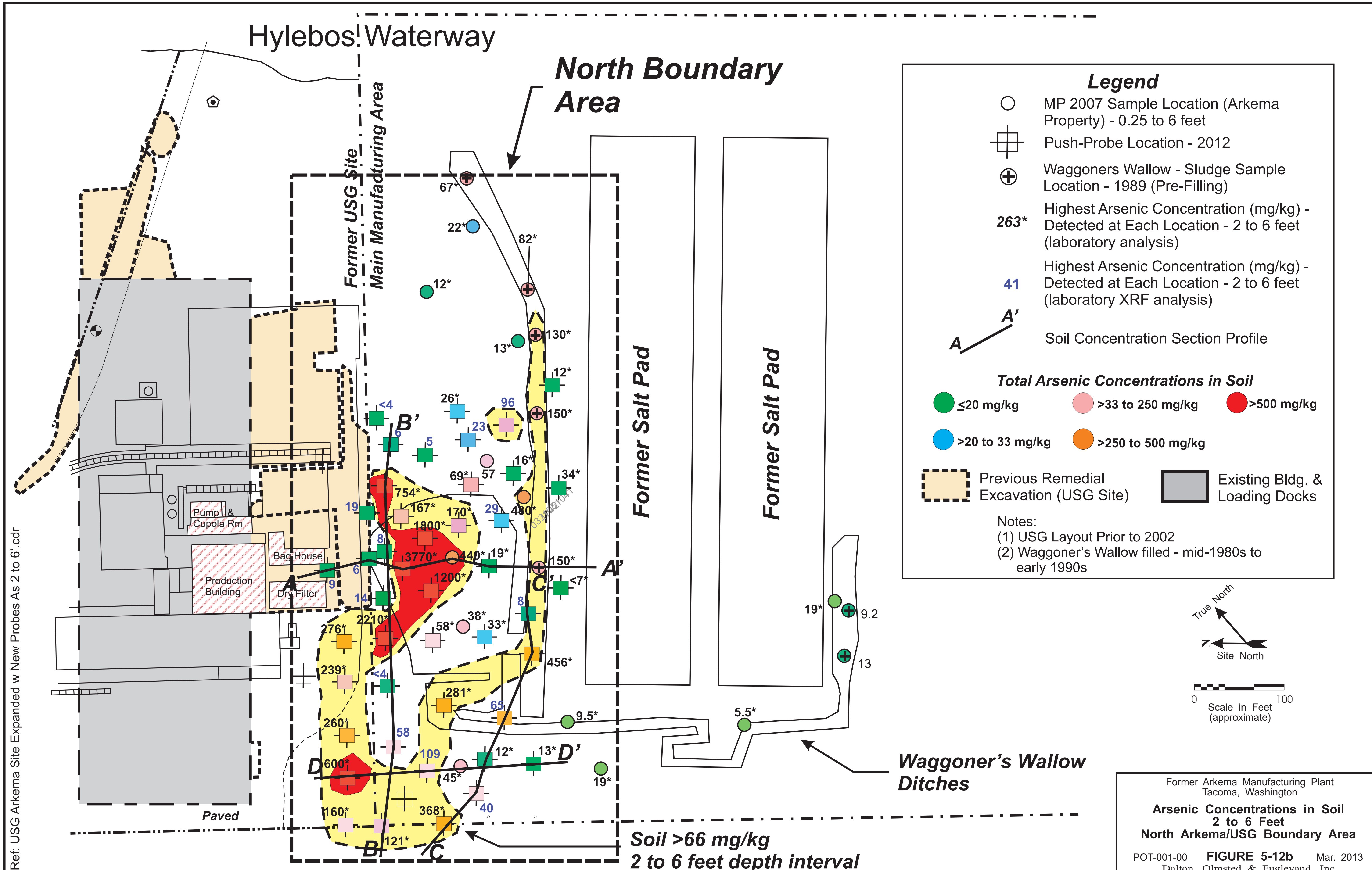
Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Soil Concentration Profile Xw-Xe

POT-001-00 **FIGURE 5-11b** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.


Hylebos Waterway
North Boundary Area
Former USG Site
Main Manufacturing Area
Former Salt Pad
Former Salt Pad
Pump & Cupola Rm
Bag House
Production Building
Dry Filter
Paved
Waggoner's Wallow Ditches
Soil >66 mg/kg
0 to 2 feet depth interval
Legend
MP 2007 Sample Location (Arkema Property) - 0-0.25 feet
Push-Probe Location - 2012
Waggoners Wallow - Sludge Sample Location - 1989 (Pre-Filling)
263* Highest Arsenic Concentration (mg/kg) - Detected at Each Location - 0 to 2 feet (laboratory analysis)
41 Highest Arsenic Concentration (mg/kg) - Detected at Each Location - 0 to 2 feet (laboratory XRF analysis-CDM-Smith)
A A' Soil Concentration Section Profile
Total Arsenic Concentrations in Soil
≤20 mg/kg
>33 to 250 mg/kg
>500 mg/kg
>20 to 33 mg/kg
>250 to 500 mg/kg
Previous Remedial Excavation (USG Site)
Existing Bldg. & Loading Docks
Notes:
(1) USG Layout Prior to 2002
(2) Waggoner's Wallow filled - mid-1980s to early 1990s
True North
Site North
0 100
Scale in Feet (approximate)
Ref: USG Arkema Site Expanded w New Probes As 0 to 2'.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Arsenic Concentrations in Soil
0 to 2 Feet
North Arkema/USG Boundary Area
POT-001-00
FIGURE 5-12a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

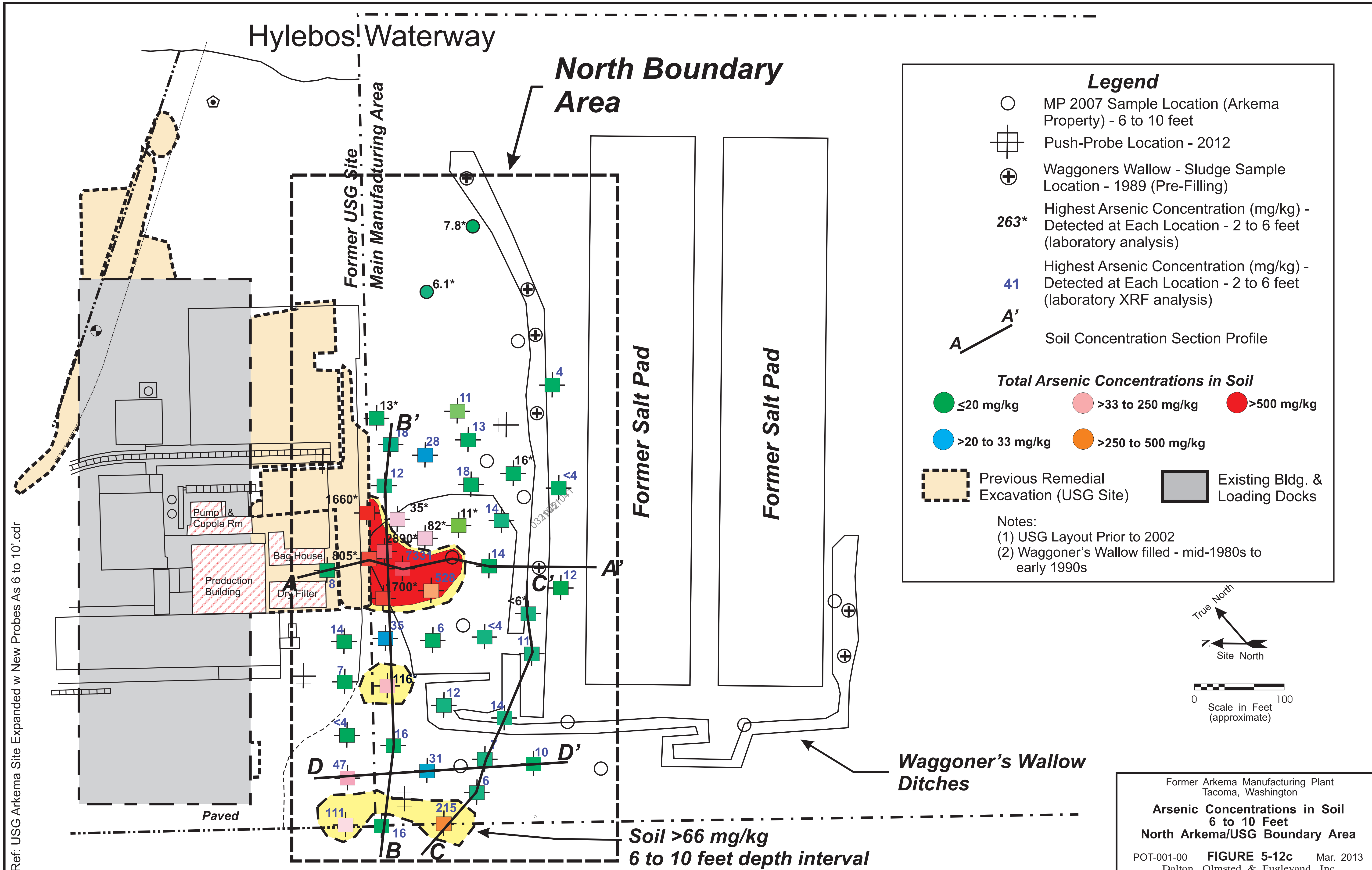


Former Arkema Manufacturing Plant
Tacoma, Washington

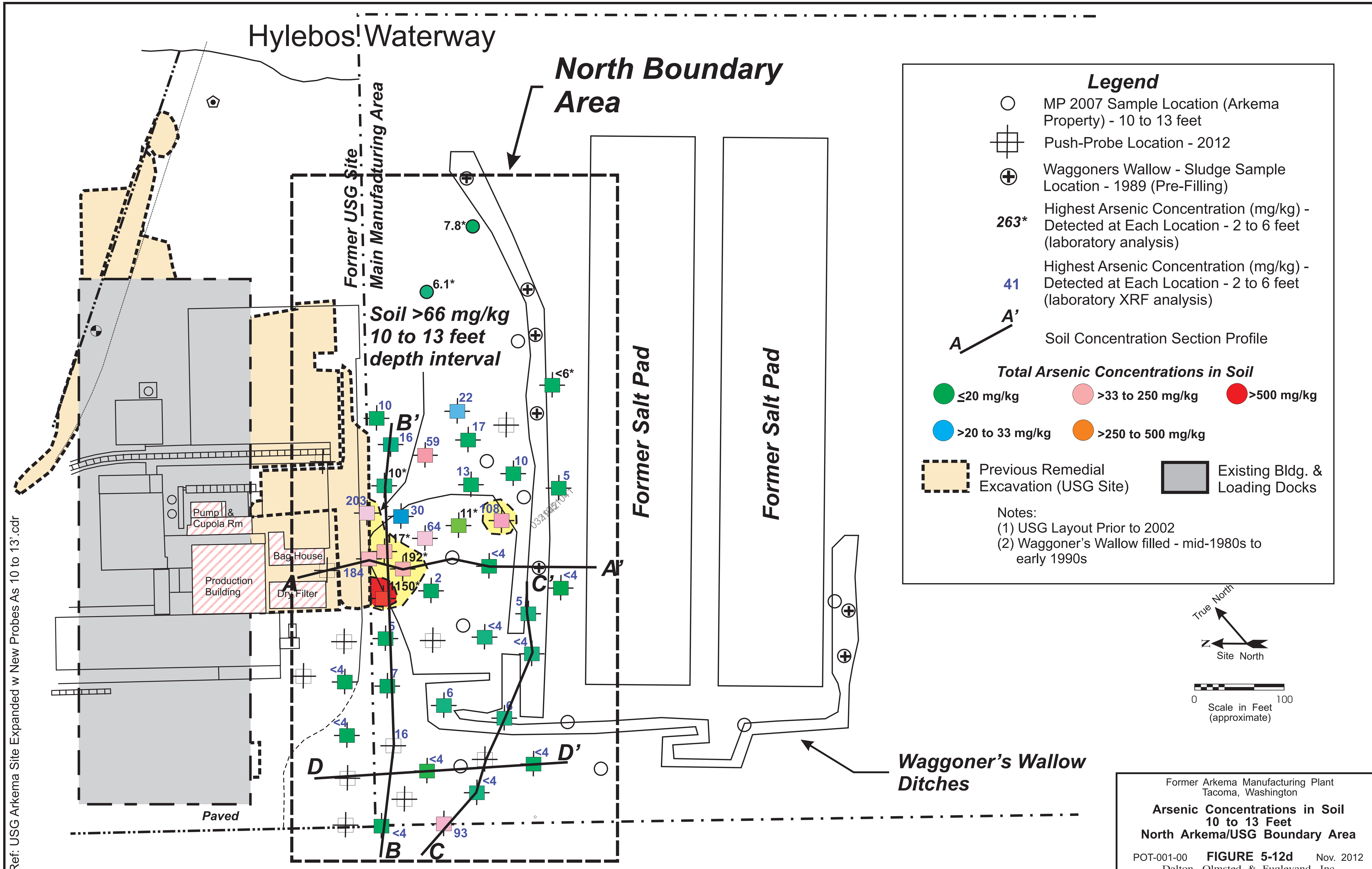
Arsenic Concentrations in Soil
2 to 6 Feet
North Arkema/USG Boundary Area

POT-001-00 **FIGURE 5-12b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Hylebos Waterway
North Boundary Area
Former USG Site
Main Manufacturing Area
Former Salt Pad
Former Salt Pad
Legend
MP 2007 Sample Location (Arkema Property) - 6 to 10 feet
Push-Probe Location - 2012
Waggoners Wallow - Sludge Sample Location - 1989 (Pre-Filling)
263* Highest Arsenic Concentration (mg/kg) - Detected at Each Location - 2 to 6 feet (laboratory analysis)
41 Highest Arsenic Concentration (mg/kg) - Detected at Each Location - 2 to 6 feet (laboratory XRF analysis)
A A' Soil Concentration Section Profile
Total Arsenic Concentrations in Soil
≤20 mg/kg
>33 to 250 mg/kg
>500 mg/kg
>20 to 33 mg/kg
>250 to 500 mg/kg
Previous Remedial Excavation (USG Site)
Existing Bldg. & Loading Docks
Notes:
(1) USG Layout Prior to 2002
(2) Waggoner's Wallow filled - mid-1980s to early 1990s
True North
Site North
0
100
Scale in Feet (approximate)
Pump & Cupola Rm
Bag House
Production Building
Dry Filter
Paved
Waggoner's Wallow Ditches
Soil >66 mg/kg
6 to 10 feet depth interval
Ref: USG Arkema Site Expanded w New Probes As 6 to 10'.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Arsenic Concentrations in Soil
6 to 10 Feet
North Arkema/USG Boundary Area
POT-001-00
FIGURE 5-12c
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

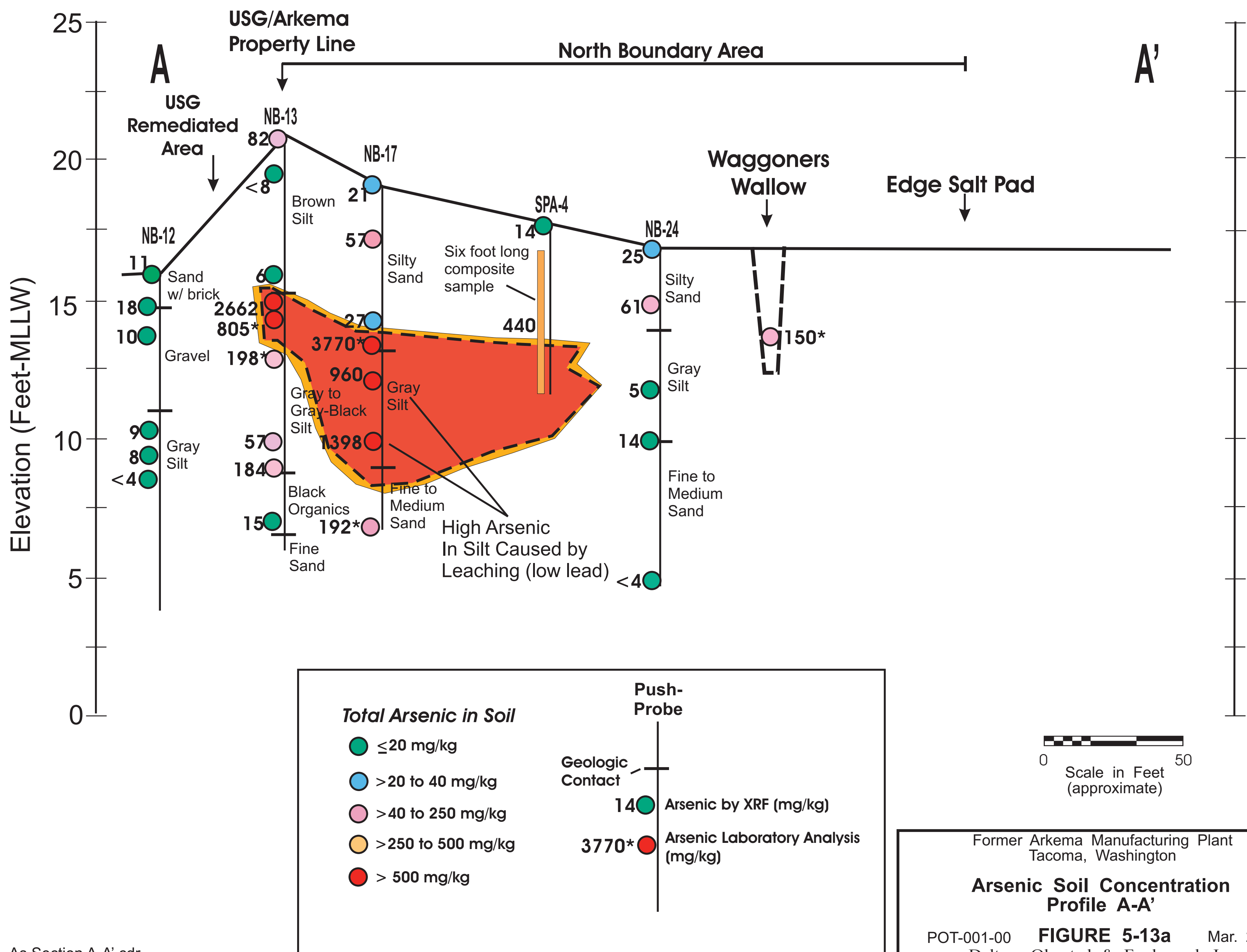


Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Concentrations in Soil 10 to 13 Feet North Arkema/USG Boundary Area

POT-001-00 **FIGURE 5-12d** Nov. 2012

Dalton, Olmsted & Fuglevand, Inc.



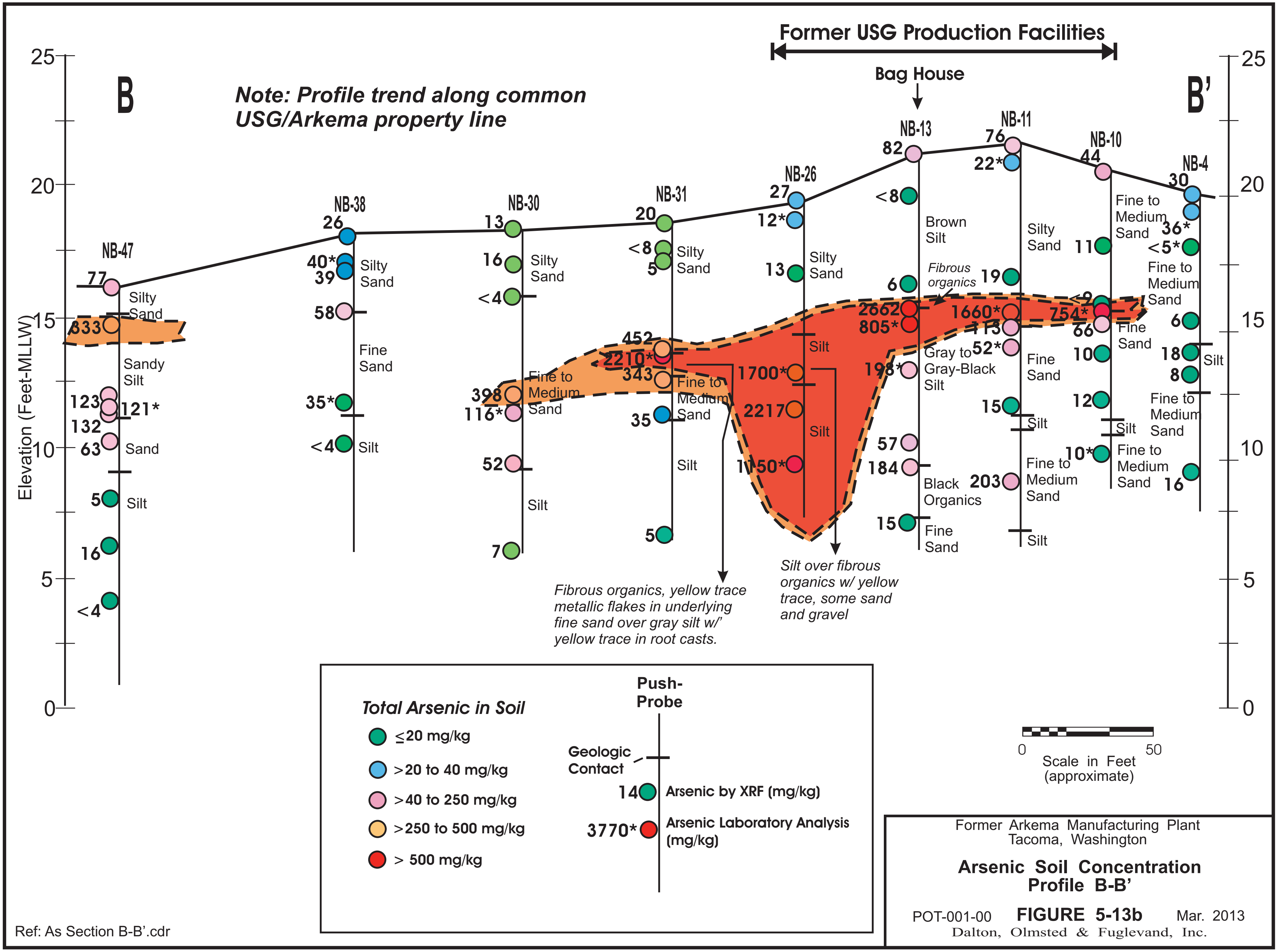
Former Arkema Manufacturing Plant
Tacoma, Washington

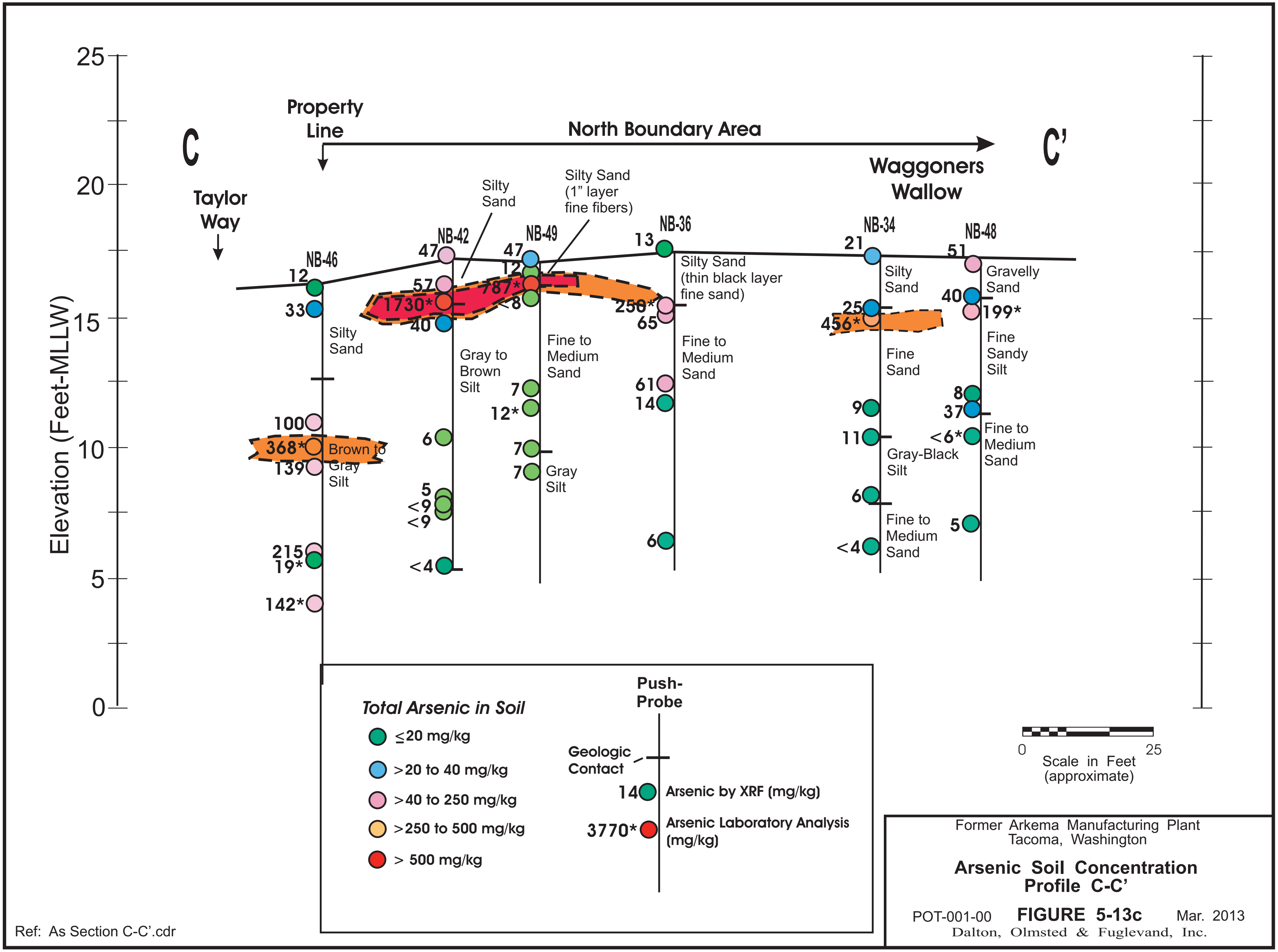
Arsenic Soil Concentration Profile A-A'

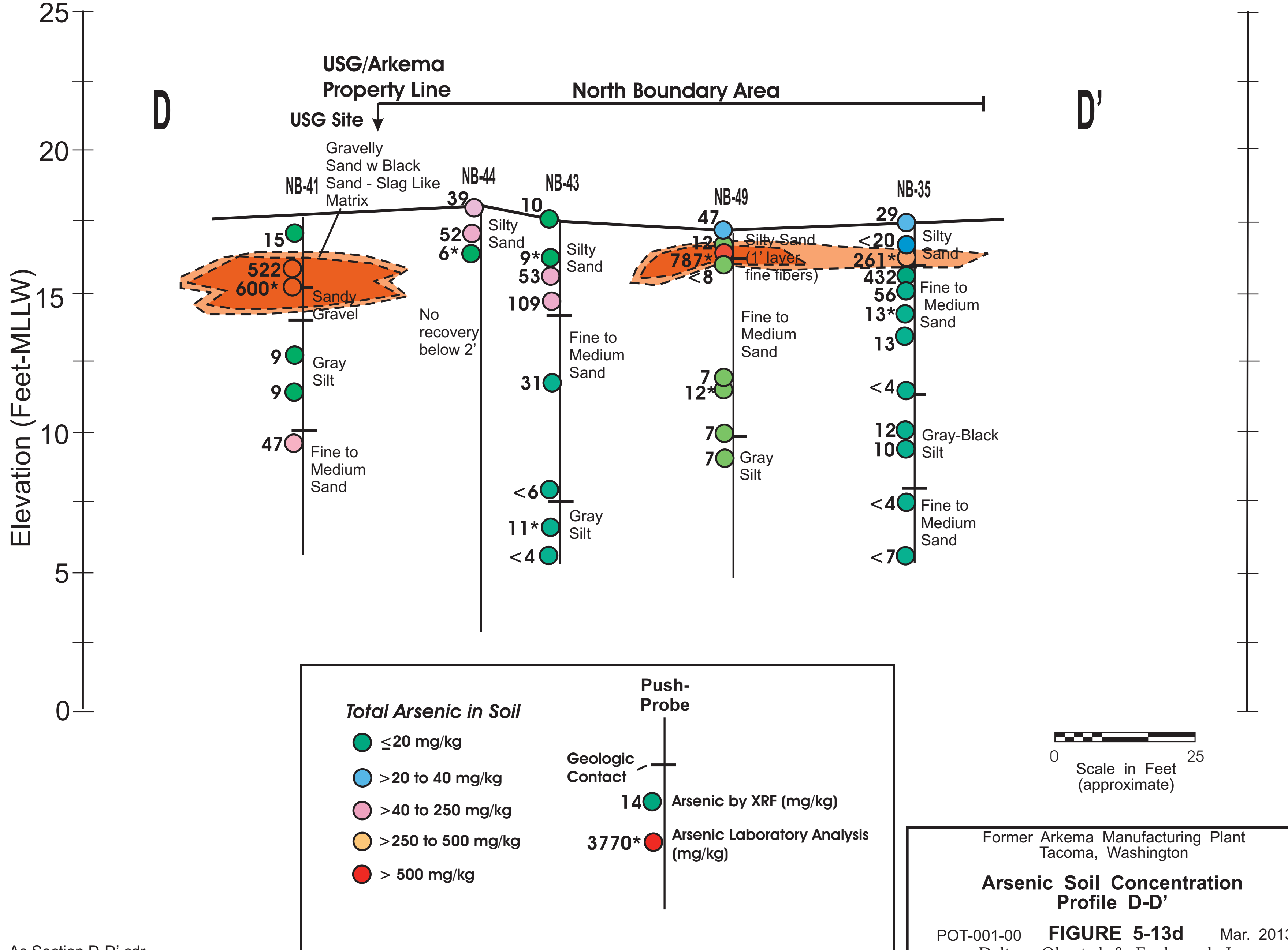
POT-001-00 **FIGURE 5-13a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: As Section A-A'.cdr


Former USG Production Facilities
Bag House
B
B'
Note: Profile trend along common USG/Arkema property line
Elevation (Feet-MLLW)
25
20
15
10
5
0
NB-47
NB-38
NB-30
NB-31
NB-26
NB-13
NB-11
NB-10
NB-4
Silty Sand
Sandy Silt
Sand
Silt
Fine Sand
Fine to Medium Sand
Brown Silt
Fibrous organics
Gray to Gray-Black Silt
Black Organics
Fine to Medium Sand
Fibrous organics, yellow trace metallic flakes in underlying fine sand over gray silt w/' yellow trace in root casts.
Silt over fibrous organics w/ yellow trace, some sand and gravel
Total Arsenic in Soil
≤20 mg/kg
>20 to 40 mg/kg
>40 to 250 mg/kg
>250 to 500 mg/kg
> 500 mg/kg
Push-Probe
Geologic Contact
14 Arsenic by XRF (mg/kg)
3770* Arsenic Laboratory Analysis (mg/kg)
0
50
Scale in Feet (approximate)
Former Arkema Manufacturing Plant
Tacoma, Washington
Arsenic Soil Concentration Profile B-B'
POT-001-00
FIGURE 5-13b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: As Section B-B'.cdr


Elevation (Feet-MLLW)
25
20
15
10
5
0
C
C'
Property Line
North Boundary Area
Taylor Way
Waggoners Wallow
NB-46
NB-42
NB-49
NB-36
NB-34
NB-48
Silty Sand
Silty Sand (1" layer fine fibers)
Silty Sand (thin black layer fine sand)
Silty Sand
Gravelly Sand
Silty Sand
Brown to Gray Silt
Gray to Brown Silt
Fine to Medium Sand
Fine to Medium Sand
Fine Sand
Fine Sandy Silt
Gray Silt
Gray-Black Silt
Fine to Medium Sand
Fine to Medium Sand
12
33
100
368*
139
215
19*
142*
47
57
1730*
40
6
5
<9
<9
<4
47
12
787*
<8
7
12*
7
7
13
250*
65
61
14
6
21
25
456*
9
11
6
<4
51
40
199*
8
37
<6*
5
Total Arsenic in Soil
≤20 mg/kg
>20 to 40 mg/kg
>40 to 250 mg/kg
>250 to 500 mg/kg
> 500 mg/kg
Push-Probe
Geologic Contact
14 Arsenic by XRF (mg/kg)
3770* Arsenic Laboratory Analysis (mg/kg)
0
25
Scale in Feet (approximate)
Ref: As Section C-C'.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Arsenic Soil Concentration Profile C-C'
POT-001-00
FIGURE 5-13c
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



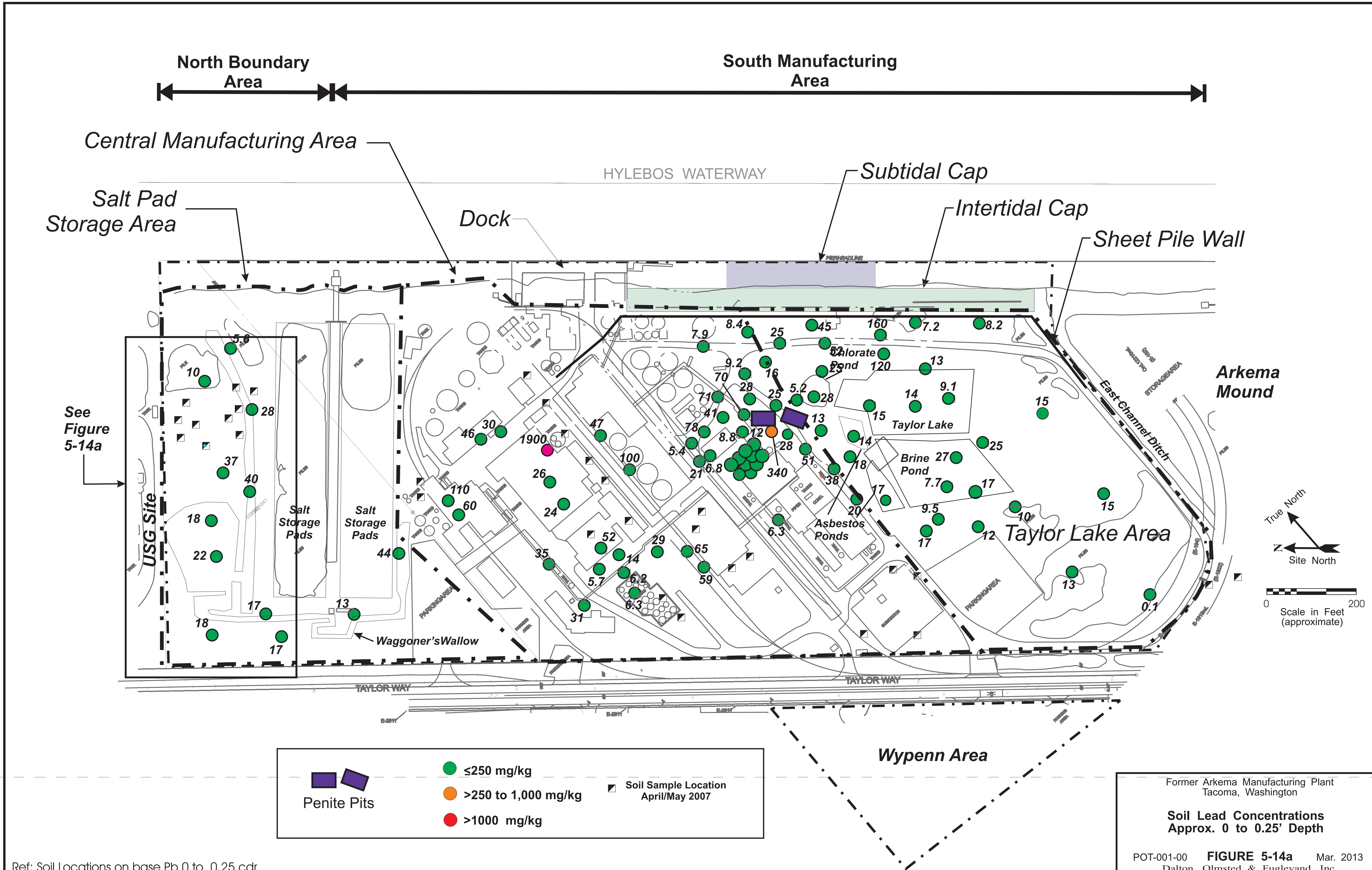
Former Arkema Manufacturing Plant
Tacoma, Washington

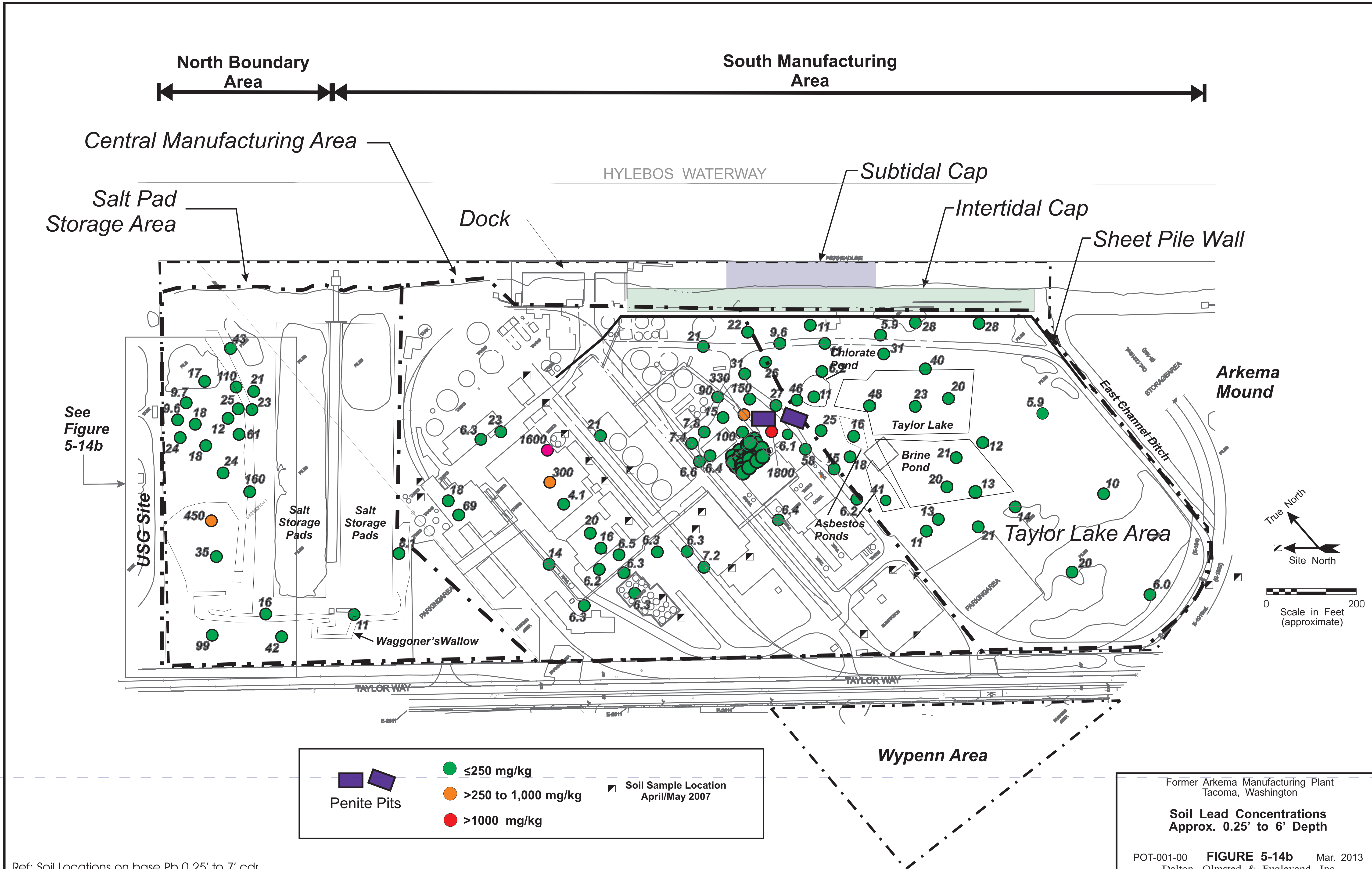
Arsenic Soil Concentration Profile D-D'

POT-001-00 **FIGURE 5-13d** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: As Section D-D'.cdr


North Boundary Area
South Manufacturing Area
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Dock
See Figure 5-14a
USG Site
Salt Storage Pads
Salt Storage Pads
Waggoner'sWallow
Chlorate Pond
Taylor Lake
Brine Pond
Asbestos Ponds
Taylor Lake Area
Arkema Mound
East Channel Ditch
TAYLOR WAY
TAYLOR WAY
Wypenn Area
True North
Site North
0
200
Scale in Feet (approximate)
Penite Pits
≤250 mg/kg
>250 to 1,000 mg/kg
>1000 mg/kg
Soil Sample Location April/May 2007
Ref: Soil Locations on base Pb 0 to 0.25.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Soil Lead Concentrations
Approx. 0 to 0.25' Depth
POT-001-00
FIGURE 5-14a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

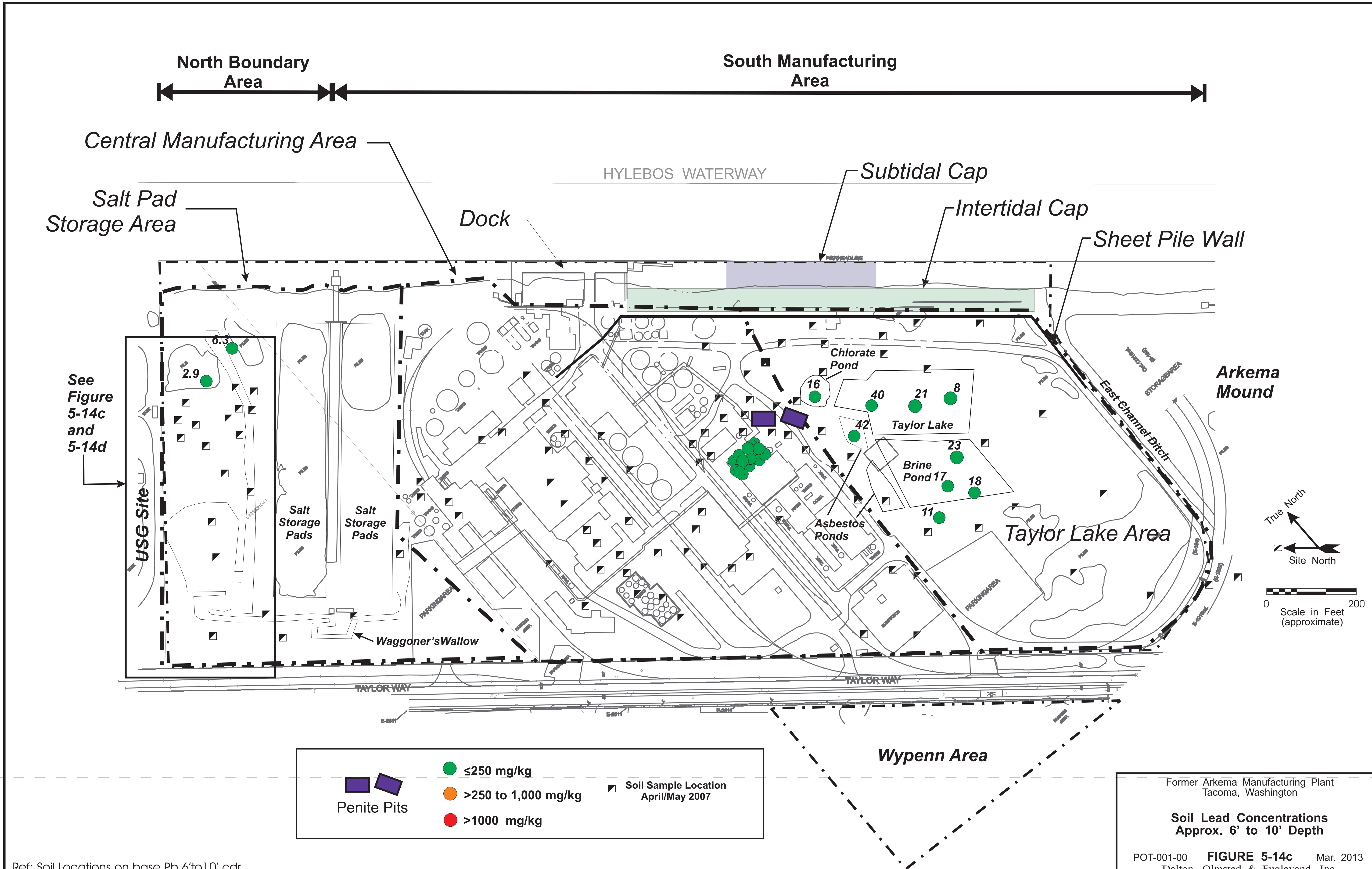


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Lead Concentrations Approx. 0.25' to 6' Depth

POT-001-00 **FIGURE 5-14b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



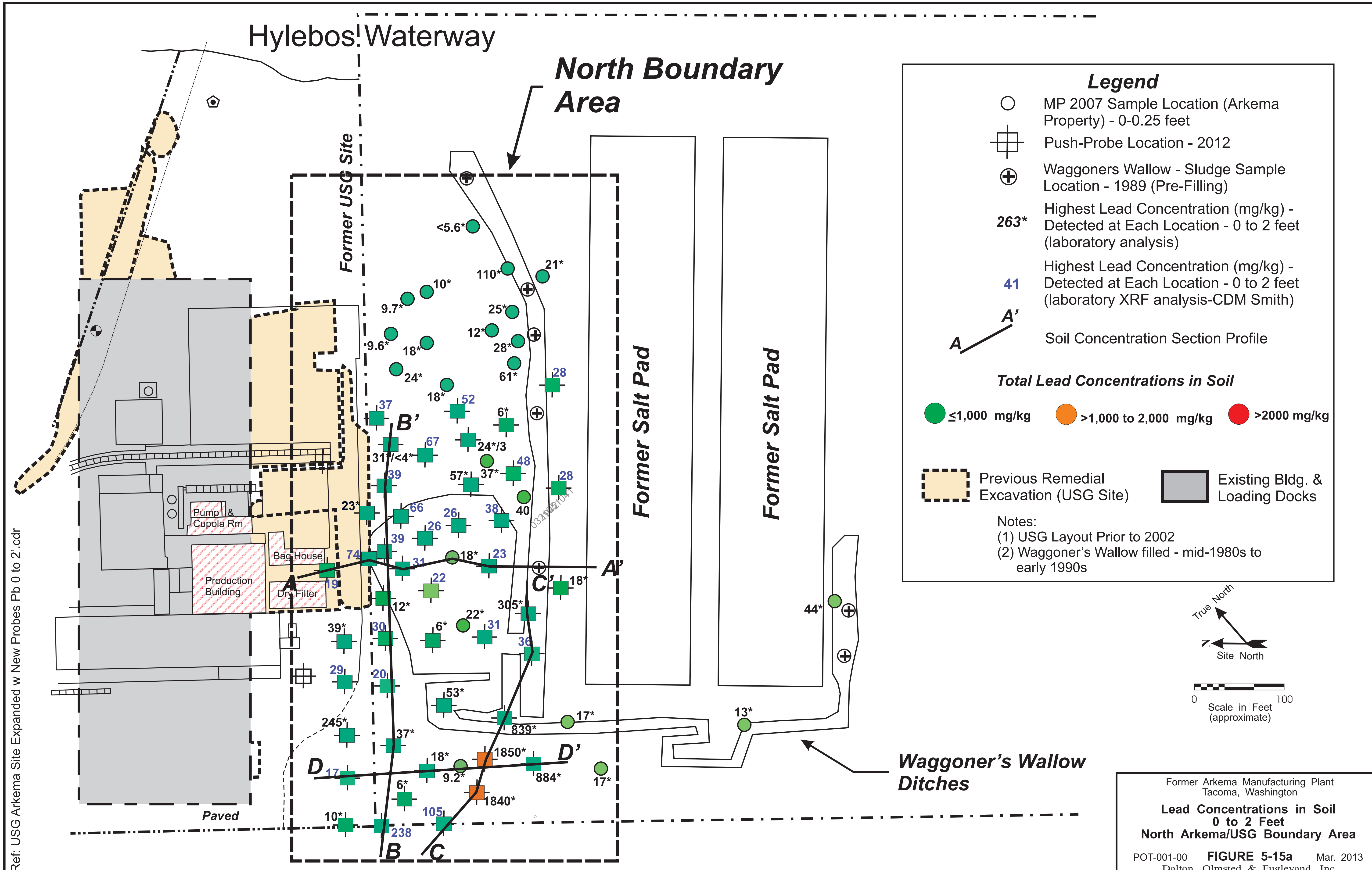
Former Arkema Manufacturing Plant
Tacoma, Washington

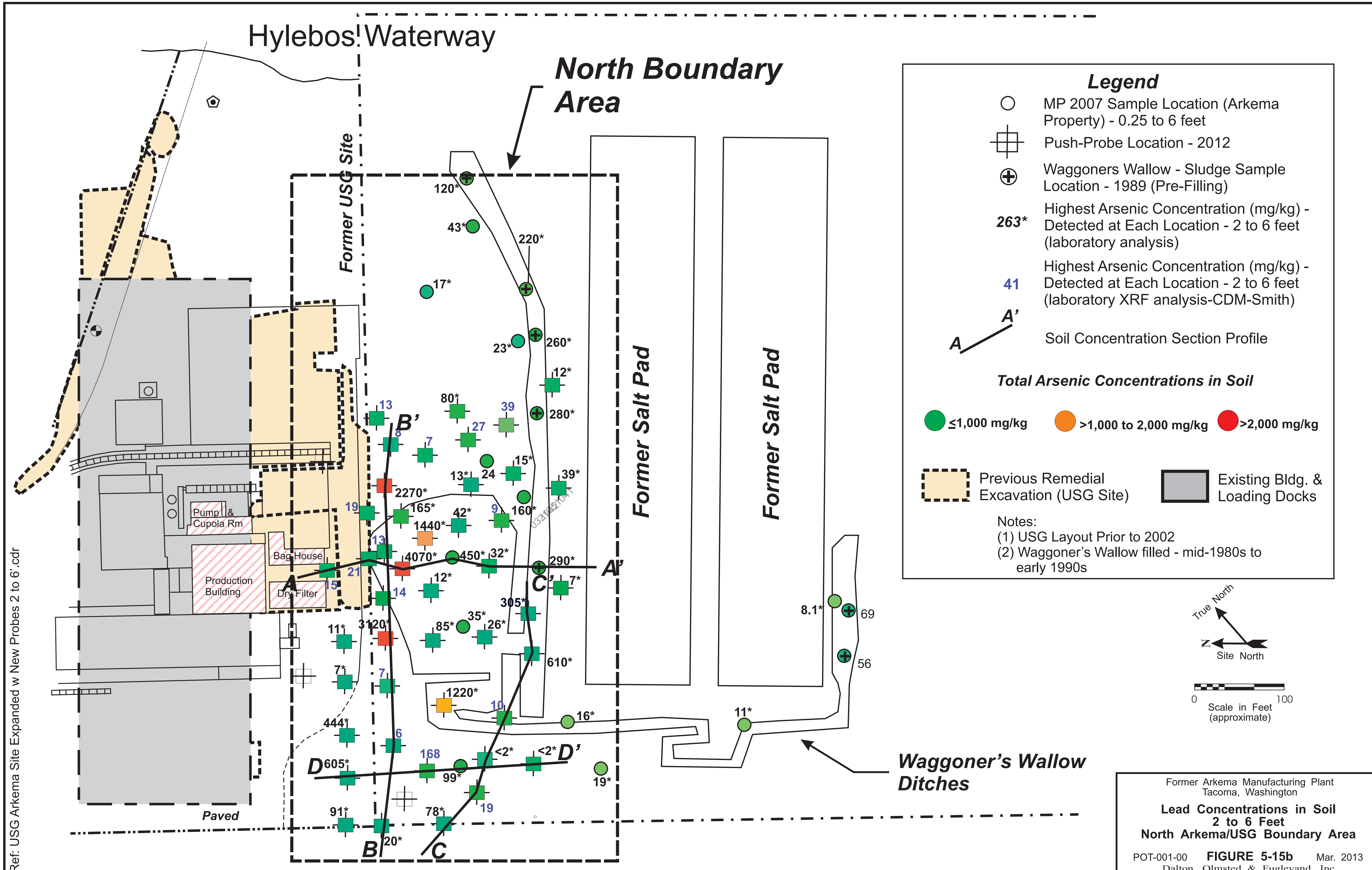
Soil Lead Concentrations
Approx. 6' to 10' Depth

POT-001-00 **FIGURE 5-14c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Soil Locations on base Pb 6'to10'.cdr


Hylebos Waterway
North Boundary Area
Former USG Site
Former Salt Pad
Former Salt Pad
Pump & Cupola Rm
Production Building
Bag House
Dry Filter
Paved
Waggoner's Wallow Ditches
A
A'
B
B'
C
C'
D
D'
<5.6*
110*
21*
10*
9.7*
25*
9.6*
12*
28*
18*
24*
61*
18*
52
37
6*
28
67
24*/3
31*/<4*
48
57*
37*
39
28
40
23*
66
26
38
26
39
74
18*
23
31
22
19
18*
12*
305*
22*
39*
30
6*
31
36
29
20
53*
17*
13*
839*
44*
245*
37*
18*
1850*
884*
17
9.2*
17*
6*
1840*
105
10*
238
Legend
MP 2007 Sample Location (Arkema Property) - 0-0.25 feet
Push-Probe Location - 2012
Waggoners Wallow - Sludge Sample Location - 1989 (Pre-Filling)
263* Highest Lead Concentration (mg/kg) - Detected at Each Location - 0 to 2 feet (laboratory analysis)
41 Highest Lead Concentration (mg/kg) - Detected at Each Location - 0 to 2 feet (laboratory XRF analysis-CDM Smith)
Soil Concentration Section Profile
Total Lead Concentrations in Soil
≤1,000 mg/kg
>1,000 to 2,000 mg/kg
>2000 mg/kg
Previous Remedial Excavation (USG Site)
Existing Bldg. & Loading Docks
Notes:
(1) USG Layout Prior to 2002
(2) Waggoner's Wallow filled - mid-1980s to early 1990s
True North
Site North
0
100
Scale in Feet (approximate)
Ref: USG Arkema Site Expanded w New Probes Pb 0 to 2'.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Lead Concentrations in Soil
0 to 2 Feet
North Arkema/USG Boundary Area
POT-001-00
FIGURE 5-15a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

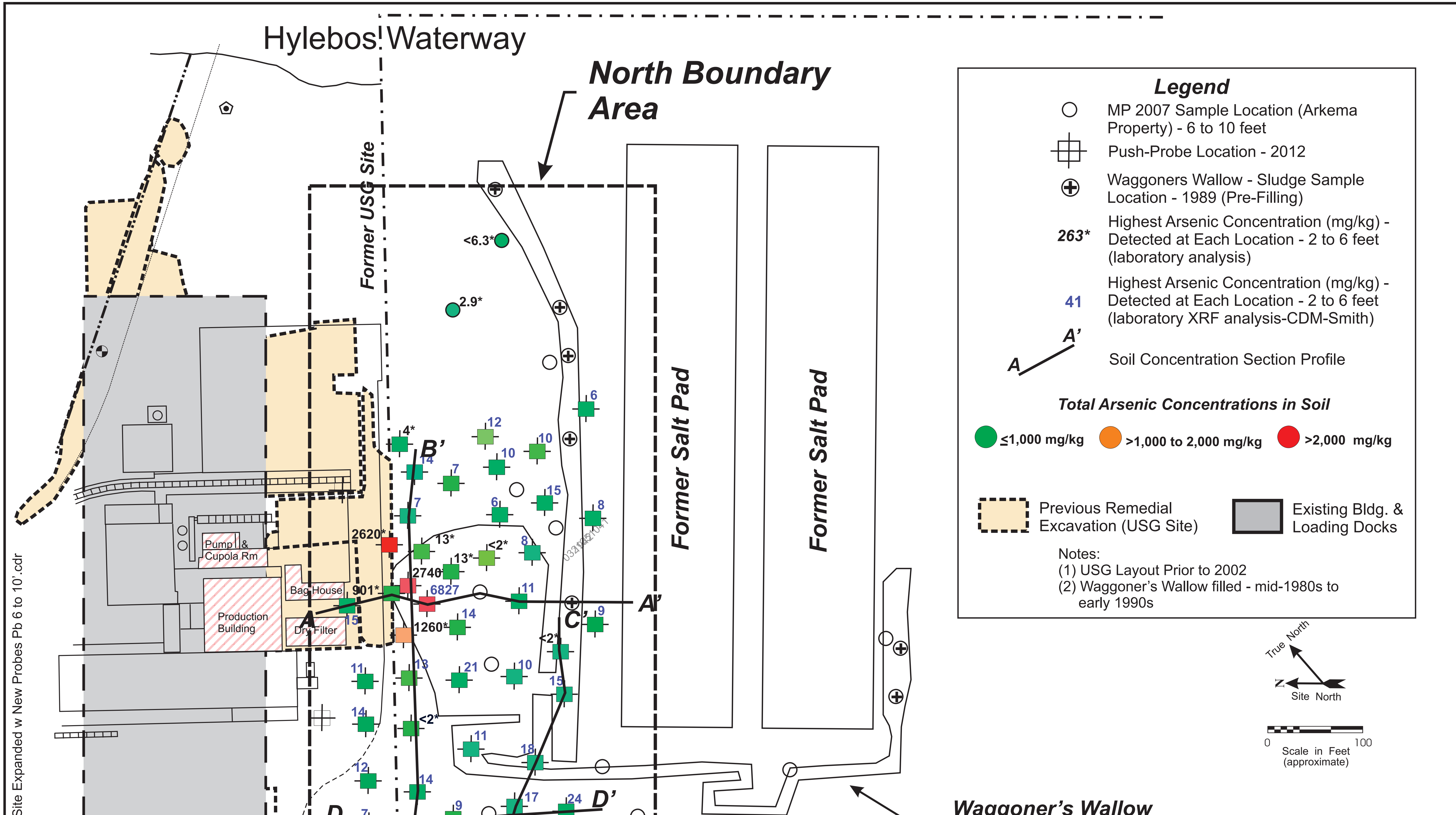


Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Concentrations in Soil
2 to 6 Feet
North Arkema/USG Boundary Area

POT-001-00 **FIGURE 5-15b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

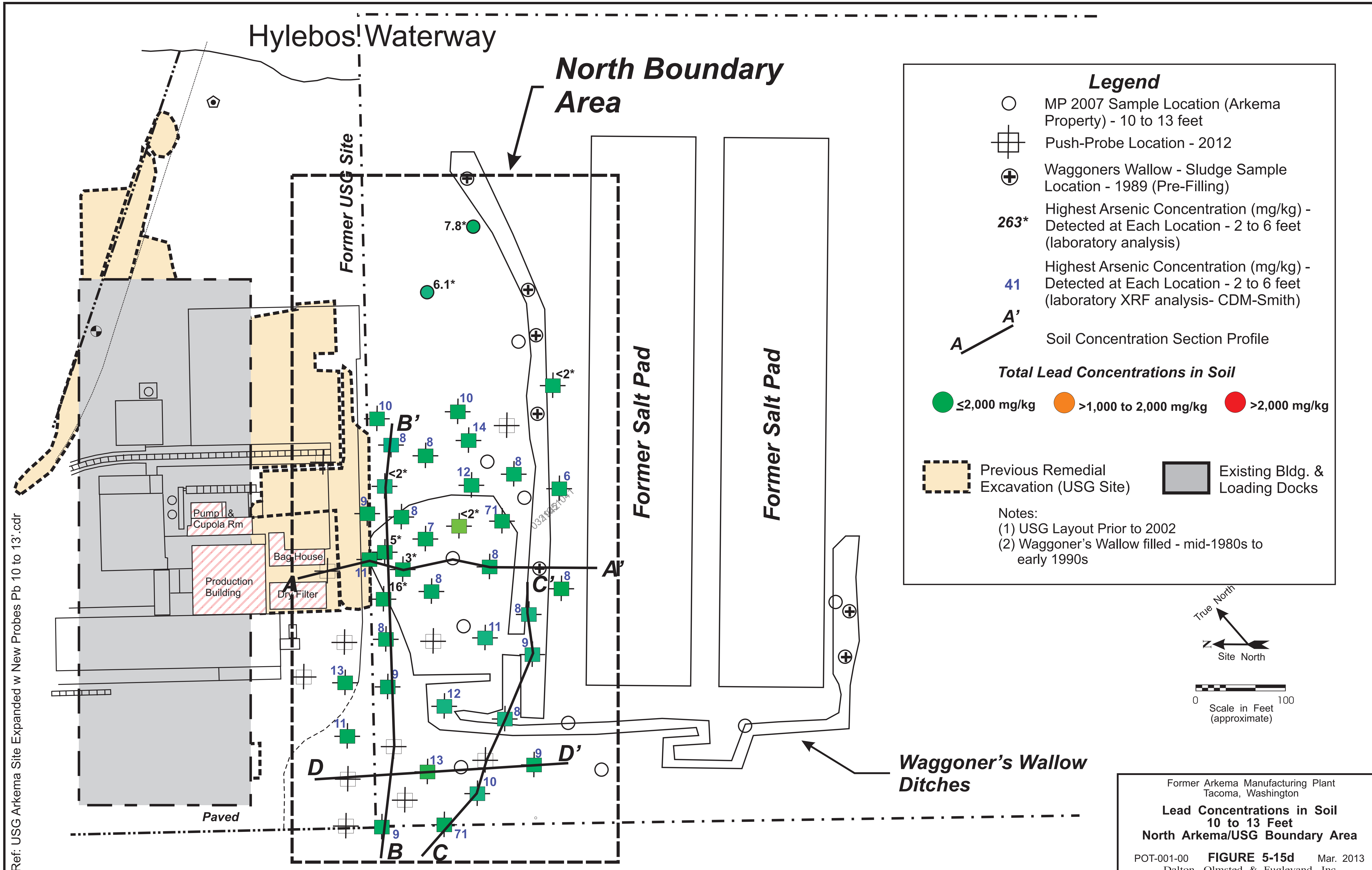


Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Concentrations in Soil
6 to 10 Feet
North Arkema/USG Boundary Area

POT-001-00 **FIGURE 5-15c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

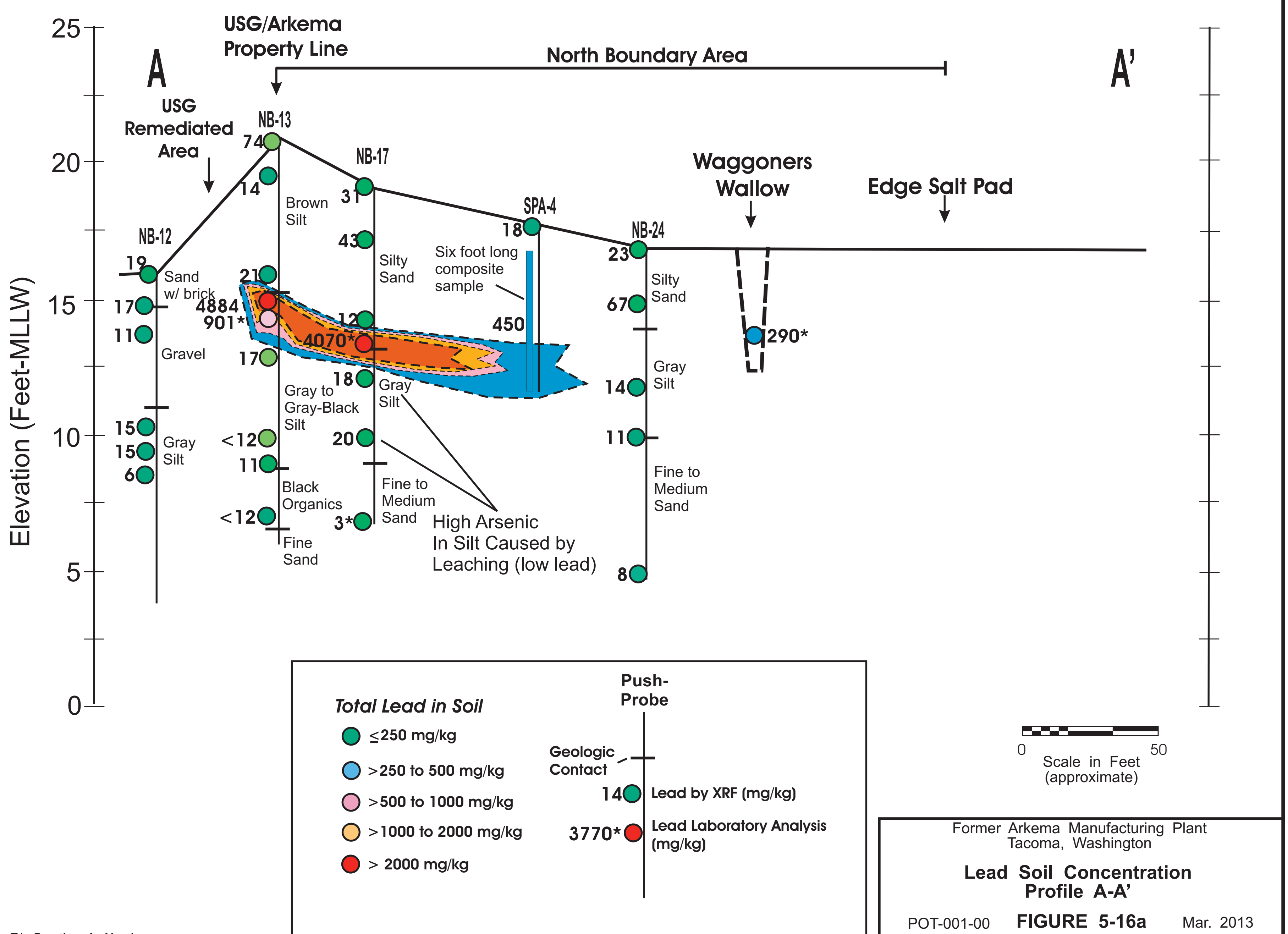


Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Concentrations in Soil
10 to 13 Feet
North Arkema/USG Boundary Area

POT-001-00 **FIGURE 5-15d** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

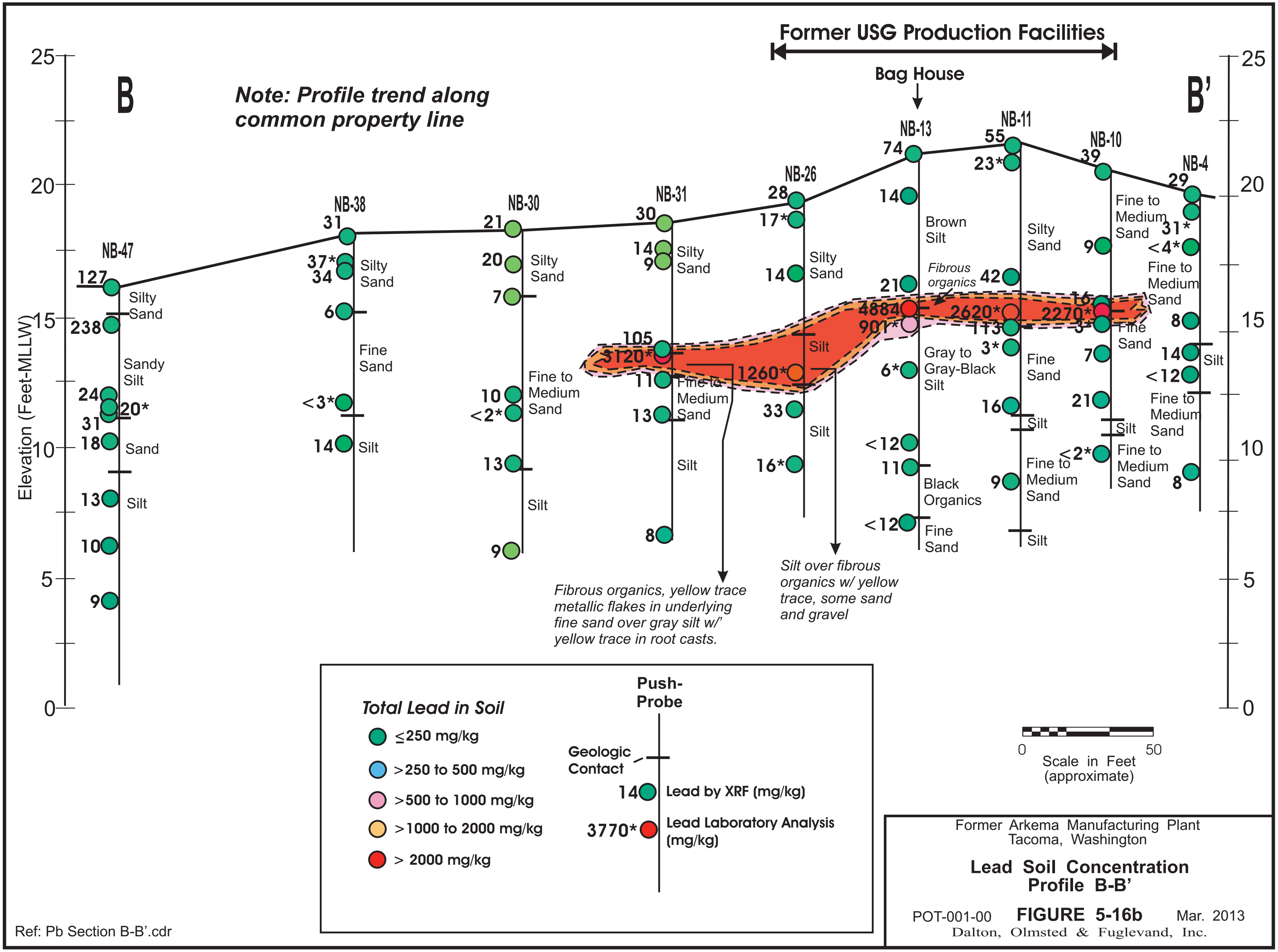


Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Soil Concentration Profile A-A'

POT-001-00 **FIGURE 5-16a** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

Ref: Pb Section A-A'.cdr

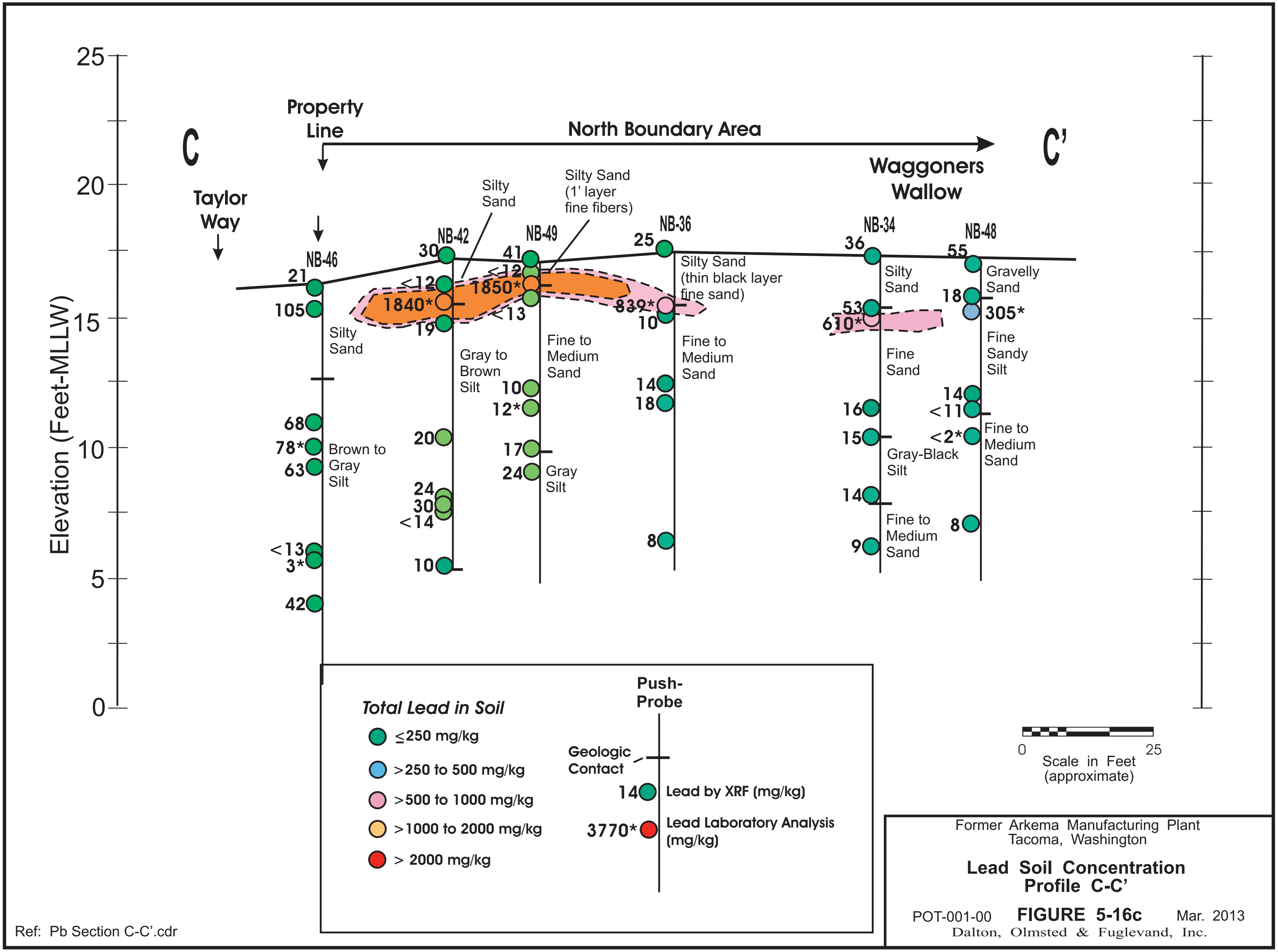


Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Soil Concentration Profile B-B'

POT-001-00 **FIGURE 5-16b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

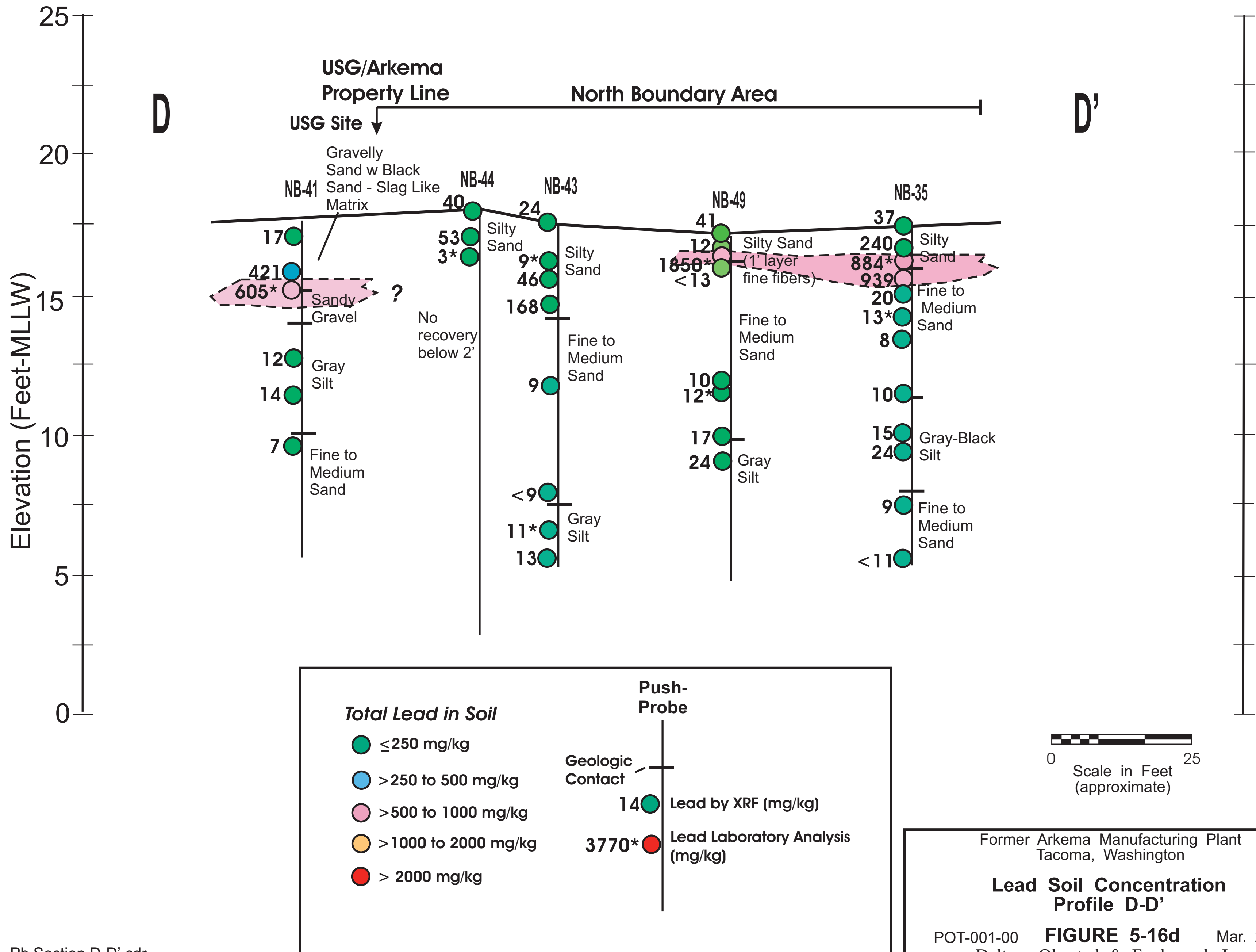


Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Soil Concentration Profile C-C'

POT-001-00 **FIGURE 5-16c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



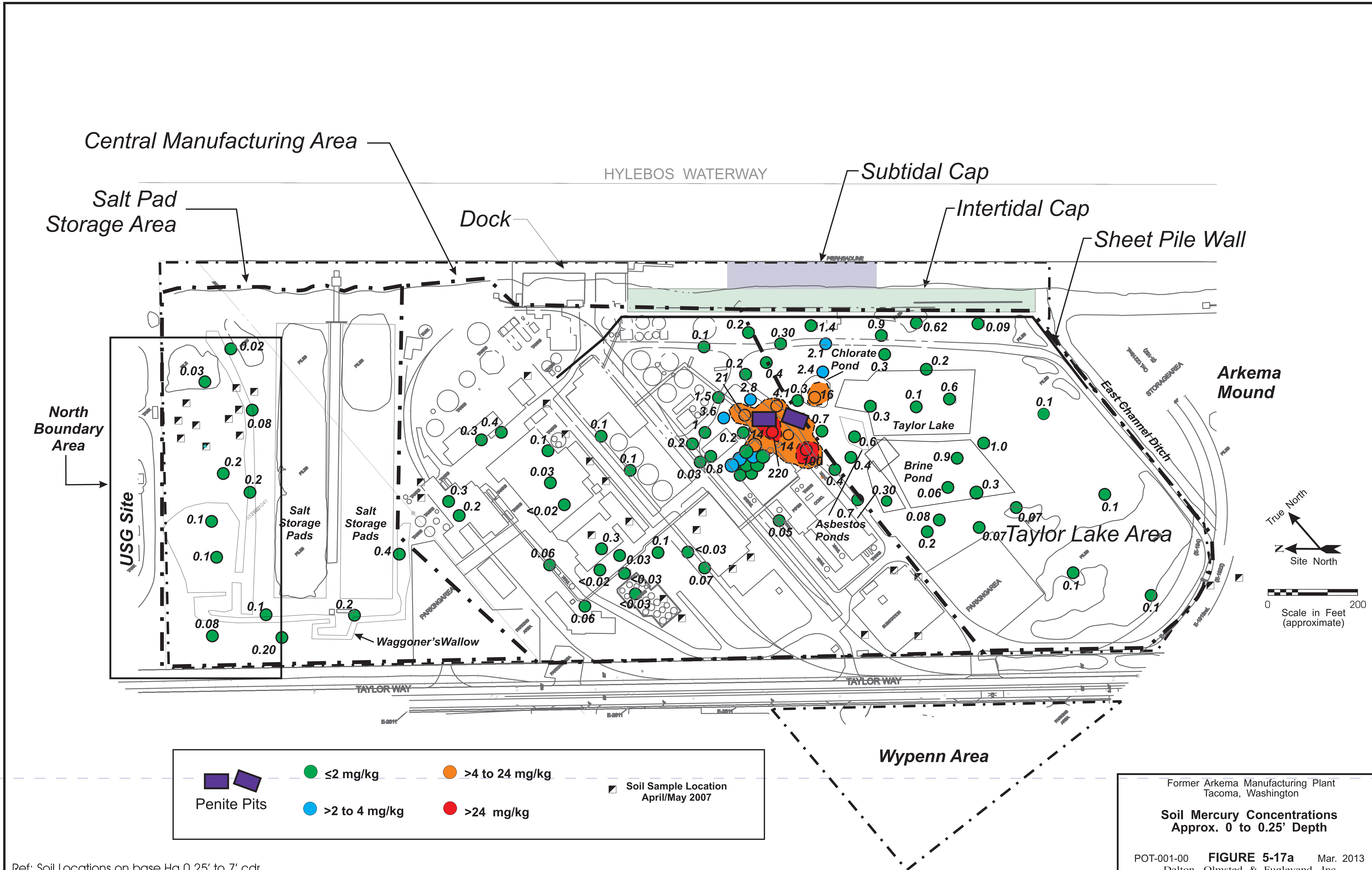
Former Arkema Manufacturing Plant
Tacoma, Washington

Lead Soil Concentration Profile D-D'

POT-001-00 **FIGURE 5-16d** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Pb Section D-D'.cdr



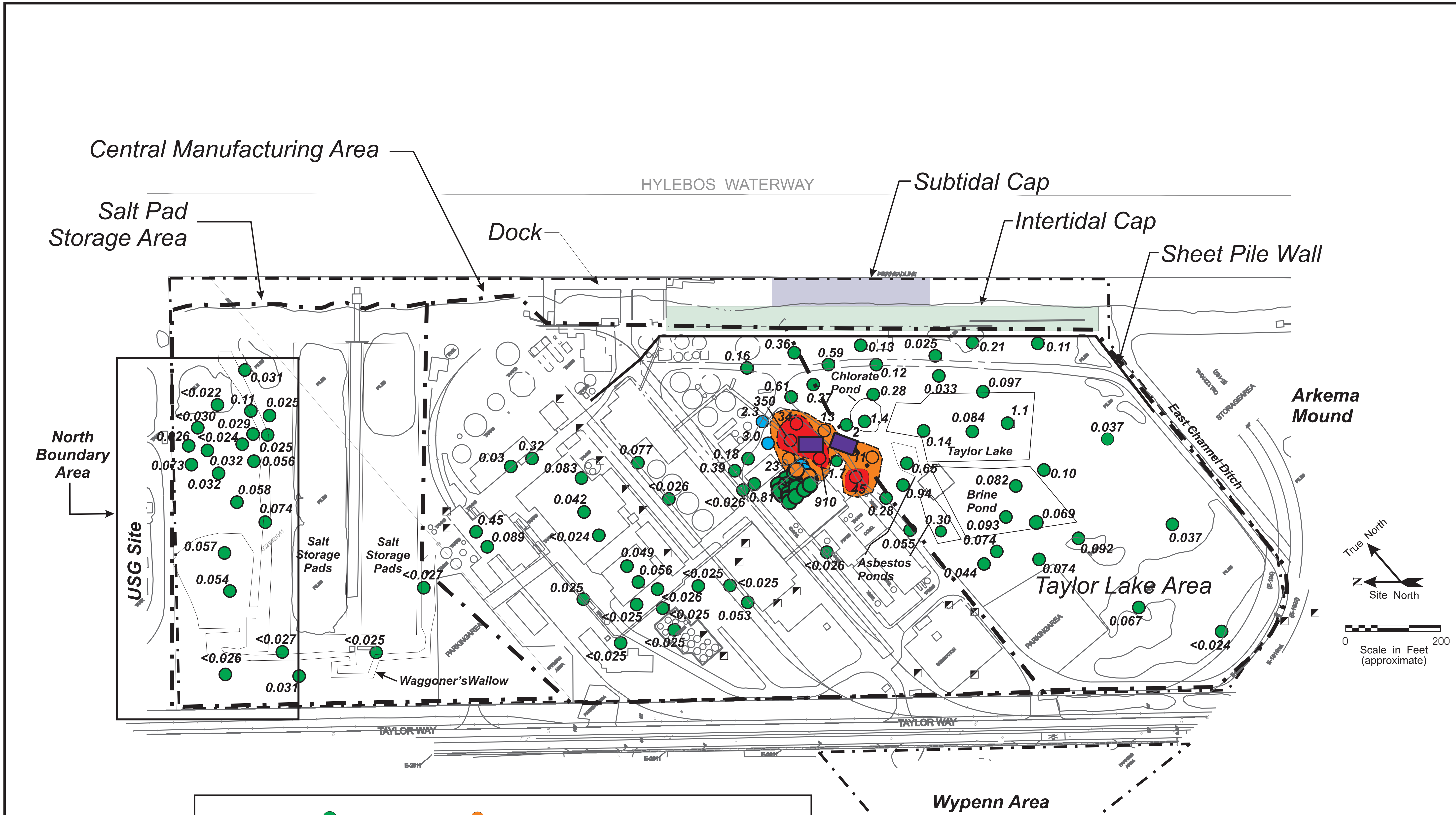
Ref: Soil Locations on base Hg 0.25' to 7'.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Mercury Concentrations
Approx. 0 to 0.25' Depth

POT-001-00 **FIGURE 5-17a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



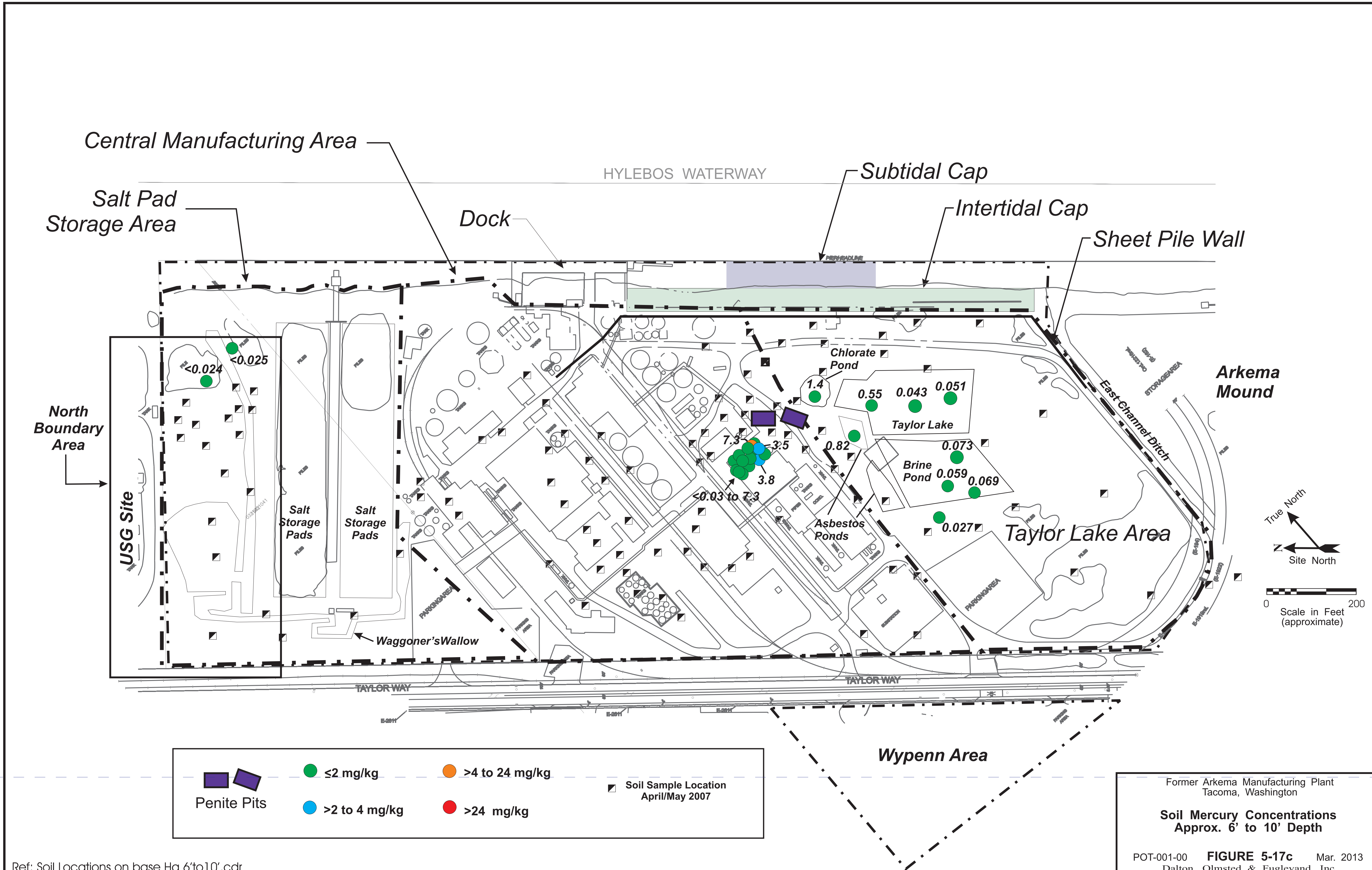
Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Mercury Concentrations
Approx. 0.25' to 6' Depth

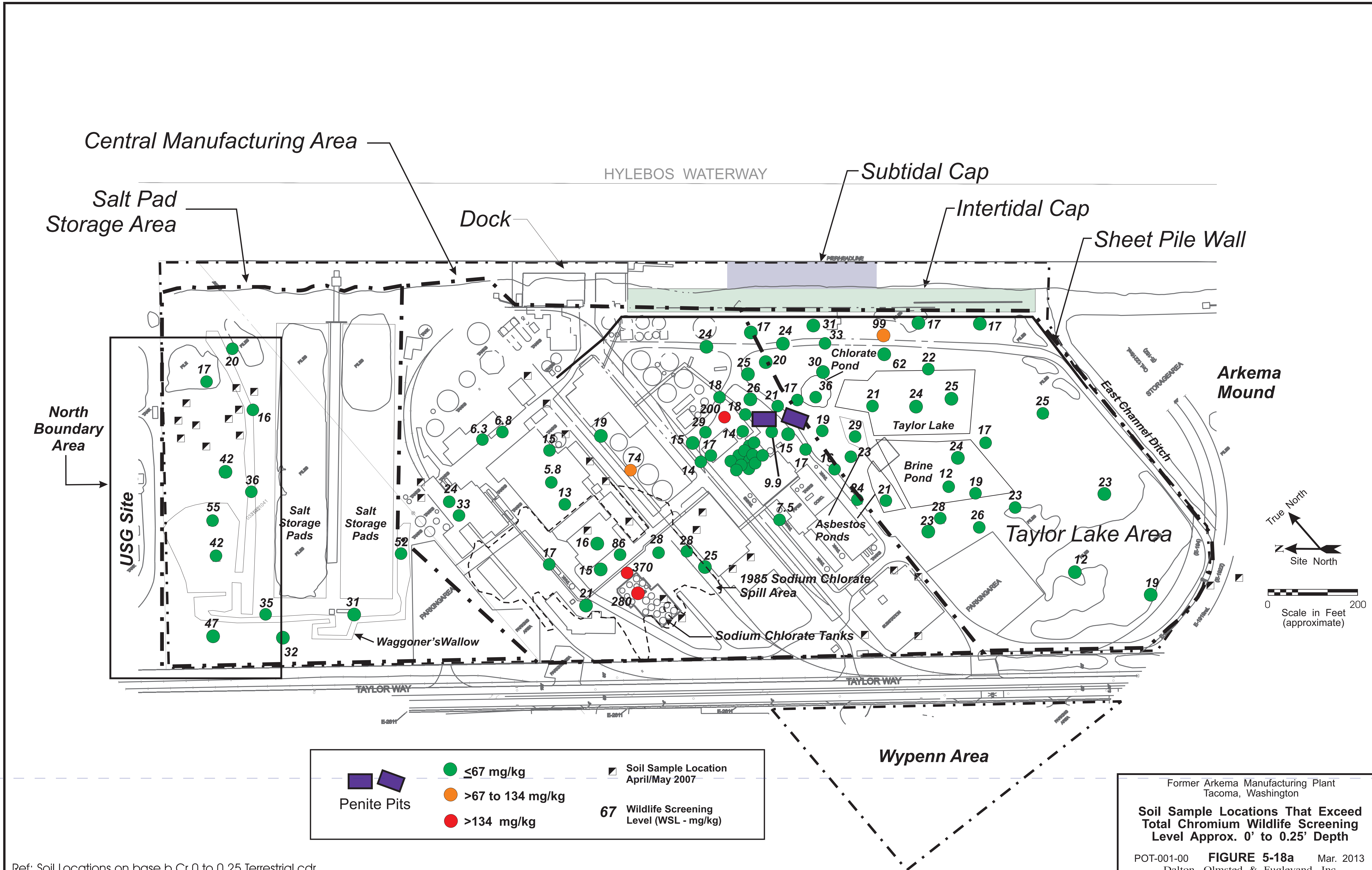
POT-001-00 **FIGURE 5-17b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Soil Locations on base Hg 0.25' to 7'.cdr



Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad
Storage Area
Dock
North
Boundary
Area
USG Site
<0.024
<0.025
Salt
Storage
Pads
Salt
Storage
Pads
Waggoner'sWallow
Chlorate
Pond
1.4
0.55
0.043
0.051
Taylor Lake
7.3
3.5
0.82
3.8
<0.03 to 7.3
0.073
Brine
Pond
0.059
0.069
0.027
Asbestos
Ponds
Taylor Lake Area
Arkema
Mound
East Channel Ditch
True North
Site North
0
200
Scale in Feet
(approximate)
TAYLOR WAY
TAYLOR WAY
Wypenn Area
Penite Pits
≤2 mg/kg
>2 to 4 mg/kg
>4 to 24 mg/kg
>24 mg/kg
Soil Sample Location
April/May 2007
Ref: Soil Locations on base Hg 6'to10'.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Soil Mercury Concentrations
Approx. 6' to 10' Depth
POT-001-00
FIGURE 5-17c
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

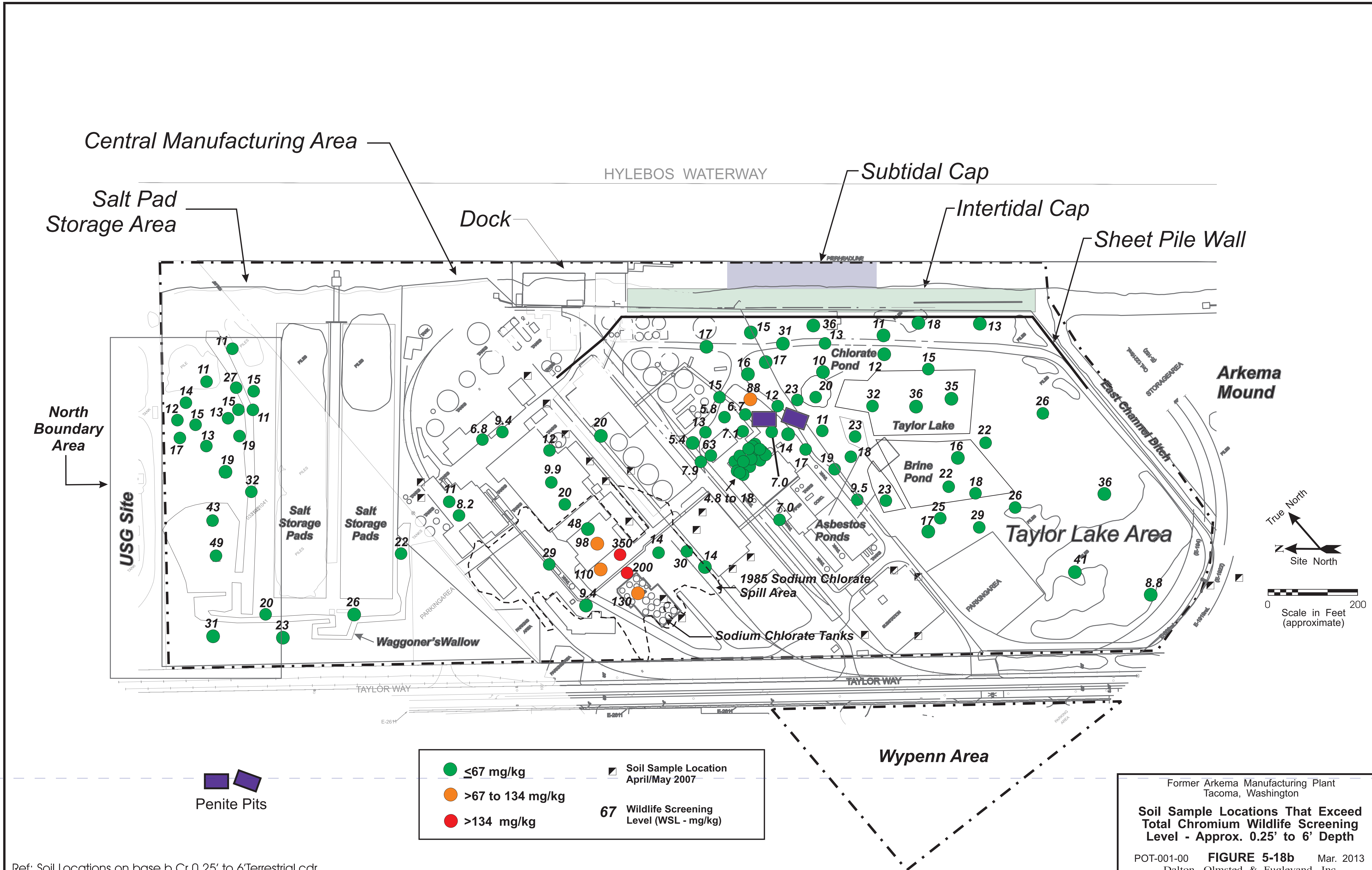


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Total Chromium Wildlife Screening Level Approx. 0' to 0.25' Depth

POT-001-00 **FIGURE 5-18a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

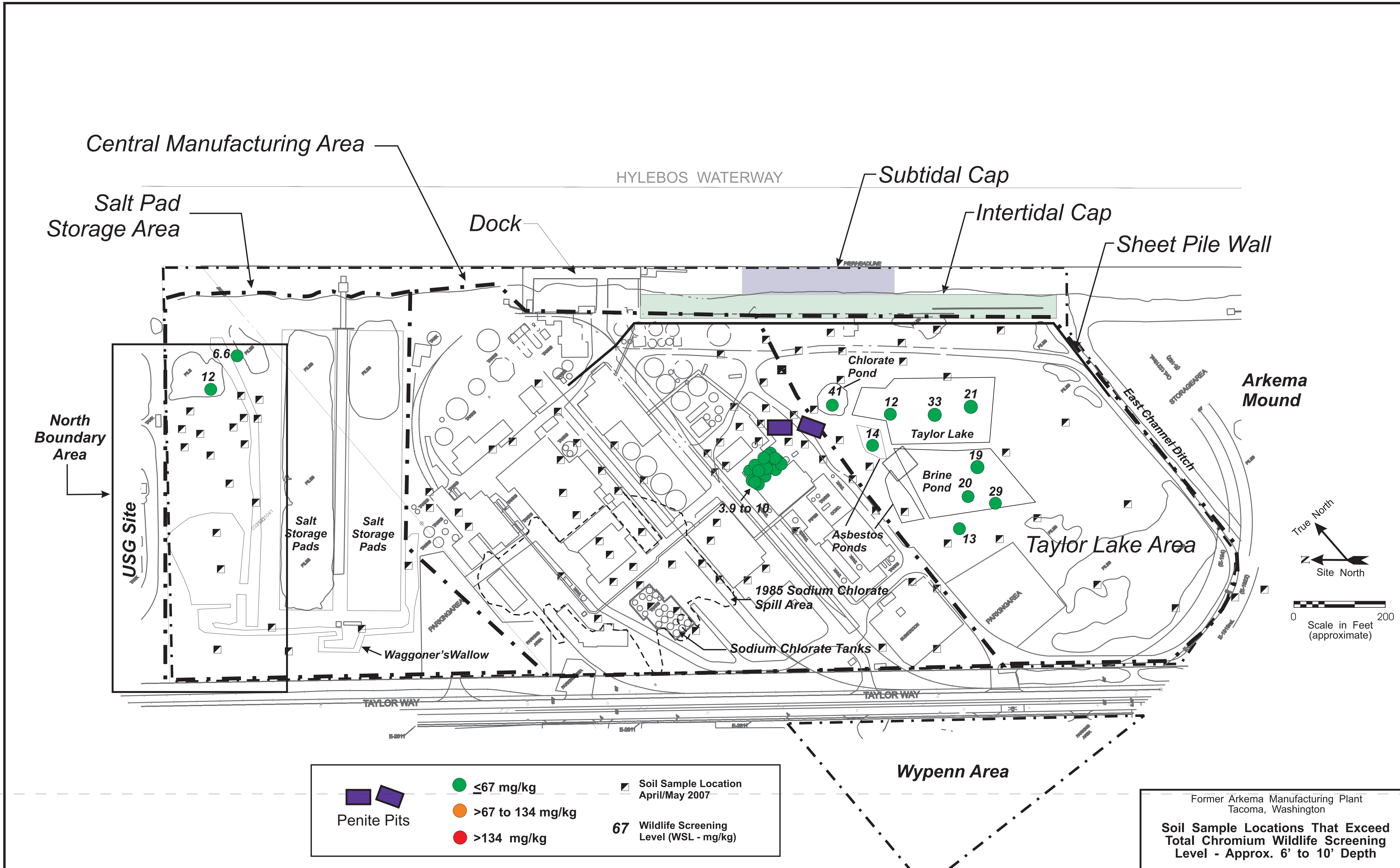


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Total Chromium Wildlife Screening Level - Approx. 0.25' to 6' Depth

POT-001-00 **FIGURE 5-18b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



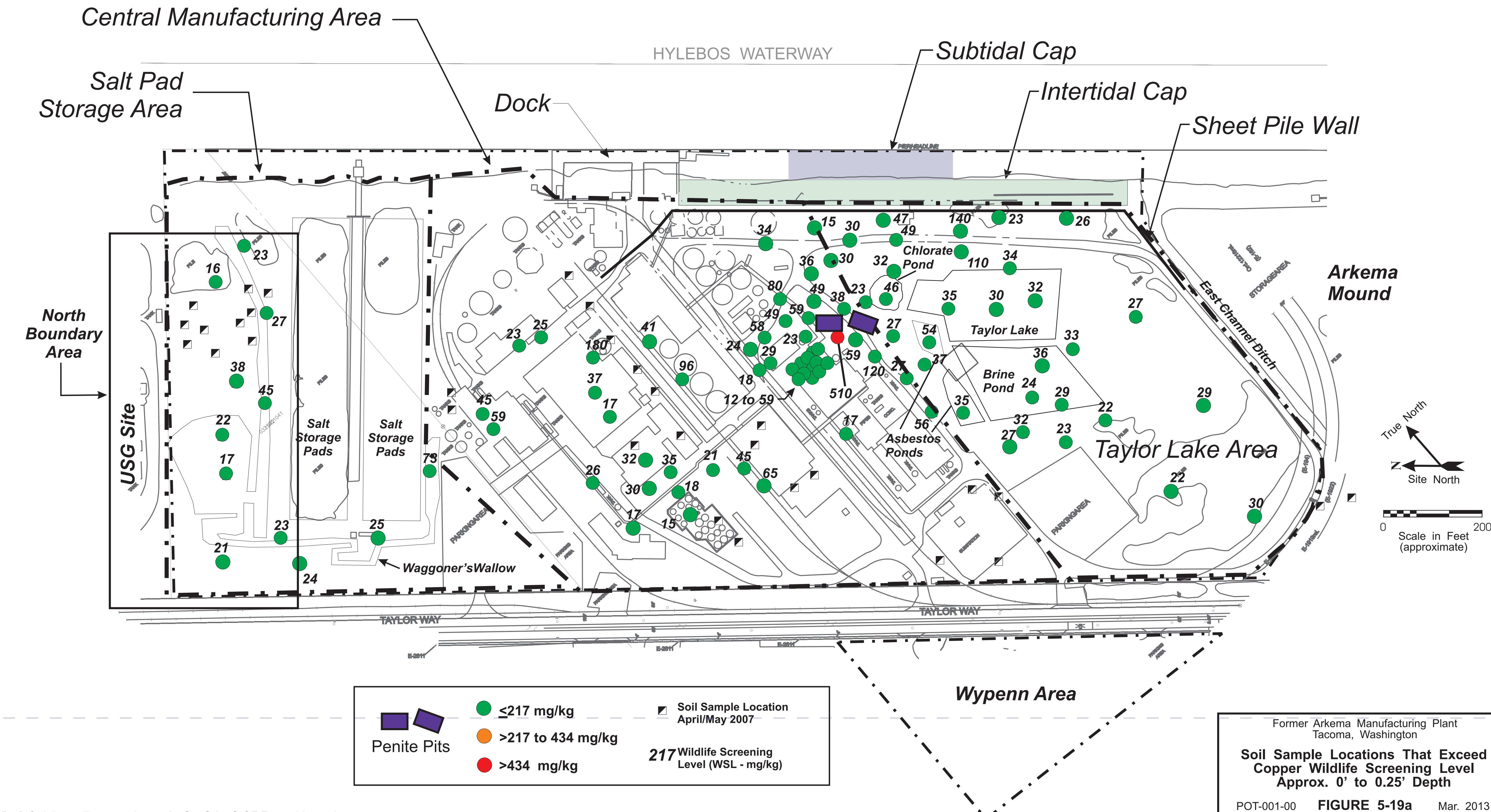
Ref: Soil Locations on base b Cr 6'to10' Terrestrial.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Total Chromium Wildlife Screening Level - Approx. 6' to 10' Depth

POT-001-00 **FIGURE 5-18c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



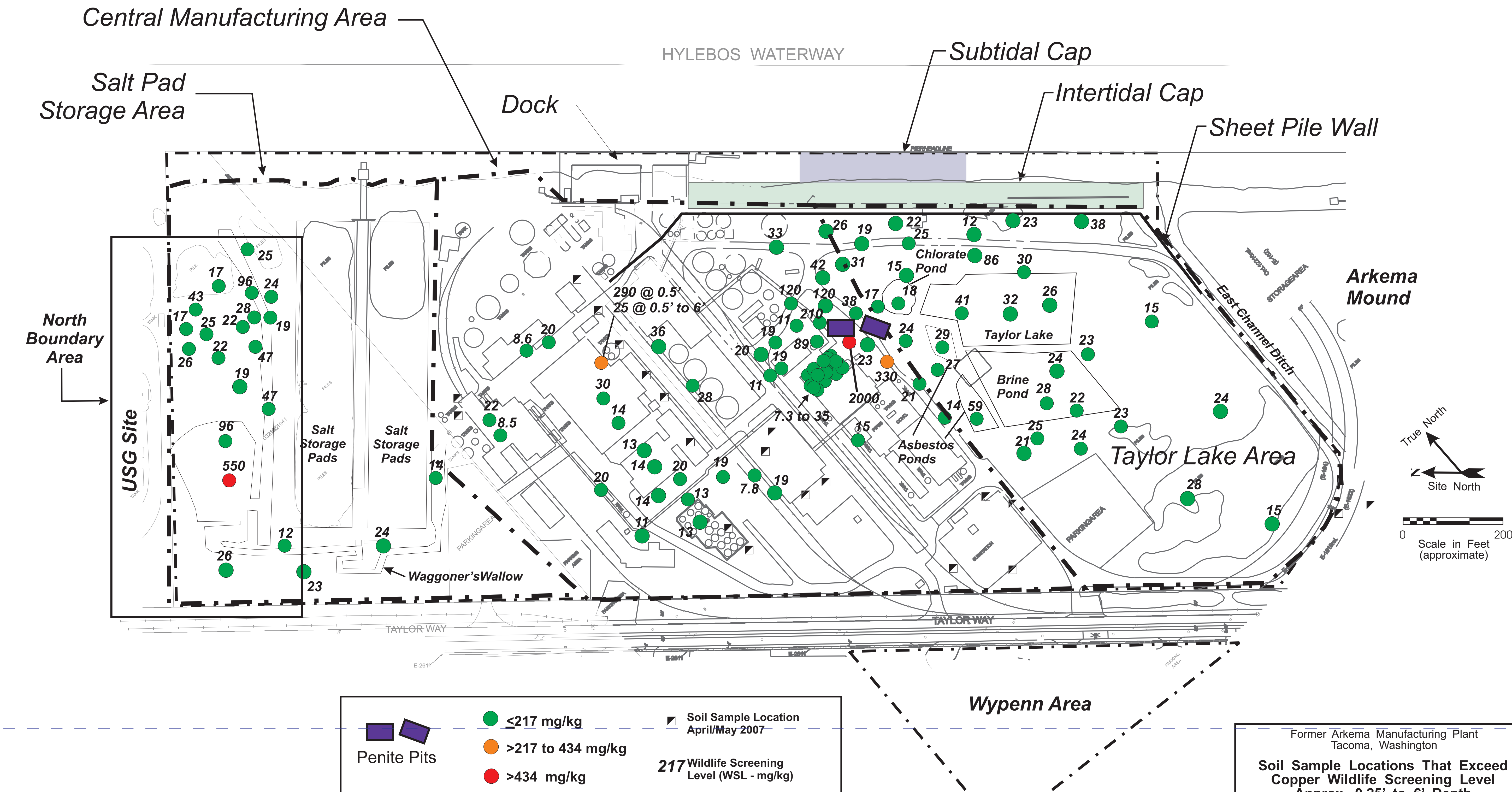
Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Copper Wildlife Screening Level Approx. 0' to 0.25' Depth

POT-001-00 **FIGURE 5-19a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Soil Locations on base b Cu 0 to 0.25 Terrestrial.cdr



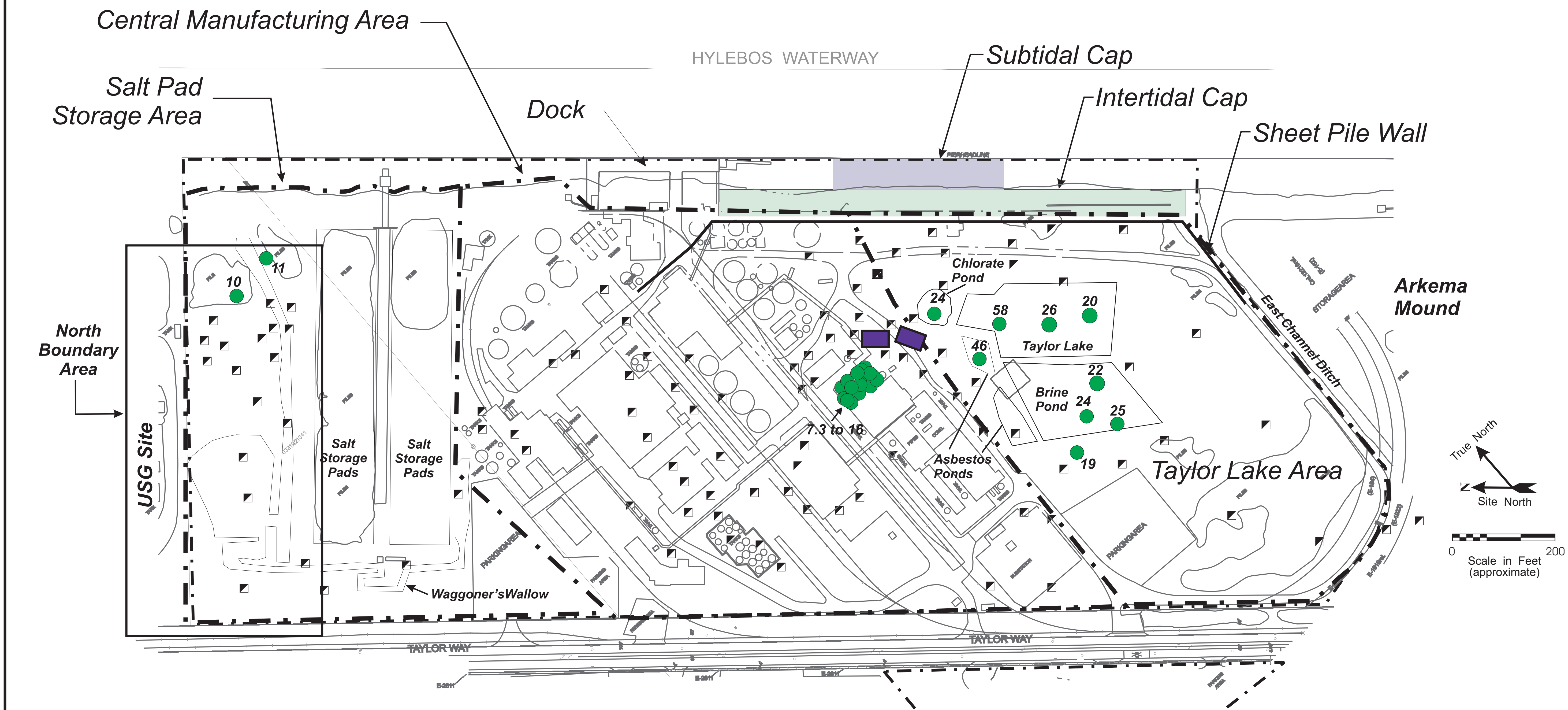
Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Copper Wildlife Screening Level Approx. 0.25' to 6' Depth

POT-001-00 **FIGURE 5-19b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Soil Locations on base b Cr 0.25' to 6'Terrestrial.cdr



Penite Pits

<217 mg/kg

>217 to 434 mg/kg

>434 mg/kg

Soil Sample Location
April/May 2007

217 Wildlife Screening Level (WSL - mg/kg)

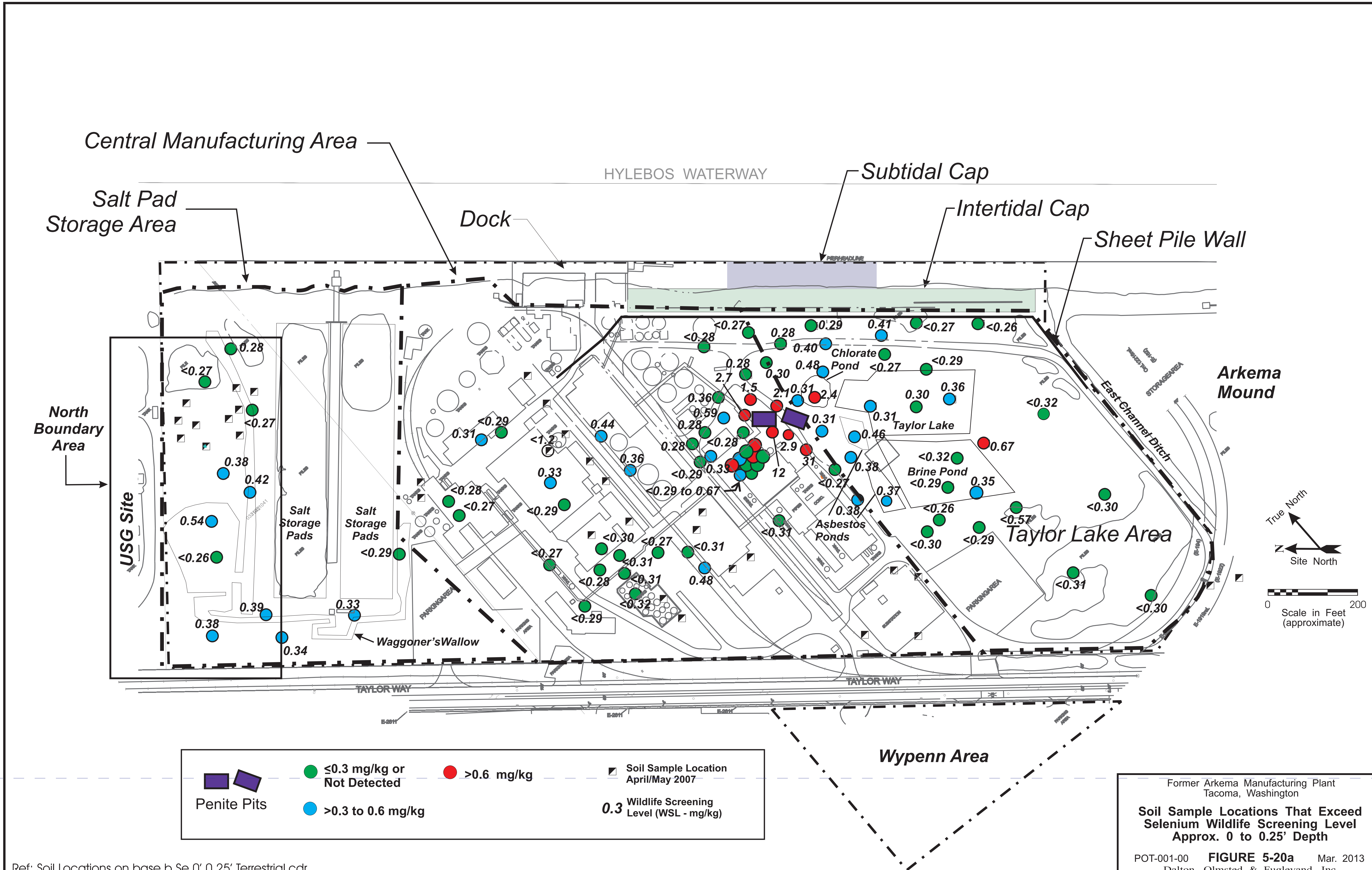
Ref: Soil Locations on base b Cu 6'to10' Terrestrial.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Copper Wildlife Screening Level Approx. 6' to 10' Depth

POT-001-00 **FIGURE 5-19c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

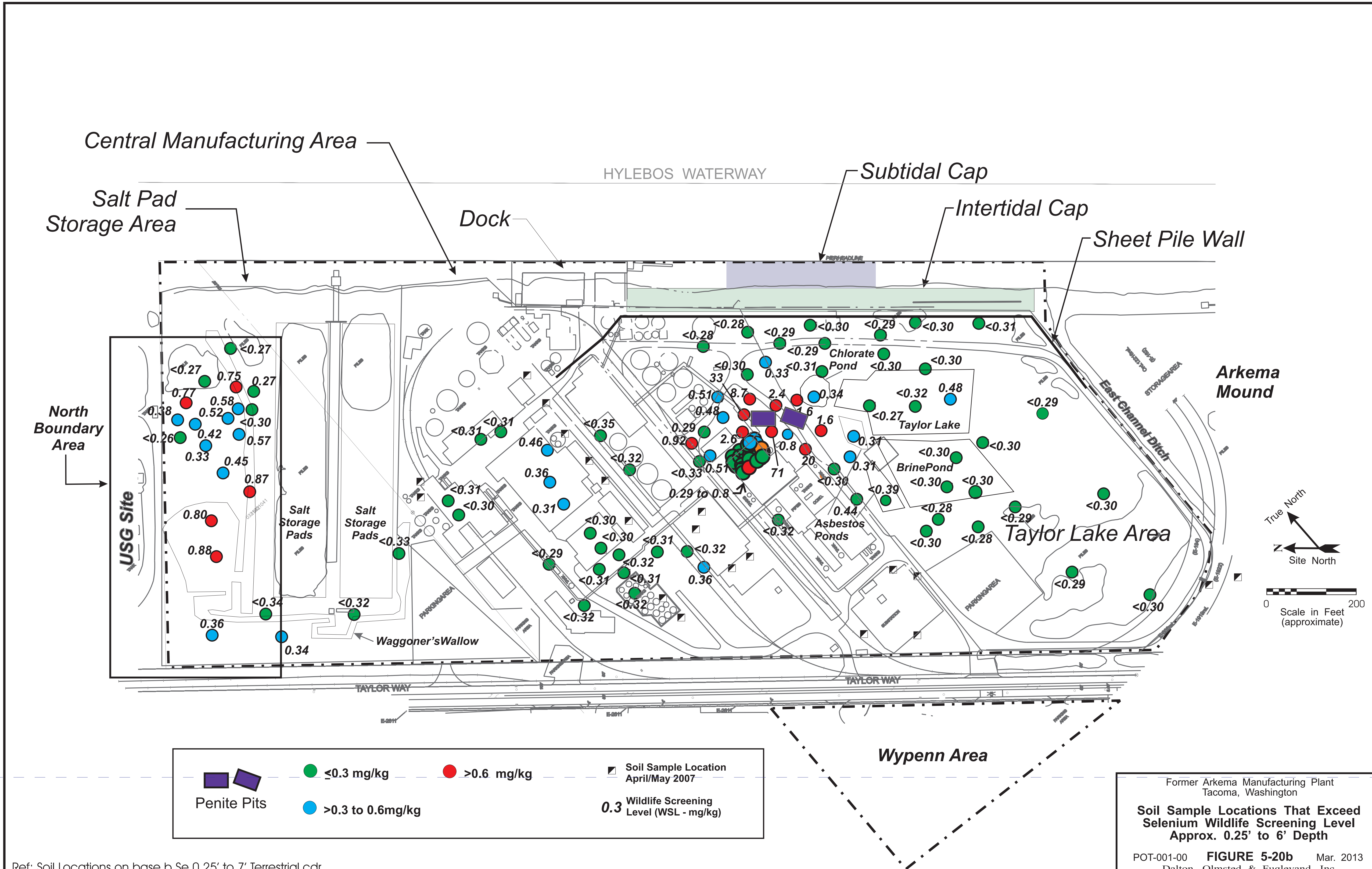


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Selenium Wildlife Screening Level Approx. 0 to 0.25' Depth

POT-001-00 **FIGURE 5-20a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

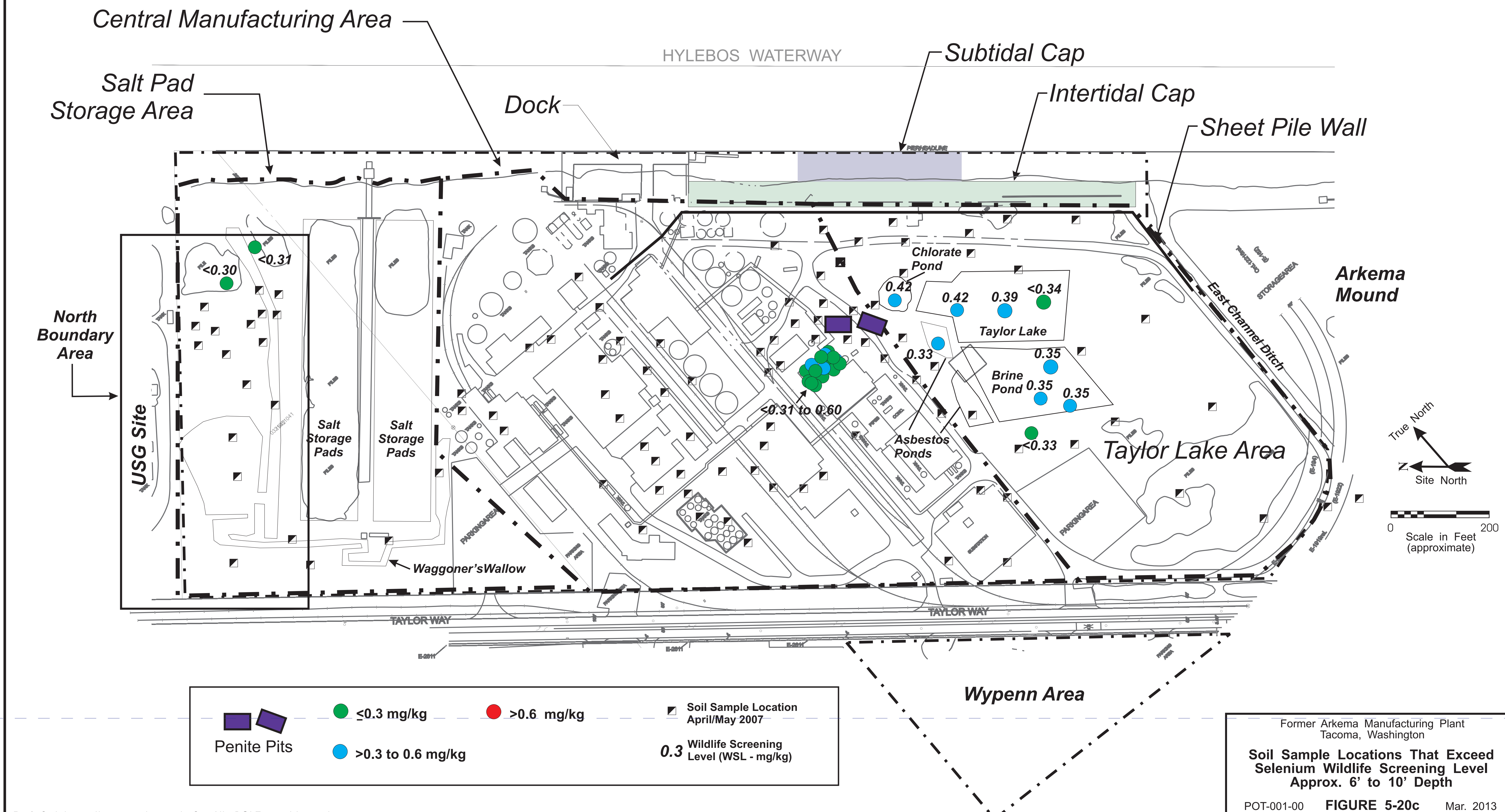


Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Selenium Wildlife Screening Level Approx. 0.25' to 6' Depth

POT-001-00 **FIGURE 5-20b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



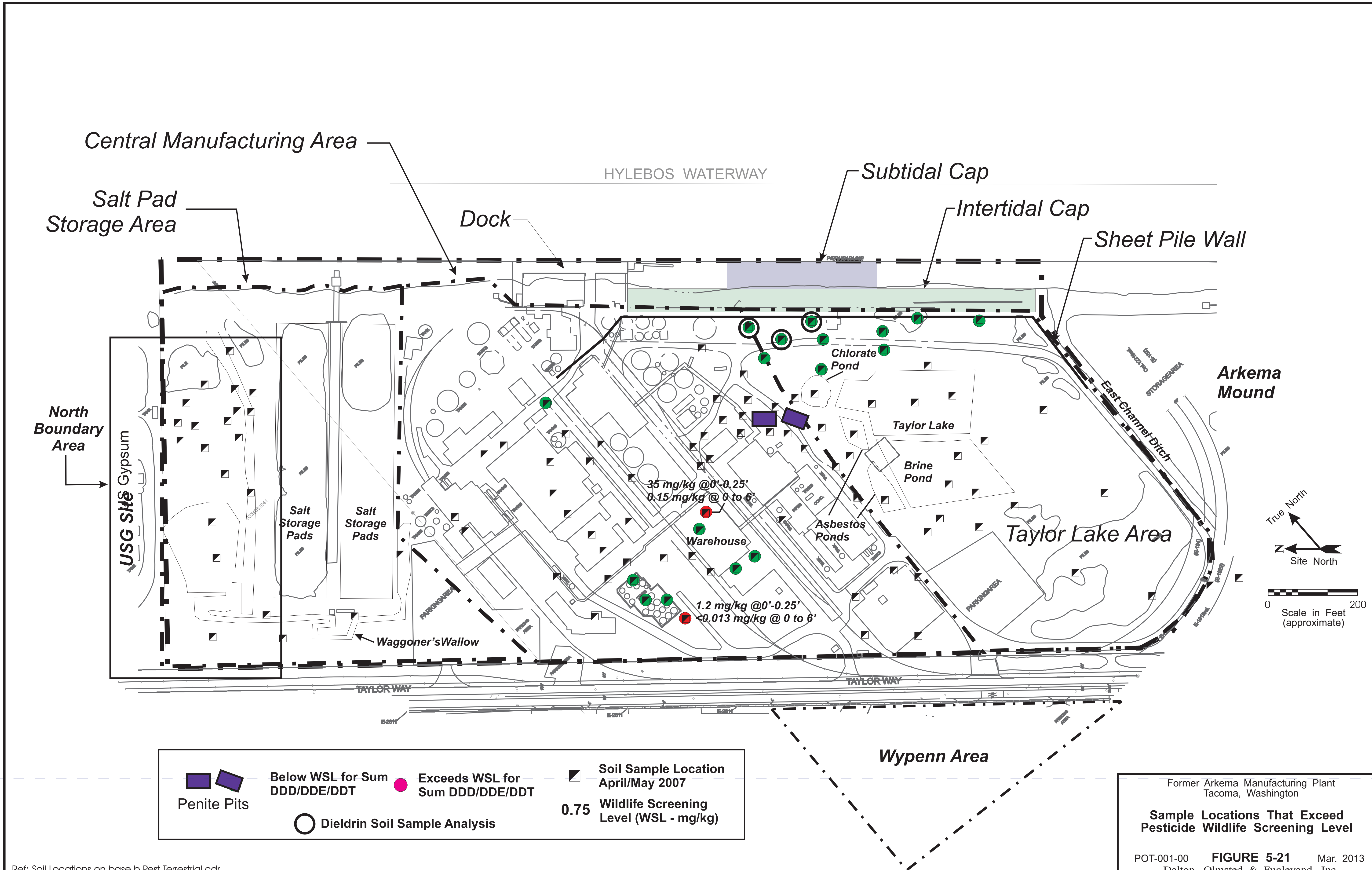
Former Arkema Manufacturing Plant
Tacoma, Washington

Soil Sample Locations That Exceed Selenium Wildlife Screening Level Approx. 6' to 10' Depth

POT-001-00 **FIGURE 5-20c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Soil Locations on base b Se 6'to10' Terrestrial.cdr

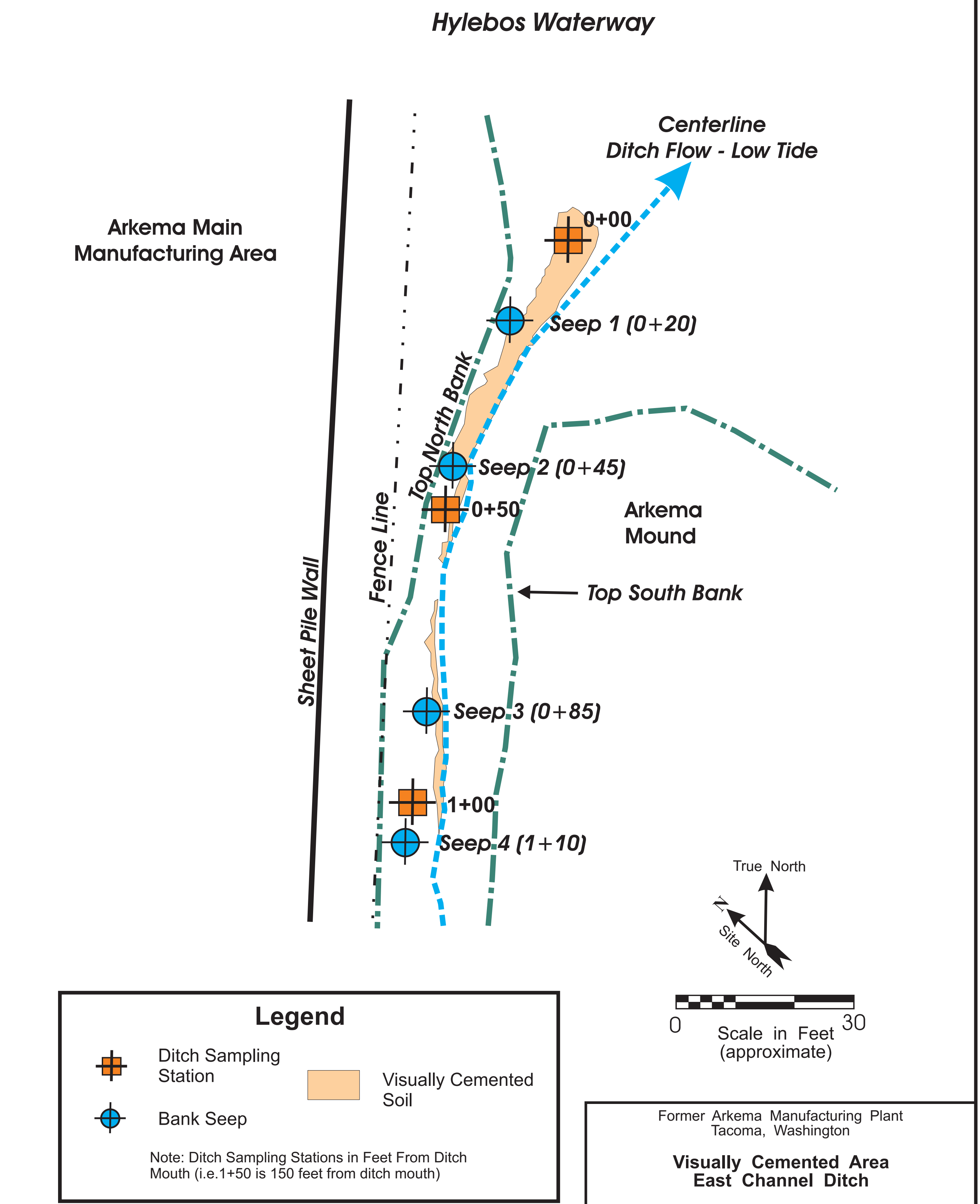


Former Arkema Manufacturing Plant
Tacoma, Washington

Sample Locations That Exceed Pesticide Wildlife Screening Level

POT-001-00 **FIGURE 5-21** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



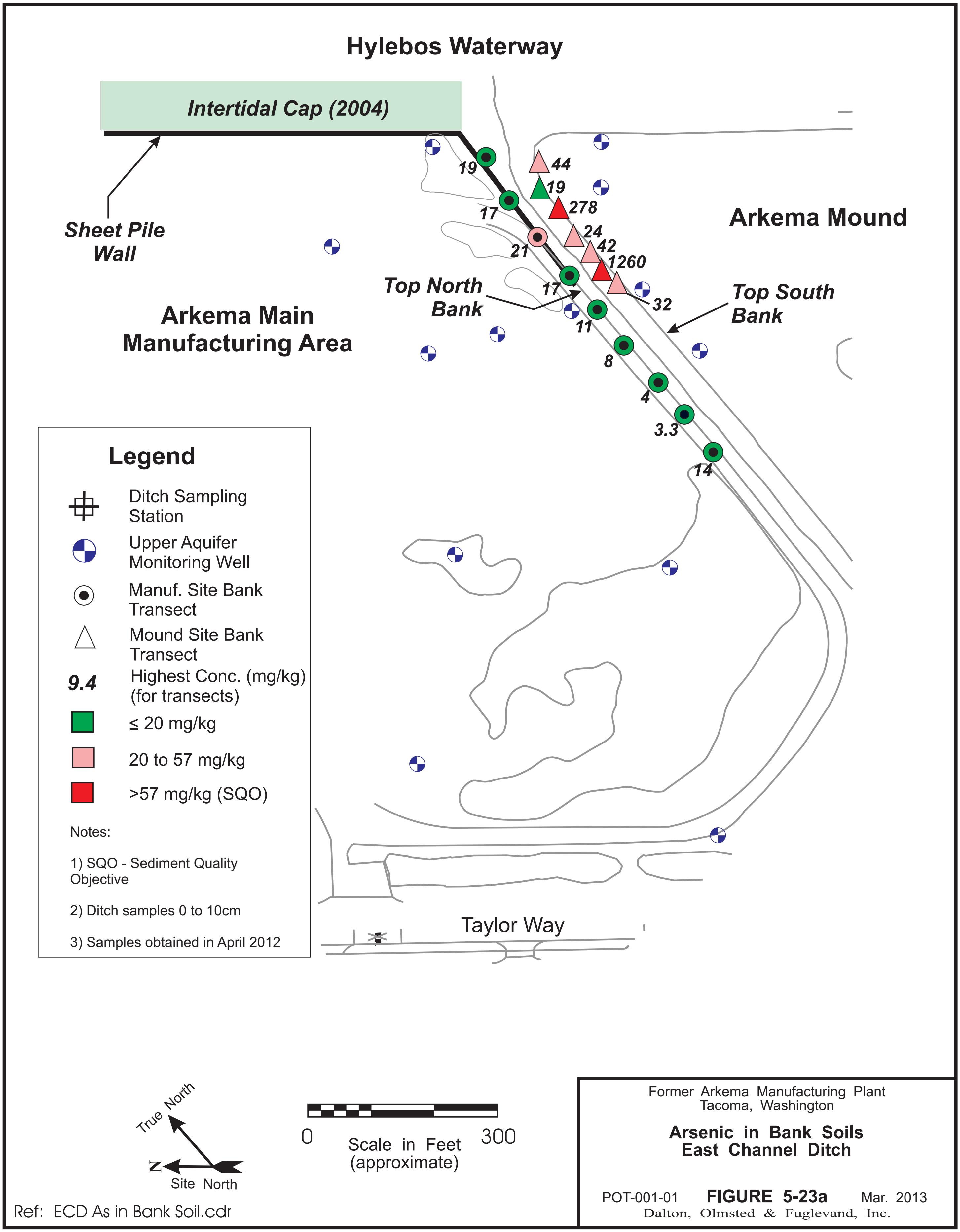
Ref: ECD Cemented Area a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Visually Cemented Area
East Channel Ditch

POT-001-00 **FIGURE 5-22** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



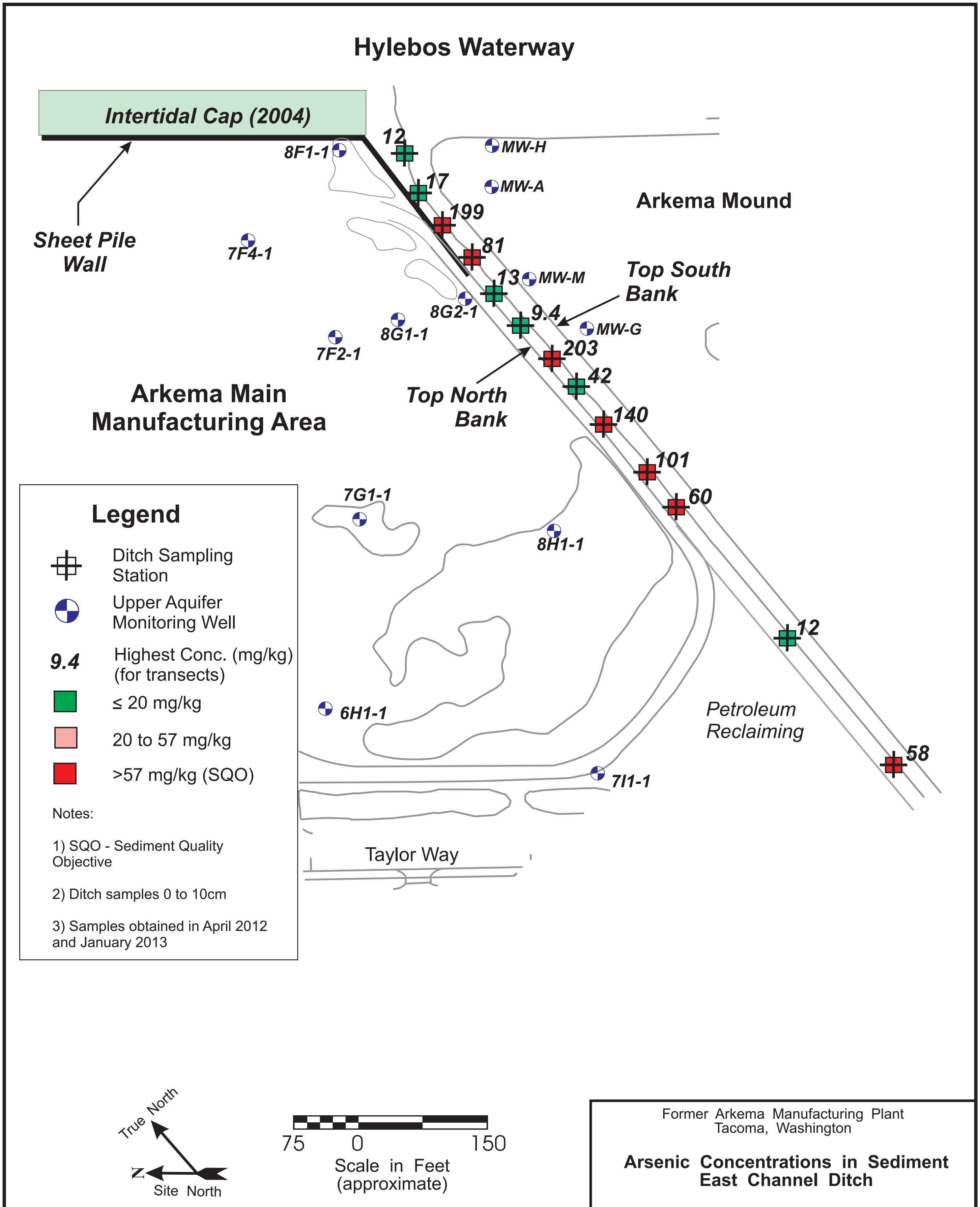
Ref: ECD As in Bank Soil.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic in Bank Soils
East Channel Ditch

POT-001-01 **FIGURE 5-23a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



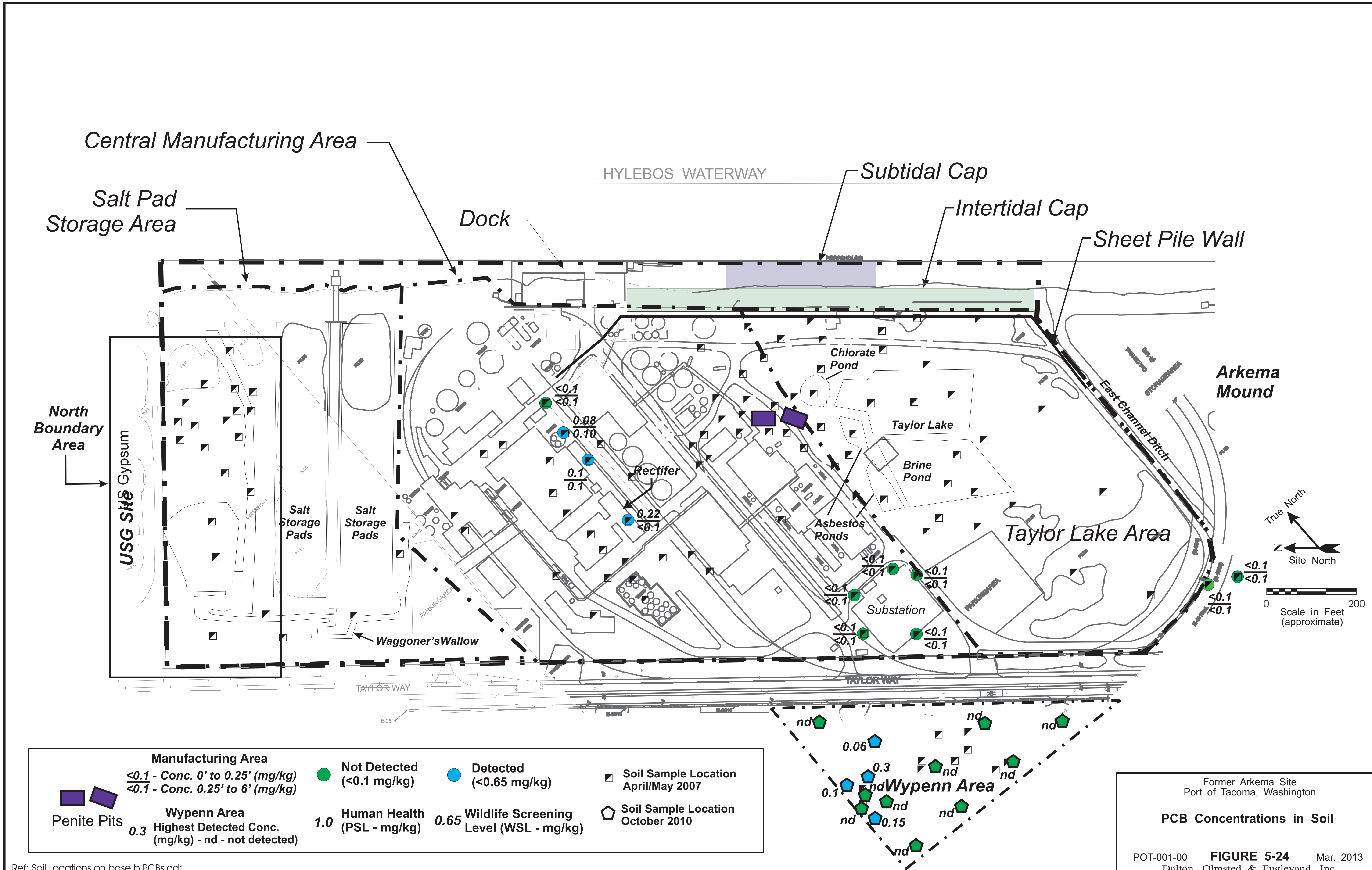
Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Concentrations in Sediment
East Channel Ditch

POT-001-01 **FIGURE 5-23b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: ECD As in Ditch Sediment.cdr



Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Dock
North Boundary Area
USG Site
Gypsum
Salt Storage Pads
Salt Storage Pads
Waggoner'sWallow
Rectifer
Chlorate Pond
Taylor Lake
Brine Pond
Asbestos Ponds
Substation
Taylor Lake Area
East Channel Ditch
Arkema Mound
TAYLOR WAY
Wypenn Area
True North
Site North
0
200
Scale in Feet (approximate)
<0.1 / <0.1
0.08 / 0.10
0.1 / 0.1
0.22 / <0.1
nd
0.06
0.3
0.1
0.15
Manufacturing Area
<0.1 - Conc. 0' to 0.25' (mg/kg)
<0.1 - Conc. 0.25' to 6' (mg/kg)
Penite Pits
Wypenn Area
0.3 Highest Detected Conc. (mg/kg) - nd - not detected)
Not Detected (<0.1 mg/kg)
Detected (<0.65 mg/kg)
1.0 Human Health (PSL - mg/kg)
0.65 Wildlife Screening Level (WSL - mg/kg)
Soil Sample Location April/May 2007
Soil Sample Location October 2010
Ref: Soil Locations on base b PCBs.cdr
Former Arkema Site
Port of Tacoma, Washington
PCB Concentrations in Soil
POT-001-00
FIGURE 5-24
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

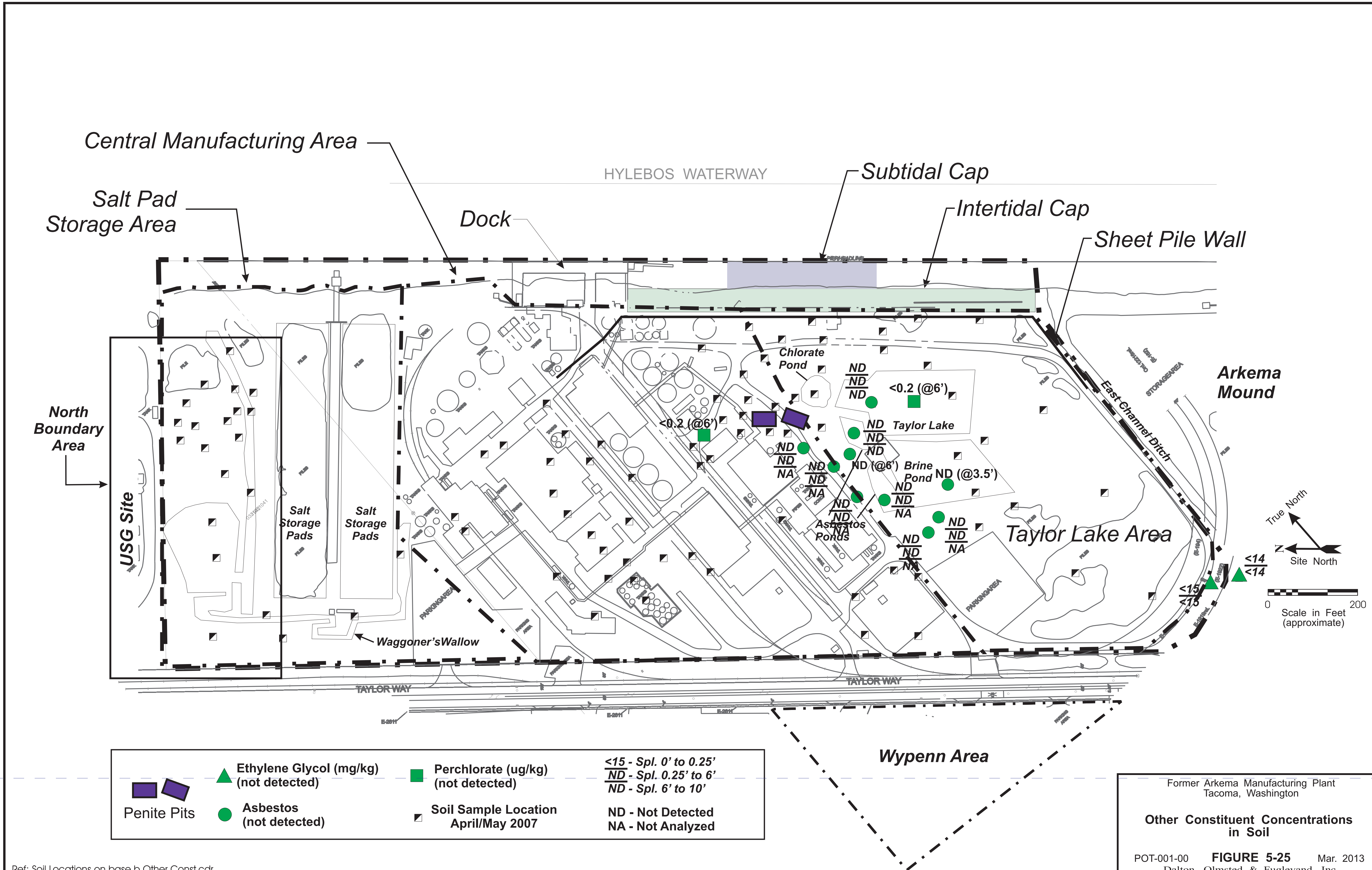
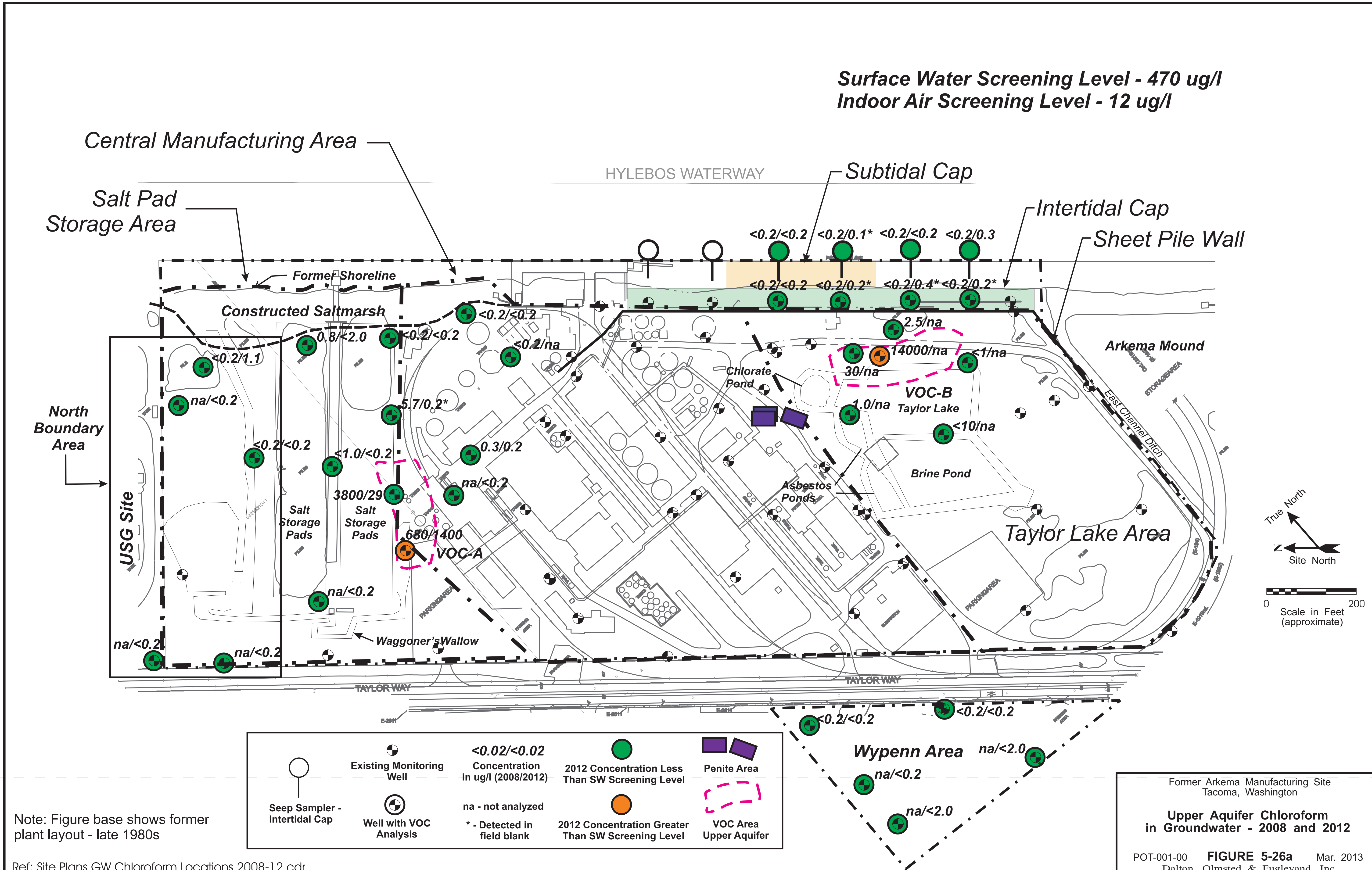
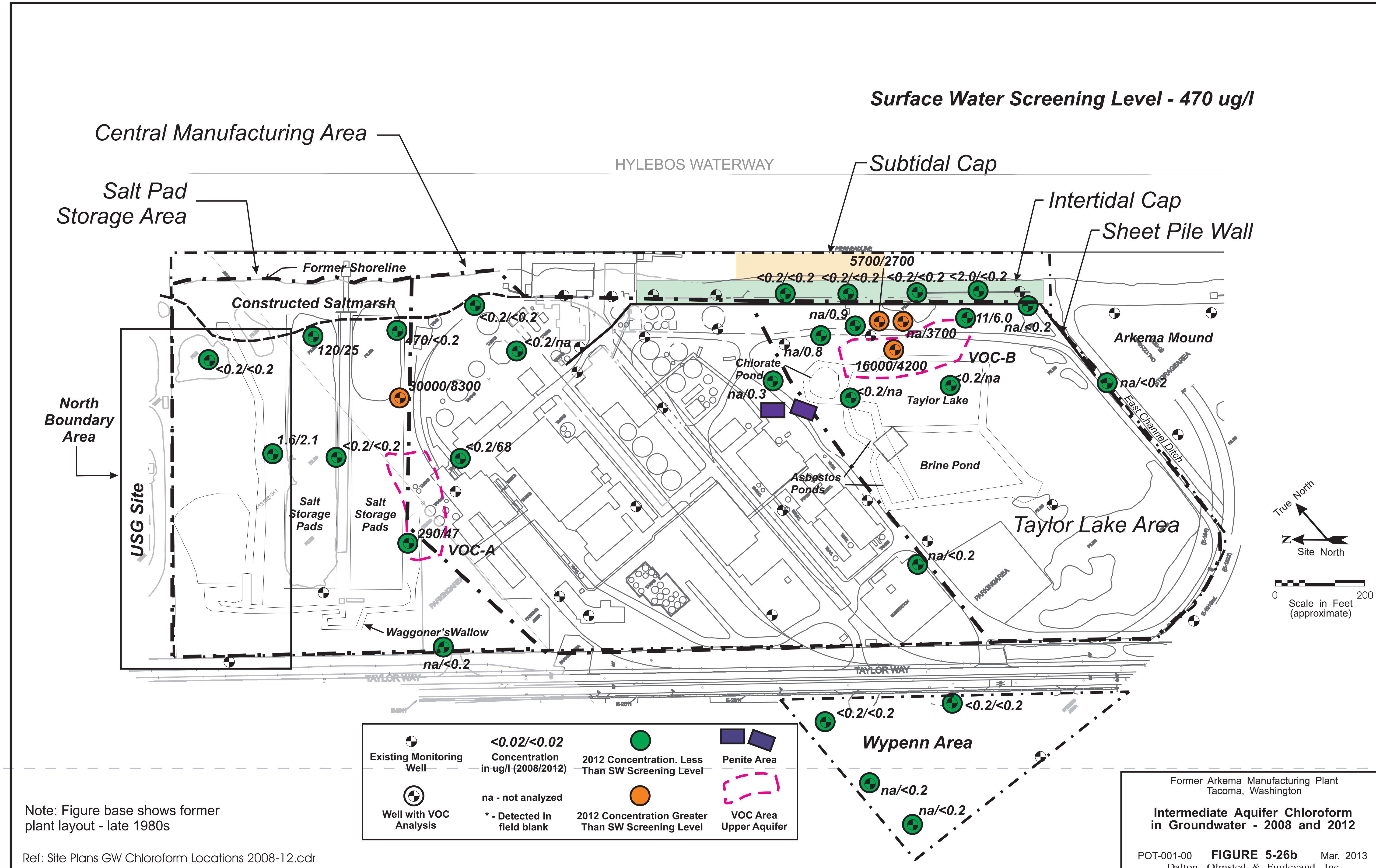
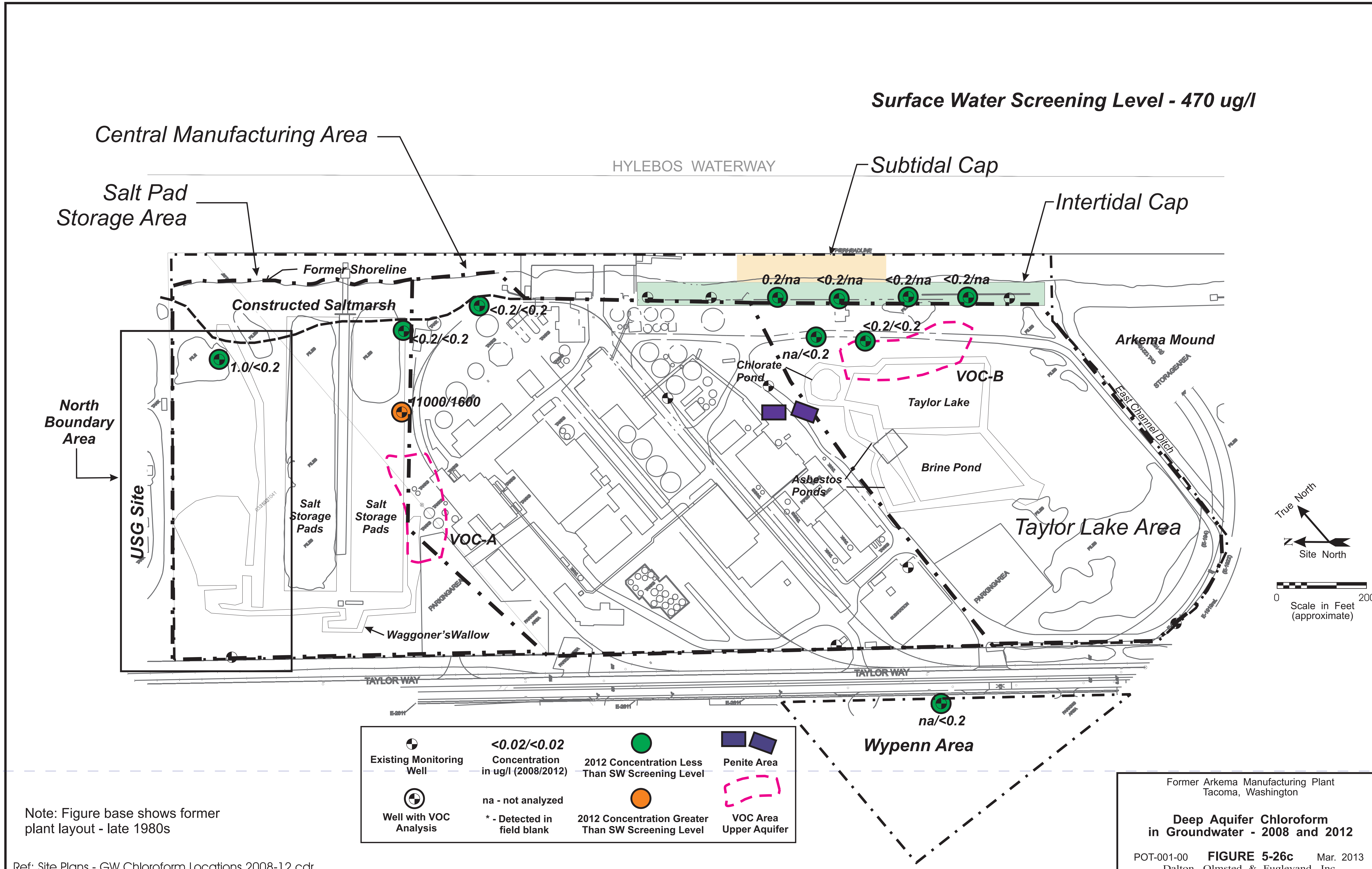


FIGURE 5-25 Other Constituent Concentrations in Soil


Surface Water Screening Level - 470 ug/l
Indoor Air Screening Level - 12 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
VOC-A
VOC-B
Chlorate Pond
Taylor Lake
Asbestos Ponds
Brine Pond
Taylor Lake Area
Arkema Mound
East Channel Ditch
Waggoner's Wallow
TAYLOR WAY
Wypenn Area
True North
Site North
Scale in Feet (approximate)
0
200
Seep Sampler - Intertidal Cap
Existing Monitoring Well
Well with VOC Analysis
<0.02/<0.02
Concentration in ug/l (2008/2012)
na - not analyzed
* - Detected in field blank
2012 Concentration Less Than SW Screening Level
2012 Concentration Greater Than SW Screening Level
Penite Area
VOC Area Upper Aquifer
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW Chloroform Locations 2008-12.cdr
Former Arkema Manufacturing Site
Tacoma, Washington
Upper Aquifer Chloroform in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-26a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Surface Water Screening Level - 470 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
VOC-A
VOC-B
Waggoner'sWallow
Chlorate Pond
Asbestos Ponds
Taylor Lake
Brine Pond
Taylor Lake Area
Arkema Mound
East Channel Ditch
Wypenn Area
TAYLOR WAY
5700/2700
<0.2/<0.2
<0.2/<0.2
<0.2/<0.2
<2.0/<0.2
na/0.9
11/6.0
na/<0.2
na/3700
na/0.8
16000/4200
<0.2/na
na/0.3
<0.2/na
na/<0.2
<0.2/<0.2
120/25
470/<0.2
<0.2/na
<0.2/<0.2
30000/8300
1.6/2.1
<0.2/<0.2
<0.2/68
290/47
na/<0.2
na/<0.2
<0.2/<0.2
<0.2/<0.2
na/<0.2
na/<0.2
True North
Site North
0
200
Scale in Feet (approximate)
Existing Monitoring Well
<0.02/<0.02
Concentration in ug/l (2008/2012)
2012 Concentration. Less Than SW Screening Level
Penite Area
Well with VOC Analysis
na - not analyzed
* - Detected in field blank
2012 Concentration Greater Than SW Screening Level
VOC Area Upper Aquifer
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW Chloroform Locations 2008-12.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Intermediate Aquifer Chloroform in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-26b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Note: Figure base shows former plant layout - late 1980s

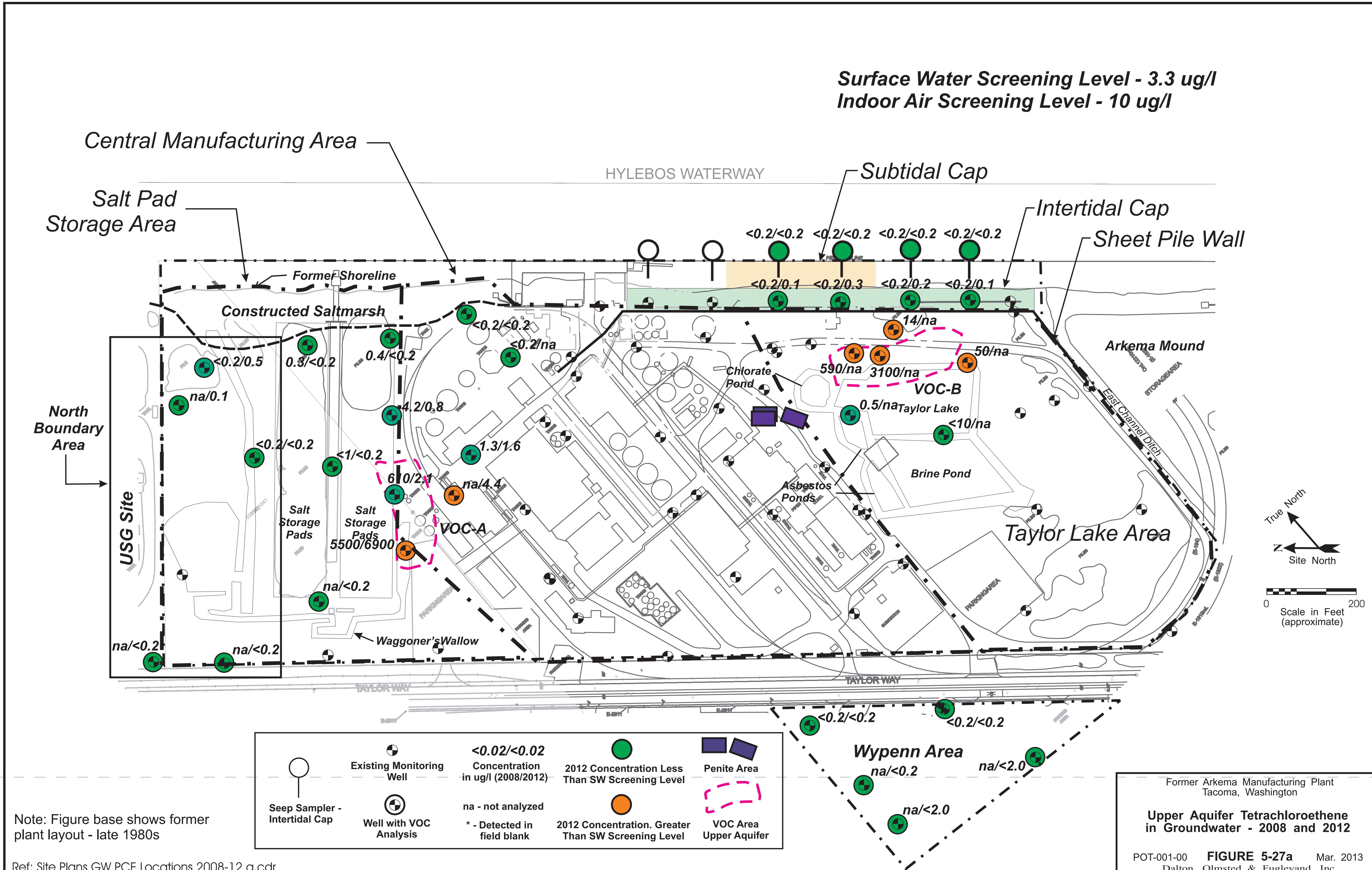
Ref: Site Plans - GW Chloroform Locations 2008-12.cdr

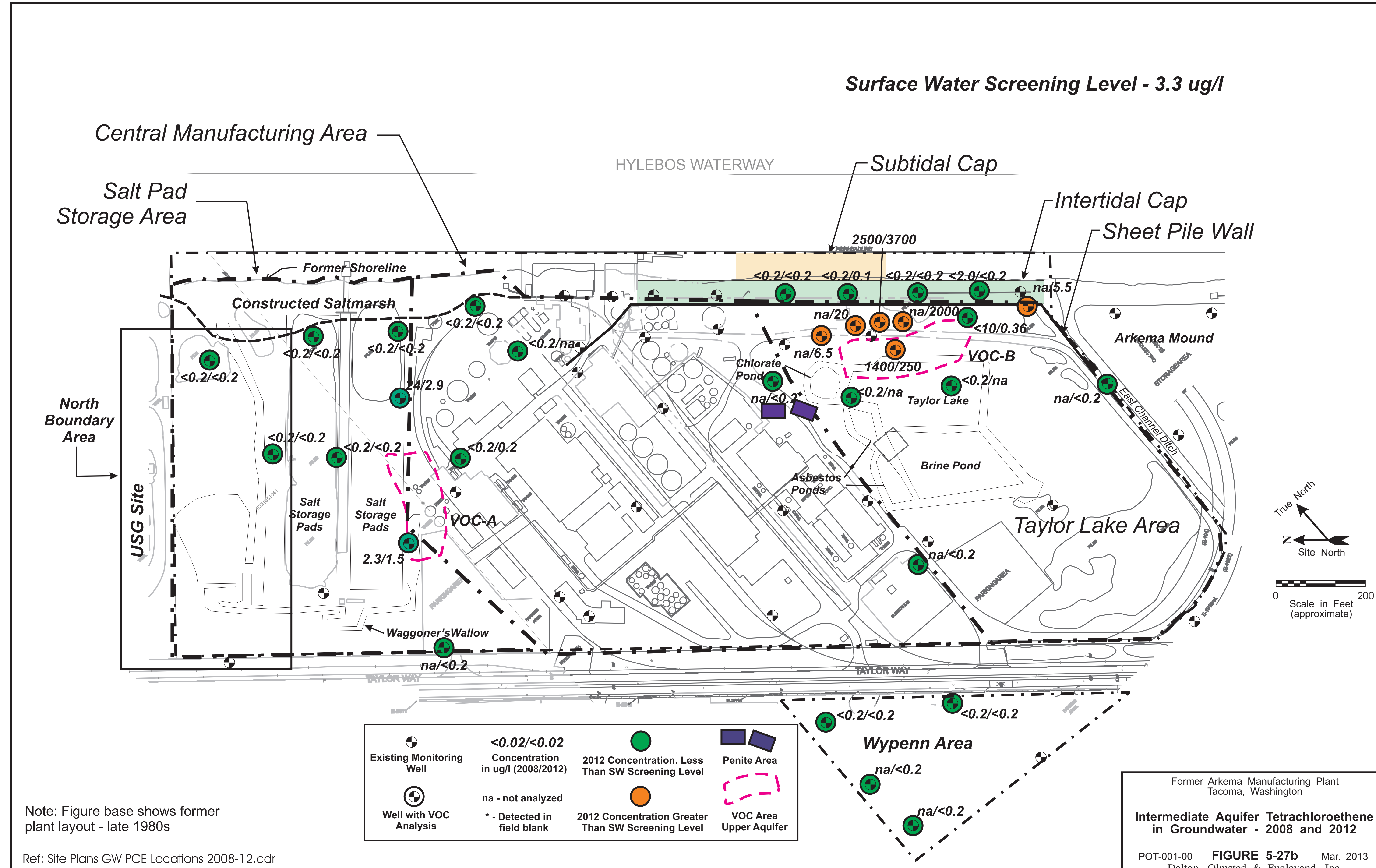
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Chloroform in Groundwater - 2008 and 2012

POT-001-00 FIGURE 5-26c Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.


Surface Water Screening Level - 3.3 ug/l
Indoor Air Screening Level - 10 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
VOC-A
VOC-B
Chlorate Pond
Taylor Lake
Brine Pond
Asbestos Ponds
Arkema Mound
East Channel Ditch
Taylor Lake Area
Waggoner's Wallow
TAYLOR WAY
Wypenn Area
<0.2/<0.2
<0.2/<0.2
<0.2/<0.2
<0.2/<0.2
<0.2/0.1
<0.2/0.3
<0.2/0.2
<0.2/0.1
14/na
590/na
3100/na
50/na
0.5/na
<10/na
<0.2/<0.2
<0.2/na
<0.2/0.5
0.3/<0.2
0.4/<0.2
na/0.1
4.2/0.8
1.3/1.6
<0.2/<0.2
<1/<0.2
610/2.1
na/4.4
5500/6900
na/<0.2
na/<0.2
na/<0.2
<0.2/<0.2
<0.2/<0.2
na/<0.2
na/<2.0
na/<2.0
True North
Site North
0
200
Scale in Feet (approximate)
Seep Sampler - Intertidal Cap
Existing Monitoring Well
Well with VOC Analysis
<0.02/<0.02 Concentration in ug/l (2008/2012)
na - not analyzed
* - Detected in field blank
2012 Concentration Less Than SW Screening Level
2012 Concentration. Greater Than SW Screening Level
Penite Area
VOC Area Upper Aquifer
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW PCE Locations 2008-12 a.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer Tetrachloroethene in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-27a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Note: Figure base shows former plant layout - late 1980s

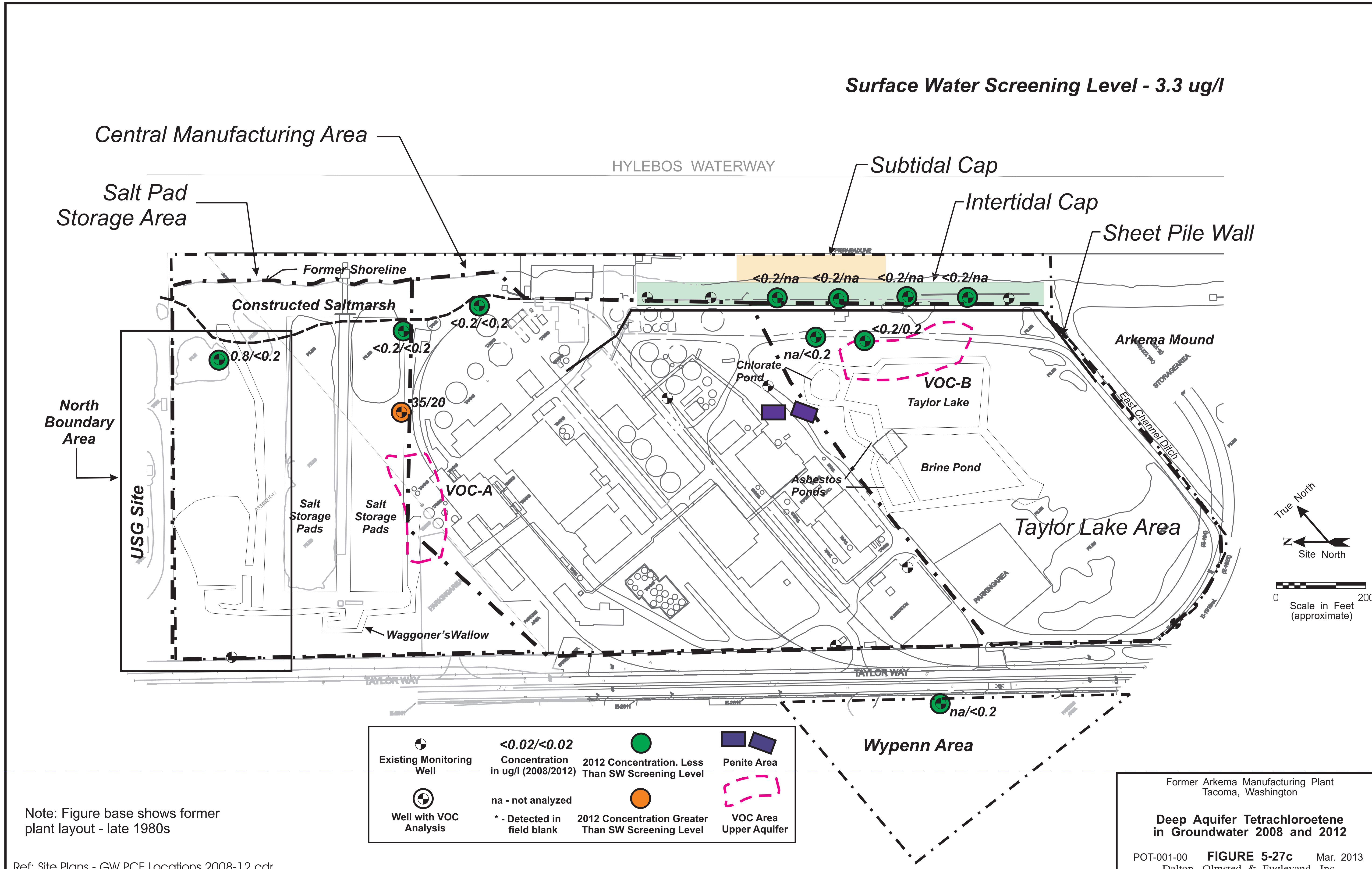
Ref: Site Plans GW PCE Locations 2008-12.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Tetrachloroethene in Groundwater - 2008 and 2012

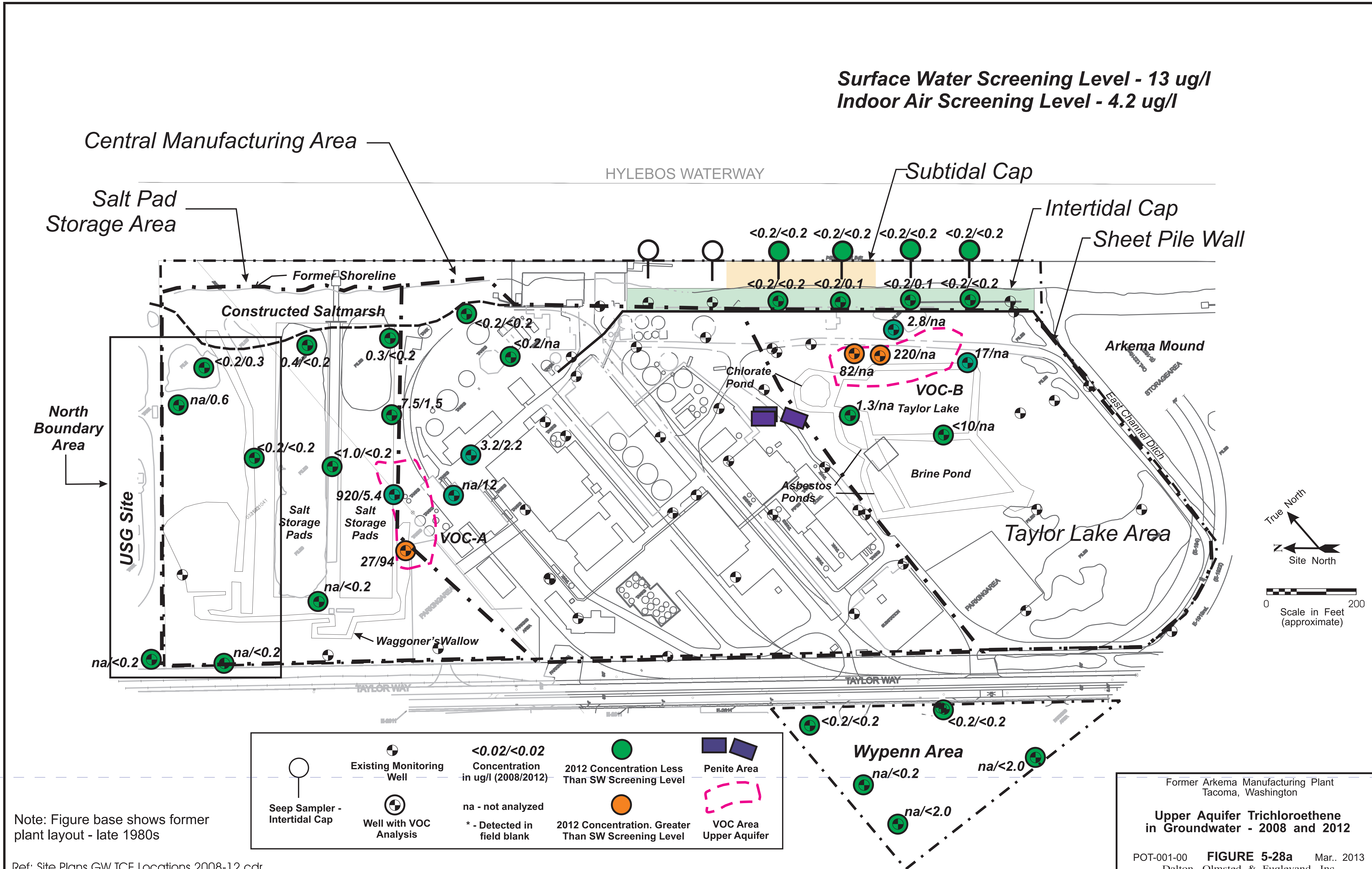
POT-001-00 **FIGURE 5-27b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Note: Figure base shows former plant layout - late 1980s

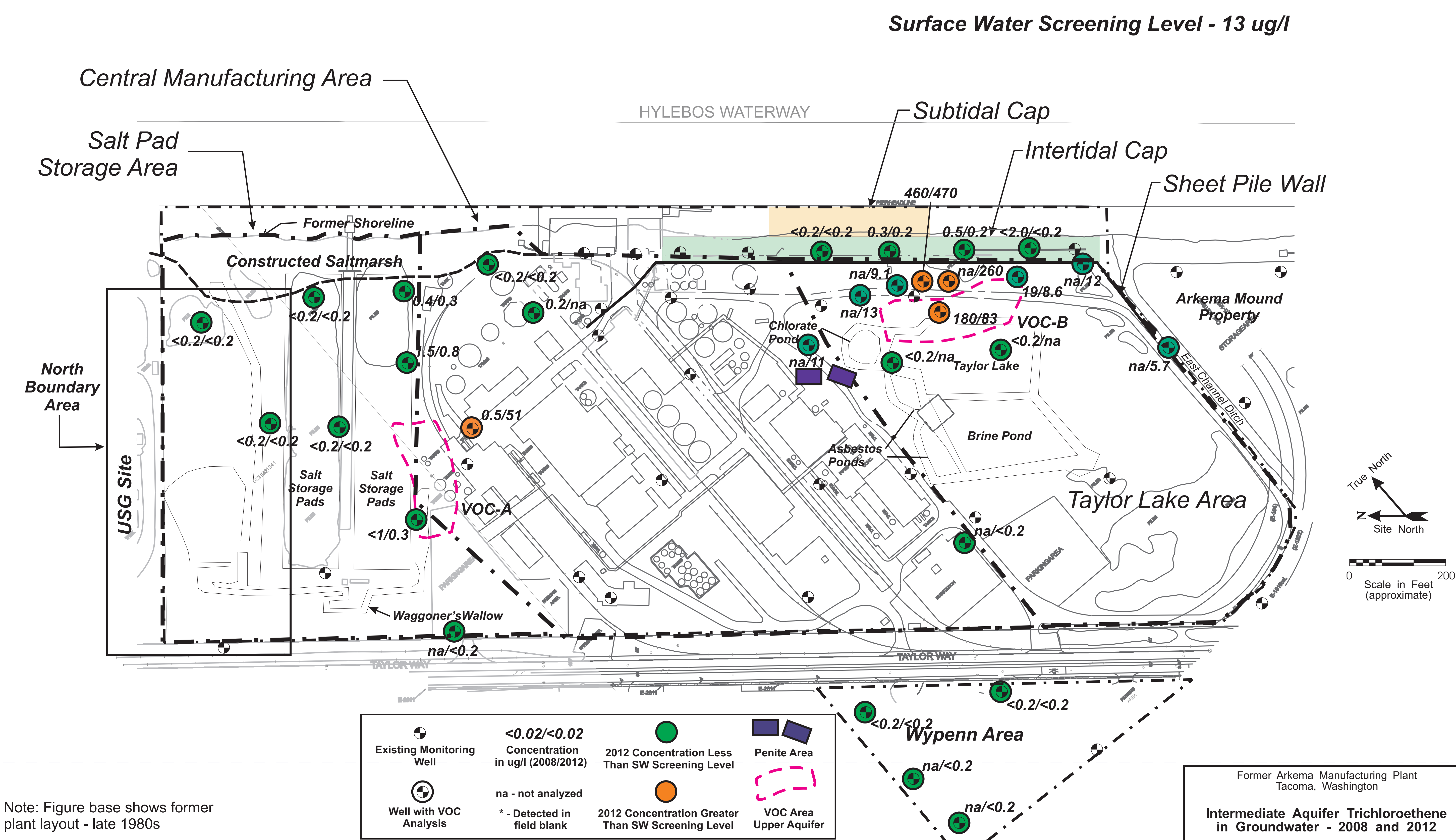
Ref: Site Plans - GW PCE Locations 2008-12.cdr



Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer Trichloroethene in Groundwater - 2008 and 2012

POT-001-00 FIGURE 5-28a Mar.. 2013
Dalton, Olmsted & Fuglevand, Inc.



Note: Figure base shows former plant layout - late 1980s

Ref: Site Plans GW TCE Locations 2008-12.cdr

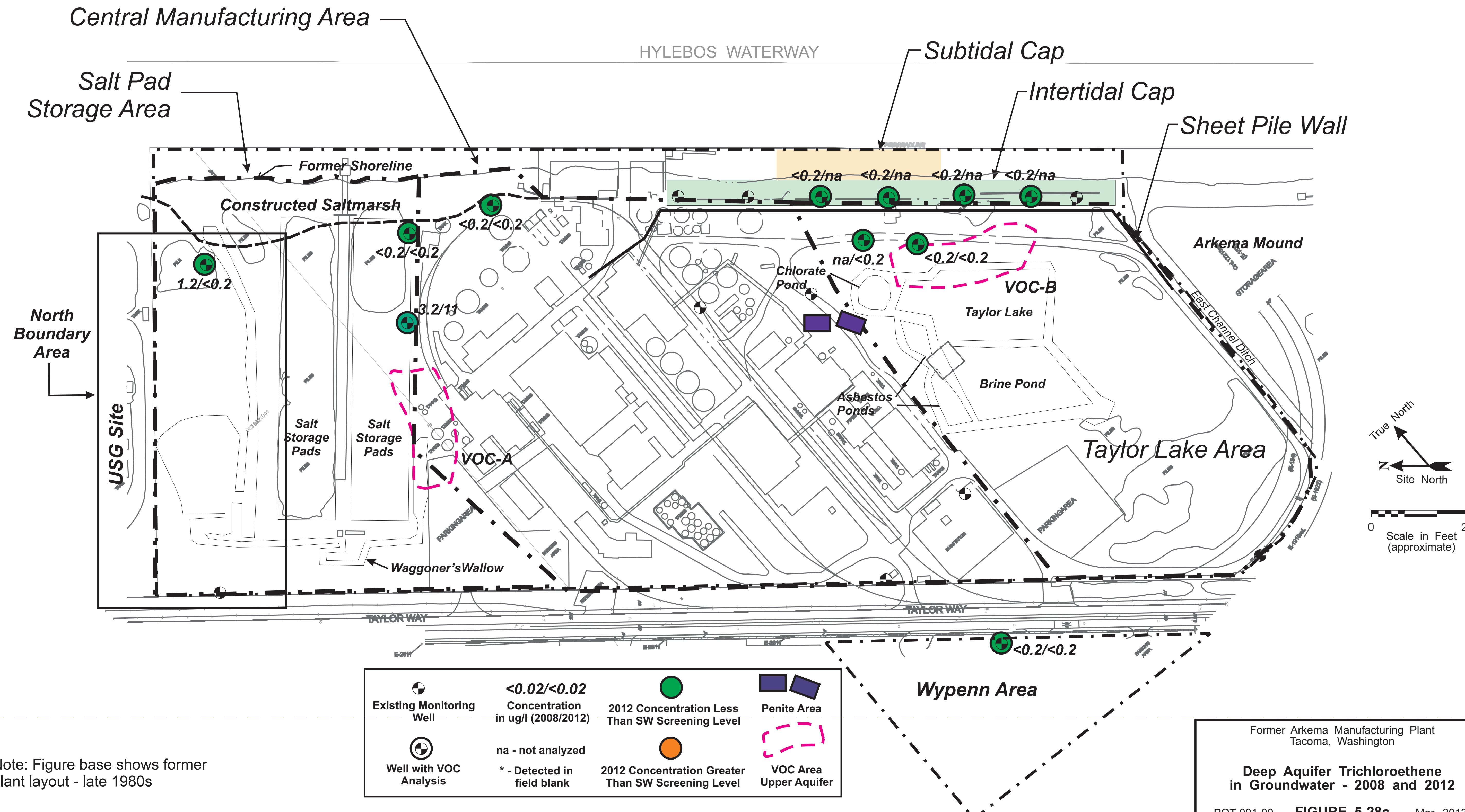
Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Trichloroethene in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-28b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Surface Water Screening Level - 13 ug/l



Note: Figure base shows former plant layout - late 1980s

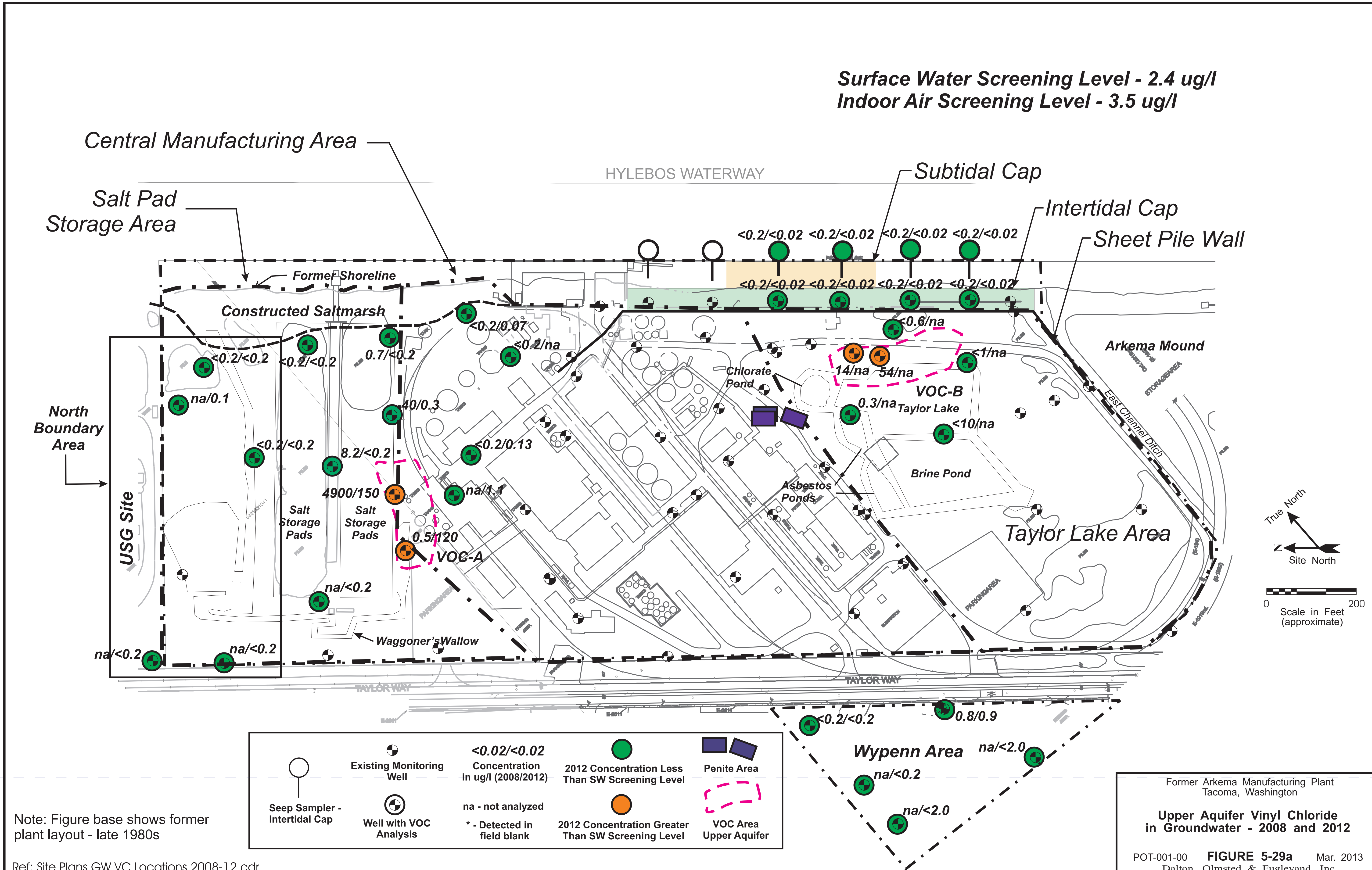
Ref: Site Plans - GW TCE Locations 2008-12.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

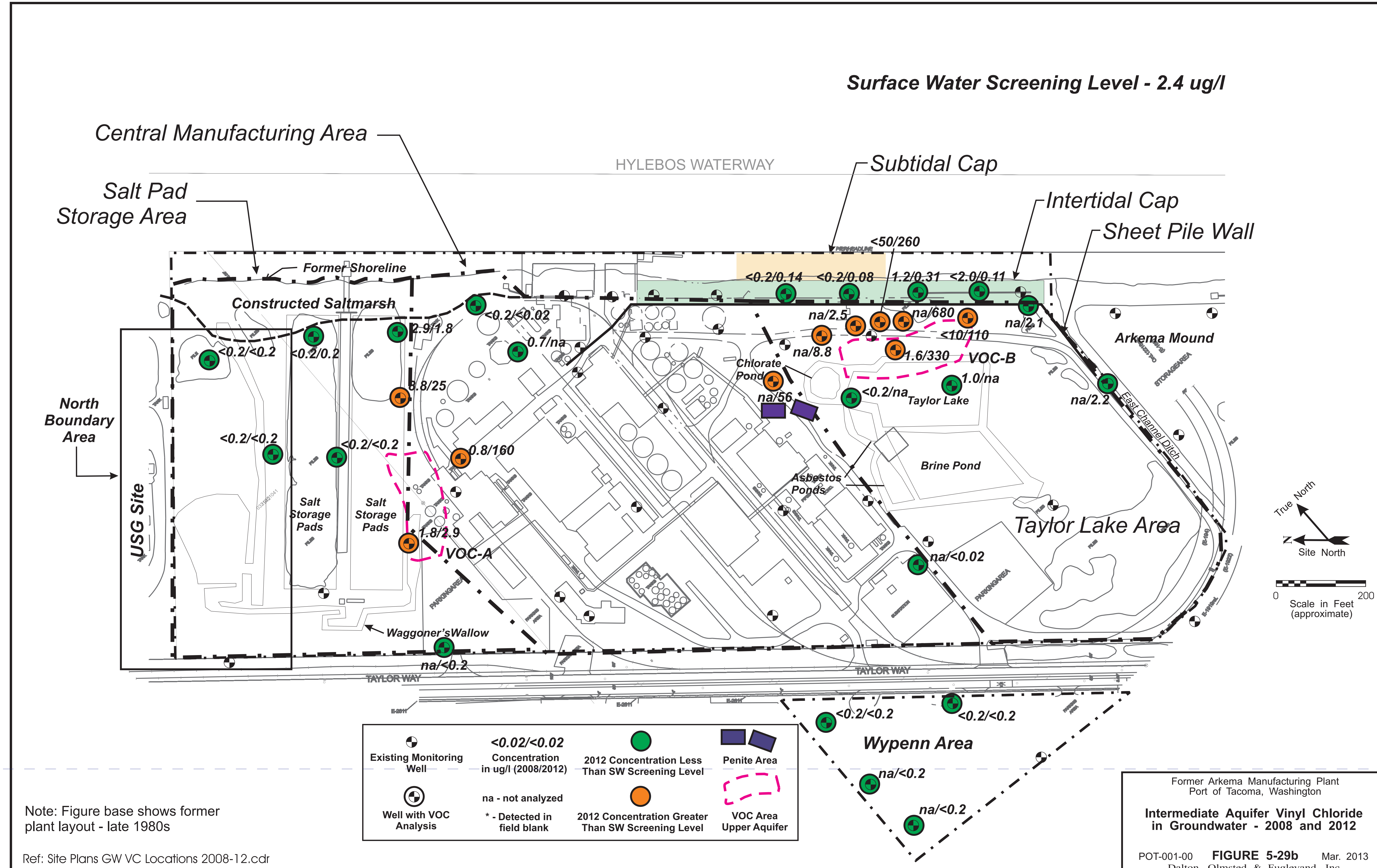
Deep Aquifer Trichloroethene in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-28c** Mar. 2013

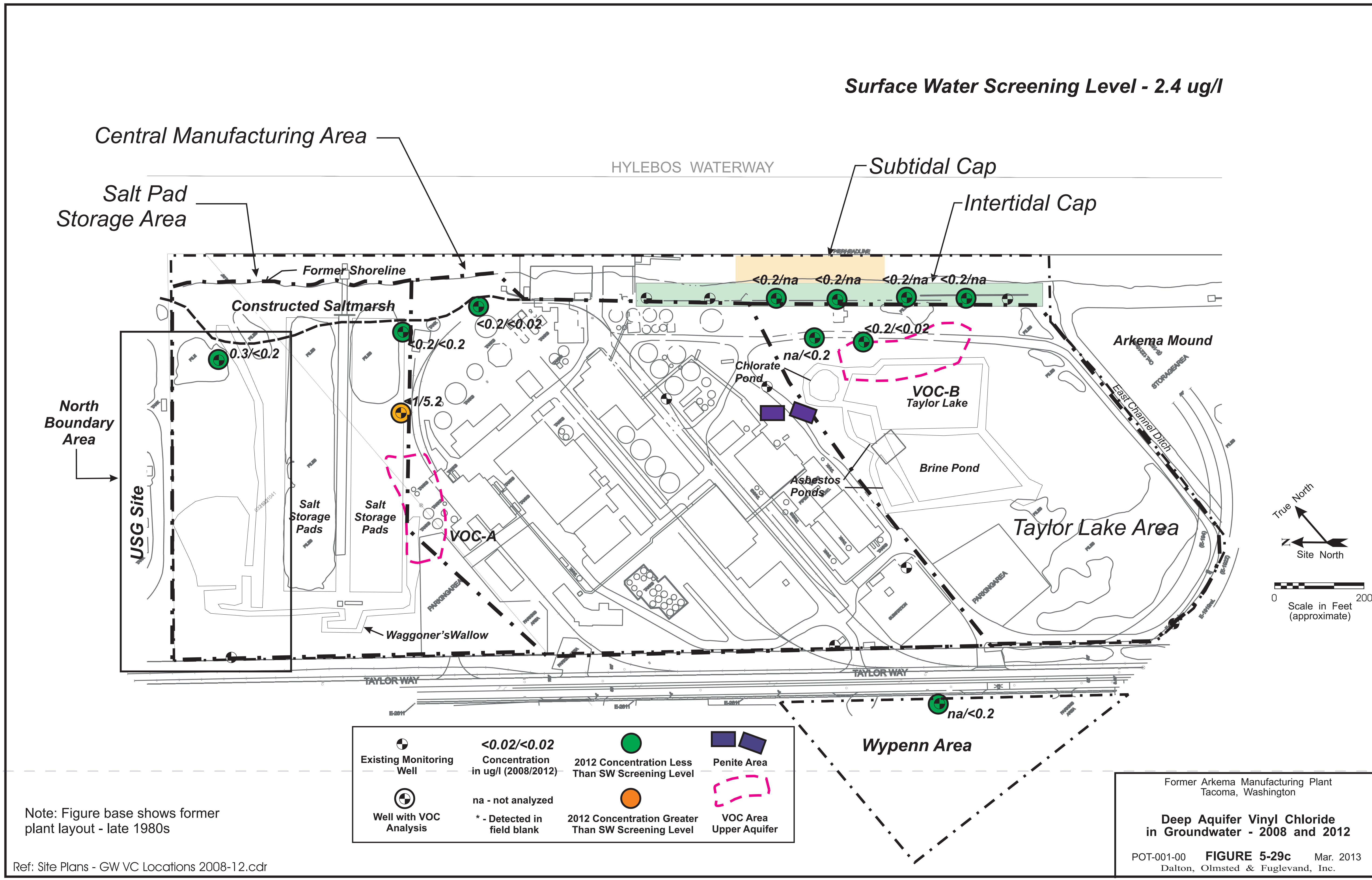
Dalton, Olmsted & Fuglevand, Inc.



Surface Water Screening Level - 2.4 ug/l
Indoor Air Screening Level - 3.5 ug/l
Central Manufacturing Area
Salt Pad Storage Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Former Shoreline
Constructed Saltmarsh
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
Waggoner's Wallow
VOC-A
VOC-B
Chlorate Pond
Taylor Lake
Asbestos Ponds
Brine Pond
Arkema Mound
East Channel Ditch
Taylor Lake Area
TAYLOR WAY
Wypenn Area
<0.2/<0.02
<0.2/<0.02
<0.2/<0.02
<0.2/<0.02
<0.2/<0.02
<0.2/<0.02
<0.2/<0.02
<0.2/<0.02
<0.2/0.07
<0.2/na
<0.2/<0.2
<0.2/<0.2
0.7/<0.2
na/0.1
40/0.3
<0.2/<0.2
8.2/<0.2
<0.2/0.13
4900/150
na/1.1
0.5/120
na/<0.2
na/<0.2
na/<0.2
<0.6/na
14/na
54/na
<1/na
0.3/na
<10/na
<0.2/<0.2
0.8/0.9
na/<2.0
na/<0.2
na/<2.0
True North
Site North
0
200
Scale in Feet (approximate)
Seep Sampler - Intertidal Cap
Existing Monitoring Well
Well with VOC Analysis
<0.02/<0.02
Concentration in ug/l (2008/2012)
na - not analyzed
* - Detected in field blank
2012 Concentration Less Than SW Screening Level
2012 Concentration Greater Than SW Screening Level
Penite Area
VOC Area Upper Aquifer
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW VC Locations 2008-12.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer Vinyl Chloride in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-29a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Surface Water Screening Level - 2.4 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
<50/260
<0.2/0.14
<0.2/0.08
1.2/0.31
<2.0/0.11
na/2.5
na/680
na/2.1
<10/110
na/8.8
1.6/330
VOC-B
Arkema Mound
Chlorate Pond
na/56
<0.2/na
1.0/na
Taylor Lake
na/2.2
East Channel Ditch
<0.2/<0.02
2.9/1.8
0.7/na
<0.2/<0.2
<0.2/0.2
8.8/25
North Boundary Area
<0.2/<0.2
<0.2/<0.2
0.8/160
Asbestos Ponds
Brine Pond
USG Site
Salt Storage Pads
Salt Storage Pads
1.8/2.9
VOC-A
Taylor Lake Area
na/<0.02
True North
Site North
0
200
Scale in Feet (approximate)
Waggoner'sWallow
na/<0.2
TAYLOR WAY
TAYLOR WAY
<0.2/<0.2
<0.2/<0.2
Wypenn Area
na/<0.2
na/<0.2
Existing Monitoring Well
<0.02/<0.02 Concentration in ug/l (2008/2012)
2012 Concentration Less Than SW Screening Level
Penite Area
Well with VOC Analysis
na - not analyzed
* - Detected in field blank
2012 Concentration Greater Than SW Screening Level
VOC Area Upper Aquifer
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW VC Locations 2008-12.cdr
Former Arkema Manufacturing Plant
Port of Tacoma, Washington
Intermediate Aquifer Vinyl Chloride in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-29b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Note: Figure base shows former plant layout - late 1980s

Ref: Site Plans - GW VC Locations 2008-12.cdr

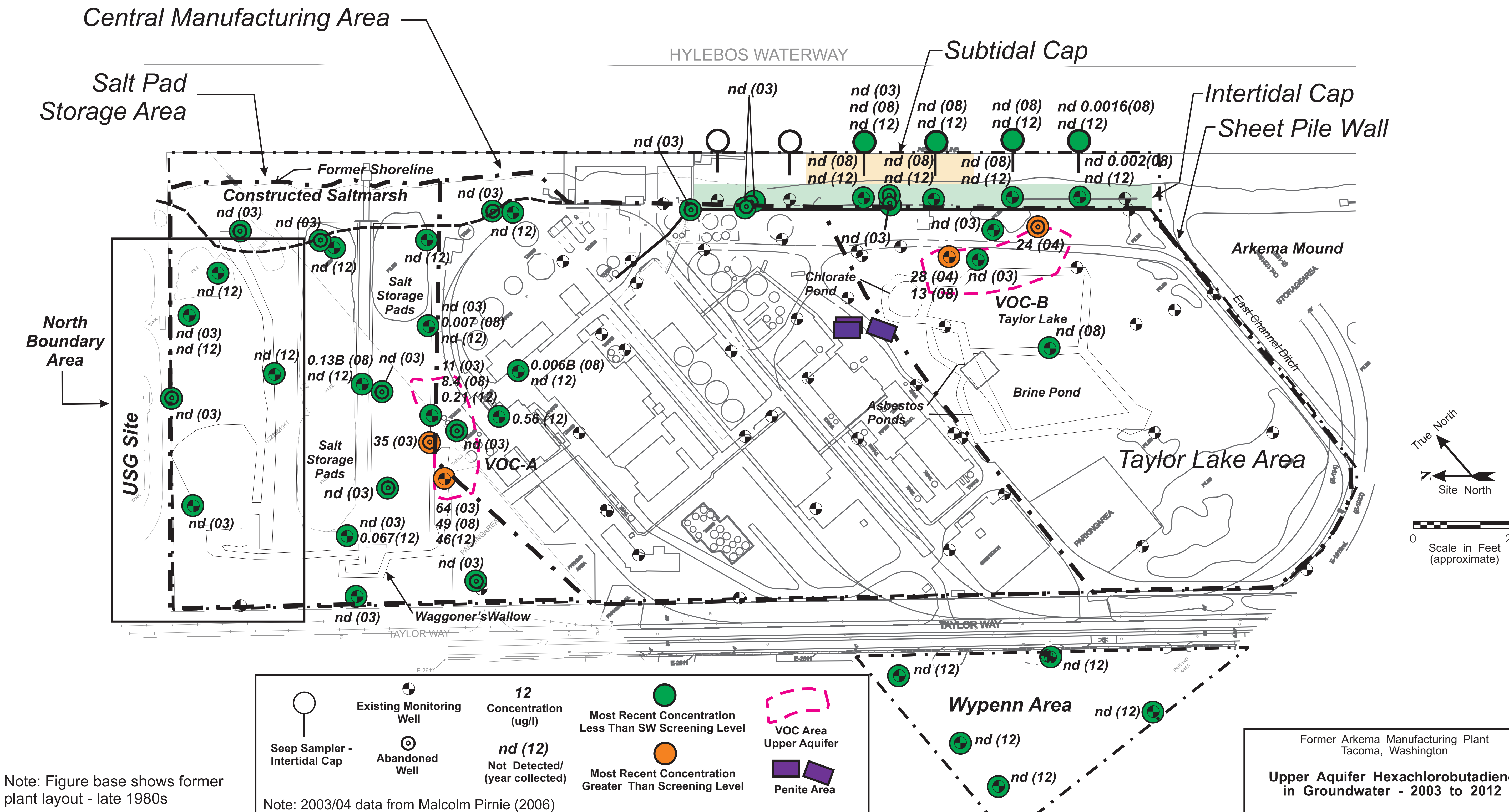
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Vinyl Chloride in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-29c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Surface Water Screening Level - 18 ug/l
Indoor Air Screening Level - 8.1 ug/l
[Reporting limits were less than SL - 2003 (RL= 0.2 to 10 ug/l); 2008 (RL=0.0008 ug/l); 2012 (RL=0.05 to 0.0008 ug/l)]



Note: Figure base shows former plant layout - late 1980s

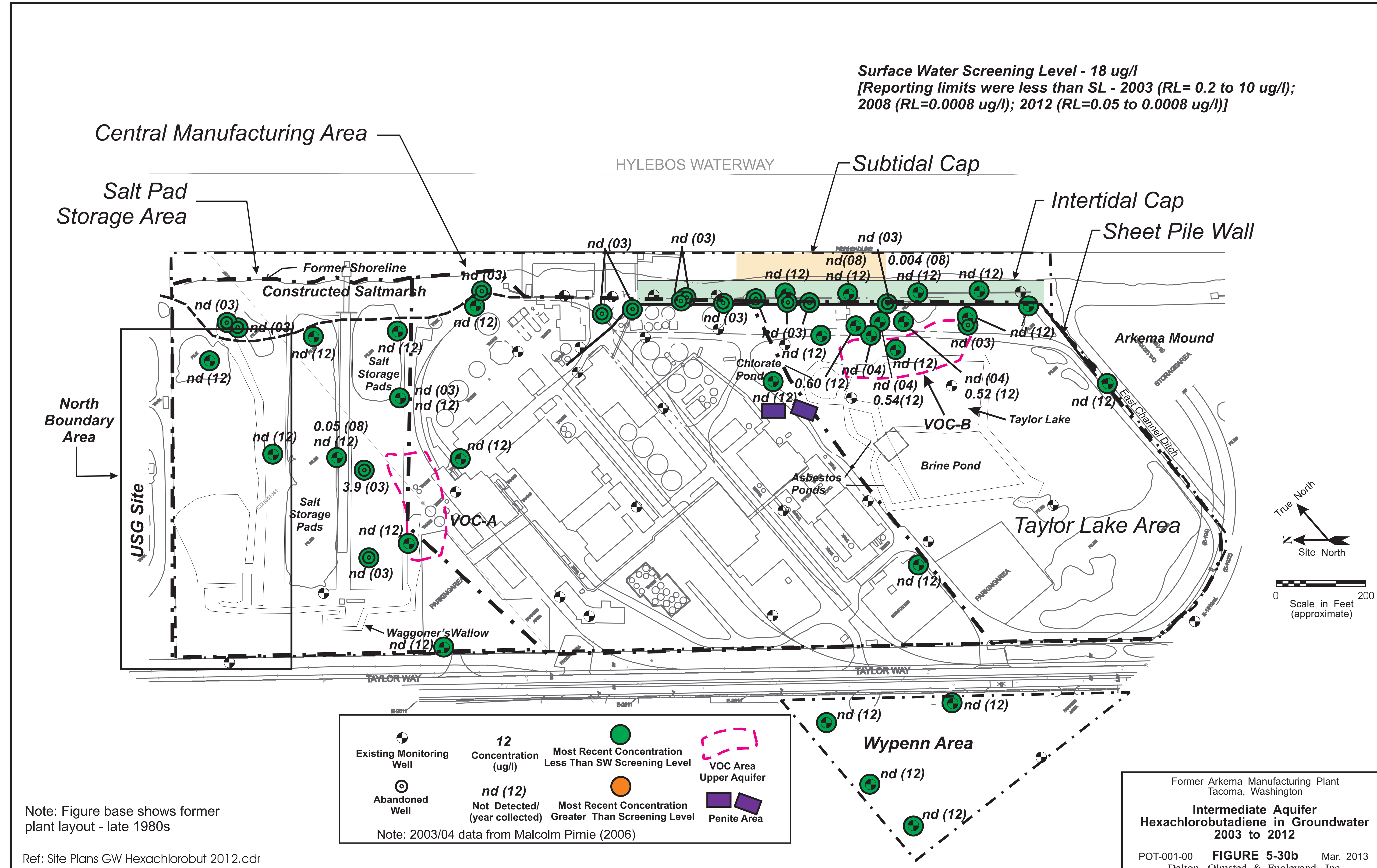
Ref: Site Plans GW Hexachlorobut 2012.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer Hexachlorobutadiene in Groundwater - 2003 to 2012

POT-001-00 **FIGURE 5-30a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

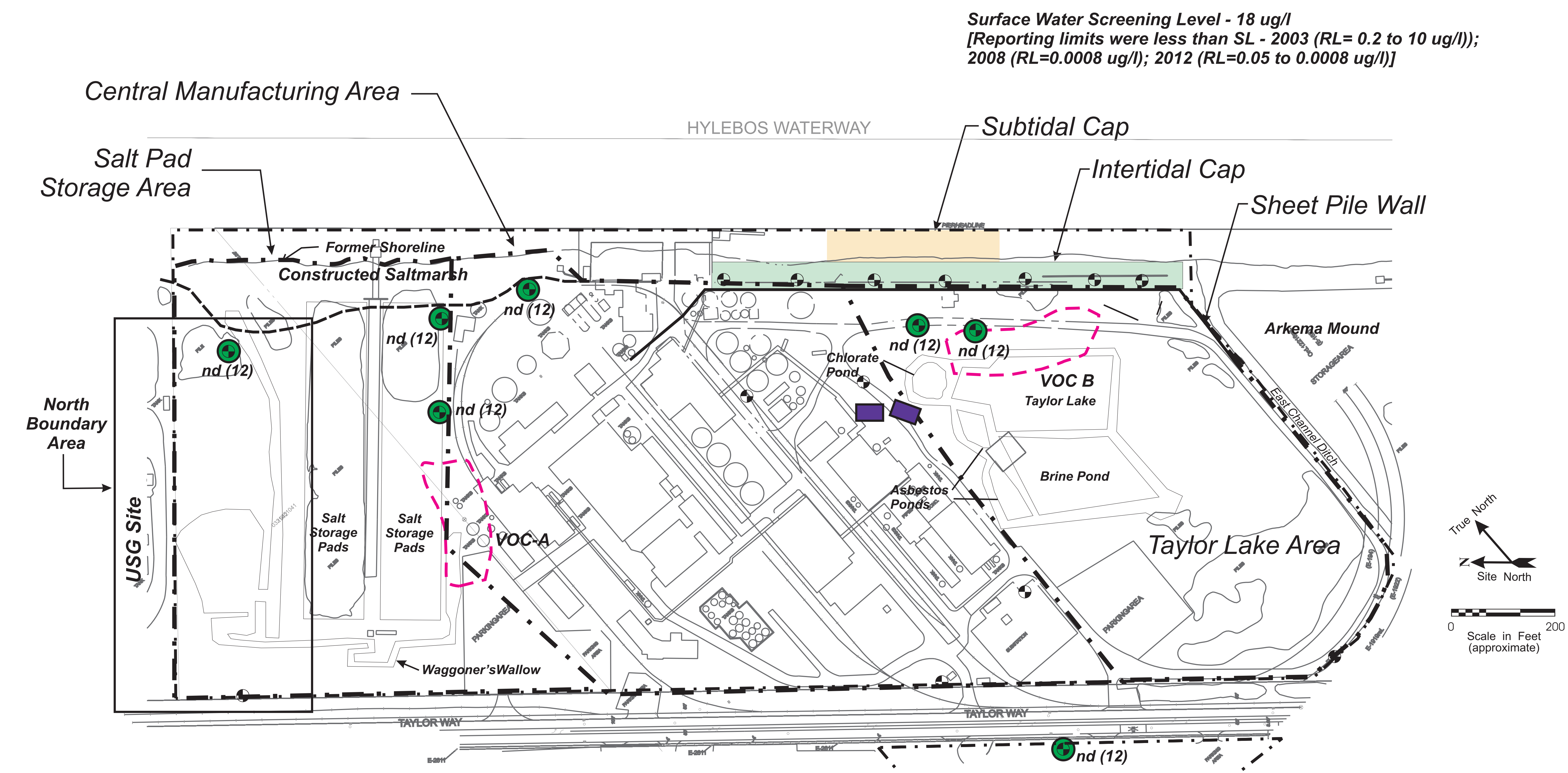


Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Hexachlorobutadiene in Groundwater 2003 to 2012

POT-001-00 **FIGURE 5-30b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Existing Monitoring Well	12 Concentration (ug/l)	Most Recent Concentration Less Than SW Screening Level	VOC Area Upper Aquifer
Abandoned Well	nd (12) Not Detected/ (year collected)	Most Recent Concentration Greater Than Screening Level	Penite Area

Note: Figure base shows former plant layout - late 1980s

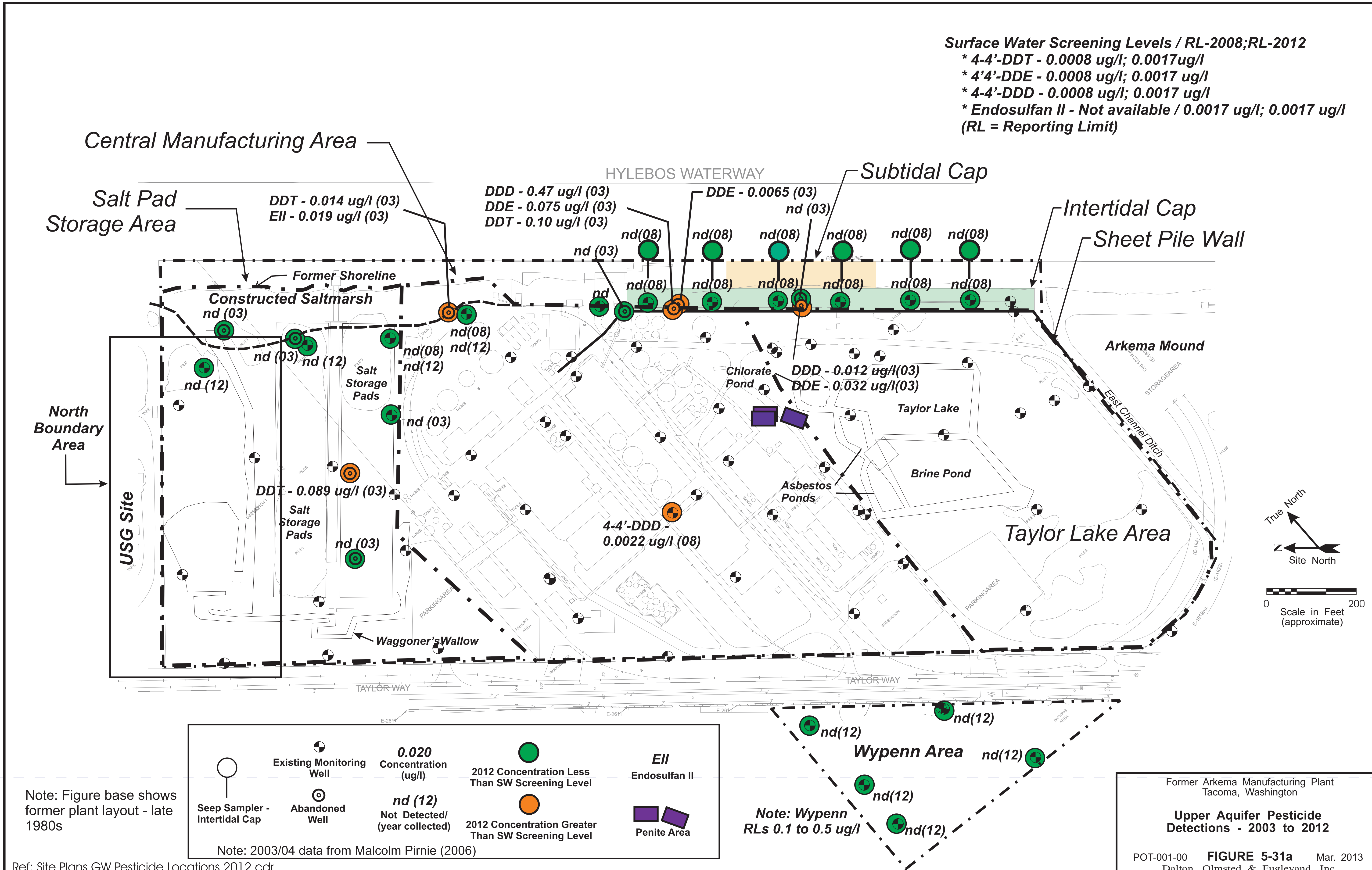
Ref: Site Plans GW PCE Locations 12-08 a.cdr

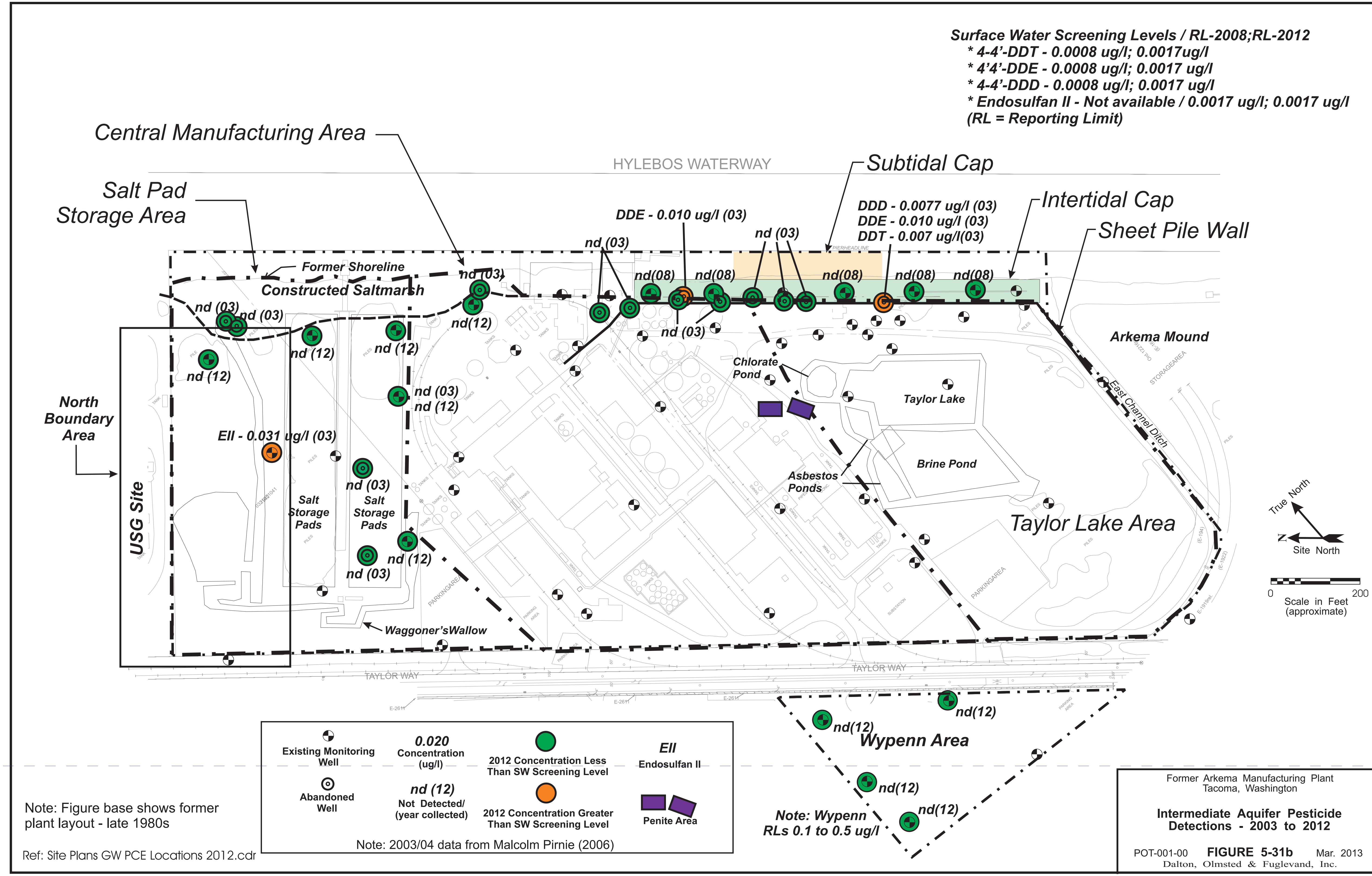
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer
Hexachlorobutadiene in Groundwater
2003 to 2012

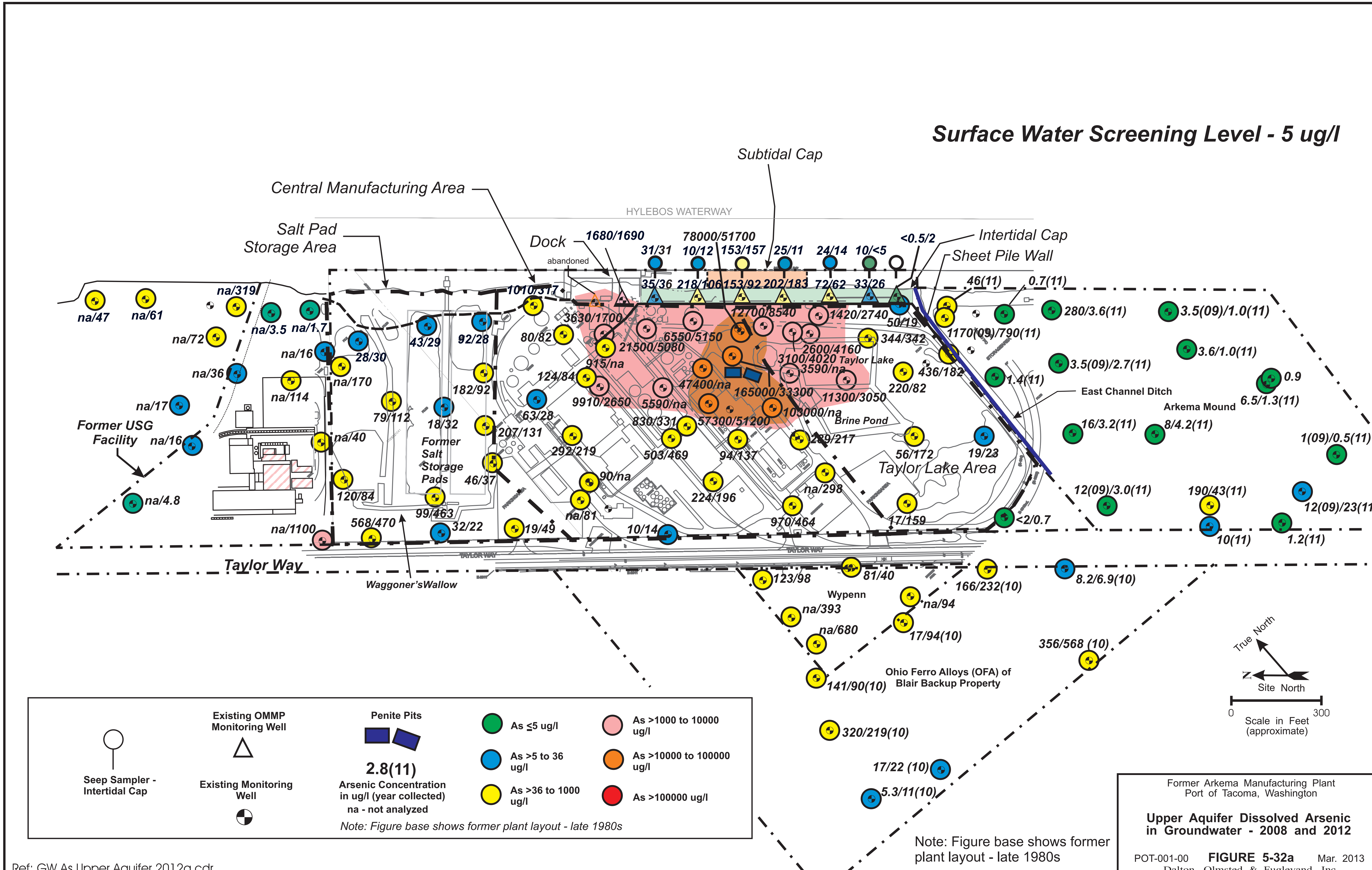
POT-001-00 **FIGURE 5-30c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

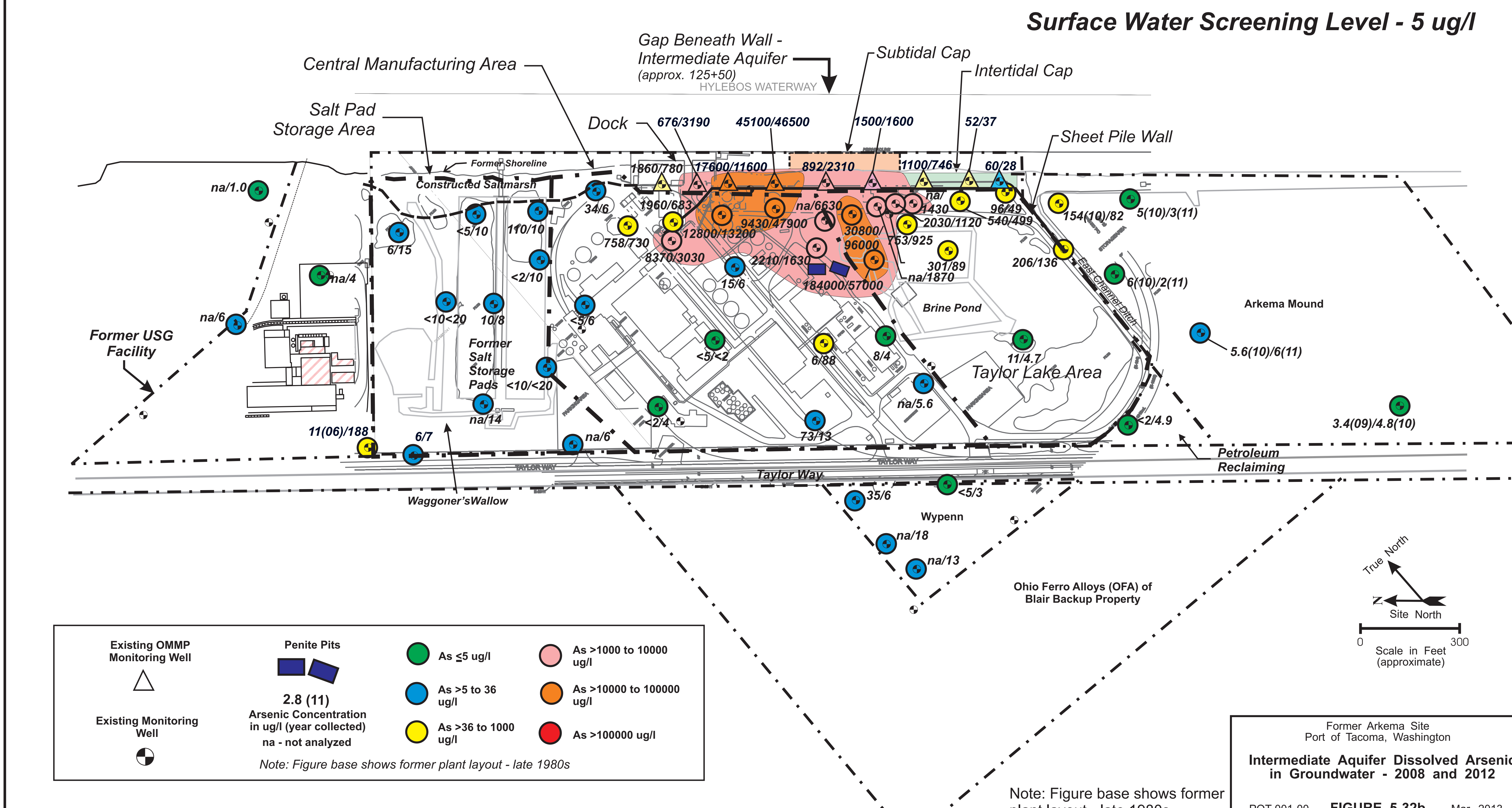

Surface Water Screening Levels / RL-2008;RL-2012
* 4-4'-DDT - 0.0008 ug/l; 0.0017ug/l
* 4'4'-DDE - 0.0008 ug/l; 0.0017 ug/l
* 4-4'-DDD - 0.0008 ug/l; 0.0017 ug/l
* Endosulfan II - Not available / 0.0017 ug/l; 0.0017 ug/l
(RL = Reporting Limit)
Central Manufacturing Area
Salt Pad Storage Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
DDT - 0.014 ug/l (03)
EII - 0.019 ug/l (03)
DDD - 0.47 ug/l (03)
DDE - 0.075 ug/l (03)
DDT - 0.10 ug/l (03)
DDE - 0.0065 (03)
nd (03)
nd(08)
Former Shoreline
Constructed Saltmarsh
nd (12)
nd(12)
Salt Storage Pads
North Boundary Area
USG Site
DDT - 0.089 ug/l (03)
Waggoner's Wallow
4-4'-DDD - 0.0022 ug/l (08)
Chlorate Pond
DDD - 0.012 ug/l(03)
DDE - 0.032 ug/l(03)
Taylor Lake
Brine Pond
Asbestos Ponds
Arkema Mound
East Channel Ditch
Taylor Lake Area
True North
Site North
0
200
Scale in Feet (approximate)
TAYLOR WAY
Wypenn Area
Note: Wypenn RLs 0.1 to 0.5 ug/l
Note: Figure base shows former plant layout - late 1980s
Seep Sampler - Intertidal Cap
Existing Monitoring Well
Abandoned Well
0.020 Concentration (ug/l)
nd (12) Not Detected/ (year collected)
2012 Concentration Less Than SW Screening Level
2012 Concentration Greater Than SW Screening Level
EII Endosulfan II
Penite Area
Note: 2003/04 data from Malcolm Pirnie (2006)
Ref: Site Plans GW Pesticide Locations 2012.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer Pesticide Detections - 2003 to 2012
POT-001-00
FIGURE 5-31a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Surface Water Screening Levels / RL-2008;RL-2012
* 4-4'-DDT - 0.0008 ug/l; 0.0017ug/l
* 4'4'-DDE - 0.0008 ug/l; 0.0017 ug/l
* 4-4'-DDD - 0.0008 ug/l; 0.0017 ug/l
* Endosulfan II - Not available / 0.0017 ug/l; 0.0017 ug/l
(RL = Reporting Limit)
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Salt Pad Storage Area
Intertidal Cap
Sheet Pile Wall
DDE - 0.010 ug/l (03)
DDD - 0.0077 ug/l (03)
DDE - 0.010 ug/l (03)
DDT - 0.007 ug/l(03)
nd (03)
nd (03)
Former Shoreline
Constructed Saltmarsh
nd (03)
nd(08)
nd(08)
nd(08)
nd(08)
nd(08)
nd (03)
nd (03)
nd(12)
nd (03)
nd (12)
nd (12)
nd (12)
Arkema Mound
Chlorate Pond
Taylor Lake
nd (03)
nd (12)
North Boundary Area
EII - 0.031 ug/l (03)
East Channel Ditch
Brine Pond
Asbestos Ponds
nd (03)
USG Site
Salt Storage Pads
Salt Storage Pads
Taylor Lake Area
True North
Site North
nd (12)
nd (03)
0
200
Scale in Feet (approximate)
Waggoner'sWallow
TAYLOR WAY
TAYLOR WAY
nd(12)
nd(12)
Wypenn Area
Existing Monitoring Well
0.020 Concentration (ug/l)
2012 Concentration Less Than SW Screening Level
EII Endosulfan II
Abandoned Well
nd (12) Not Detected/ (year collected)
2012 Concentration Greater Than SW Screening Level
Penite Area
Note: 2003/04 data from Malcolm Pirnie (2006)
nd(12)
nd(12)
Note: Wypenn RLs 0.1 to 0.5 ug/l
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW PCE Locations 2012.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Intermediate Aquifer Pesticide Detections - 2003 to 2012
POT-001-00
FIGURE 5-31b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Surface Water Screening Level - 5 ug/l
Subtidal Cap
Central Manufacturing Area
HYLEBOS WATERWAY
Salt Pad
Storage Area
Dock
abandoned
Intertidal Cap
Sheet Pile Wall
Former USG
Facility
Former
Salt
Storage
Pads
Taylor Lake
Brine Pond
Taylor Lake Area
East Channel Ditch
Arkema Mound
Taylor Way
Waggoner'sWallow
Wypenn
Ohio Ferro Alloys (OFA) of
Blair Backup Property
1680/1690
78000/51700
31/31
10/12
153/157
25/11
24/14
10/<5
<0.5/2
35/36
218/106
153/92
202/183
72/62
33/26
46(11)
0.7(11)
1010/317
na/319
na/47
na/61
na/3.5
na/1.7
na/72
na/16
28/30
43/29
92/28
80/82
3630/1700
21500/5080
6550/5150
12700/8540
1420/2740
50/19
344/342
2600/4160
3100/4020
3590/na
915/na
124/84
47400/na
165000/33300
11300/3050
103000/na
436/182
220/82
1170(09)/790(11)
280/3.6(11)
3.5(09)/1.0(11)
3.6/1.0(11)
3.5(09)/2.7(11)
1.4(11)
0.9
6.5/1.3(11)
na/36
na/114
na/170
na/17
182/92
79/112
18/32
63/28
9910/2650
5590/na
830/331
57300/51200
na/16
na/40
207/131
292/219
503/469
94/137
289/217
56/172
19/23
16/3.2(11)
8/4.2(11)
1(09)/0.5(11)
na/4.8
120/84
46/37
90/na
224/196
na/298
12(09)/3.0(11)
190/43(11)
12(09)/23(11)
99/463
na/81
970/464
17/159
<2/0.7
na/1100
568/470
32/22
19/49
10/14
10(11)
1.2(11)
123/98
81/40
166/232(10)
8.2/6.9(10)
na/393
na/94
na/680
17/94(10)
356/568 (10)
141/90(10)
320/219(10)
17/22 (10)
5.3/11(10)
True North
Site North
0
300
Scale in Feet
(approximate)
Seep Sampler -
Intertidal Cap
Existing OMMP
Monitoring Well
Existing Monitoring
Well
Penite Pits
2.8(11)
Arsenic Concentration
in ug/l (year collected)
na - not analyzed
As ≤5 ug/l
As >5 to 36
ug/l
As >36 to 1000
ug/l
As >1000 to 10000
ug/l
As >10000 to 100000
ug/l
As >100000 ug/l
Note: Figure base shows former plant layout - late 1980s
Note: Figure base shows former
plant layout - late 1980s
Former Arkema Manufacturing Plant
Port of Tacoma, Washington
Upper Aquifer Dissolved Arsenic
in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-32a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: GW As Upper Aquifer 2012a.cdr



Note: Figure base shows former plant layout - late 1980s

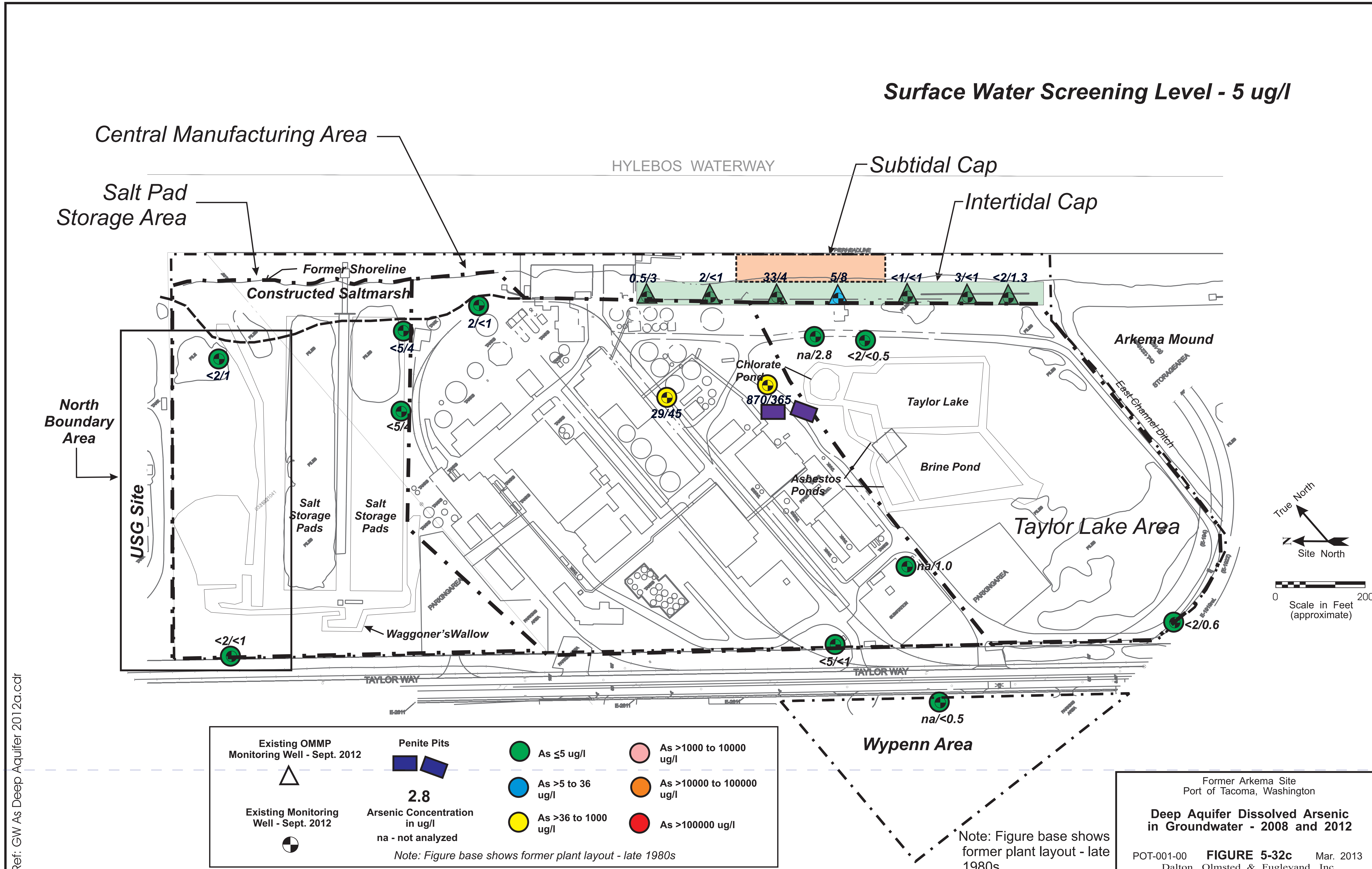
Former Arkema Site
Port of Tacoma, Washington

Intermediate Aquifer Dissolved Arsenic in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-32b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: GW As Interm Aquifer 2012a.cdr

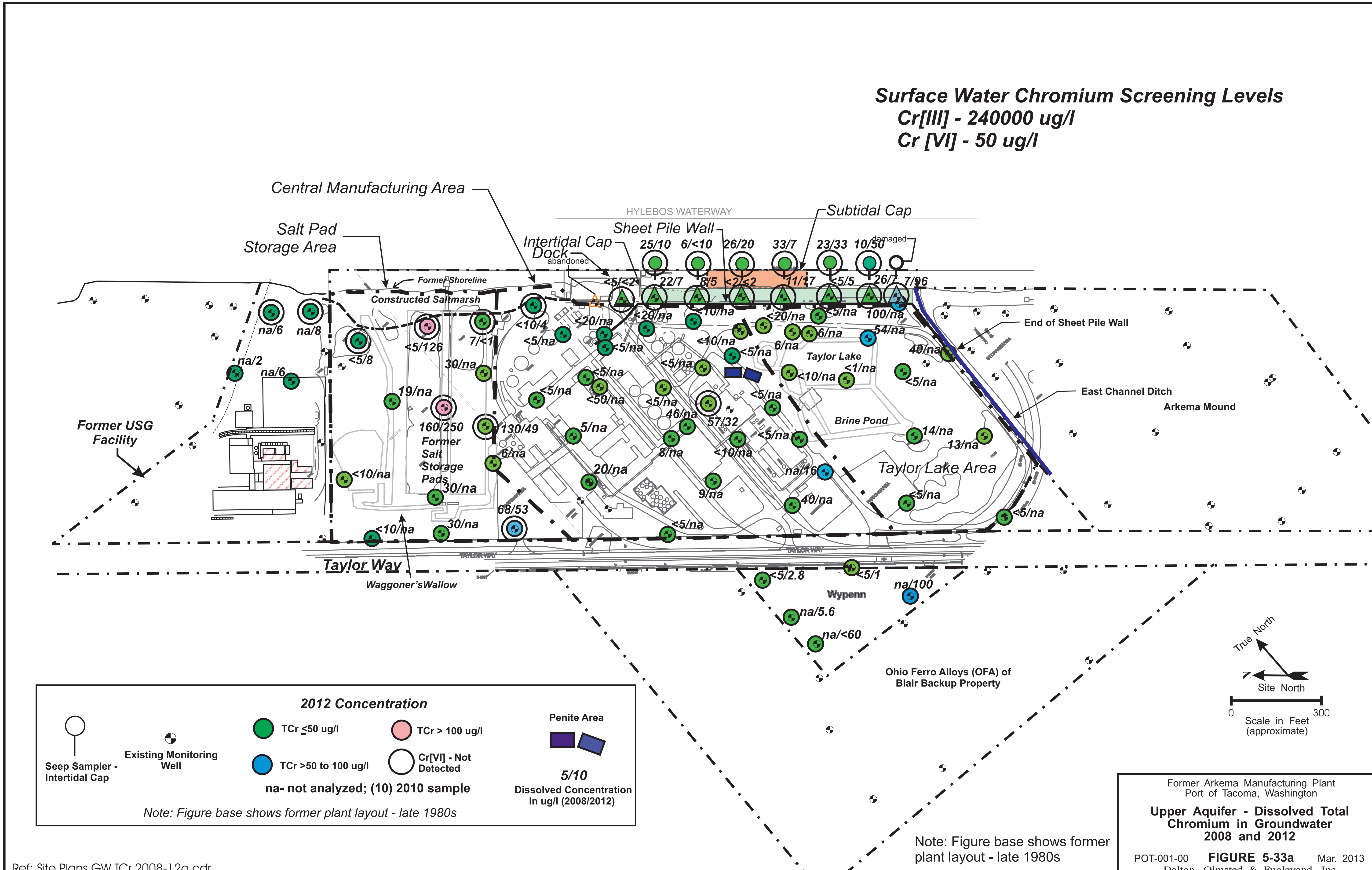


Former Arkema Site
Port of Tacoma, Washington

Deep Aquifer Dissolved Arsenic in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-32c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

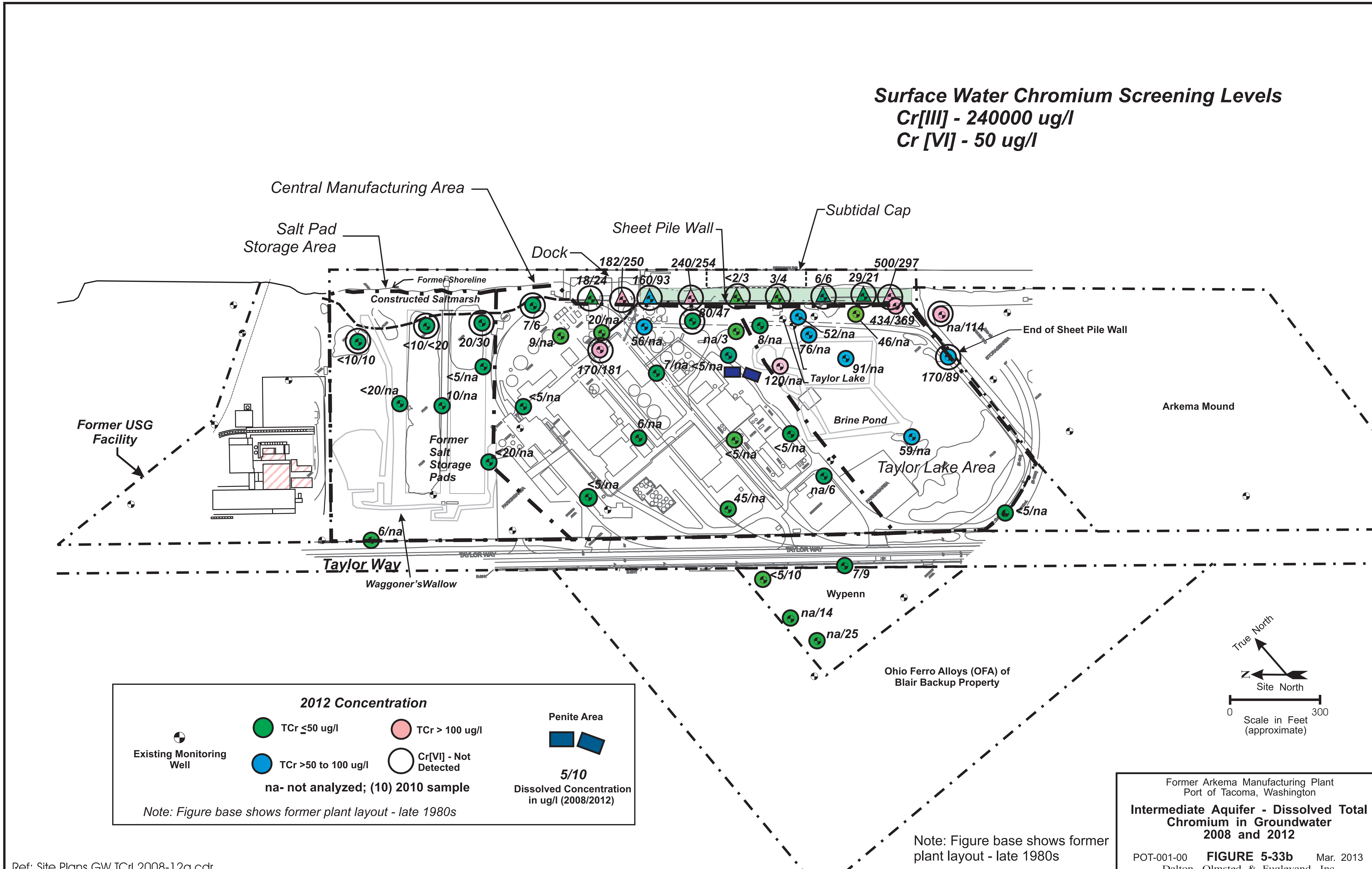


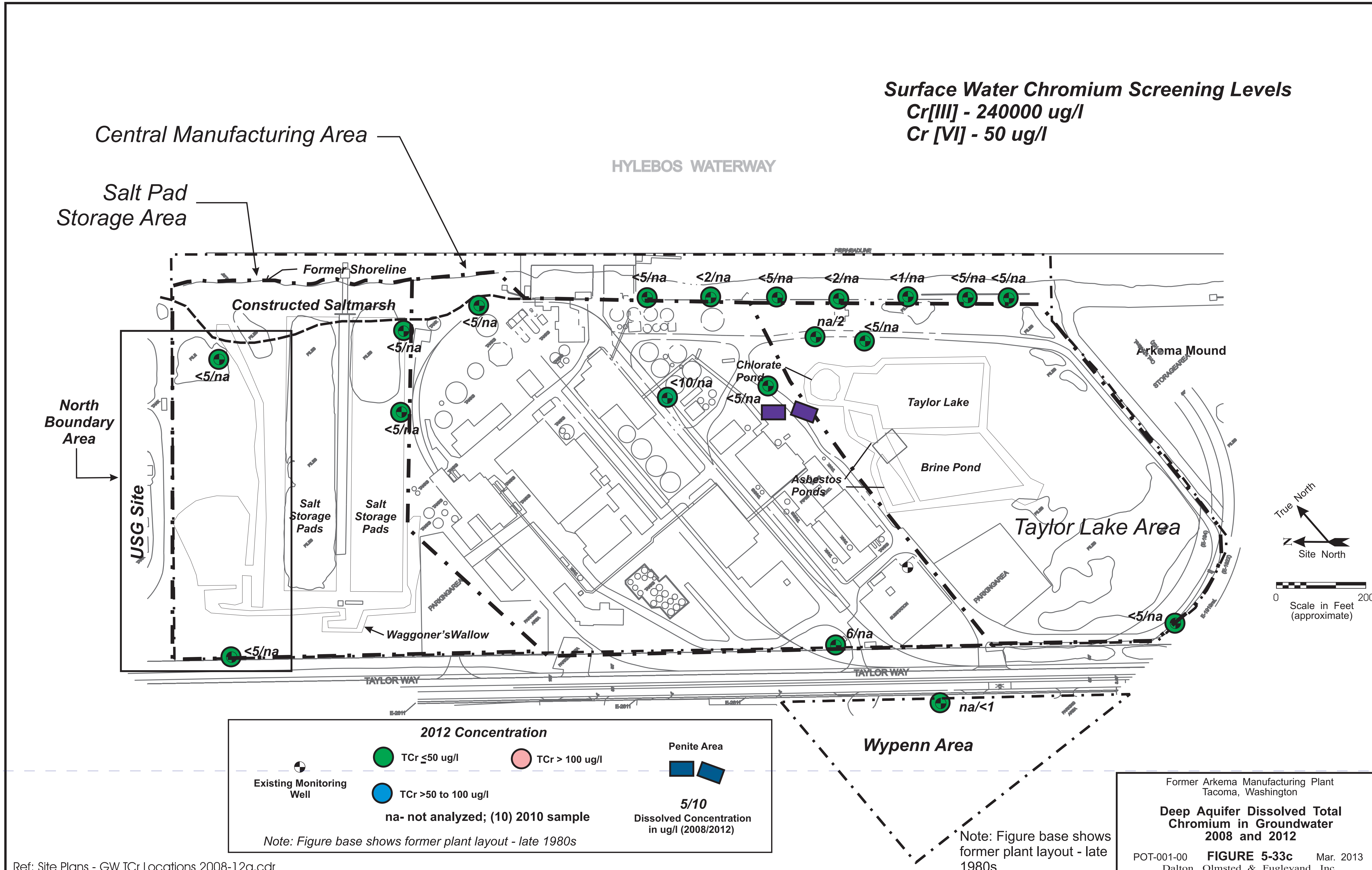
Former Arkema Manufacturing Plant
Port of Tacoma, Washington

Upper Aquifer - Dissolved Total Chromium in Groundwater 2008 and 2012

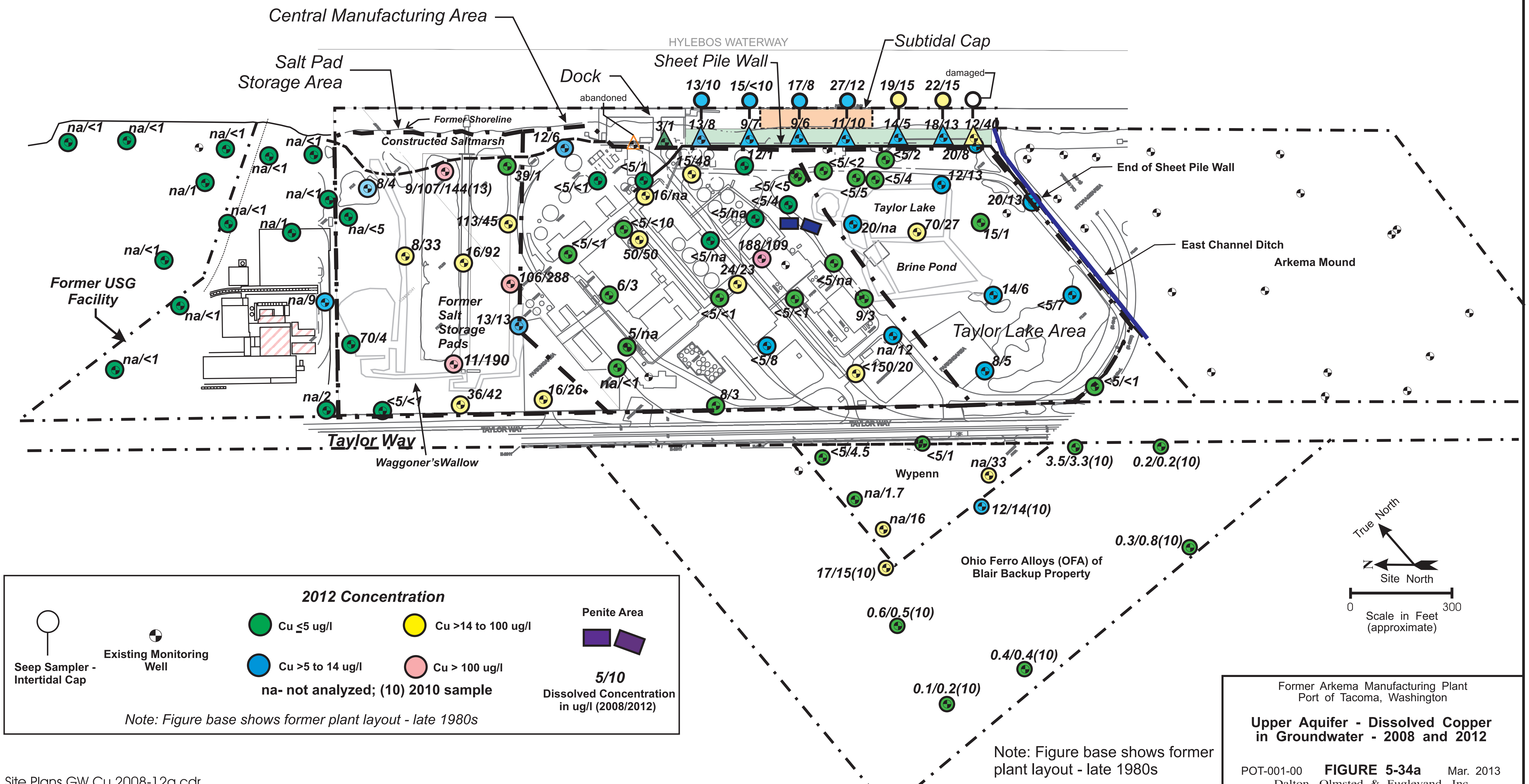
POT-001-00 **FIGURE 5-33a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.


Surface Water Chromium Screening Levels
Cr[III] - 240000 ug/l
Cr [VI] - 50 ug/l
Central Manufacturing Area
Salt Pad Storage Area
Sheet Pile Wall
Subtidal Cap
Dock
Former Shoreline
Constructed Saltmarsh
182/250
240/254
500/297
18/24
160/93
<2/3
3/4
6/6
29/21
7/6
20/na
80/47
434/369
na/114
9/na
56/na
na/3
8/na
52/na
46/na
End of Sheet Pile Wall
<10/10
<10/<20
20/30
170/181
76/na
<5/na
7/na
<5/na
120/na
Taylor Lake
91/na
170/89
10/na
<20/na
<5/na
Arkema Mound
Brine Pond
Former USG Facility
6/na
<5/na
59/na
Former Salt Storage Pads
<20/na
<5/na
Taylor Lake Area
na/6
<5/na
45/na
<5/na
6/na
Taylor Way
Waggoner'sWallow
<5/10
7/9
Wypenn
na/14
na/25
Ohio Ferro Alloys (OFA) of Blair Backup Property
True North
Site North
0
300
Scale in Feet (approximate)
2012 Concentration
Existing Monitoring Well
TCr ≤50 ug/l
TCr >50 to 100 ug/l
TCr > 100 ug/l
Cr[VI] - Not Detected
Penite Area
5/10
Dissolved Concentration in ug/l (2008/2012)
na- not analyzed; (10) 2010 sample
Note: Figure base shows former plant layout - late 1980s
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW TCrI 2008-12a.cdr
Former Arkema Manufacturing Plant
Port of Tacoma, Washington
Intermediate Aquifer - Dissolved Total Chromium in Groundwater 2008 and 2012
POT-001-00
FIGURE 5-33b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.


Surface Water Chromium Screening Levels
Cr[III] - 240000 ug/l
Cr [VI] - 50 ug/l
Central Manufacturing Area
Salt Pad Storage Area
HYLEBOS WATERWAY
Former Shoreline
Constructed Saltmarsh
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
Waggoner'sWallow
Chlorate Pond
Asbestos Ponds
Taylor Lake
Brine Pond
Arkema Mound
Taylor Lake Area
TAYLOR WAY
Wypenn Area
<5/na
<2/na
<5/na
<2/na
<1/na
<5/na
<5/na
na/2
<5/na
<10/na
<5/na
6/na
na/<1
True North
Site North
Scale in Feet (approximate)
0
200
2012 Concentration
Existing Monitoring Well
TCr ≤50 ug/l
TCr >50 to 100 ug/l
TCr > 100 ug/l
Penite Area
5/10
Dissolved Concentration in ug/l (2008/2012)
na- not analyzed; (10) 2010 sample
Note: Figure base shows former plant layout - late 1980s
Note: Figure base shows former plant layout - late 1980s
Former Arkema Manufacturing Plant
Tacoma, Washington
Deep Aquifer Dissolved Total Chromium in Groundwater 2008 and 2012
POT-001-00
FIGURE 5-33c
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Site Plans - GW TCr Locations 2008-12a.cdr

Surface Water Screening Level - 2.4 ug/l



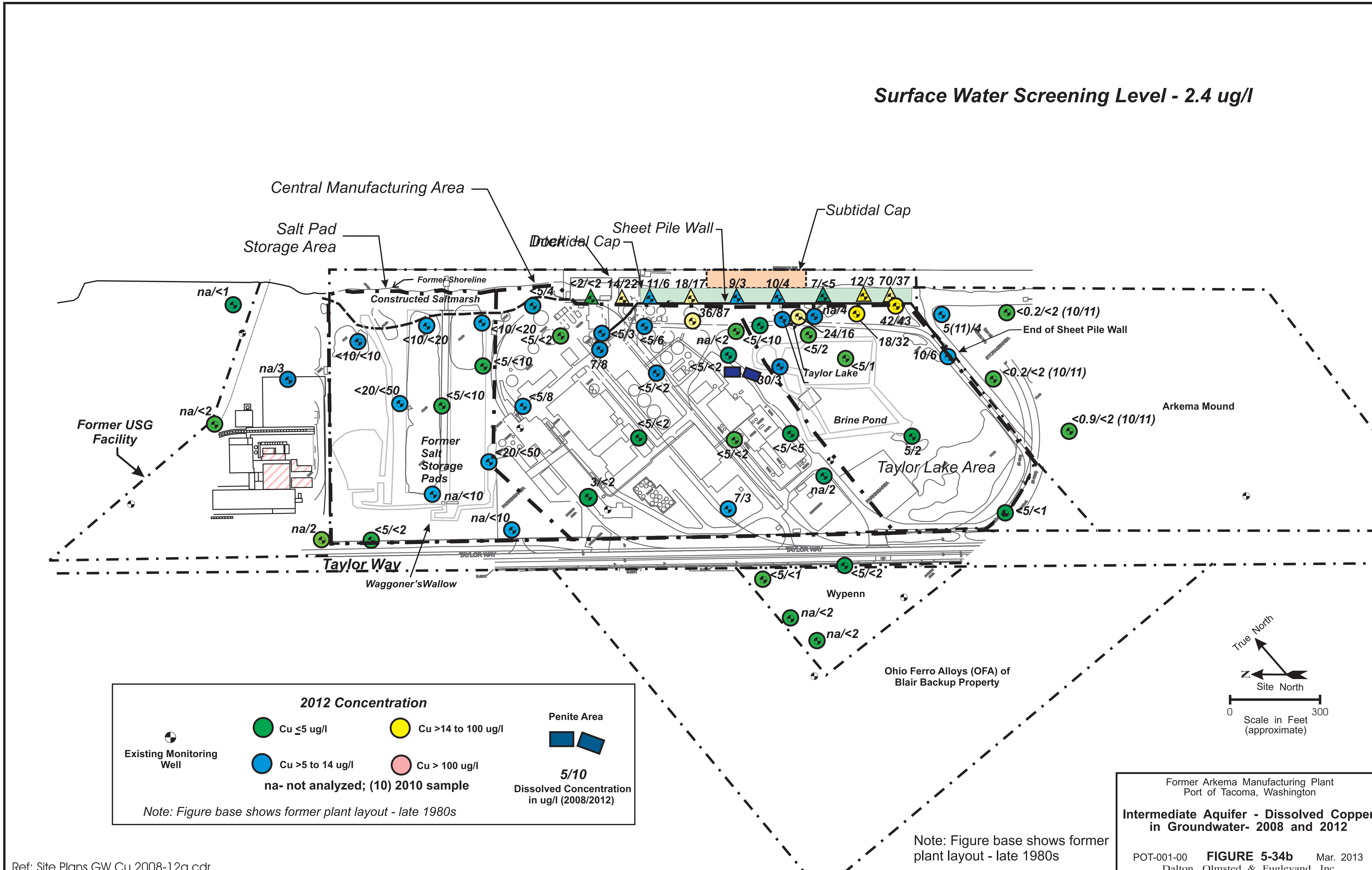
Former Arkema Manufacturing Plant
Port of Tacoma, Washington

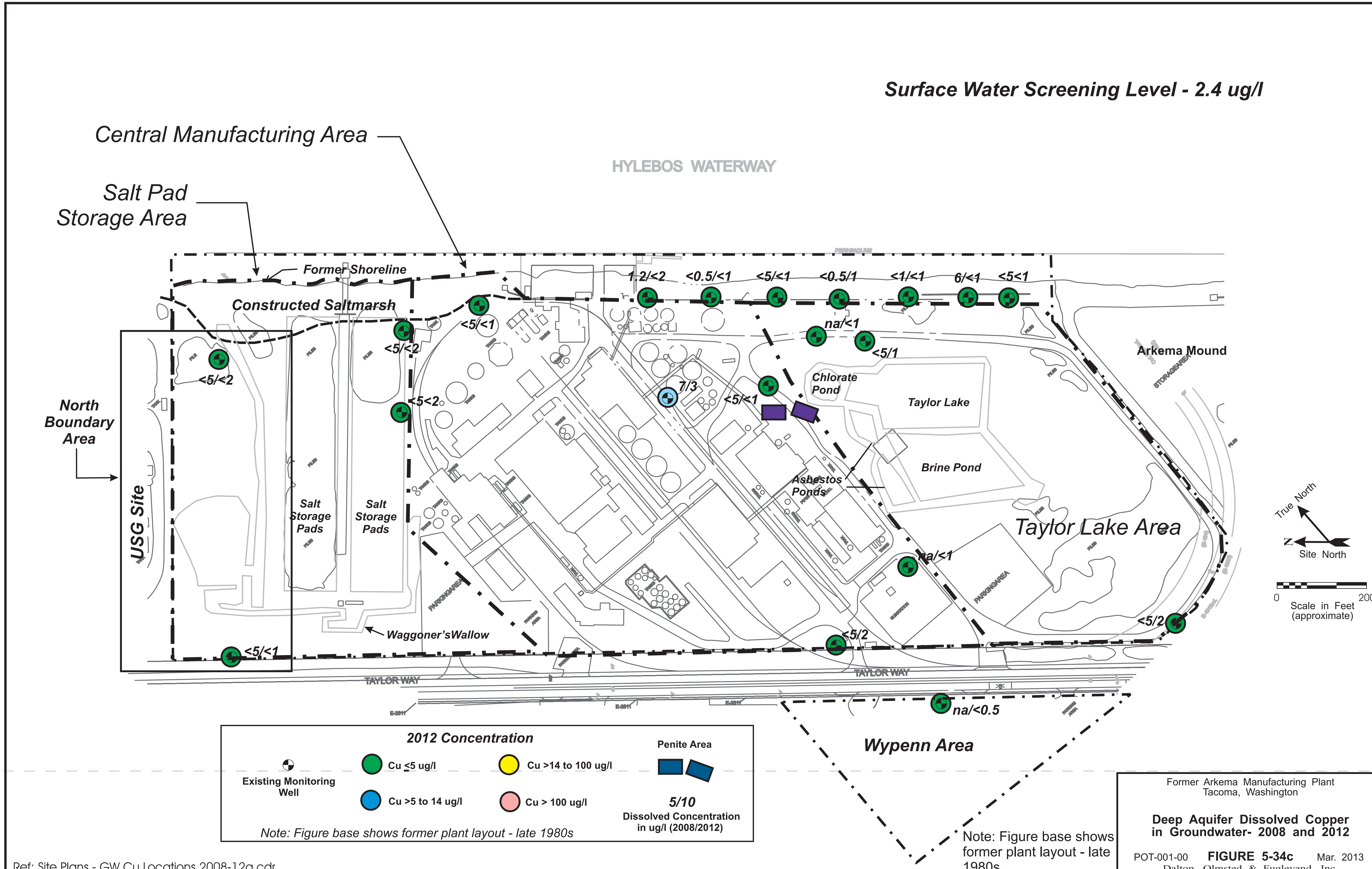
Upper Aquifer - Dissolved Copper in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-34a** Mar. 2013

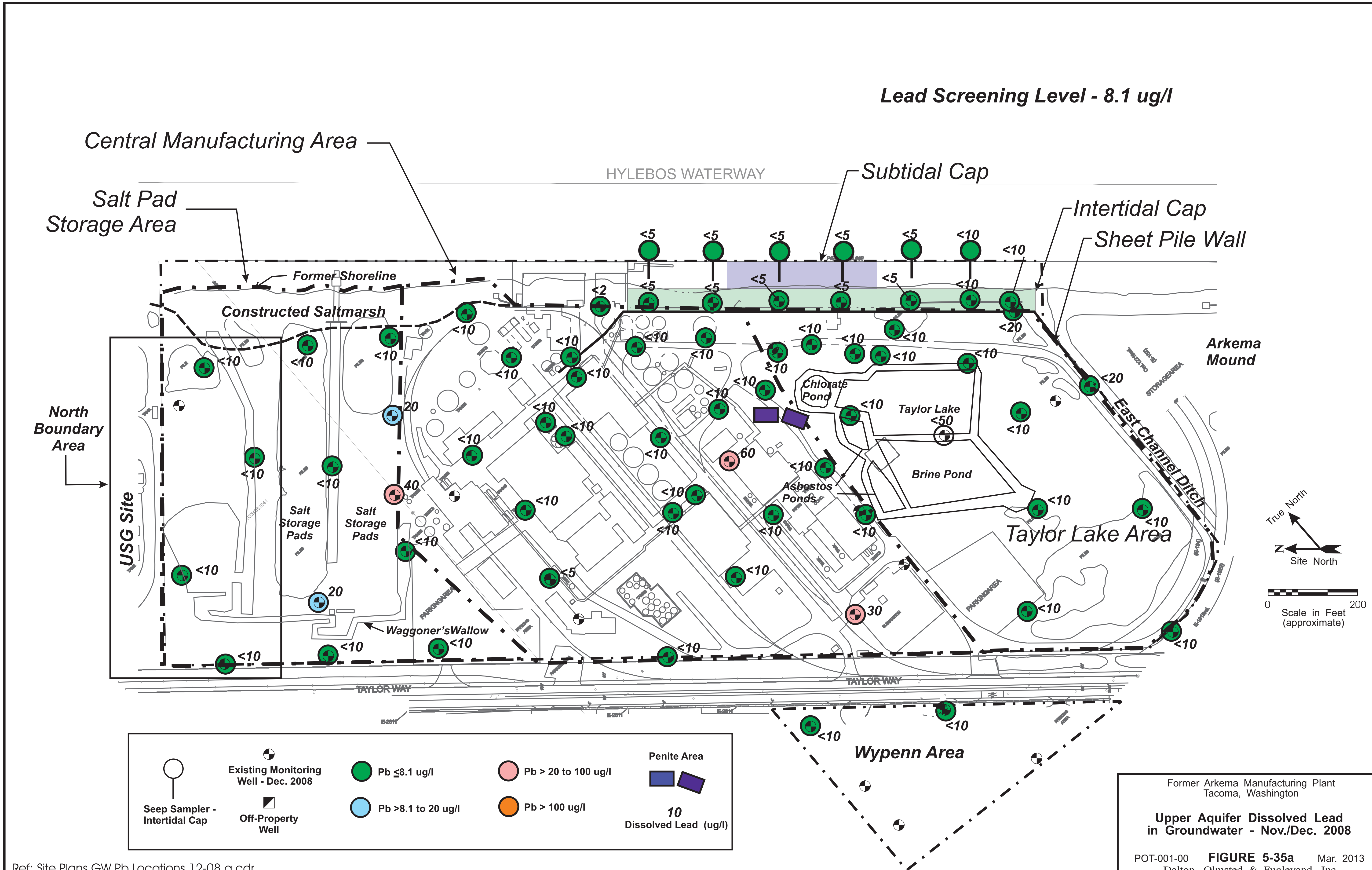
Dalton, Olmsted & Fuglevand, Inc.

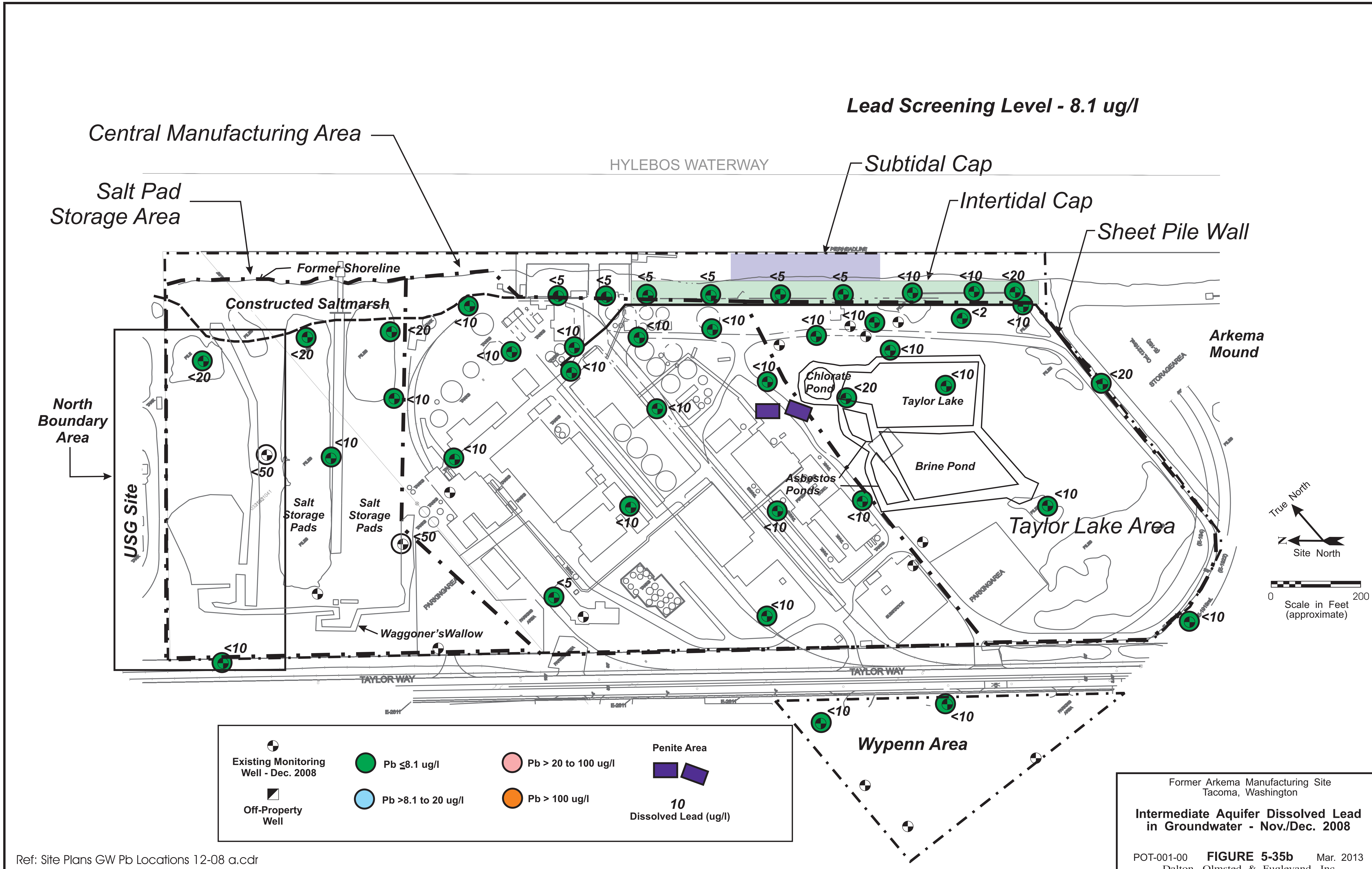
Ref: Site Plans GW Cu 2008-12a.cdr


Surface Water Screening Level - 2.4 ug/l
Central Manufacturing Area
Salt Pad
Storage Area
Dock
Intertidal Cap
Sheet Pile Wall
Subtidal Cap
Former Shoreline
Constructed Saltmarsh
Former USG
Facility
Former
Salt
Storage
Pads
Taylor Way
Waggoner'sWallow
Taylor Lake
Brine Pond
Taylor Lake Area
Arkema Mound
End of Sheet Pile Wall
Wypenn
Ohio Ferro Alloys (OFA) of
Blair Backup Property
na/<1
na/3
na/<2
na/2
<5/<2
<10/<10
<10/<20
<20/<50
<5/<10
na/<10
<5/4
<5/8
<20/<50
3/<2
7/8
<5/3
<5/6
<5/<2
7/3
<2/<2
14/22
11/6
18/17
9/3
10/4
7/<5
12/3
70/37
36/87
na/4
42/43
24/16
18/32
5(11)/4
10/6
<5/1
30/3
<5/<5
na/2
5/2
<5/<1
<0.2/<2 (10/11)
<0.9/<2 (10/11)
True North
Site North
0
300
Scale in Feet
(approximate)
2012 Concentration
Existing Monitoring
Well
Cu <5 ug/l
Cu >5 to 14 ug/l
Cu >14 to 100 ug/l
Cu > 100 ug/l
na- not analyzed; (10) 2010 sample
Penite Area
5/10
Dissolved Concentration
in ug/l (2008/2012)
Note: Figure base shows former plant layout - late 1980s
Note: Figure base shows former
plant layout - late 1980s
Former Arkema Manufacturing Plant
Port of Tacoma, Washington
Intermediate Aquifer - Dissolved Copper
in Groundwater- 2008 and 2012
POT-001-00
FIGURE 5-34b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Site Plans GW Cu 2008-12a.cdr



Surface Water Screening Level - 2.4 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
Waggoner'sWallow
Chlorate Pond
Taylor Lake
Brine Pond
Asbestos Ponds
Arkema Mound
Taylor Lake Area
TAYLOR WAY
TAYLOR WAY
Wypenn Area
1.2/<2
<0.5/<1
<5/<1
<0.5/1
<1/<1
6/<1
<5<1
<5/<1
<5/<2
<5/<2
<5<2
na/<1
<5/1
7/3
<5/<1
na/<1
<5/2
<5/2
<5/<1
na/<0.5
True North
Site North
0
200
Scale in Feet (approximate)
2012 Concentration
Existing Monitoring Well
Cu ≤5 ug/l
Cu >5 to 14 ug/l
Cu >14 to 100 ug/l
Cu > 100 ug/l
Penite Area
5/10
Dissolved Concentration in ug/l (2008/2012)
Note: Figure base shows former plant layout - late 1980s
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans - GW Cu Locations 2008-12a.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Deep Aquifer Dissolved Copper in Groundwater- 2008 and 2012
POT-001-00
FIGURE 5-34c
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.


Lead Screening Level - 8.1 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Salt Pad
Storage Area
Intertidal Cap
Sheet Pile Wall
Former Shoreline
Constructed Saltmarsh
Arkema
Mound
North
Boundary
Area
USG Site
Chlorate
Pond
Taylor Lake
<50
Brine Pond
Asbestos
Ponds
East Channel Ditch
Taylor Lake Area
Salt
Storage
Pads
Salt
Storage
Pads
Waggoner'sWallow
TAYLOR WAY
TAYLOR WAY
Wypenn Area
True North
Site North
0
200
Scale in Feet
(approximate)
Seep Sampler -
Intertidal Cap
Existing Monitoring
Well - Dec. 2008
Off-Property
Well
Pb ≤8.1 ug/l
Pb >8.1 to 20 ug/l
Pb > 20 to 100 ug/l
Pb > 100 ug/l
Penite Area
10
Dissolved Lead (ug/l)
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer Dissolved Lead
in Groundwater - Nov./Dec. 2008
POT-001-00
FIGURE 5-35a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Site Plans GW Pb Locations 12-08 a.cdr



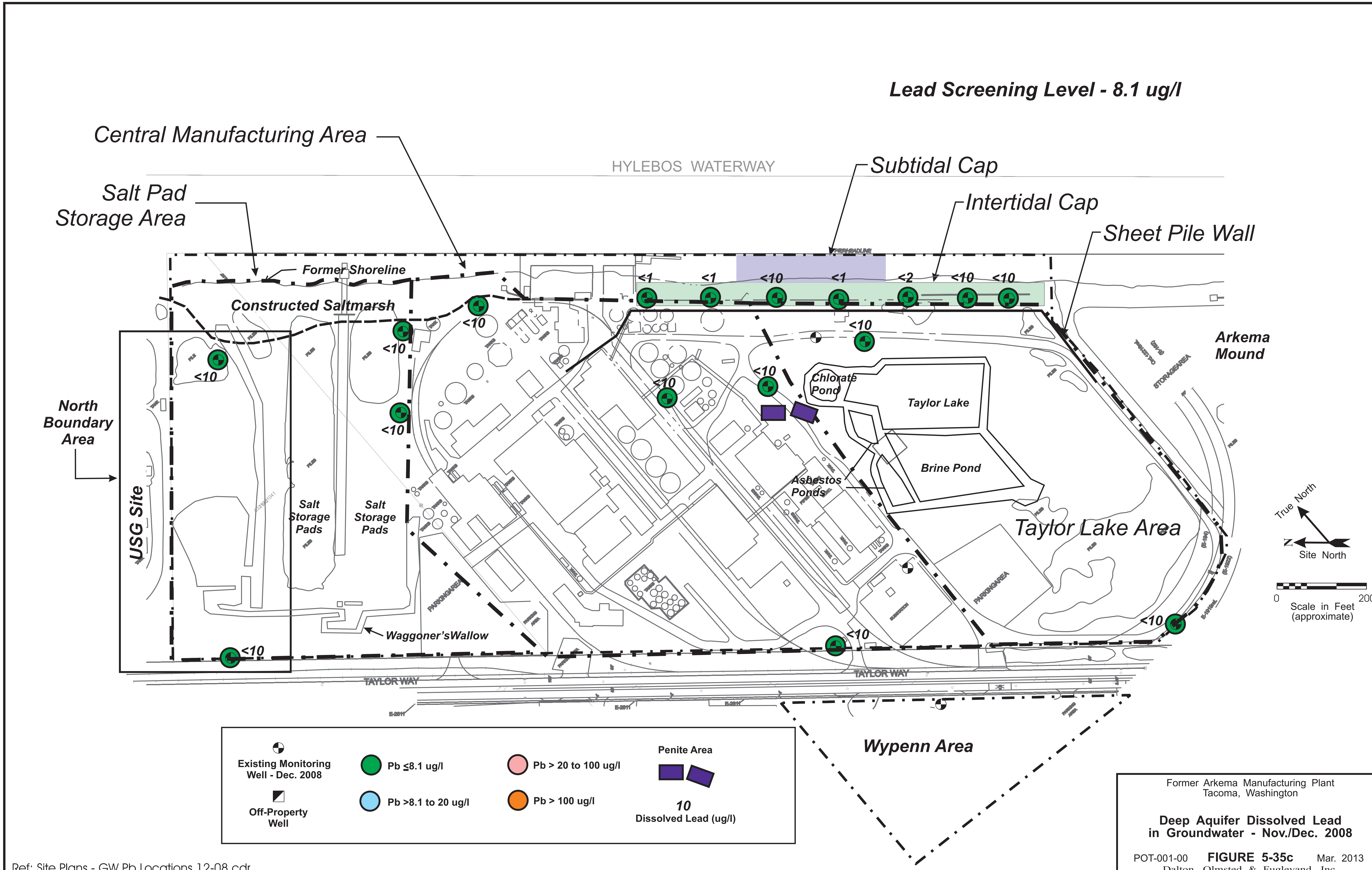
Ref: Site Plans GW Pb Locations 12-08 a.cdr

Former Arkema Manufacturing Site
Tacoma, Washington

Intermediate Aquifer Dissolved Lead in Groundwater - Nov./Dec. 2008

POT-001-00 **FIGURE 5-35b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



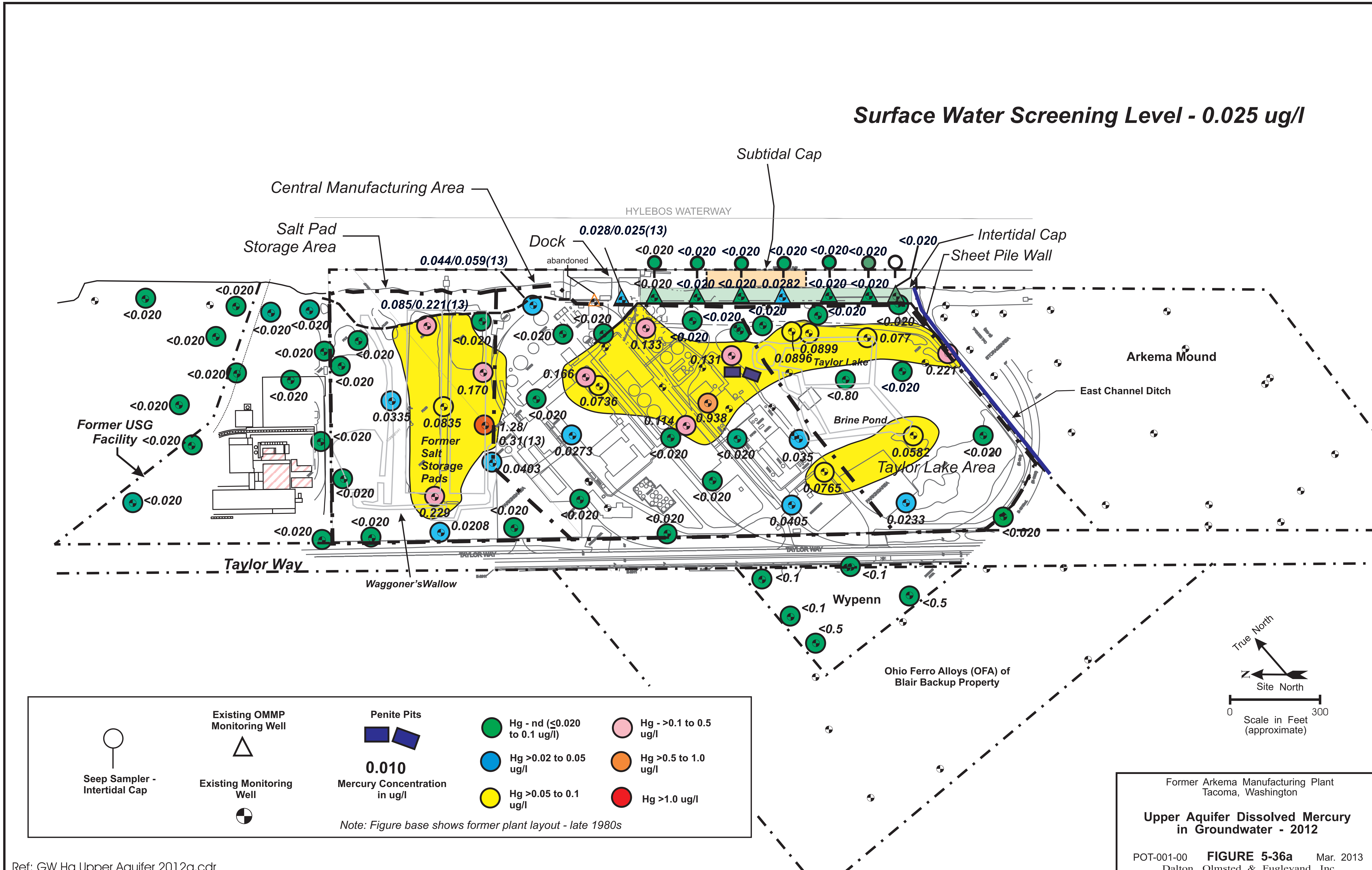
Ref: Site Plans - GW Pb Locations 12-08.cdr

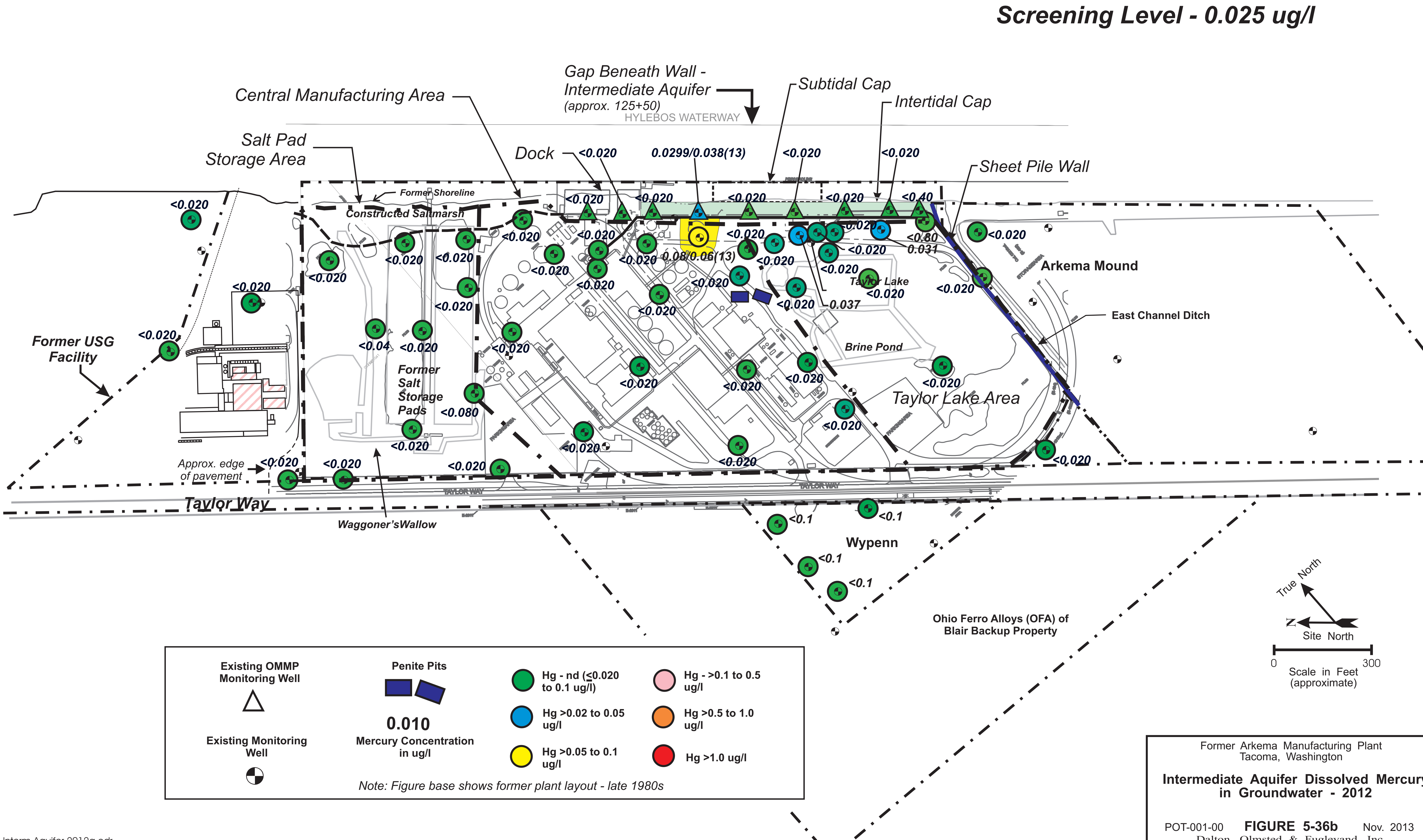
Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Dissolved Lead in Groundwater - Nov./Dec. 2008

POT-001-00 **FIGURE 5-35c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.


Surface Water Screening Level - 0.025 ug/l
Subtidal Cap
Central Manufacturing Area
HYLEBOS WATERWAY
Salt Pad
Storage Area
Dock
abandoned
0.028/0.025(13)
0.044/0.059(13)
0.085/0.221(13)
Intertidal Cap
Sheet Pile Wall
Arkema Mound
East Channel Ditch
Taylor Lake
Brine Pond
Taylor Lake Area
Former Salt Storage Pads
Former USG Facility
Taylor Way
Waggoner'sWallow
Wypenn
Ohio Ferro Alloys (OFA) of
Blair Backup Property
<0.020
0.0282
0.133
0.131
0.0899
0.0896
0.077
0.221
0.166
0.0736
0.170
0.0335
0.0835
1.28/
0.31(13)
0.0403
0.0273
0.114
0.938
0.035
0.80
0.0582
0.0765
0.0405
0.0233
0.229
0.0208
<0.1
<0.5
True North
Site North
0
300
Scale in Feet
(approximate)
Seep Sampler -
Intertidal Cap
Existing OMMP
Monitoring Well
Existing Monitoring
Well
Penite Pits
0.010
Mercury Concentration
in ug/l
Hg - nd (≤0.020
to 0.1 ug/l)
Hg >0.02 to 0.05
ug/l
Hg >0.05 to 0.1
ug/l
Hg - >0.1 to 0.5
ug/l
Hg >0.5 to 1.0
ug/l
Hg >1.0 ug/l
Note: Figure base shows former plant layout - late 1980s
Ref: GW Hg Upper Aquifer 2012a.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer Dissolved Mercury
in Groundwater - 2012
POT-001-00
FIGURE 5-36a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

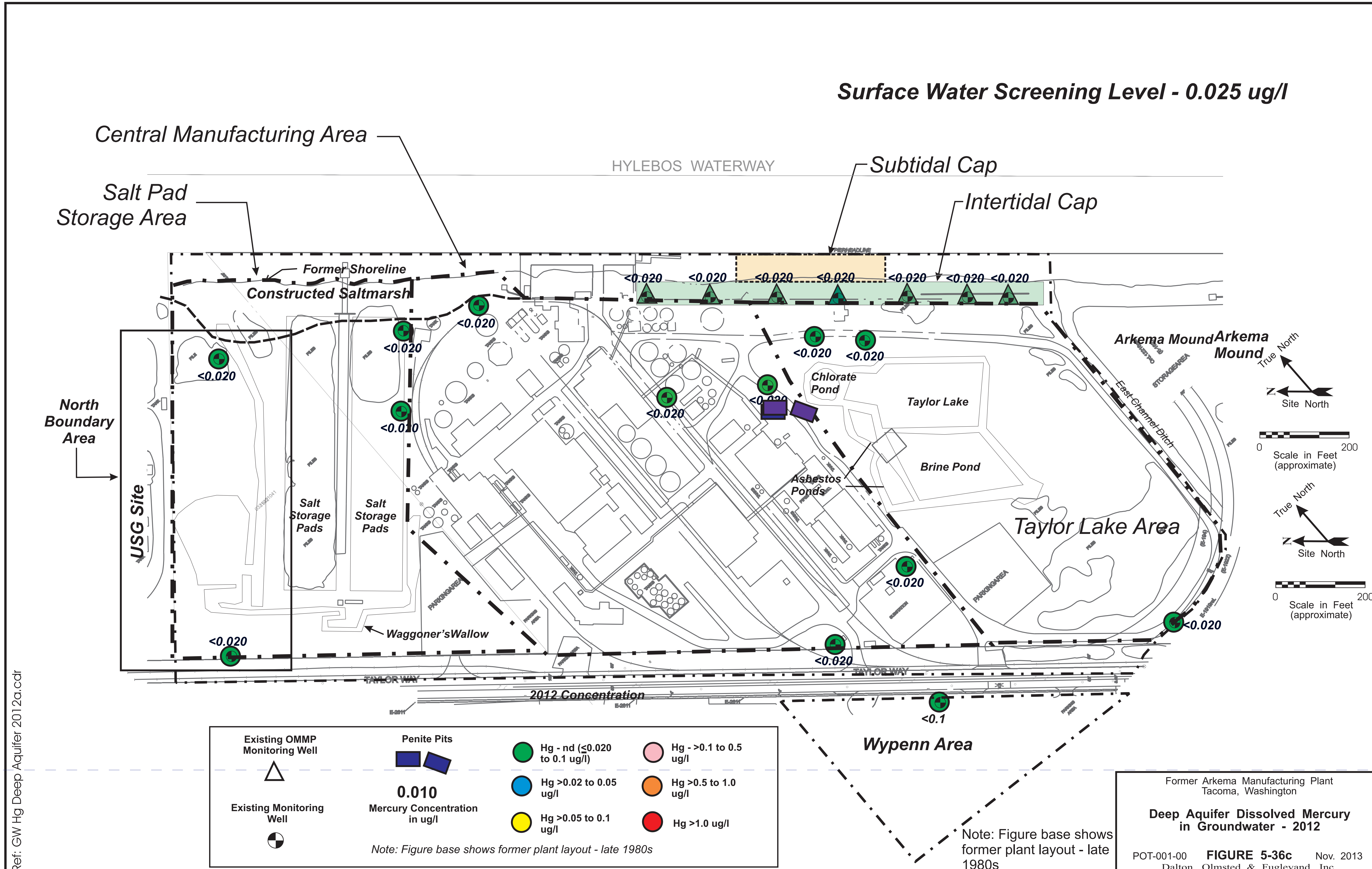


Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Dissolved Mercury in Groundwater - 2012

POT-001-00 **FIGURE 5-36b** Nov. 2013

Dalton, Olmsted & Fuglevand, Inc.

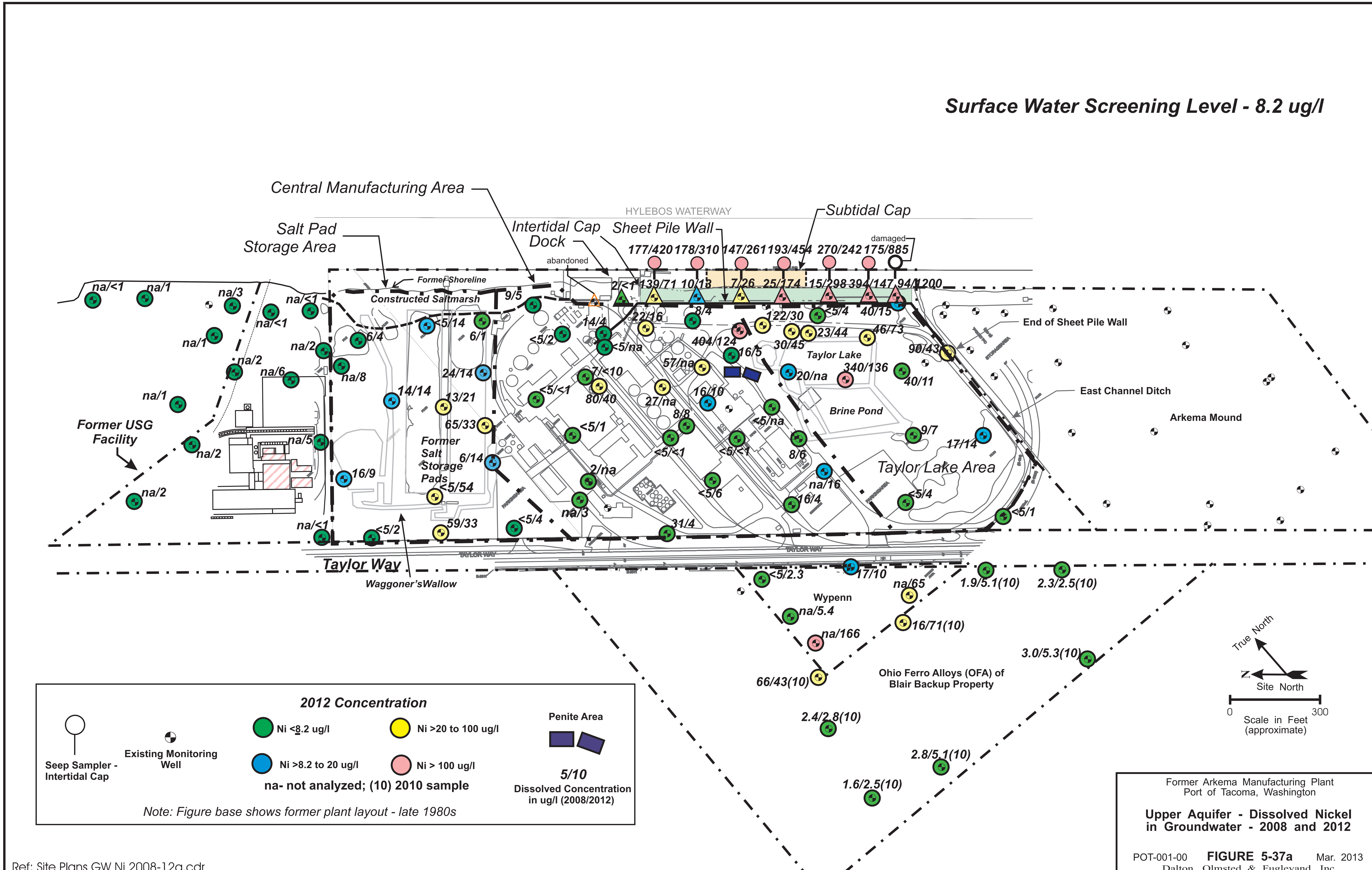


Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Dissolved Mercury in Groundwater - 2012

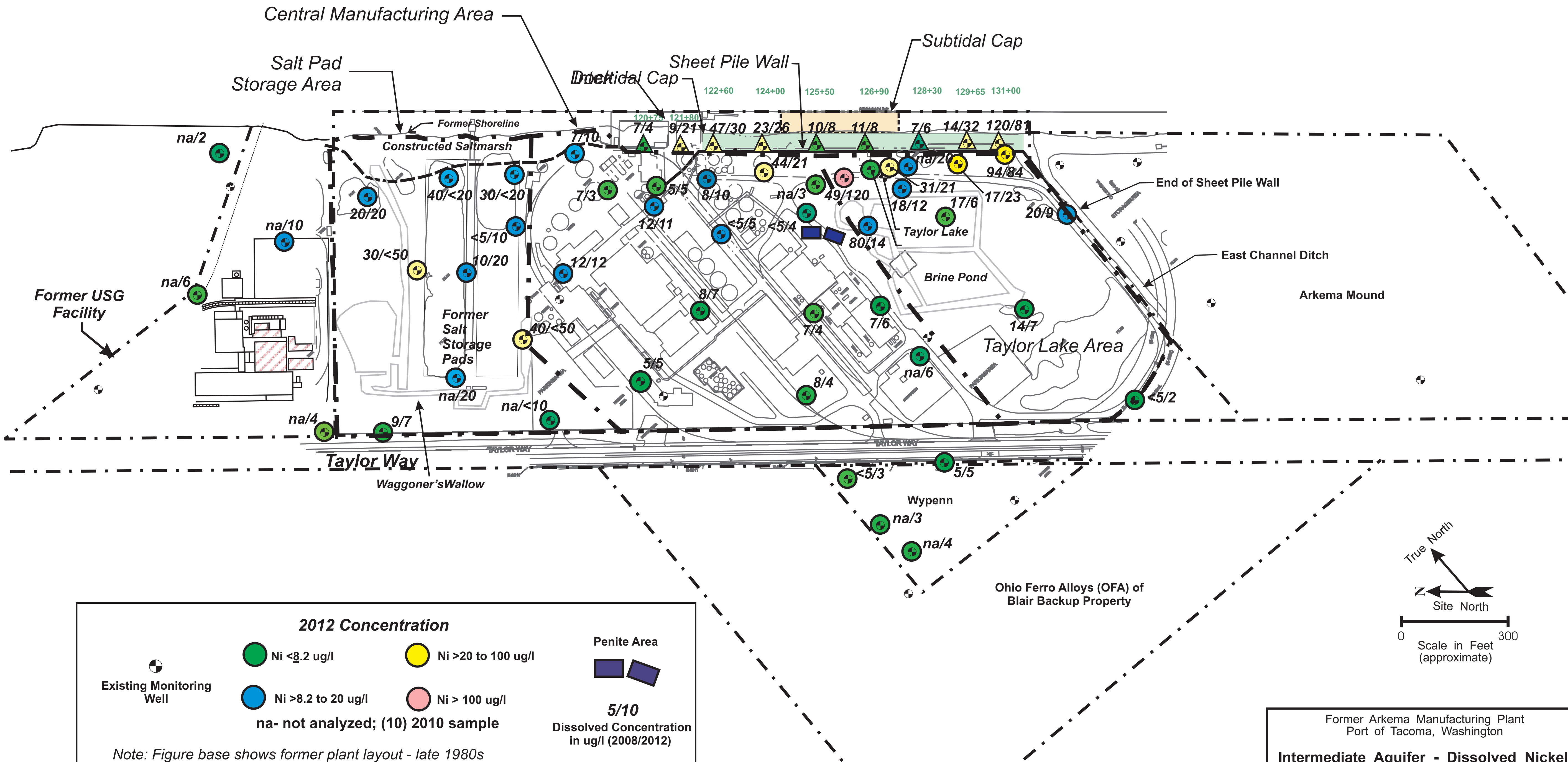
POT-001-00 **FIGURE 5-36c** Nov. 2013

Dalton, Olmsted & Fuglevand, Inc.



Surface Water Screening Level - 8.2 ug/l
Central Manufacturing Area
Salt Pad Storage Area
Intertidal Cap Dock
Sheet Pile Wall
Subtidal Cap
HYLEBOS WATERWAY
abandoned
damaged
177/420
178/310
147/261
193/454
270/242
175/885
2/<1
139/71
10/13
7/26
25/174
15/298
394/147
94/1200
Former Shoreline
Constructed Saltmarsh
End of Sheet Pile Wall
East Channel Ditch
Arkema Mound
Taylor Lake
Brine Pond
Taylor Lake Area
Former USG Facility
Former Salt Storage Pads
Taylor Way
Waggoner'sWallow
Wypenn
Ohio Ferro Alloys (OFA) of Blair Backup Property
na/<1
na/1
na/3
na/<1
na/<1
na/1
na/2
na/2
na/6
na/8
na/1
na/5
na/2
na/2
na/<1
6/4
<5/14
6/1
9/5
14/14
24/14
13/21
65/33
6/14
16/9
<5/54
59/33
<5/2
<5/2
14/4
<5/na
22/16
8/4
122/30
<5/4
40/15
404/124
30/45
23/44
46/73
16/5
90/43
57/na
20/na
340/136
40/11
7/<10
80/40
27/na
16/10
<5/<1
8/8
<5/na
<5/1
<5/<1
<5/<1
8/6
9/7
17/14
2/na
<5/6
na/16
16/4
<5/4
na/3
<5/4
31/4
<5/1
<5/2.3
17/10
na/65
1.9/5.1(10)
2.3/2.5(10)
na/5.4
16/71(10)
na/166
3.0/5.3(10)
66/43(10)
2.4/2.8(10)
2.8/5.1(10)
1.6/2.5(10)
True North
Site North
0
300
Scale in Feet (approximate)
2012 Concentration
Seep Sampler - Intertidal Cap
Existing Monitoring Well
Ni <8.2 ug/l
Ni >8.2 to 20 ug/l
Ni >20 to 100 ug/l
Ni > 100 ug/l
Penite Area
5/10
Dissolved Concentration in ug/l (2008/2012)
na- not analyzed; (10) 2010 sample
Note: Figure base shows former plant layout - late 1980s
Ref: Site Plans GW Ni 2008-12a.cdr
Former Arkema Manufacturing Plant
Port of Tacoma, Washington
Upper Aquifer - Dissolved Nickel in Groundwater - 2008 and 2012
POT-001-00
FIGURE 5-37a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

Surface Water Screening Level - 8.2 ug/l



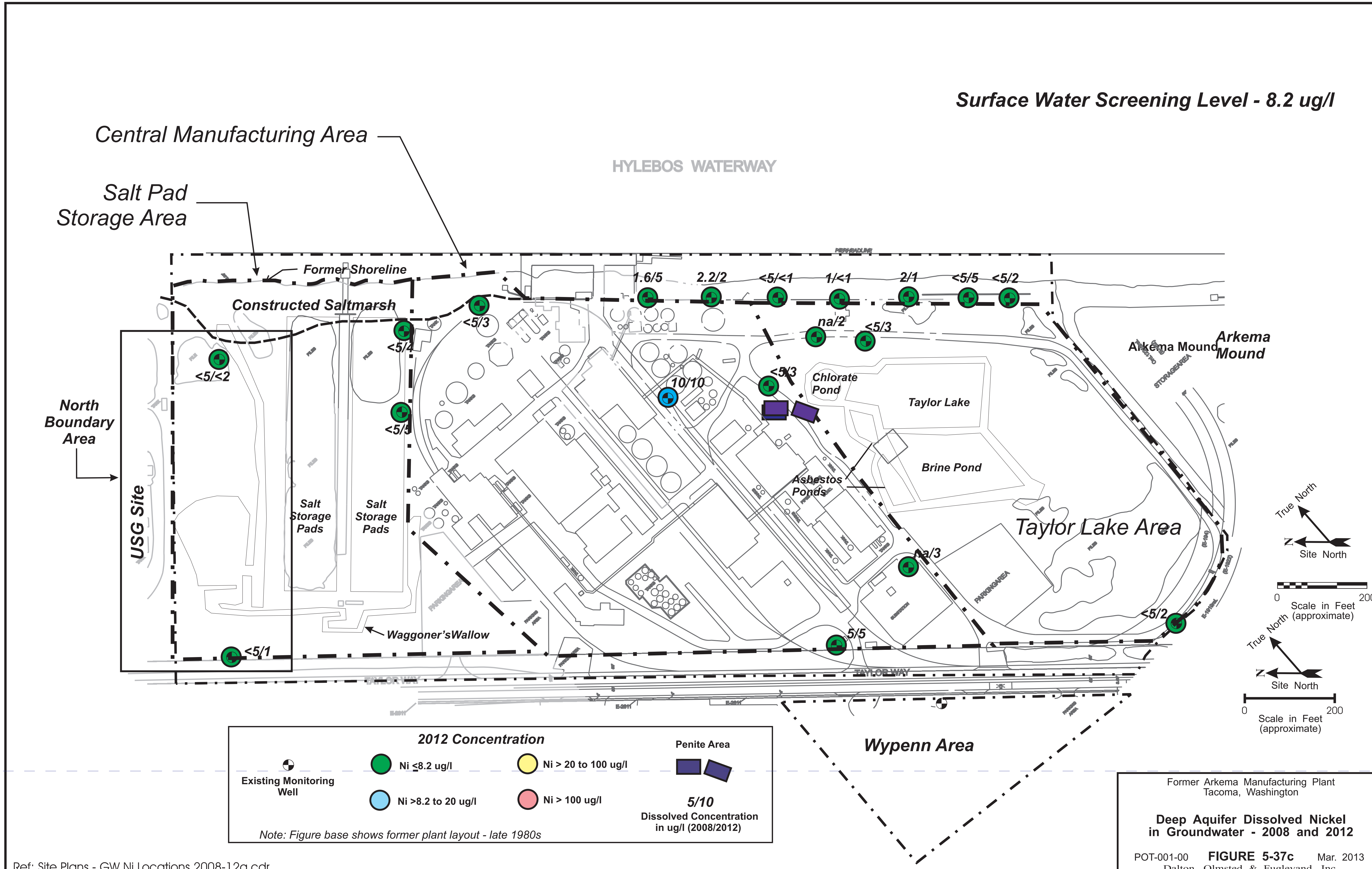
Ref: Site Plans GW Ni 2008-12a.cdr

Former Arkema Manufacturing Plant
Port of Tacoma, Washington

Intermediate Aquifer - Dissolved Nickel in Groundwater - 2008 and 2012

POT-001-00 **FIGURE 5-37b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

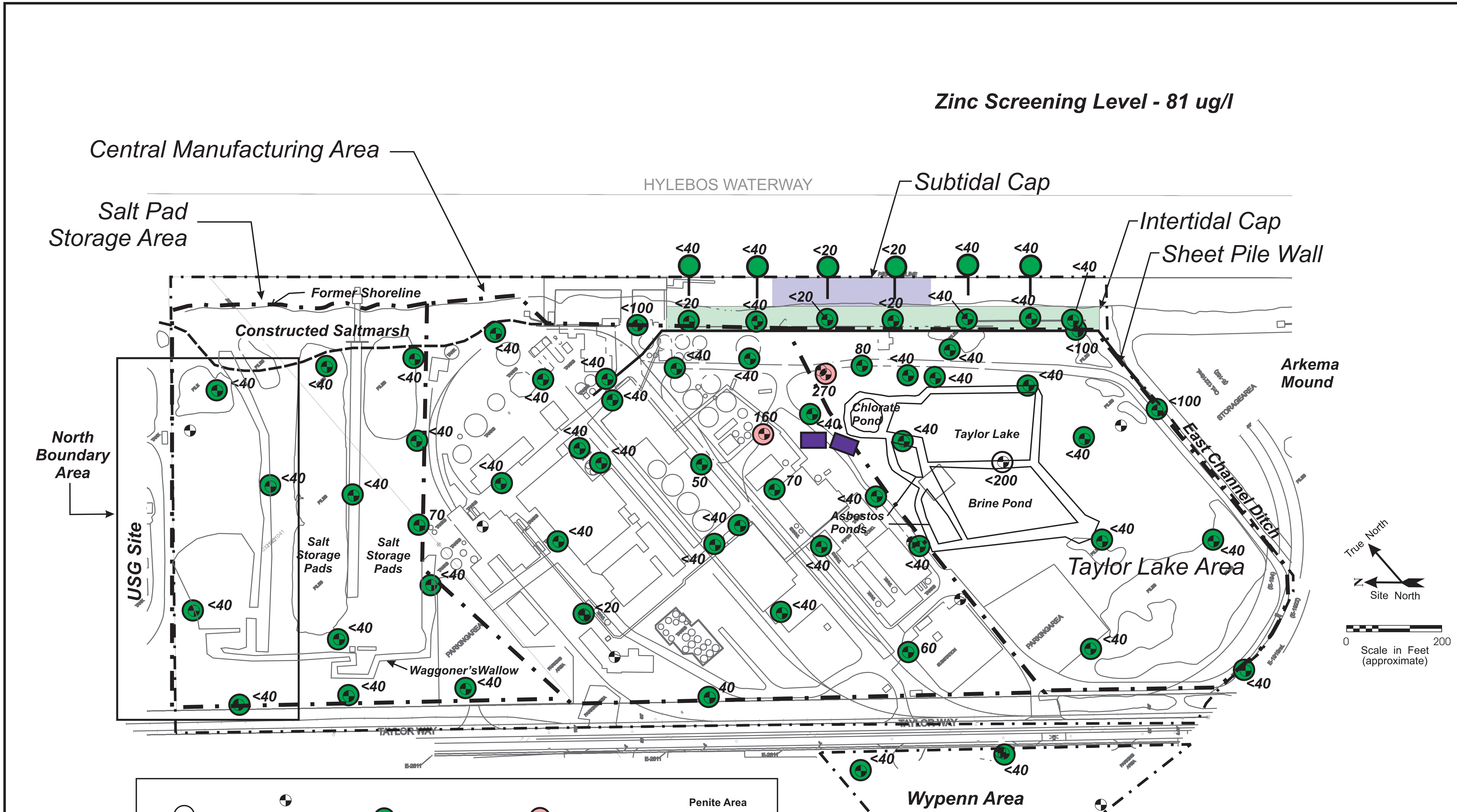


Former Arkema Manufacturing Plant
Tacoma, Washington

Deep Aquifer Dissolved Nickel in Groundwater - 2008 and 2012

POT-001-00 FIGURE 5-37c Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



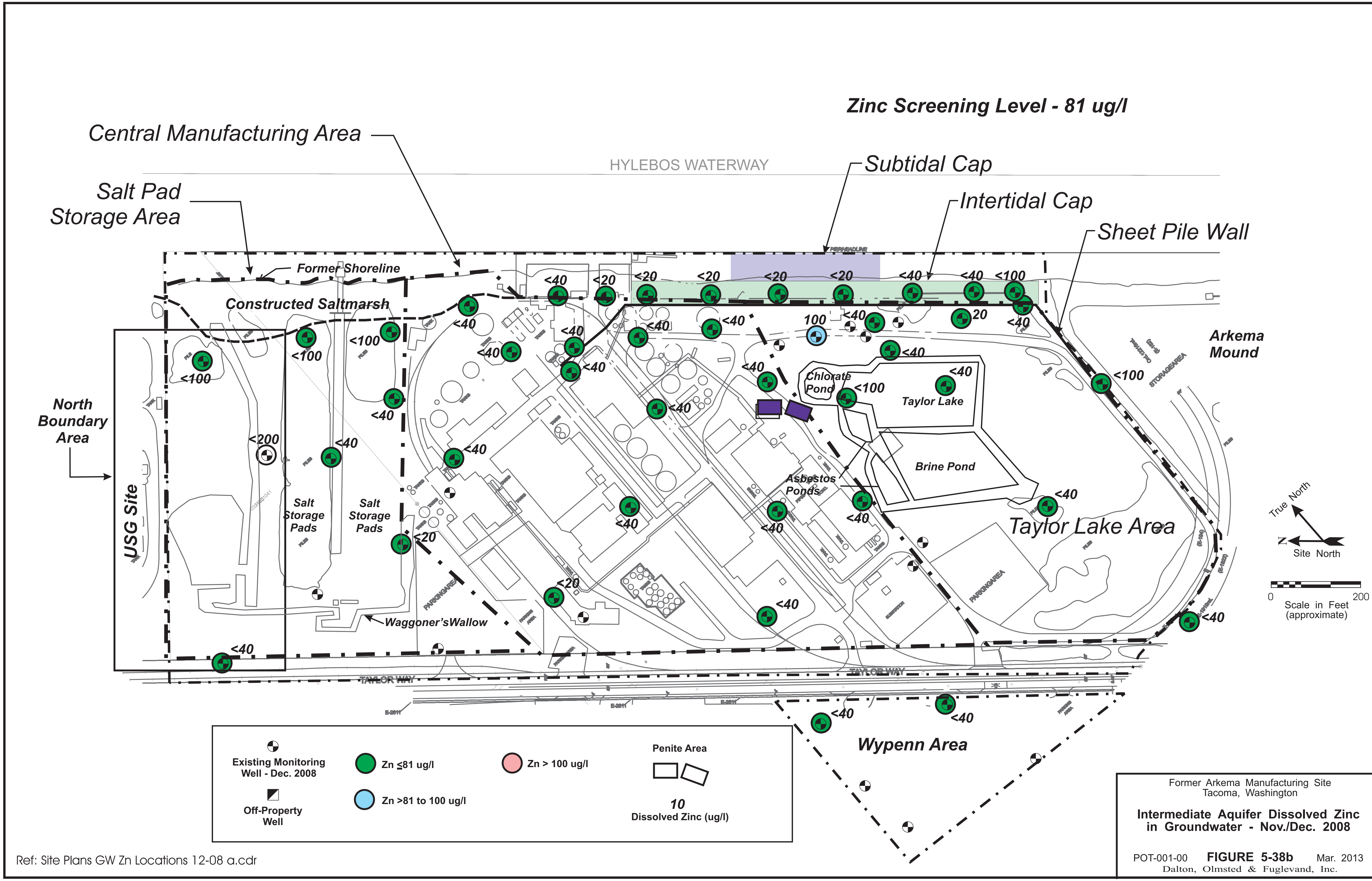
Former Arkema Manufacturing Plant
Tacoma, Washington

Upper Aquifer Dissolved Zinc in Groundwater - Nov./Dec. 2008

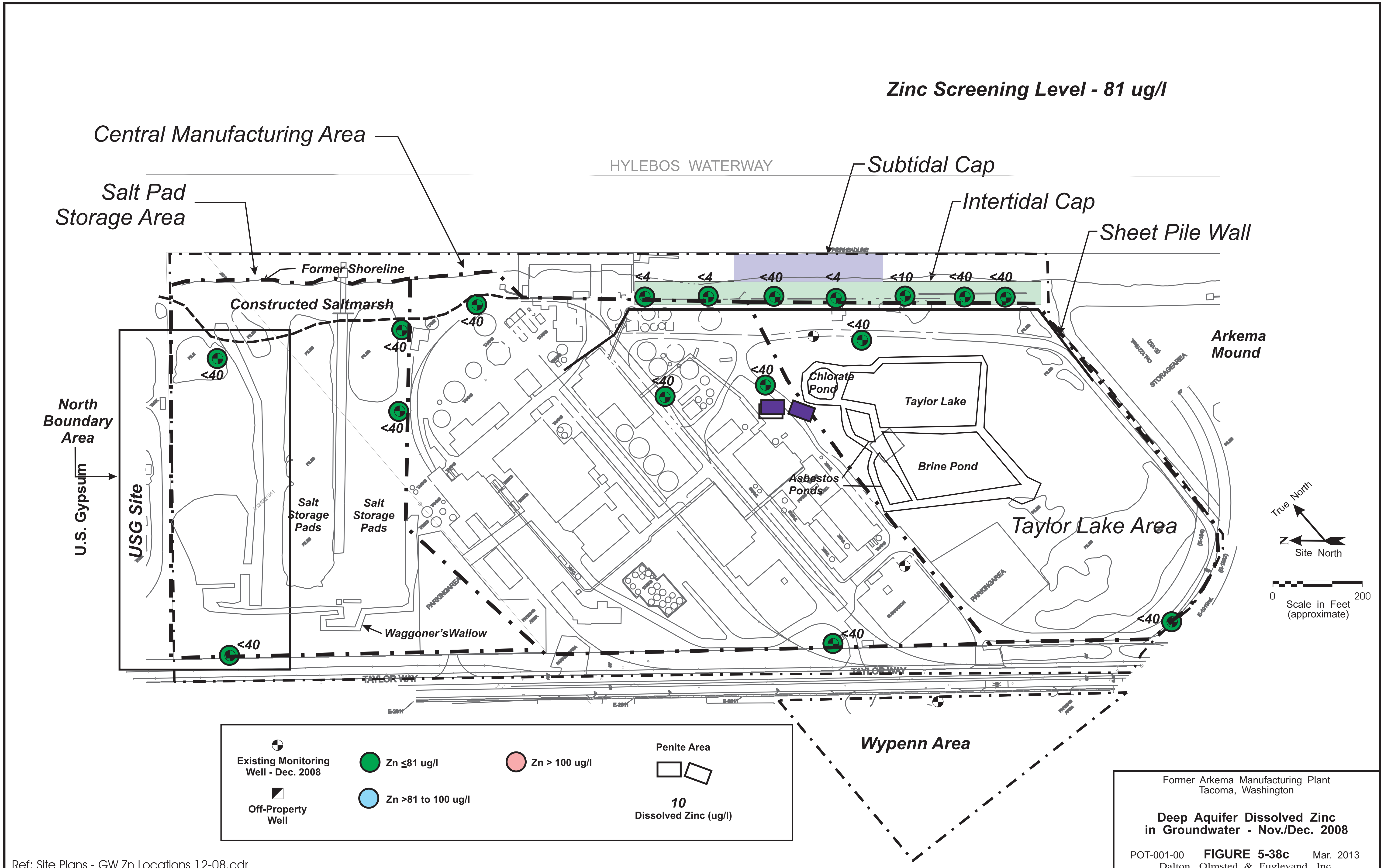
POT-001-00 **FIGURE 5-38a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Site Plans GW Zn Locations 12-08 a.cdr



Zinc Screening Level - 81 ug/l
Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Sheet Pile Wall
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
Arkema Mound
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
Chlorate Pond
Taylor Lake
Brine Pond
Asbestos Ponds
Taylor Lake Area
Waggoner'sWallow
TAYLOR WAY
TAYLOR WAY
Wypenn Area
True North
Site North
0
200
Scale in Feet (approximate)
Existing Monitoring Well - Dec. 2008
Off-Property Well
Zn ≤81 ug/l
Zn >81 to 100 ug/l
Zn > 100 ug/l
Penite Area
10
Dissolved Zinc (ug/l)
Former Arkema Manufacturing Site
Tacoma, Washington
Intermediate Aquifer Dissolved Zinc in Groundwater - Nov./Dec. 2008
POT-001-00
FIGURE 5-38b
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.
Ref: Site Plans GW Zn Locations 12-08 a.cdr

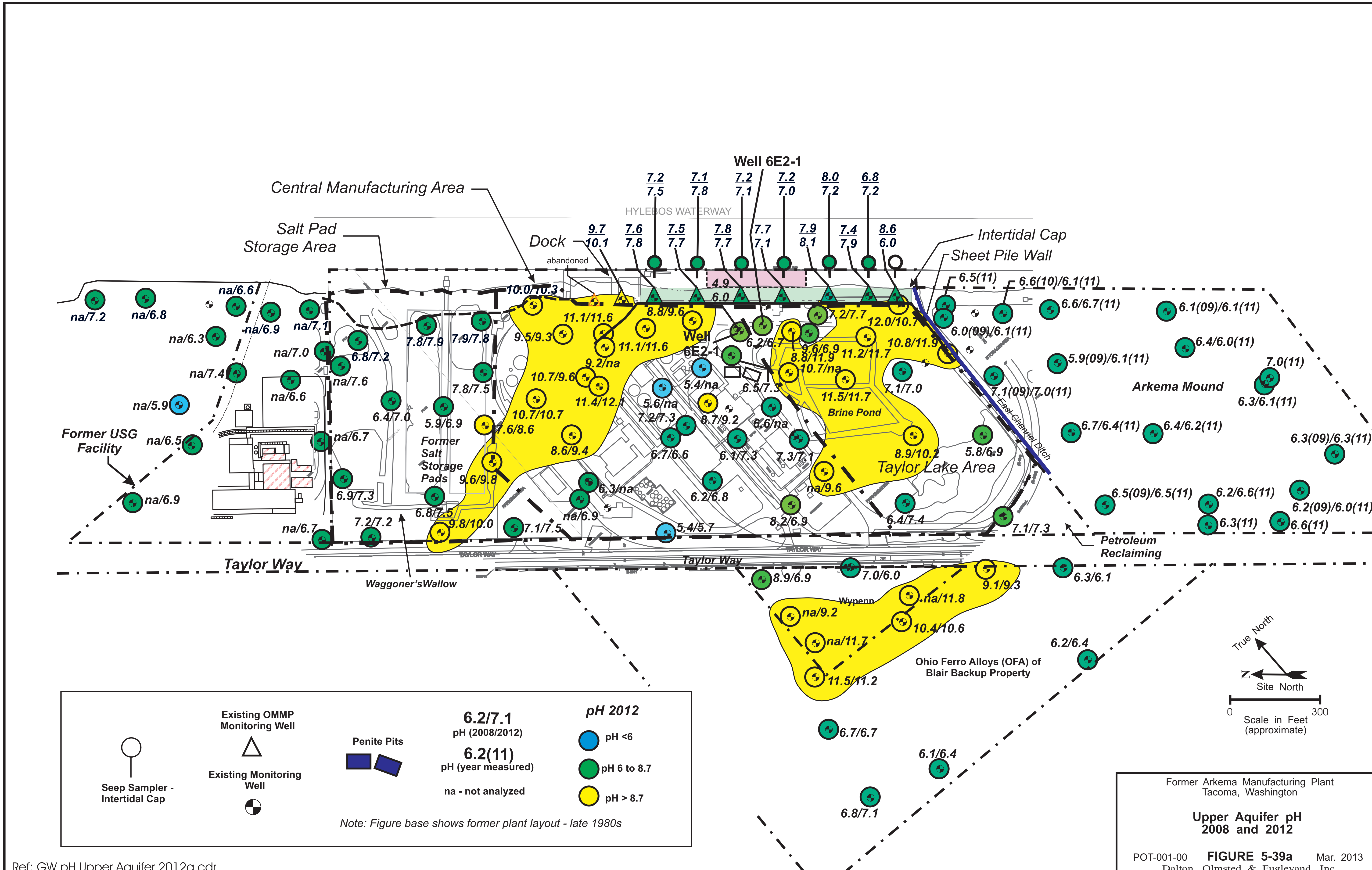


Former Arkema Manufacturing Plant
Tacoma, Washington

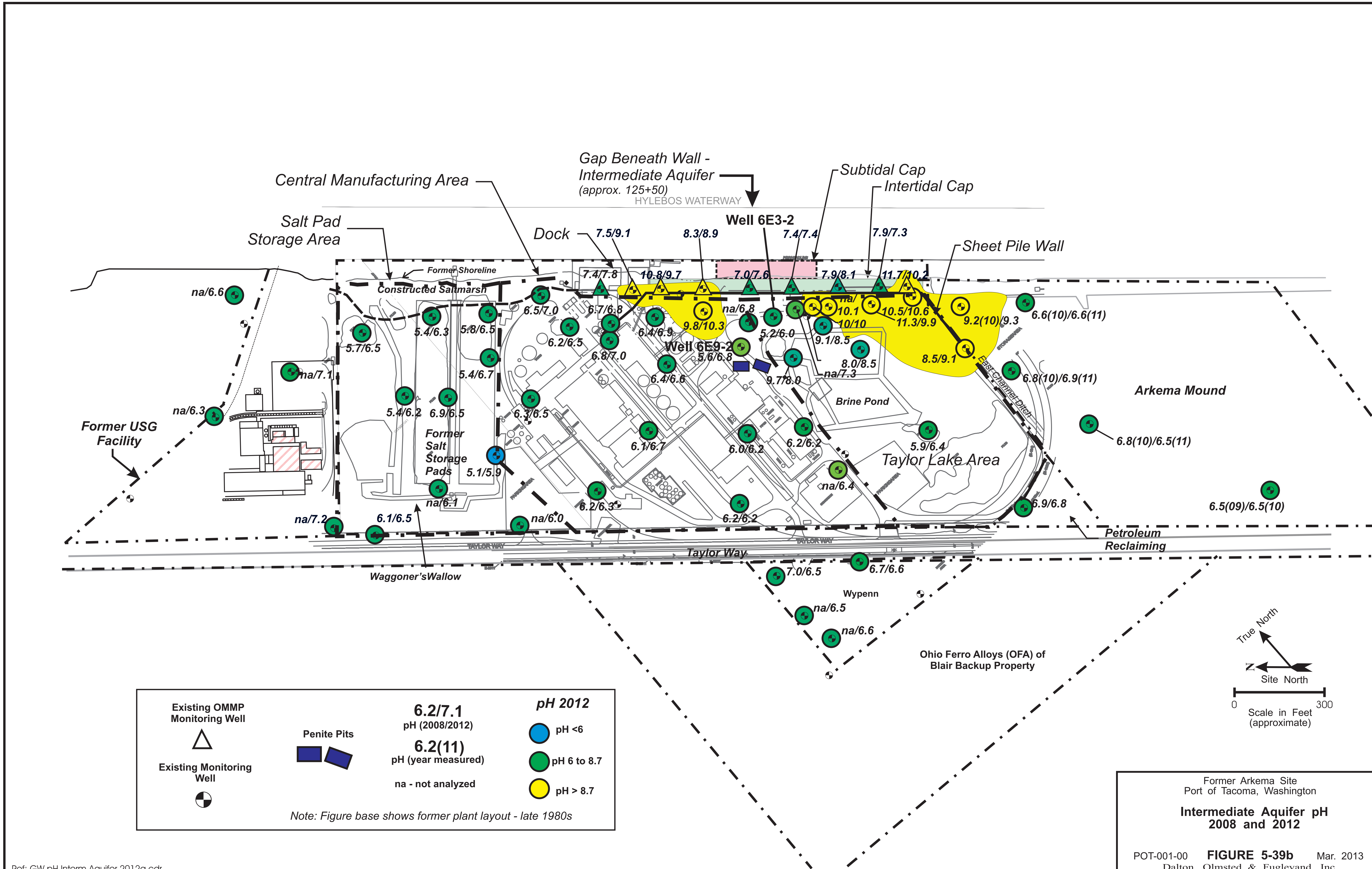
Deep Aquifer Dissolved Zinc in Groundwater - Nov./Dec. 2008

POT-001-00 **FIGURE 5-38c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



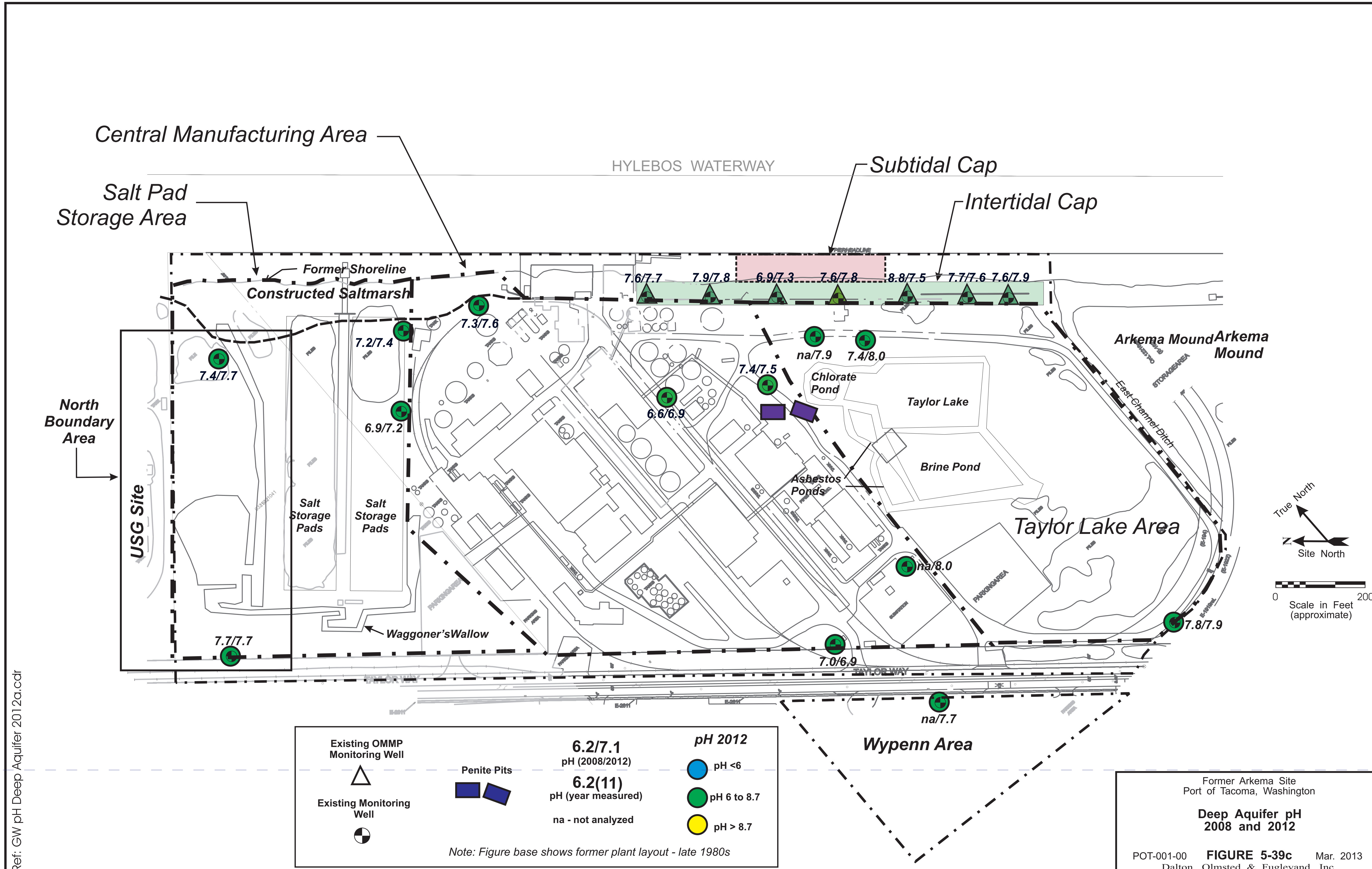
Central Manufacturing Area
Salt Pad Storage Area
Dock
abandoned
Well 6E2-1
HYLEBOS WATERWAY
Intertidal Cap
Sheet Pile Wall
Former USG Facility
Former Salt Storage Pads
Brine Pond
Taylor Lake Area
East Channel Ditch
Arkema Mound
Petroleum Reclaiming
Taylor Way
Waggoner'sWallow
Wypenn
Ohio Ferro Alloys (OFA) of Blair Backup Property
True North
Site North
0
300
Scale in Feet (approximate)
Seep Sampler - Intertidal Cap
Existing OMMP Monitoring Well
Existing Monitoring Well
Penite Pits
6.2/7.1
pH (2008/2012)
6.2(11)
pH (year measured)
na - not analyzed
pH 2012
pH <6
pH 6 to 8.7
pH > 8.7
Note: Figure base shows former plant layout - late 1980s
Ref: GW pH Upper Aquifer 2012a.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Upper Aquifer pH
2008 and 2012
POT-001-00
FIGURE 5-39a
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

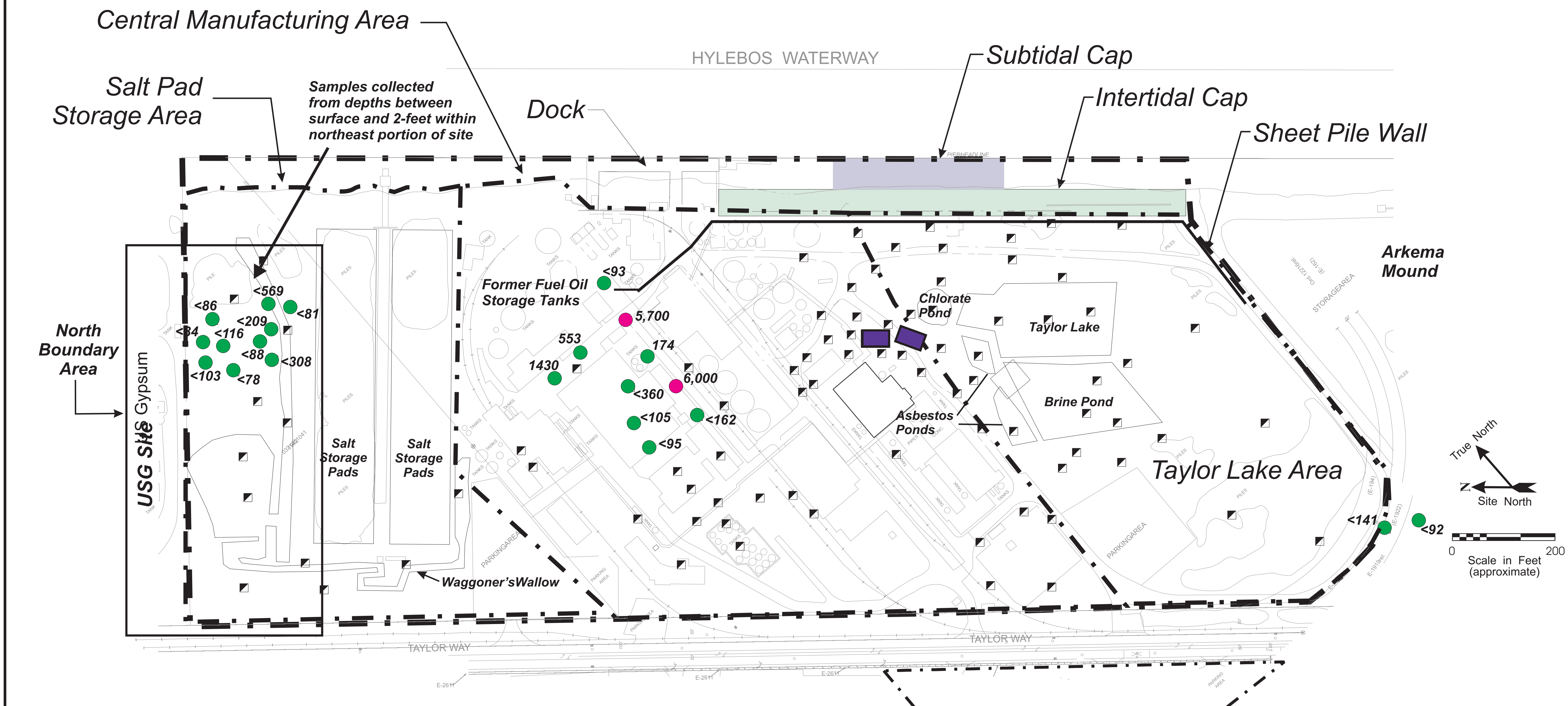


Former Arkema Site
Port of Tacoma, Washington

Intermediate Aquifer pH
2008 and 2012

POT-001-00 **FIGURE 5-39b** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.


Central Manufacturing Area
HYLEBOS WATERWAY
Subtidal Cap
Intertidal Cap
Salt Pad Storage Area
Former Shoreline
Constructed Saltmarsh
7.6/7.7
7.9/7.8
6.9/7.3
7.6/7.8
8.8/7.5
7.7/7.6
7.6/7.9
7.3/7.6
7.2/7.4
7.4/7.7
6.9/7.2
na/7.9
7.4/8.0
7.4/7.5
6.6/6.9
Chlorate Pond
Taylor Lake
Arkema Mound
Arkema Mound
East Channel Ditch
Brine Pond
Asbestos Ponds
Taylor Lake Area
North Boundary Area
USG Site
Salt Storage Pads
Salt Storage Pads
na/8.0
7.8/7.9
Waggoner'sWallow
7.7/7.7
7.0/6.9
TAYLOR WAY
na/7.7
Wypenn Area
True North
Site North
0
200
Scale in Feet (approximate)
Ref: GW pH Deep Aquifer 2012a.cdr
Existing OMMP Monitoring Well
Existing Monitoring Well
Penite Pits
6.2/7.1
pH (2008/2012)
6.2(11)
pH (year measured)
na - not analyzed
pH 2012
pH <6
pH 6 to 8.7
pH > 8.7
Note: Figure base shows former plant layout - late 1980s
Former Arkema Site
Port of Tacoma, Washington
Deep Aquifer pH
2008 and 2012
POT-001-00
FIGURE 5-39c
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



Less Than 2,000 mg/kg

Greater Than 2,000 mg/kg

Soil Sample Location April/May 2007

<162 *Highest TPH concentration at location in mg/kg (Sum of diesel and lube-oil range hydrocarbons)*

Soil Sample Location October 2010

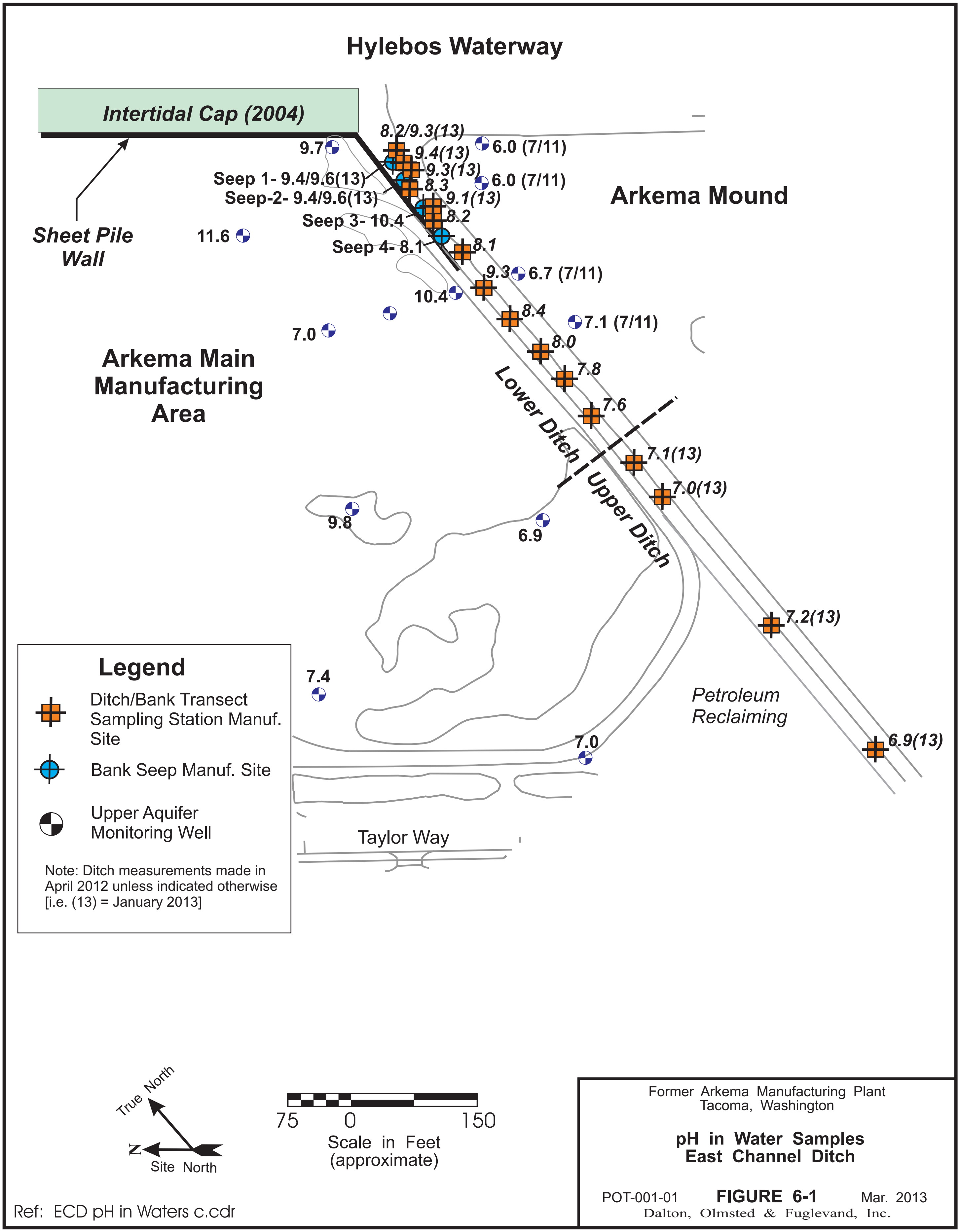
Ref: Soil Locations on base b TPH.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

TPH Concentrations in Soil Between 0' and 6' Depths

POT-001-00 **FIGURE 5-40** Mar. 2011

Dalton, Olmsted & Fuglevand, Inc.

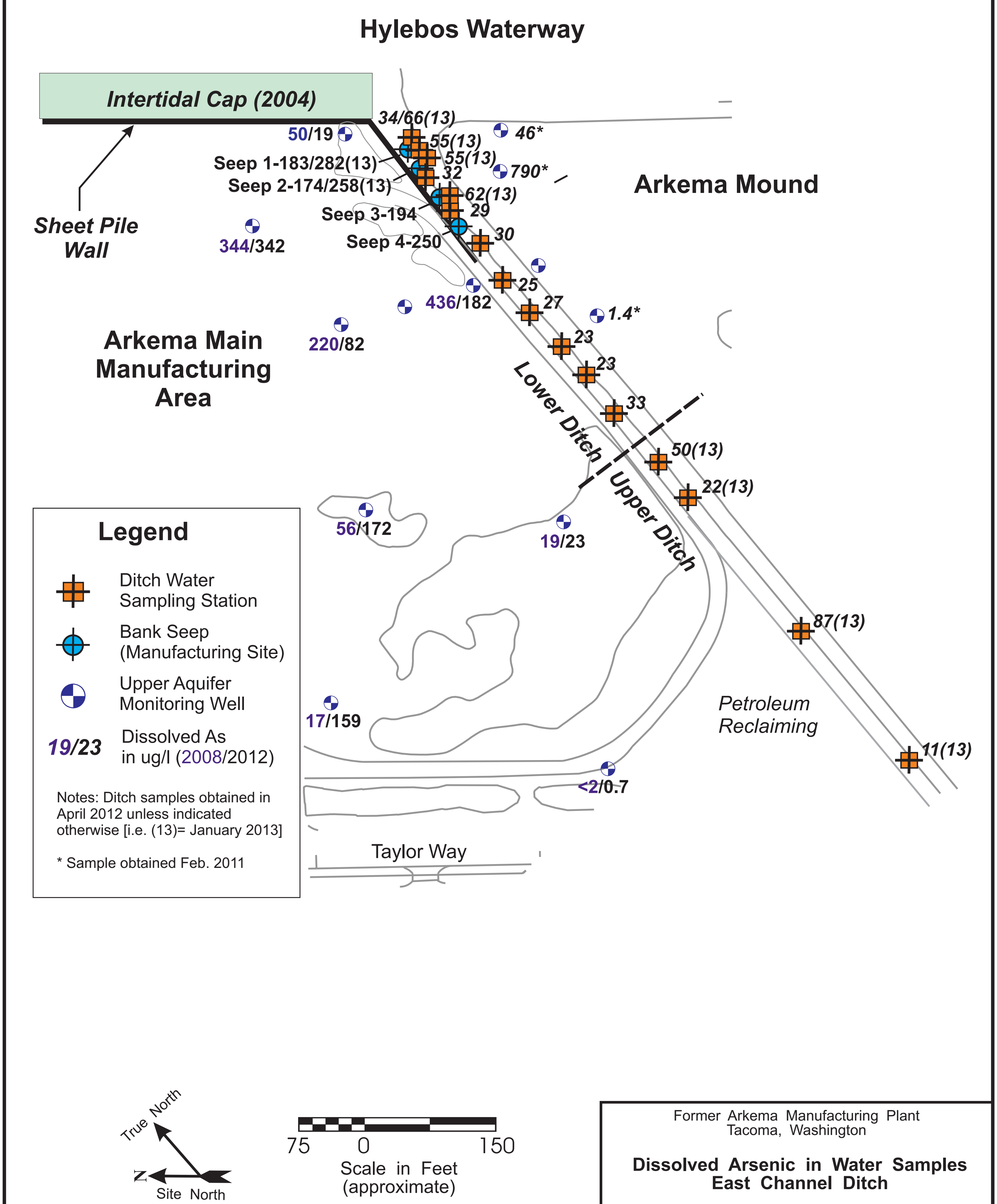


Former Arkema Manufacturing Plant
Tacoma, Washington

pH in Water Samples
East Channel Ditch

POT-001-01 **FIGURE 6-1** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

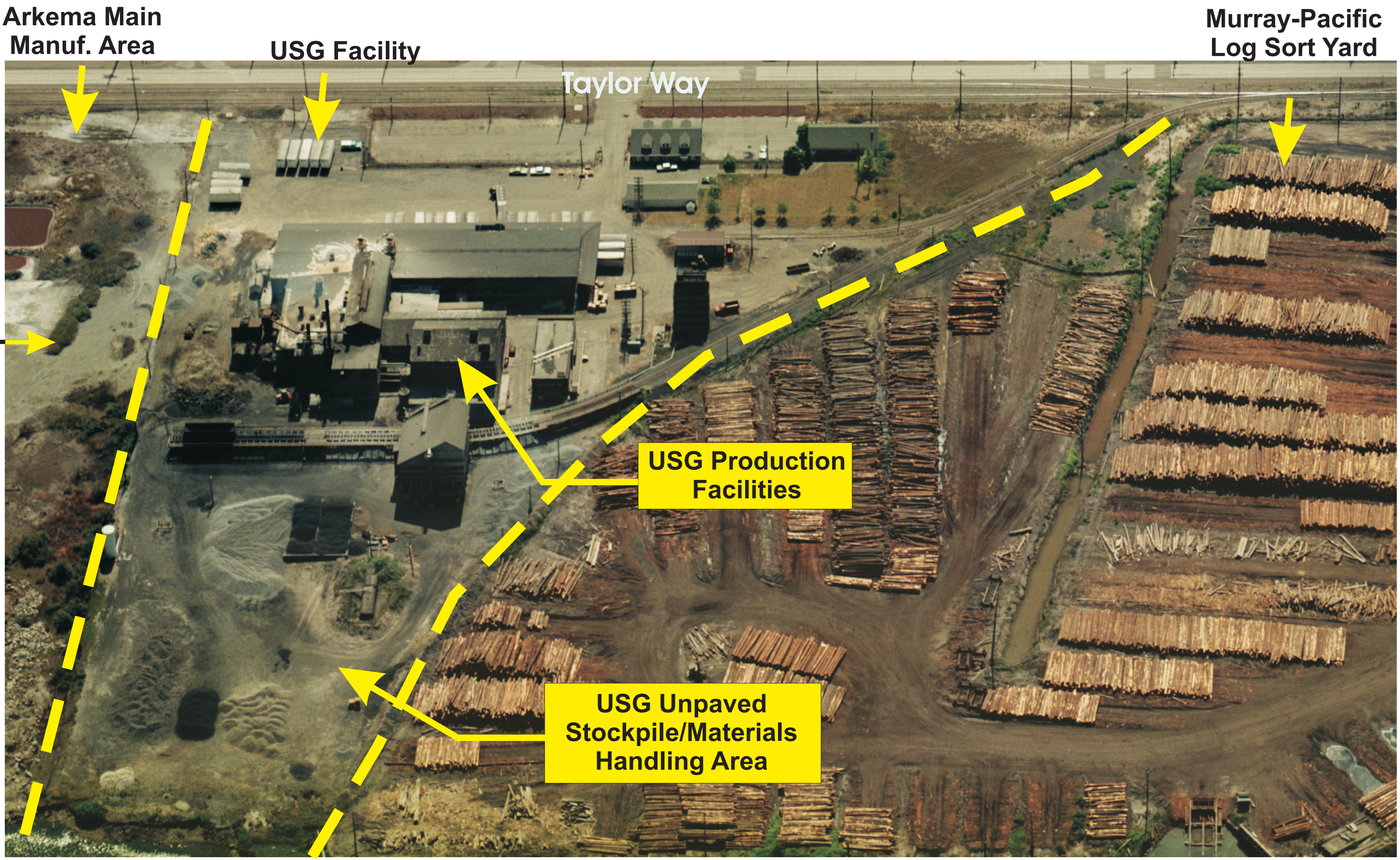


Former Arkema Manufacturing Plant
Tacoma, Washington

Dissolved Arsenic in Water Samples
East Channel Ditch

POT-001-01 **FIGURE 6-2** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

Ref: ECD DAs in Waters c.cdr



North Boundary Area
(see Figures 5-11a to 5-11d)

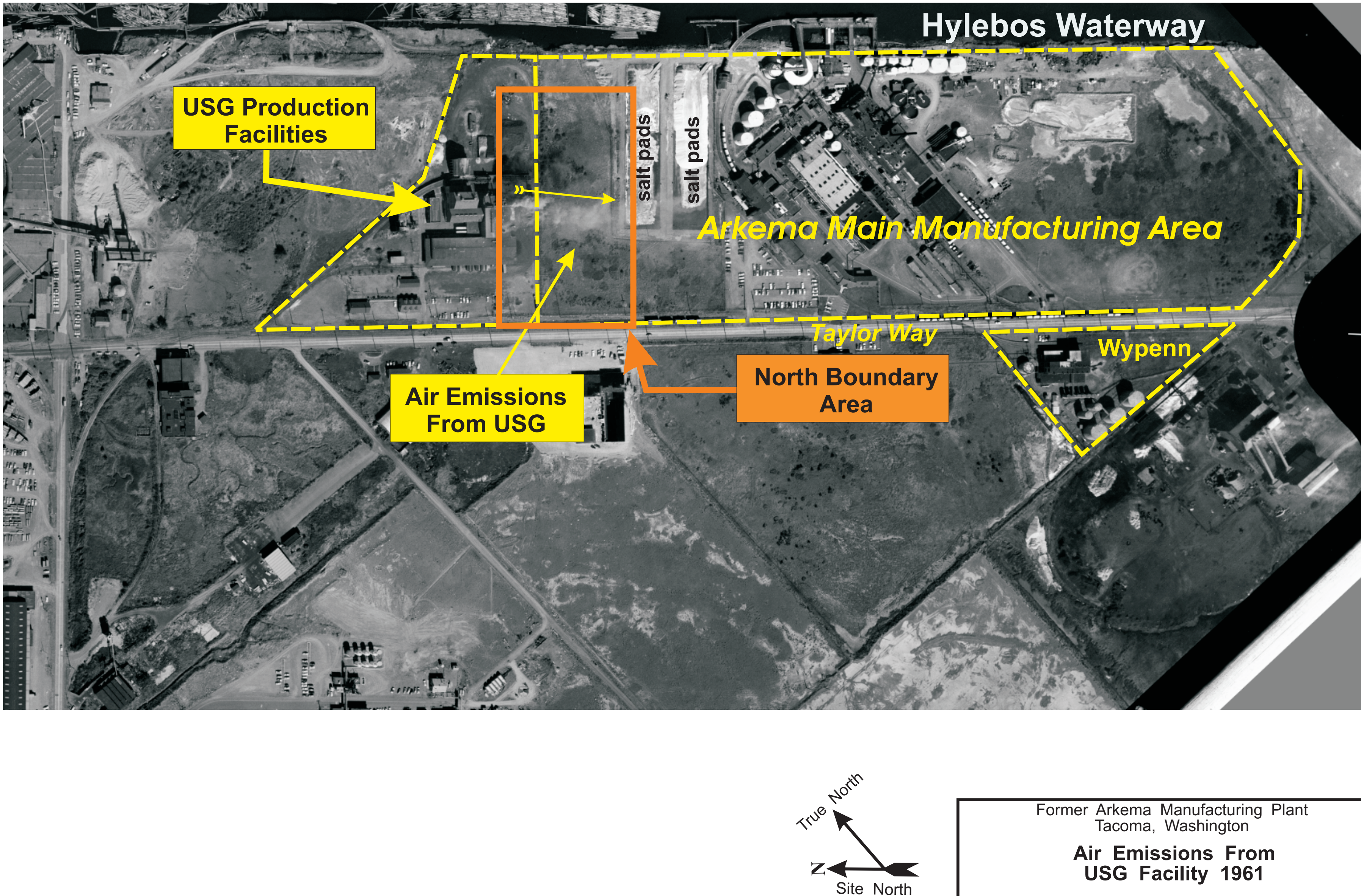
Site North
N
True North

Source: WSDOT air photo archives
Ref: USG Photo 1977.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

USG Facility 1977

POT-001-00 **FIGURE 7-1** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

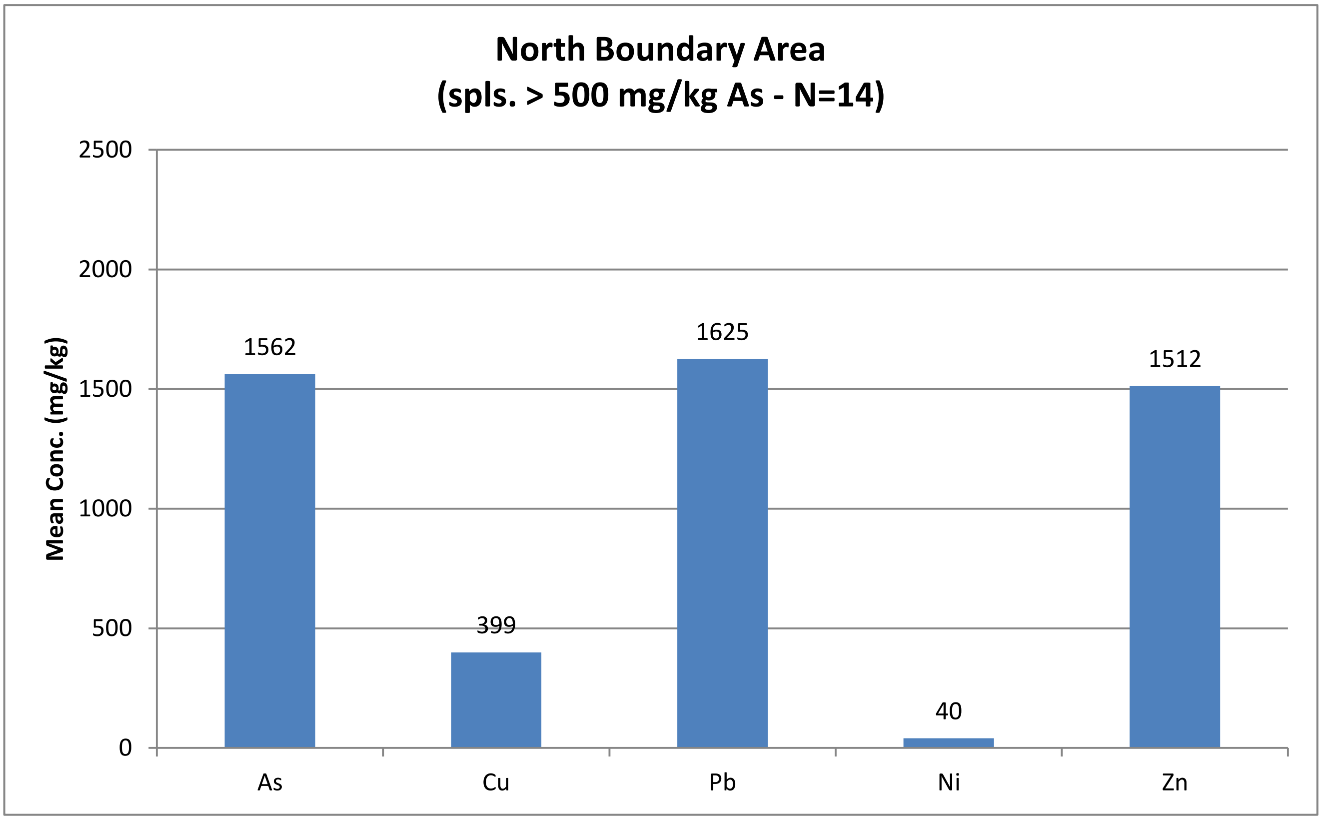


Source: WSDOT air photo archives
Ref: USG Smoke 1961.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Air Emissions From USG Facility 1961

POT-001-00 **FIGURE 7-2** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



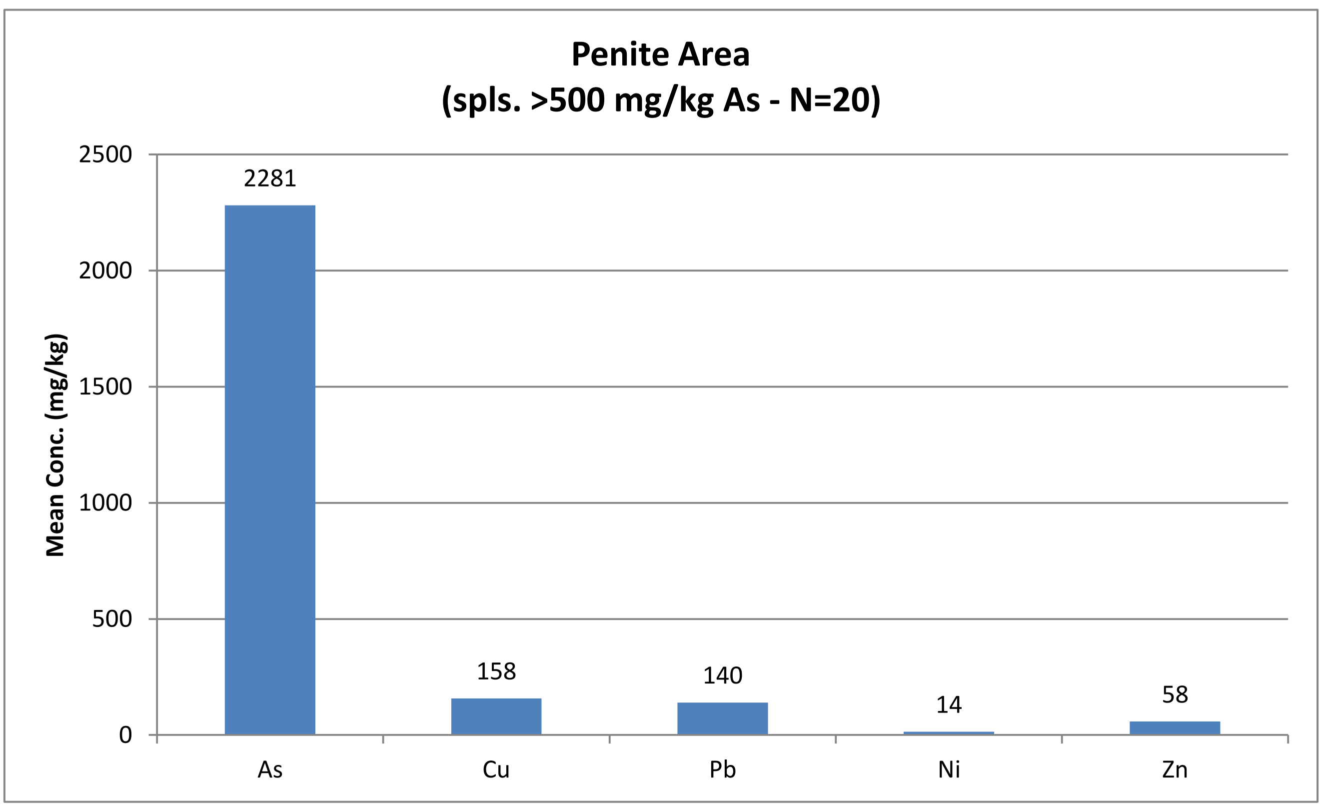
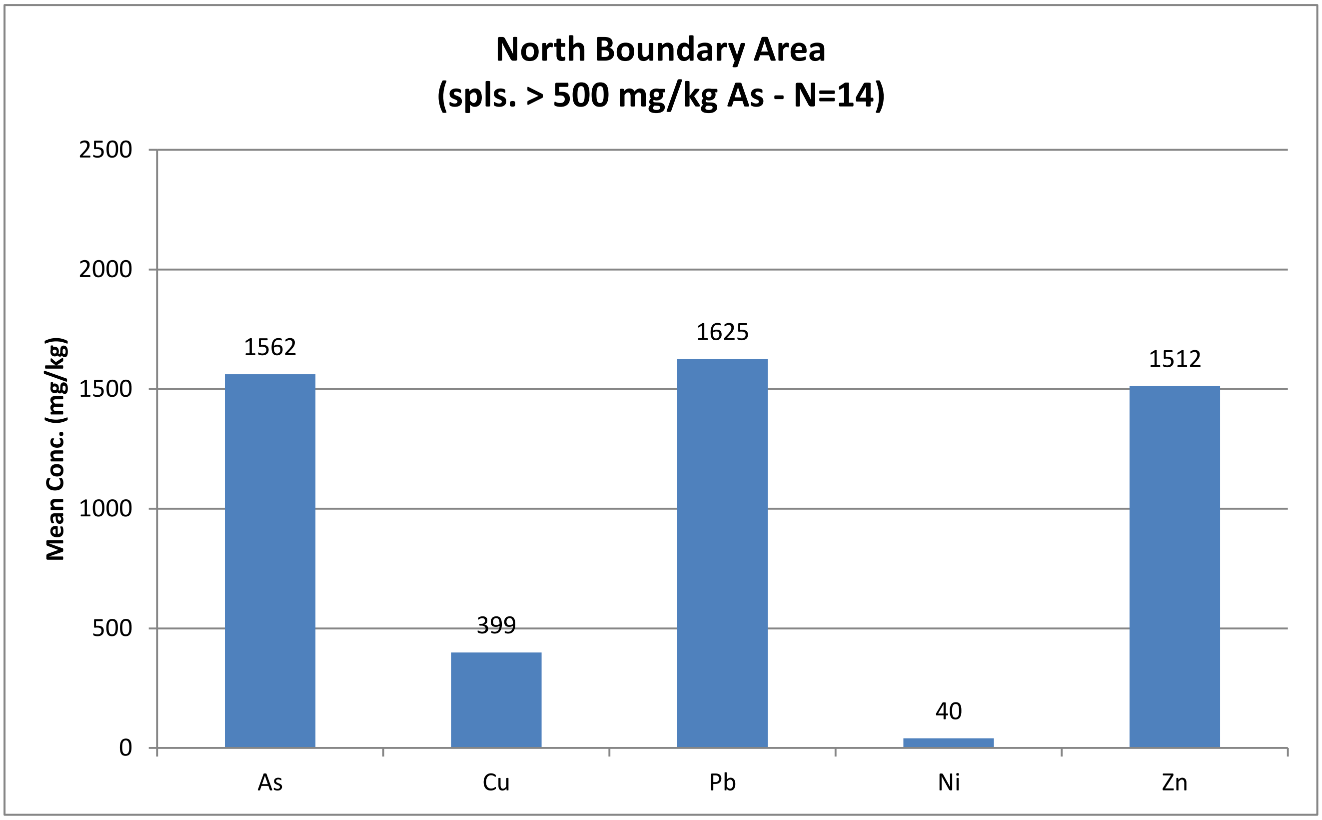


FIGURE 7-3 - Comparison With Arkema Materials



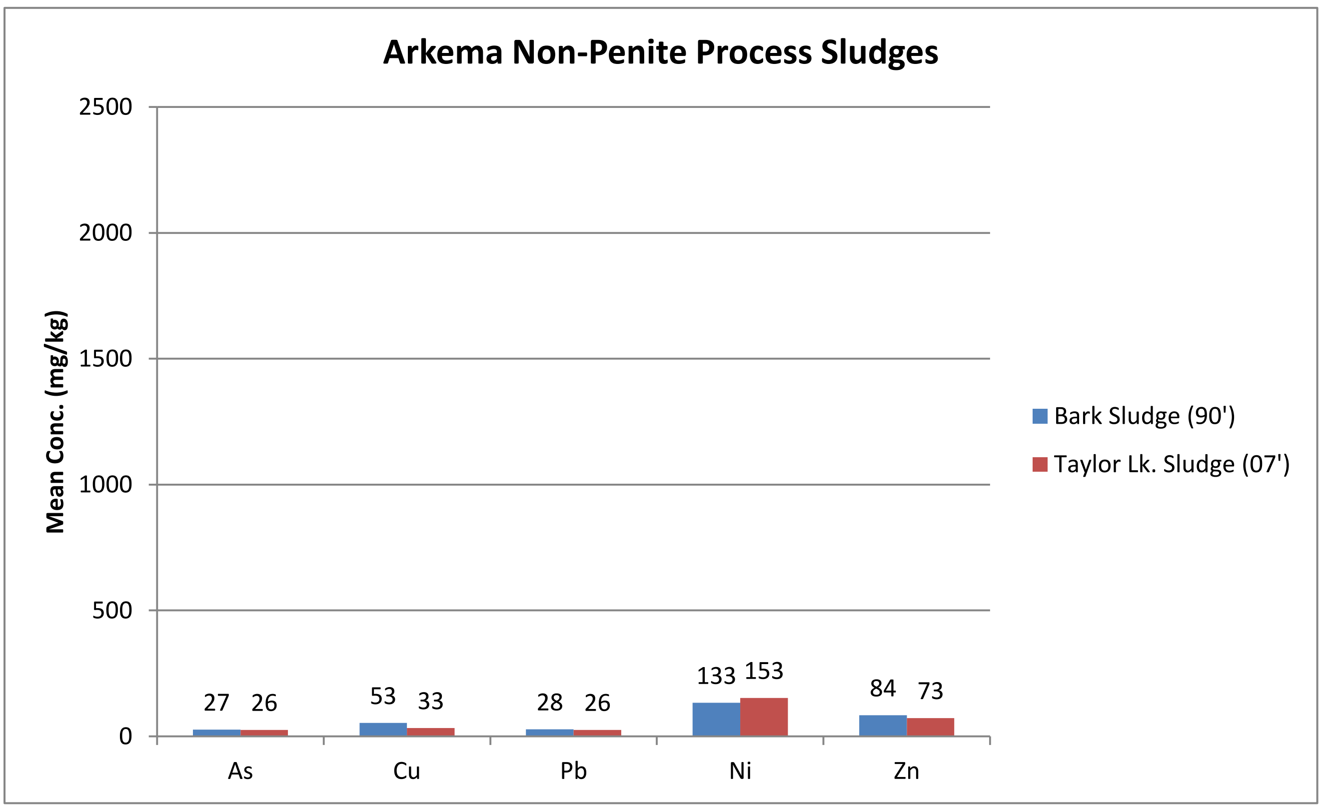
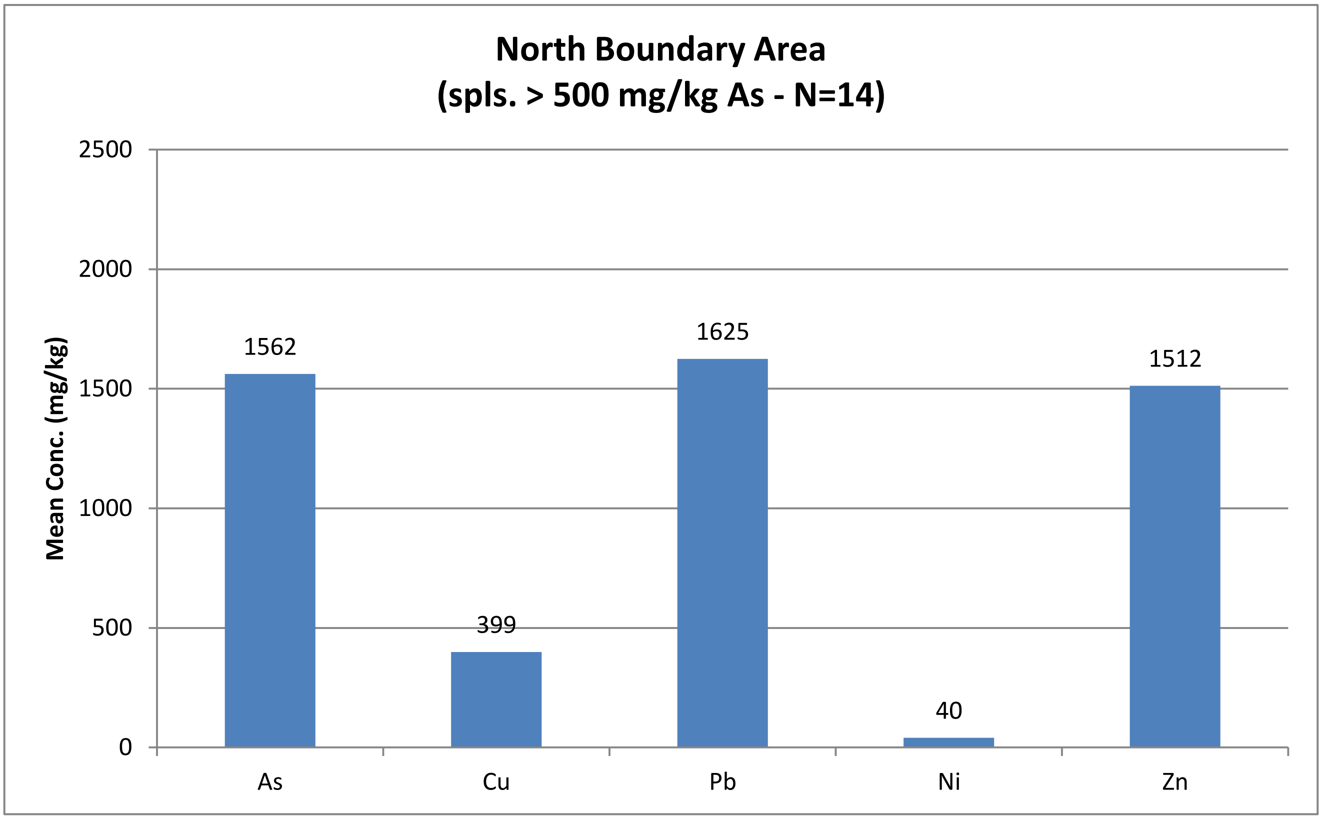


FIGURE 7-3 - Comparison With Arkema Materials



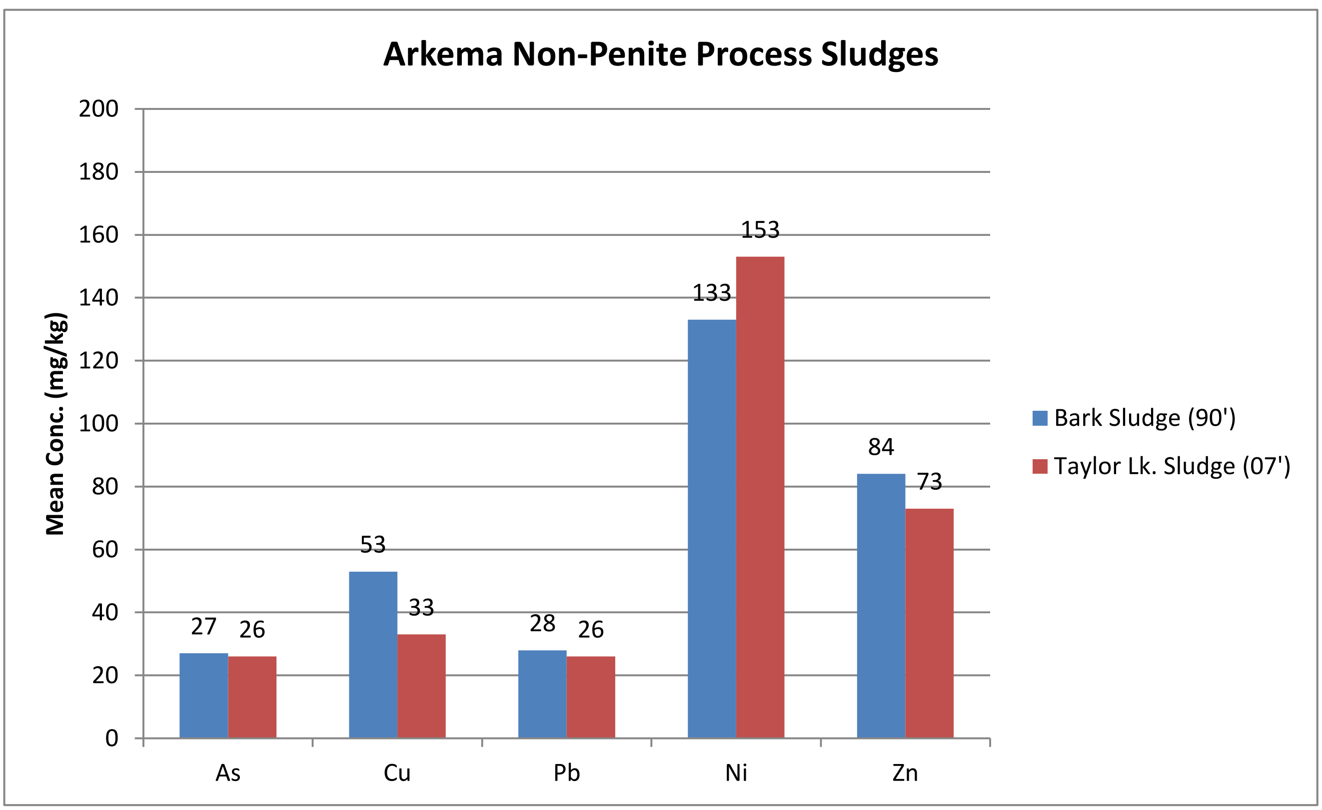
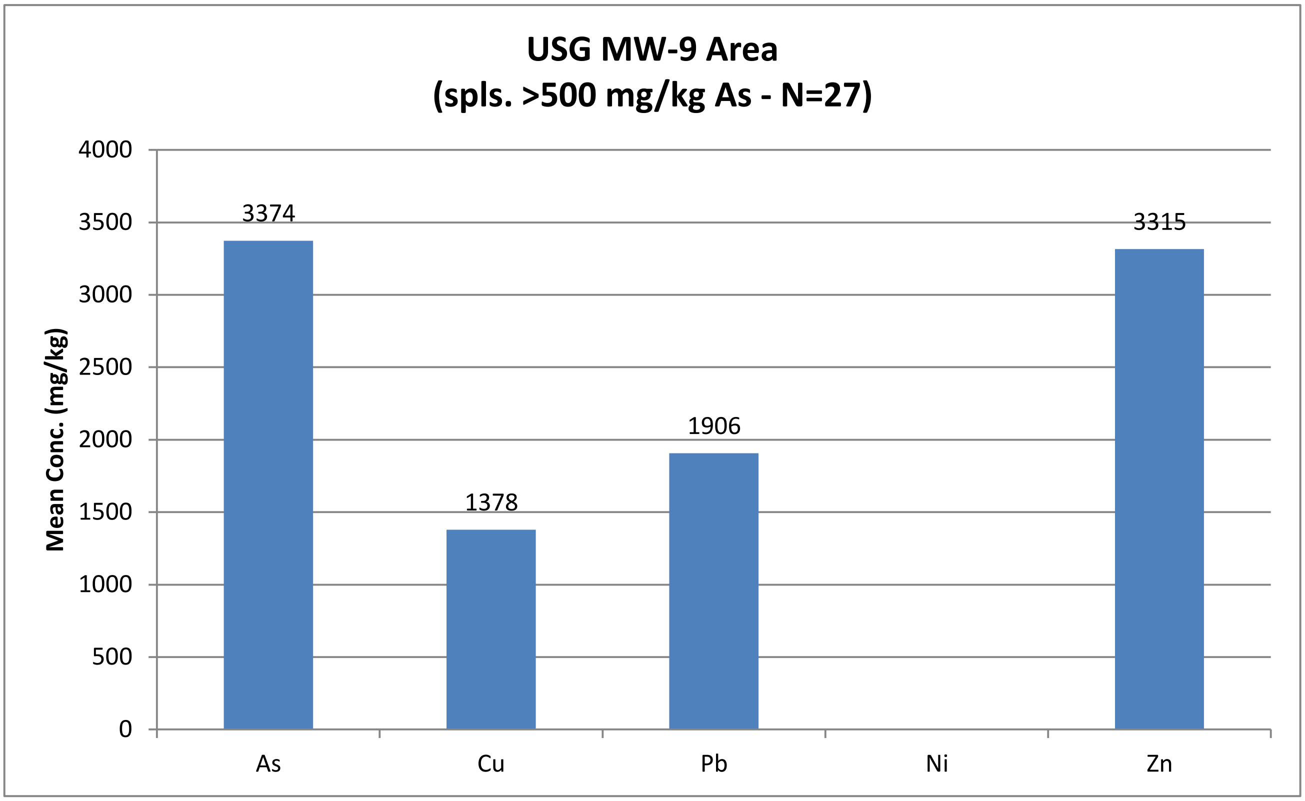


FIGURE 7-3 - Comparison With Arkema Materials



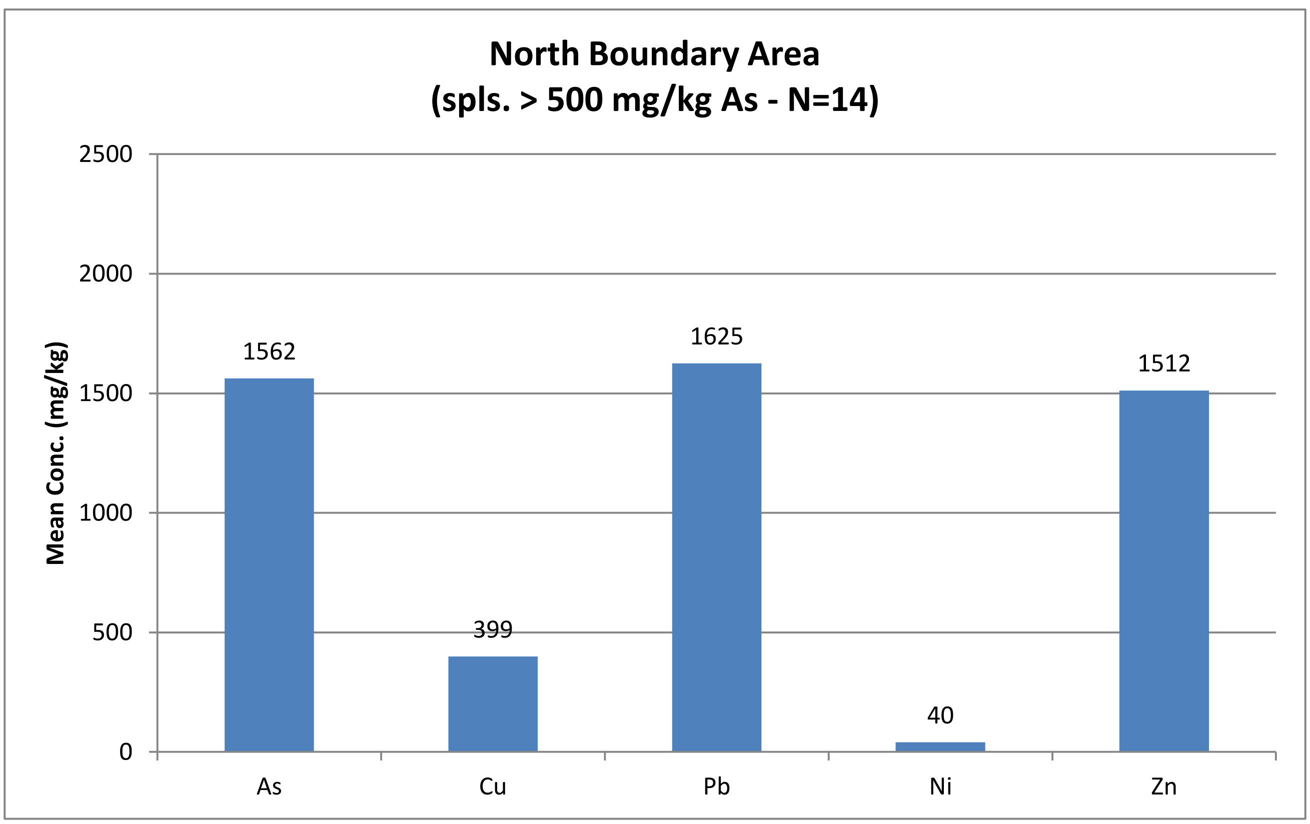
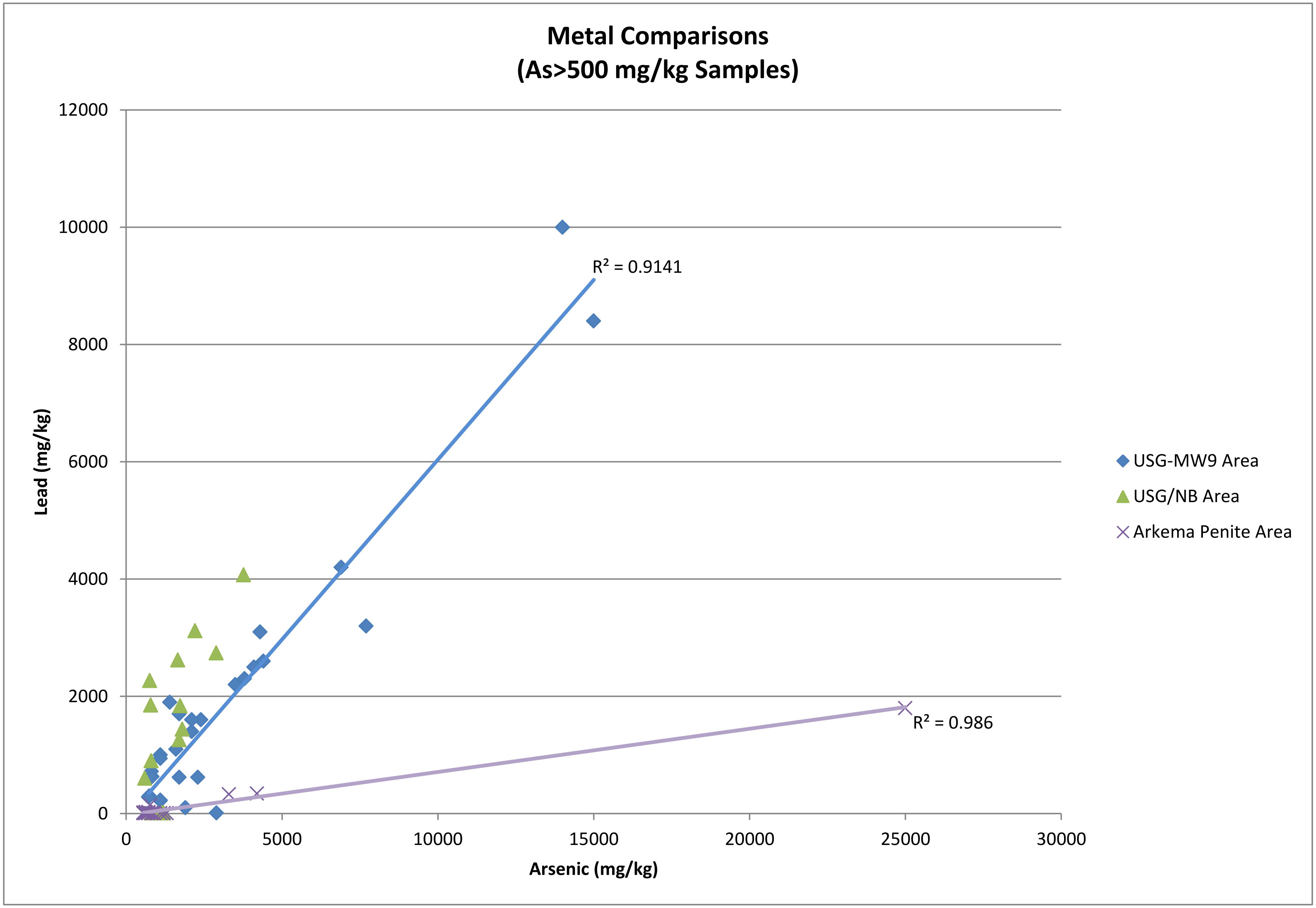


FIGURE 7-4 - Comparison With USG Soils

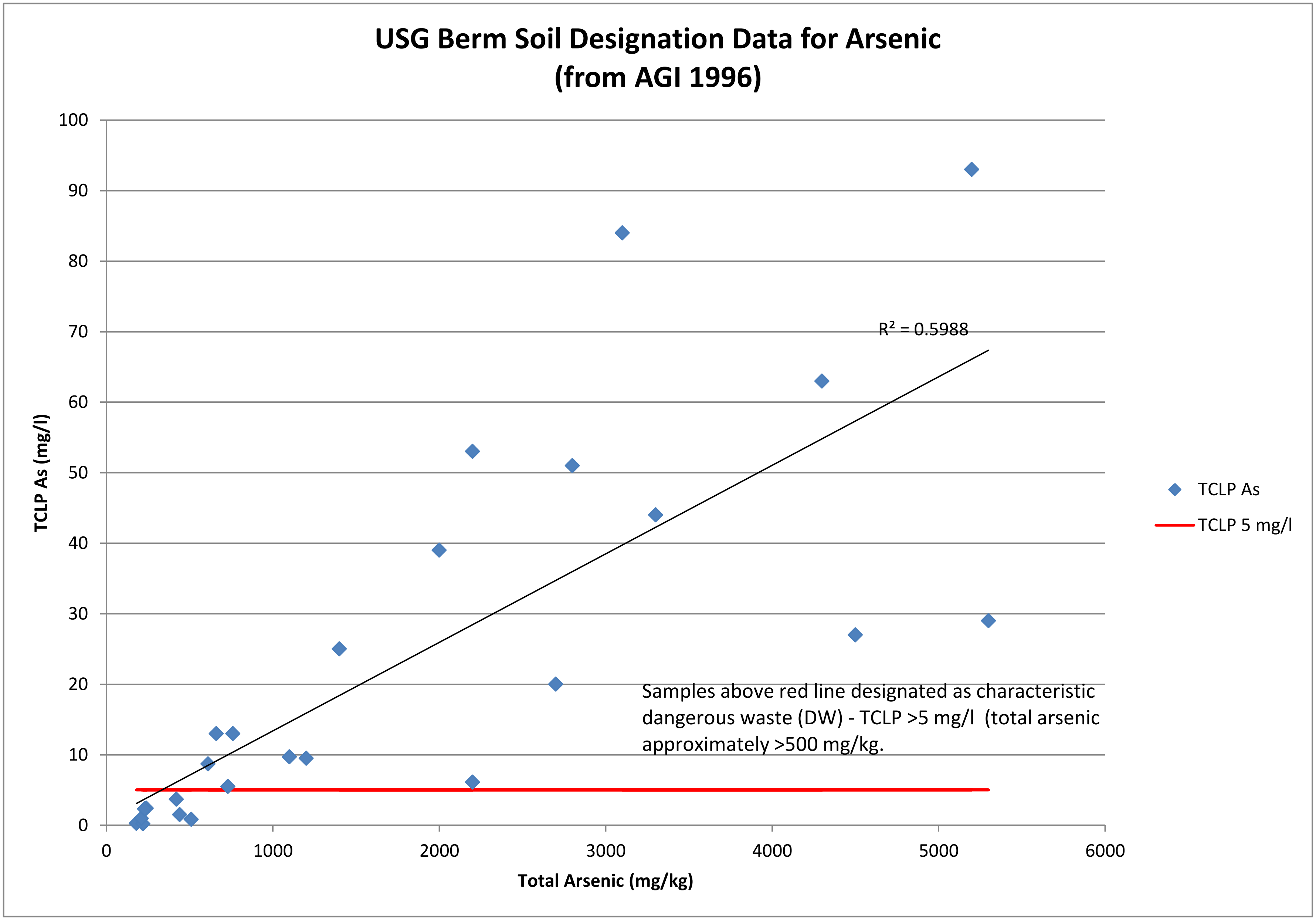


Dalton, Olmsted Fuglevand, Inc.

(Arkema Material Types - Regression-w Penite Area)

FIGURE 7-5

Lead vs. Arsenic Regression Comparisons



Dalton, Olmsted Fuglevand, Inc.

(USG Berm Soil Desig Plots-TCLP-Arsenic)

FIGURE 7-6a
USG Arsenic TCLP Test Results

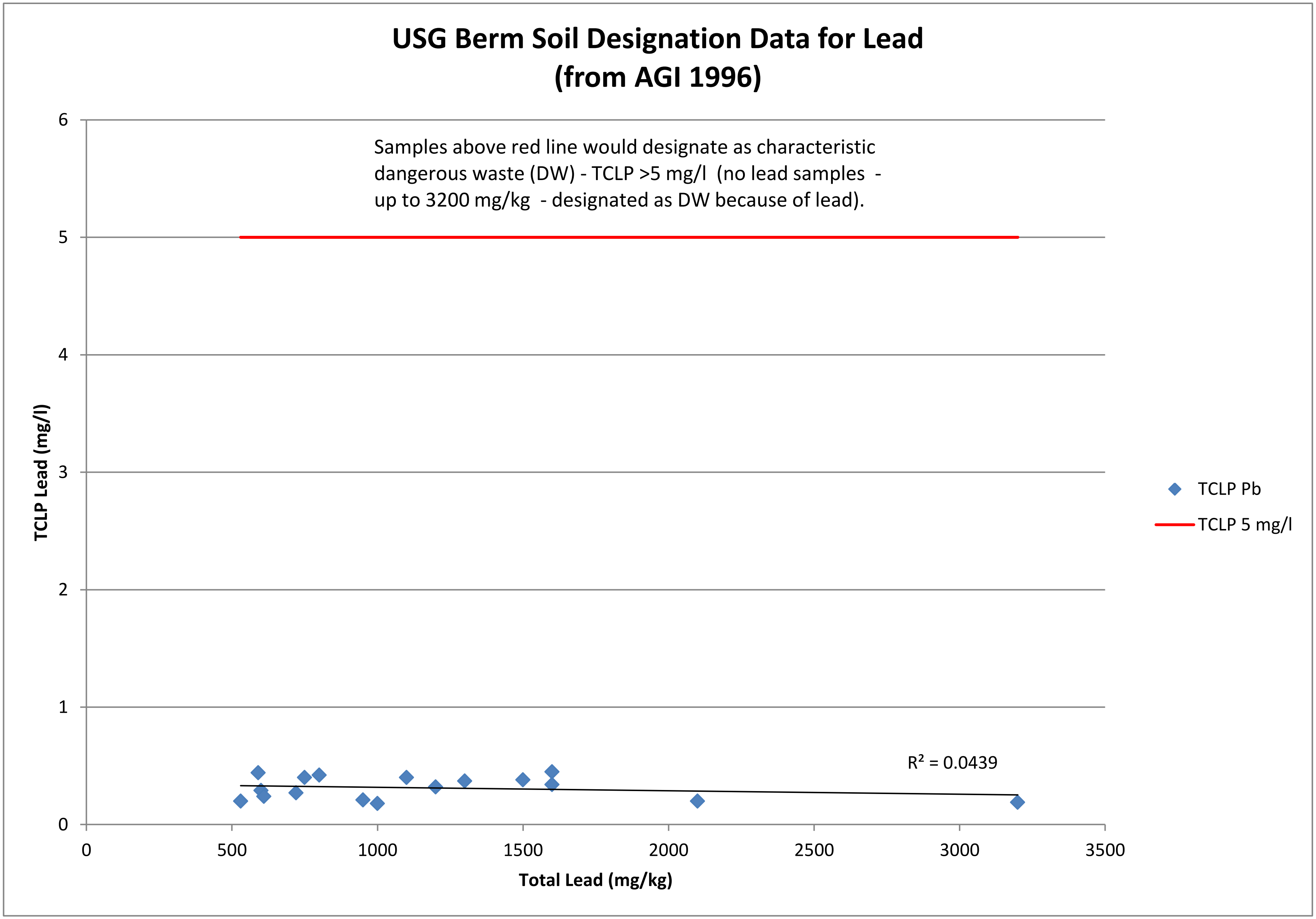
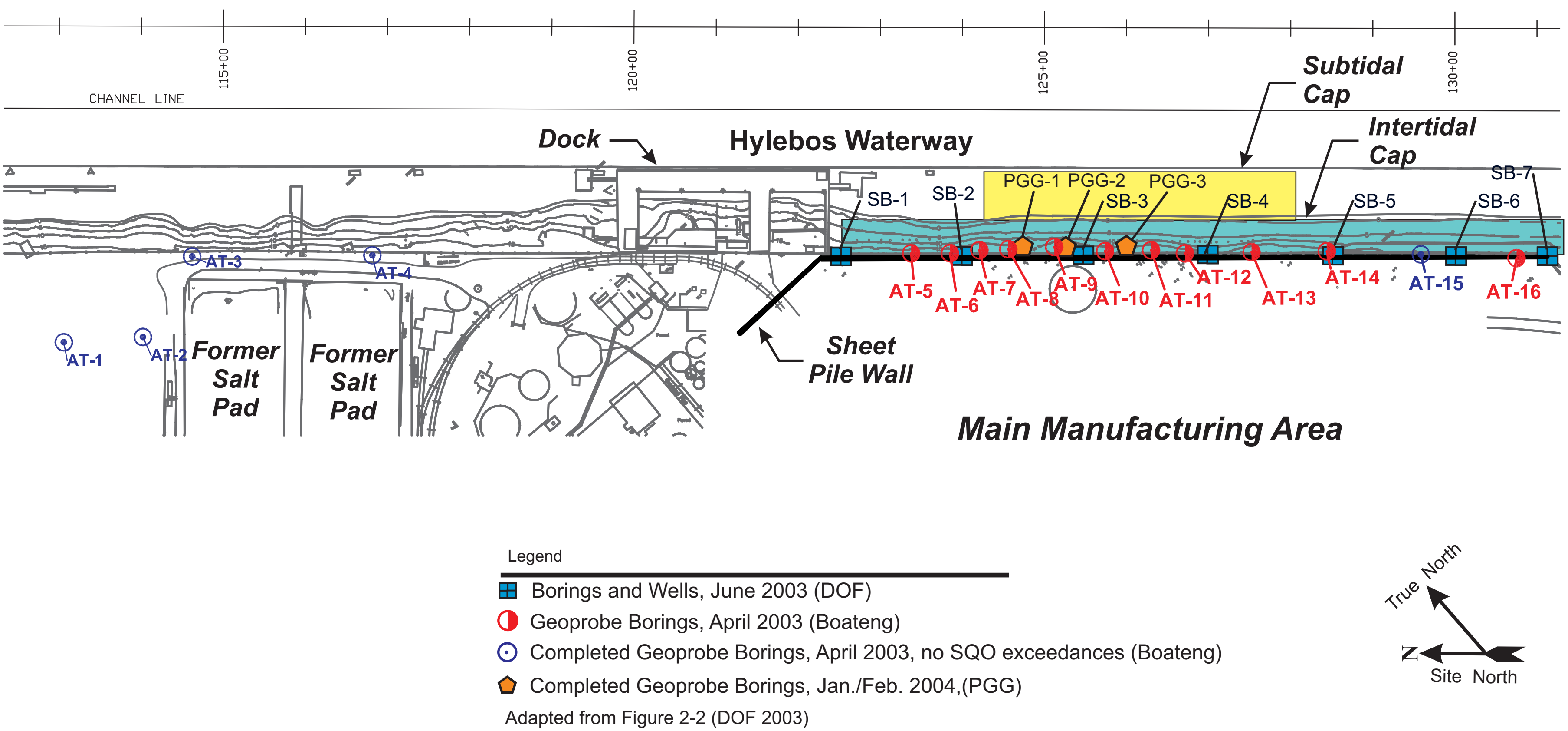


FIGURE 7-6b
USG Lead TCLP Test Results



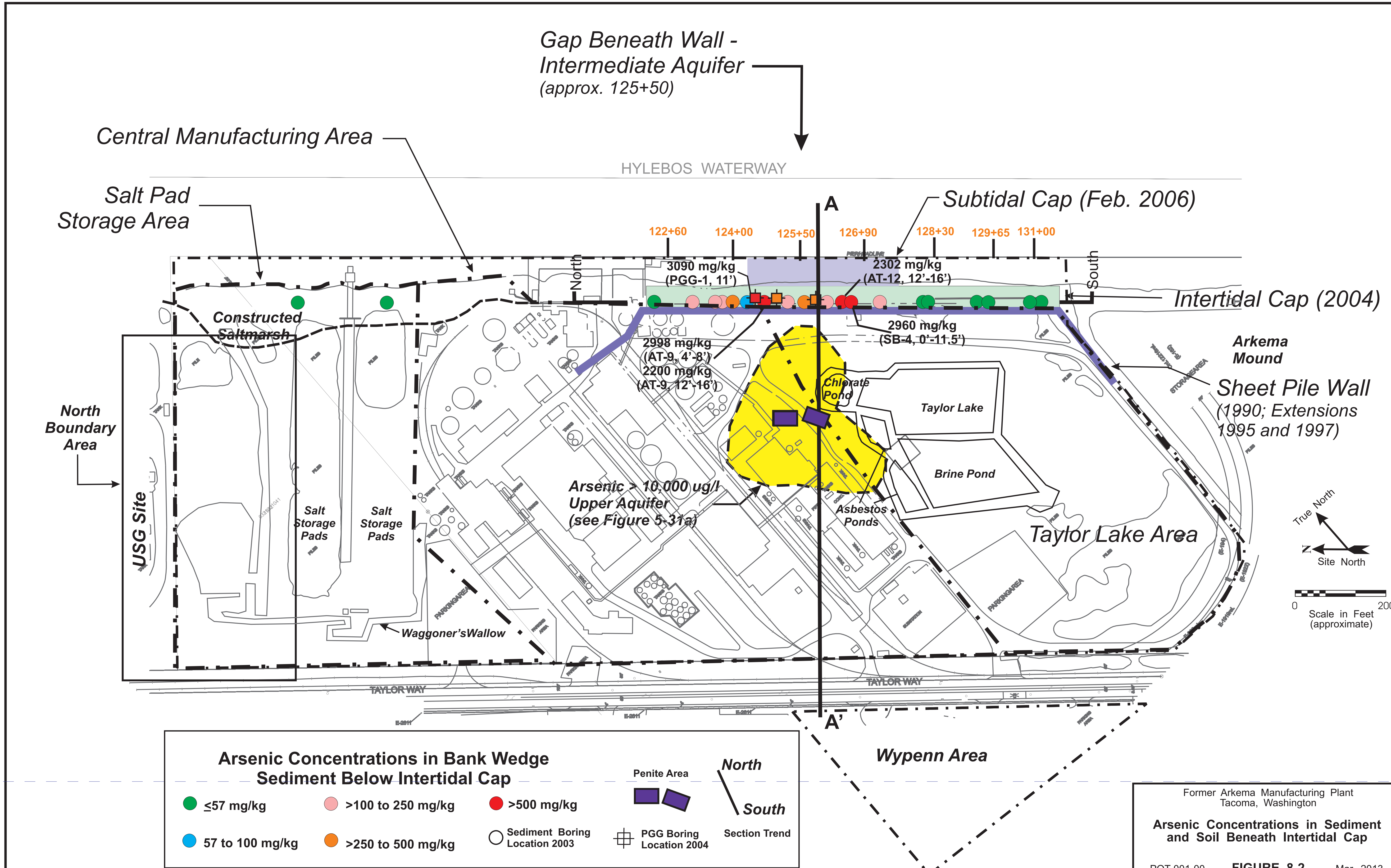
Former Arkema Manufacturing Plant
Tacoma, Washington

Wedge Area Boring Locations

POT-001-00 **FIGURE 8-1** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Wedge Boring Map 3-2013.cdr



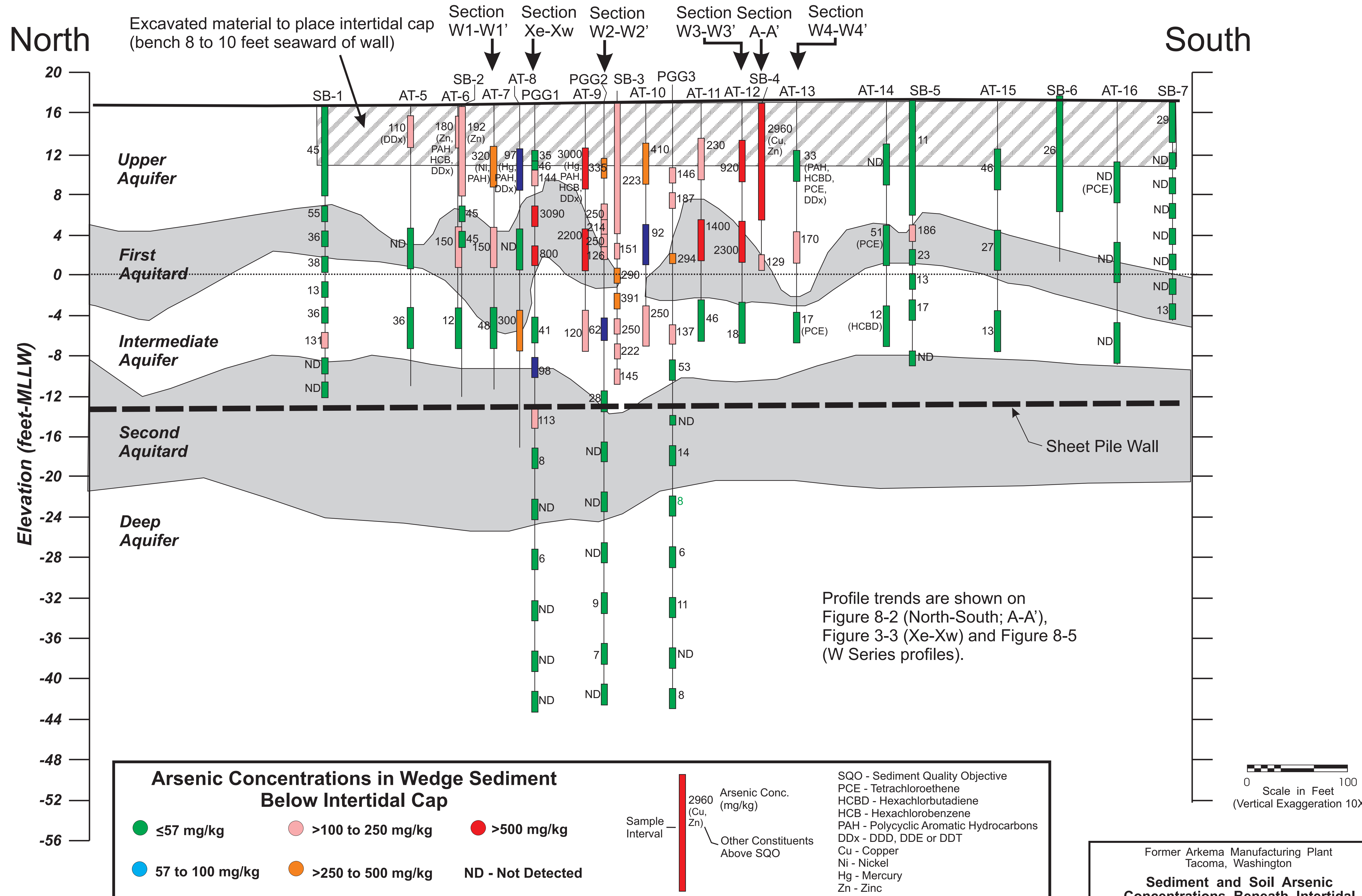
Ref: Site Plans - Wedge As Locations 2003_6-11-10 rev 3-13.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Concentrations in Sediment and Soil Beneath Intertidal Cap

POT-001-00 **FIGURE 8-2** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



Former Arkema Manufacturing Plant
Tacoma, Washington

Sediment and Soil Arsenic Concentrations Beneath Intertidal CAP (north-south section)

POT-001 **FIGURE 8-3** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: As Section Beneath Cap 6-11-10 rev 8-12.cdr (adapted from Figure 3 PGG 2004)

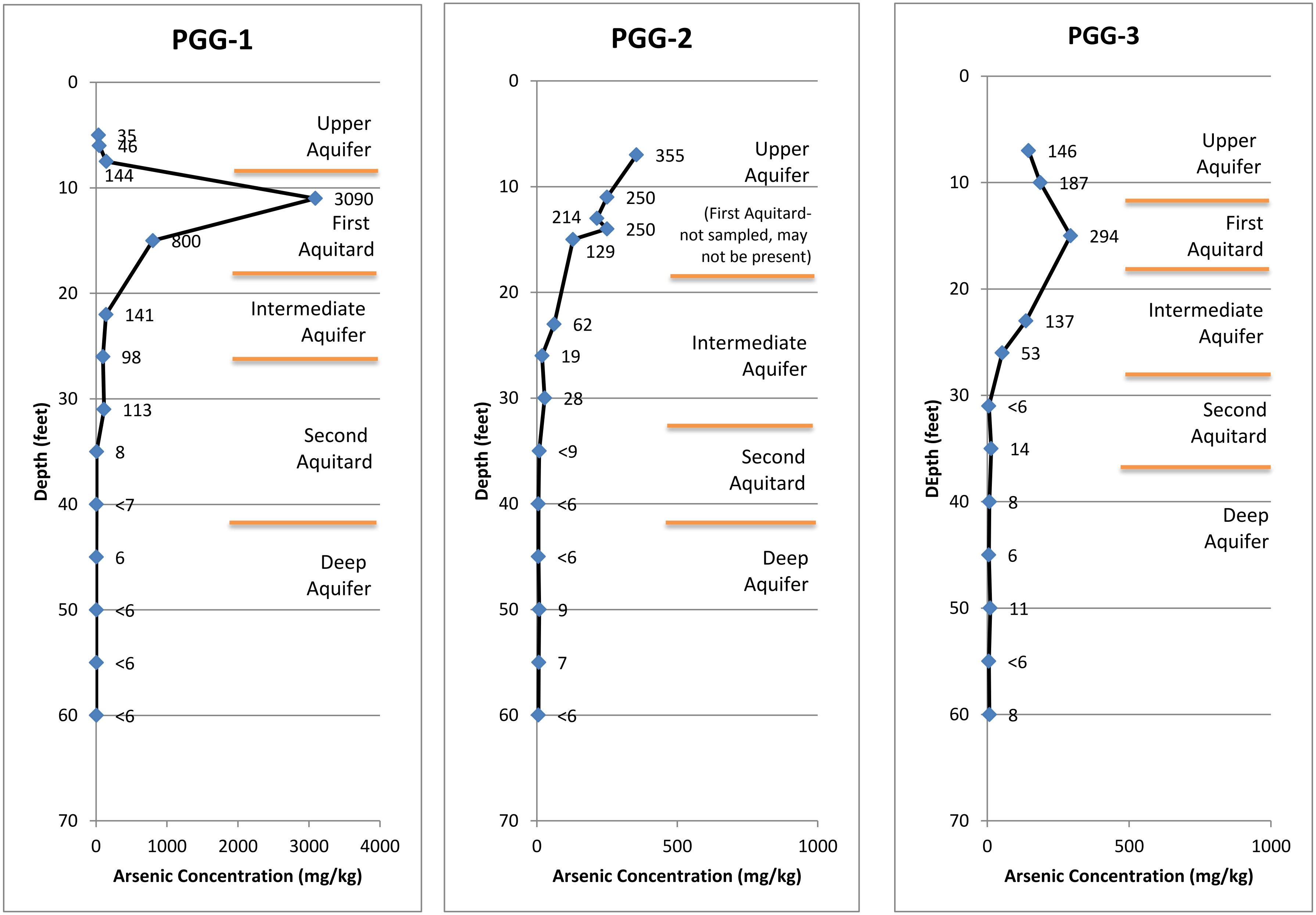
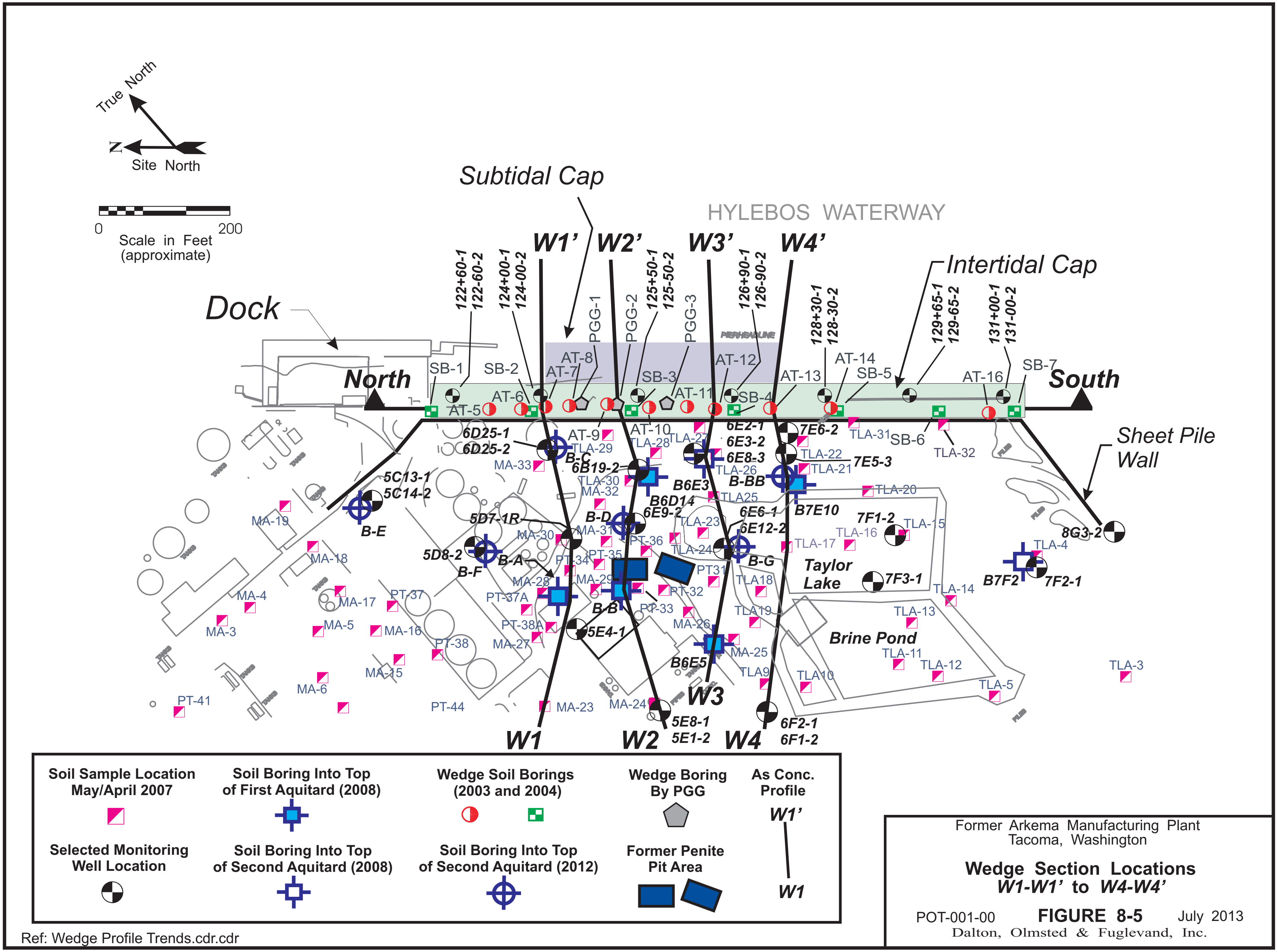
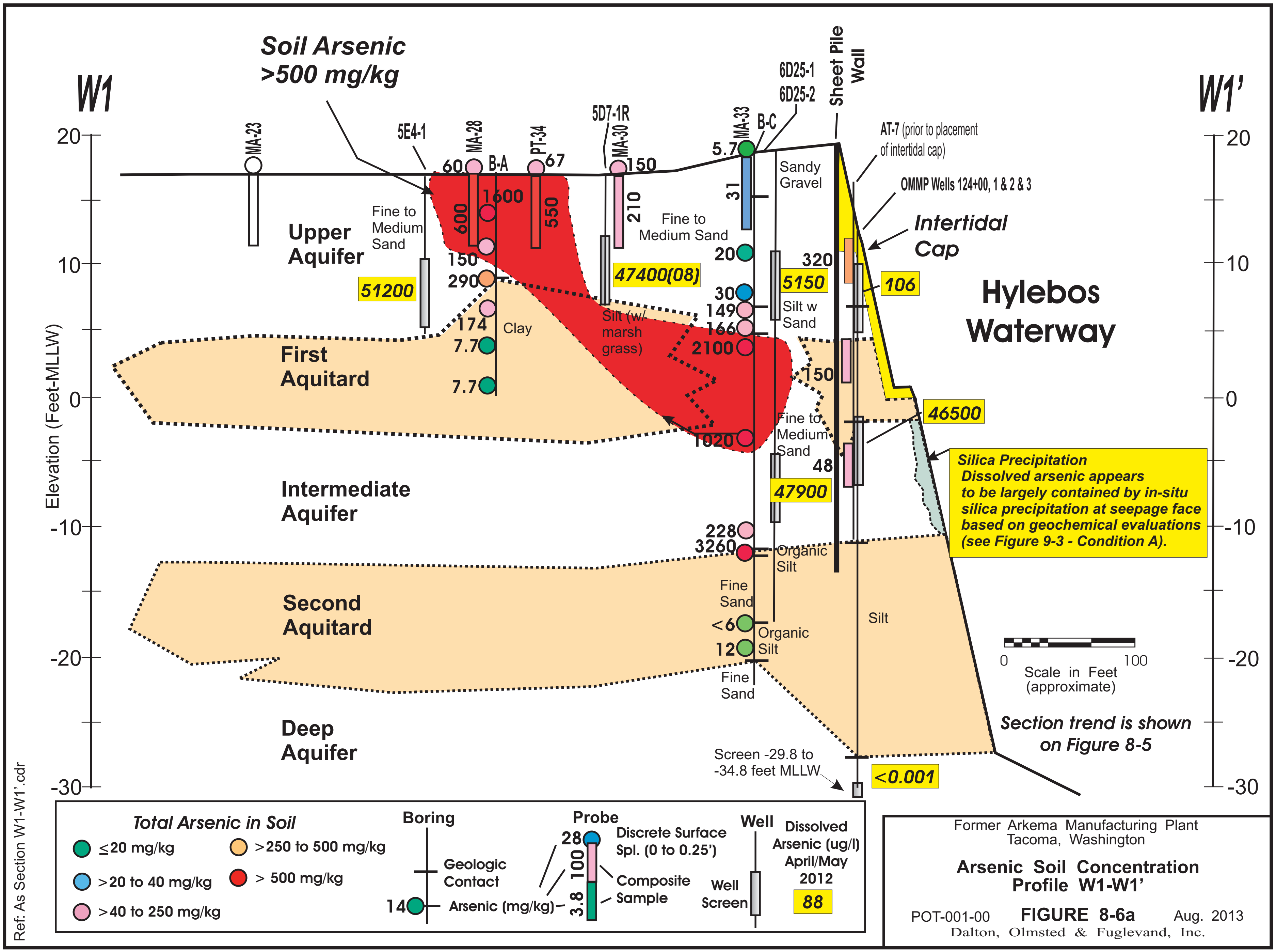
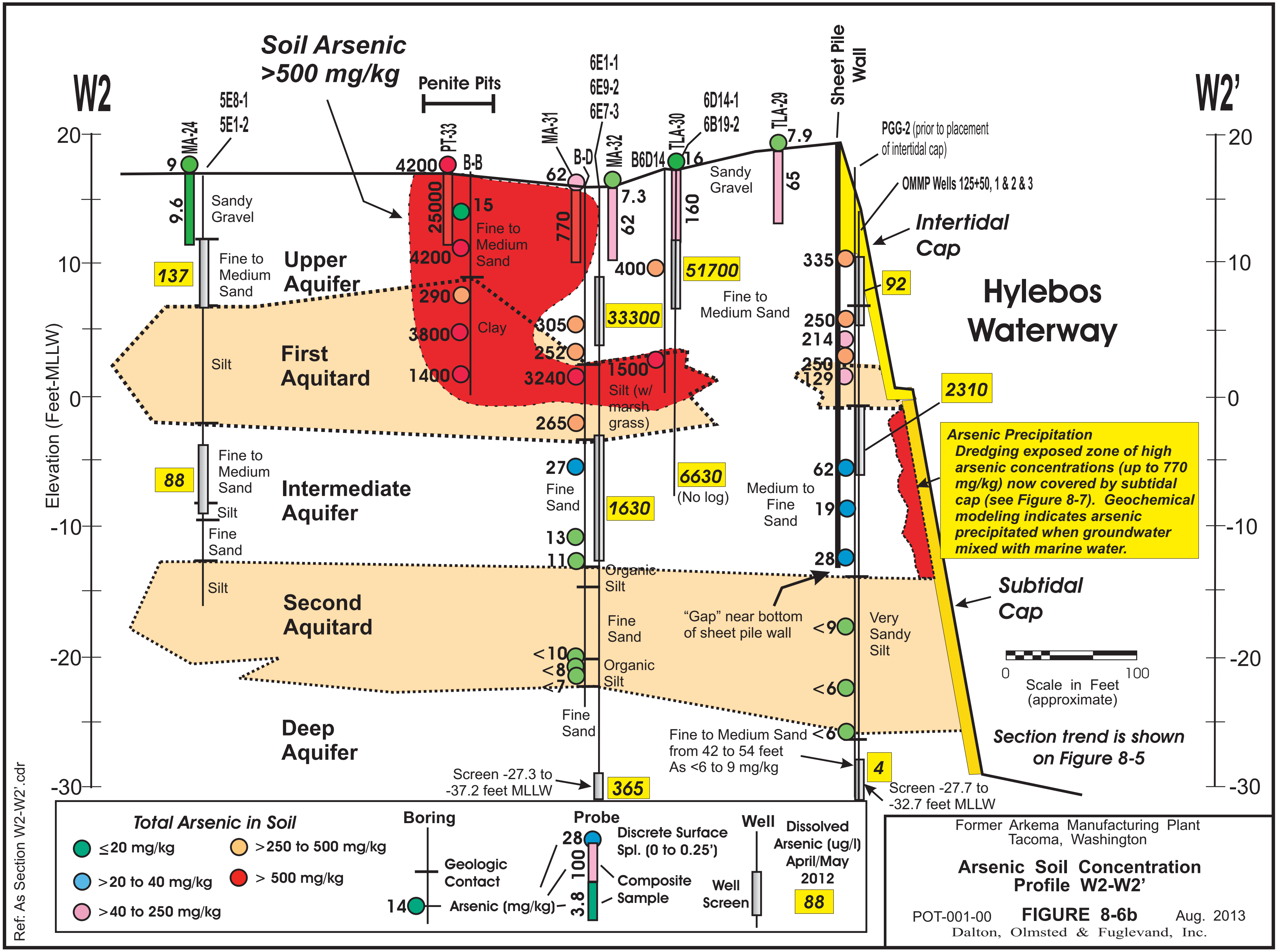


FIGURE 8-4 - Soil Arsenic Concentration Profiles Wedge Area


True North
Site North
0
200
Scale in Feet
(approximate)
Subtidal Cap
HYLEBOS WATERWAY
Dock
North
South
Intertidal Cap
Sheet Pile Wall
W1'
W2'
W3'
W4'
W1
W2
W3
W4
122+60-1
122-60-2
124+00-1
124-00-2
125+50-1
125-50-2
126+90-1
126-90-2
128+30-1
128-30-2
129+65-1
129-65-2
131+00-1
131-00-2
PGG-1
PGG-2
PGG-3
SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
AT-5
AT-6
AT-7
AT-8
AT-9
AT-10
AT-11
AT-12
AT-13
AT-14
AT-16
6D25-1
6D25-2
5C13-1
5C14-2
B-E
B-C
6B19-2
B6E3
B6D14
B-D
6E9-2
5D7-1R
5D8-2
B-A
B-F
B-B
5E4-1
B6E5
5E8-1
5E1-2
6F2-1
6F1-2
6E2-1
6E3-2
6E8-3
7E6-2
7E5-3
B-BB
B7E10
6E6-1
6E12-2
B-G
7F1-2
7F3-1
Taylor Lake
Brine Pond
8G3-2
B7F2
7F2-1
TLA-3
TLA-4
TLA-5
TLA-11
TLA-12
TLA-13
TLA-14
TLA-15
TLA-16
TLA-17
TLA18
TLA19
TLA-20
TLA-21
TLA-22
TLA-23
TLA-24
TLA25
TLA-26
TLA-28
TLA-29
TLA-30
TLA-31
TLA-32
TLA9
TLA10
MA-3
MA-4
MA-5
MA-6
MA-15
MA-16
MA-17
MA-18
MA-19
MA-23
MA-24
MA-25
MA-26
MA-27
MA-28
MA-29
MA-30
MA-31
MA-32
MA-33
PT-31
PT-32
PT-33
PT-34
PT-35
PT-36
PT-37
PT-37A
PT-38
PT-38A
PT-41
PT-44
Soil Sample Location May/April 2007
Soil Boring Into Top of First Aquitard (2008)
Wedge Soil Borings (2003 and 2004)
Wedge Boring By PGG
As Conc. Profile
Selected Monitoring Well Location
Soil Boring Into Top of Second Aquitard (2008)
Soil Boring Into Top of Second Aquitard (2012)
Former Penite Pit Area
Ref: Wedge Profile Trends.cdr.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Wedge Section Locations
W1-W1' to W4-W4'
POT-001-00
FIGURE 8-5
July 2013
Dalton, Olmsted & Fuglevand, Inc.



W1
W1'
Soil Arsenic
>500 mg/kg
MA-23
5E4-1
MA-28
B-A
PT-34
5D7-1R
MA-30
MA-33
B-C
6D25-1
6D25-2
Sheet Pile Wall
AT-7 (prior to placement of intertidal cap)
OMMP Wells 124+00, 1 & 2 & 3
Intertidal Cap
Hylebos Waterway
Upper Aquifer
Fine to Medium Sand
Sandy Gravel
Silt w Sand
Clay
Silt (w/ marsh grass)
First Aquitard
Fine to Medium Sand
Intermediate Aquifer
Organic Silt
Fine Sand
Second Aquitard
Silt
Deep Aquifer
51200
47400(08)
5150
106
46500
47900
<0.001
Silica Precipitation
Dissolved arsenic appears to be largely contained by in-situ silica precipitation at seepage face based on geochemical evaluations (see Figure 9-3 - Condition A).
Screen -29.8 to -34.8 feet MLLW
0
100
Scale in Feet (approximate)
Section trend is shown on Figure 8-5
Elevation (Feet-MLLW)
20
10
0
-10
-20
-30
Ref: As Section W1-W1'.cdr
Total Arsenic in Soil
≤20 mg/kg
>20 to 40 mg/kg
>40 to 250 mg/kg
>250 to 500 mg/kg
> 500 mg/kg
Boring
Geologic Contact
Arsenic (mg/kg)
Probe
Discrete Surface Spl. (0 to 0.25')
Composite Sample
Well
Well Screen
Dissolved Arsenic (ug/l) April/May 2012
88
Former Arkema Manufacturing Plant
Tacoma, Washington
Arsenic Soil Concentration Profile W1-W1'
POT-001-00
FIGURE 8-6a
Aug. 2013
Dalton, Olmsted & Fuglevand, Inc.

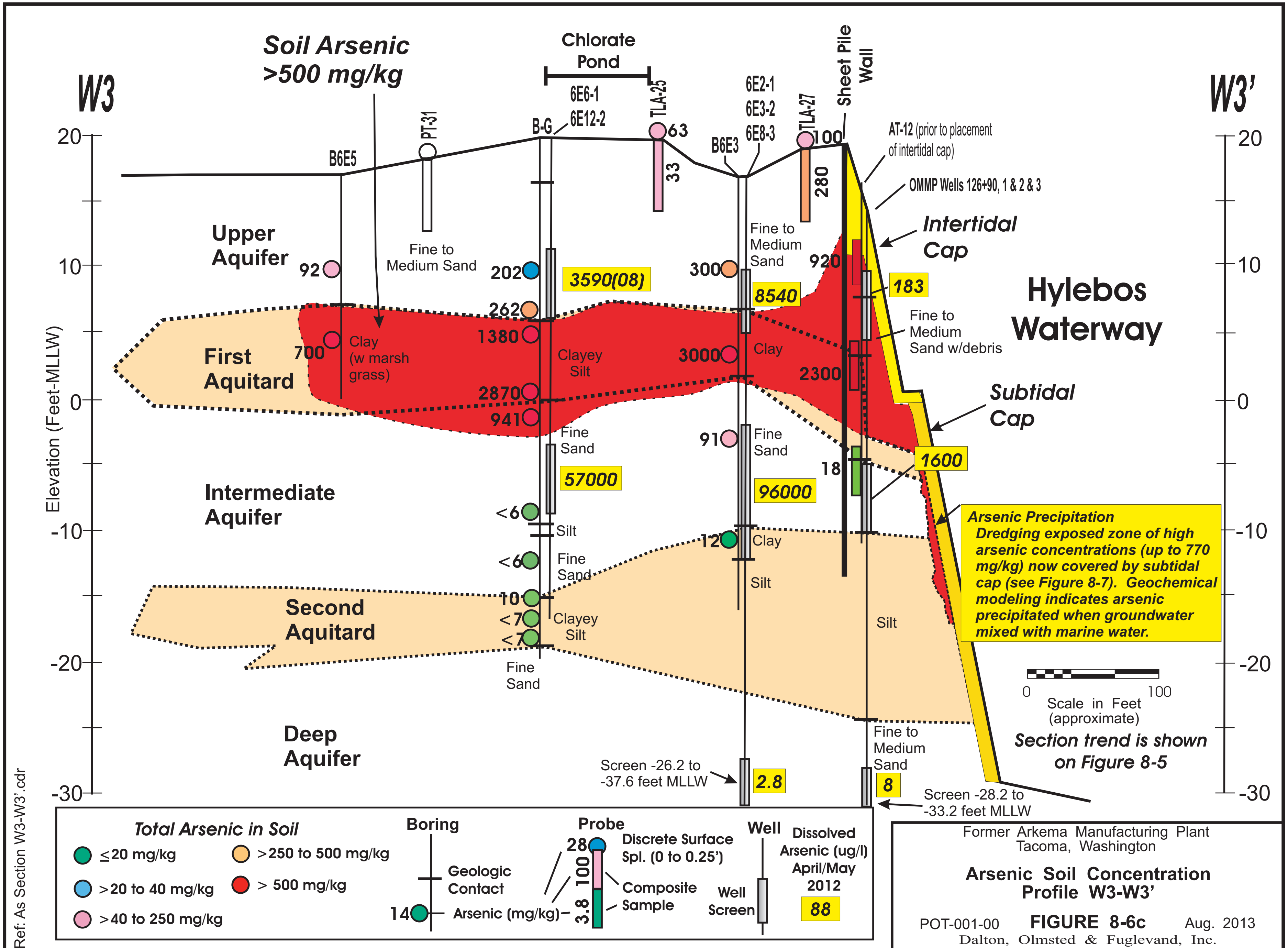


Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Soil Concentration Profile W2-W2'

POT-001-00 **FIGURE 8-6b** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.

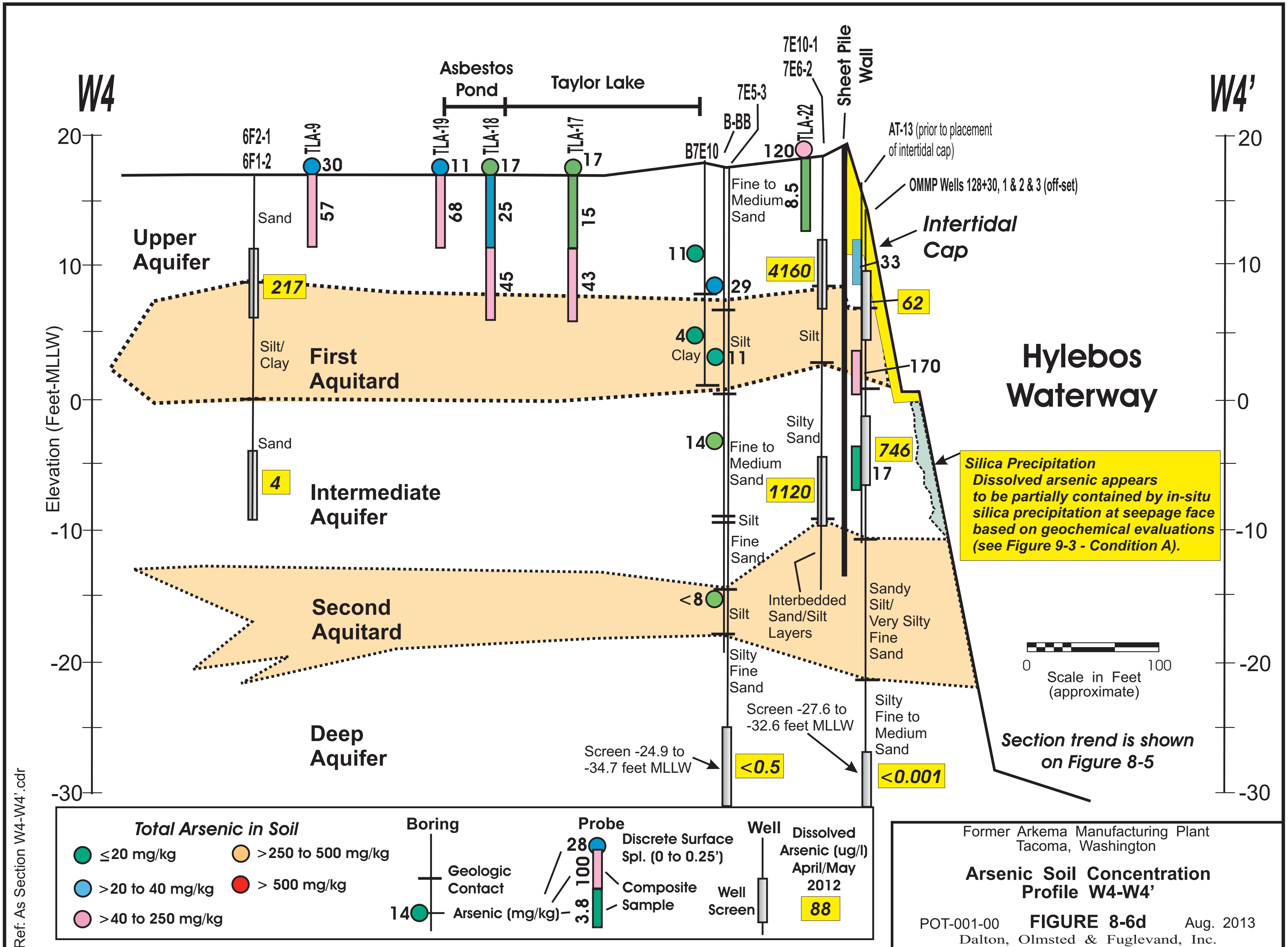


Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Soil Concentration Profile W3-W3'

POT-001-00 **FIGURE 8-6c** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.

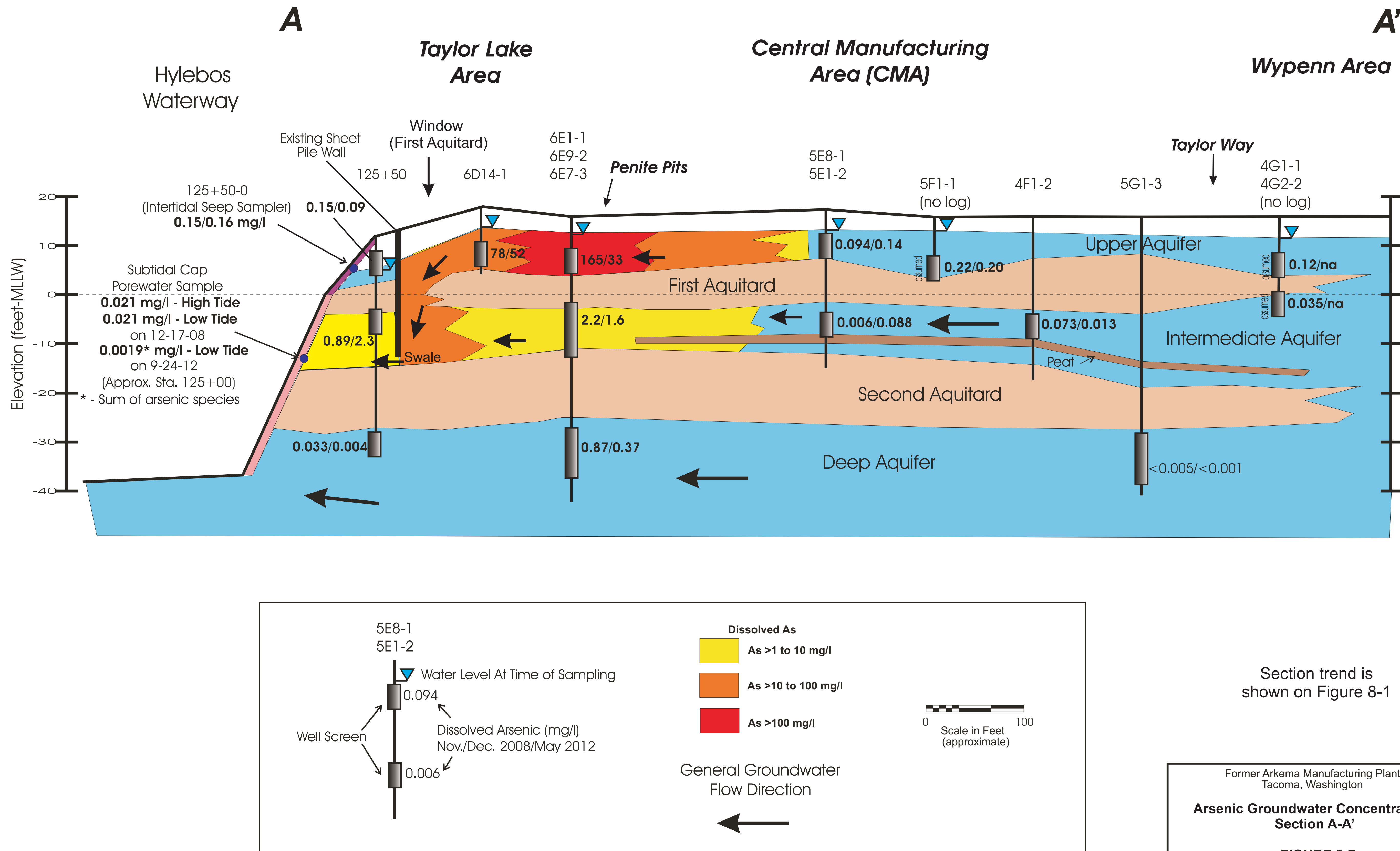


Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Soil Concentration Profile W4-W4'

POT-001-00 **FIGURE 8-6d** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.



Section trend is shown on Figure 8-1

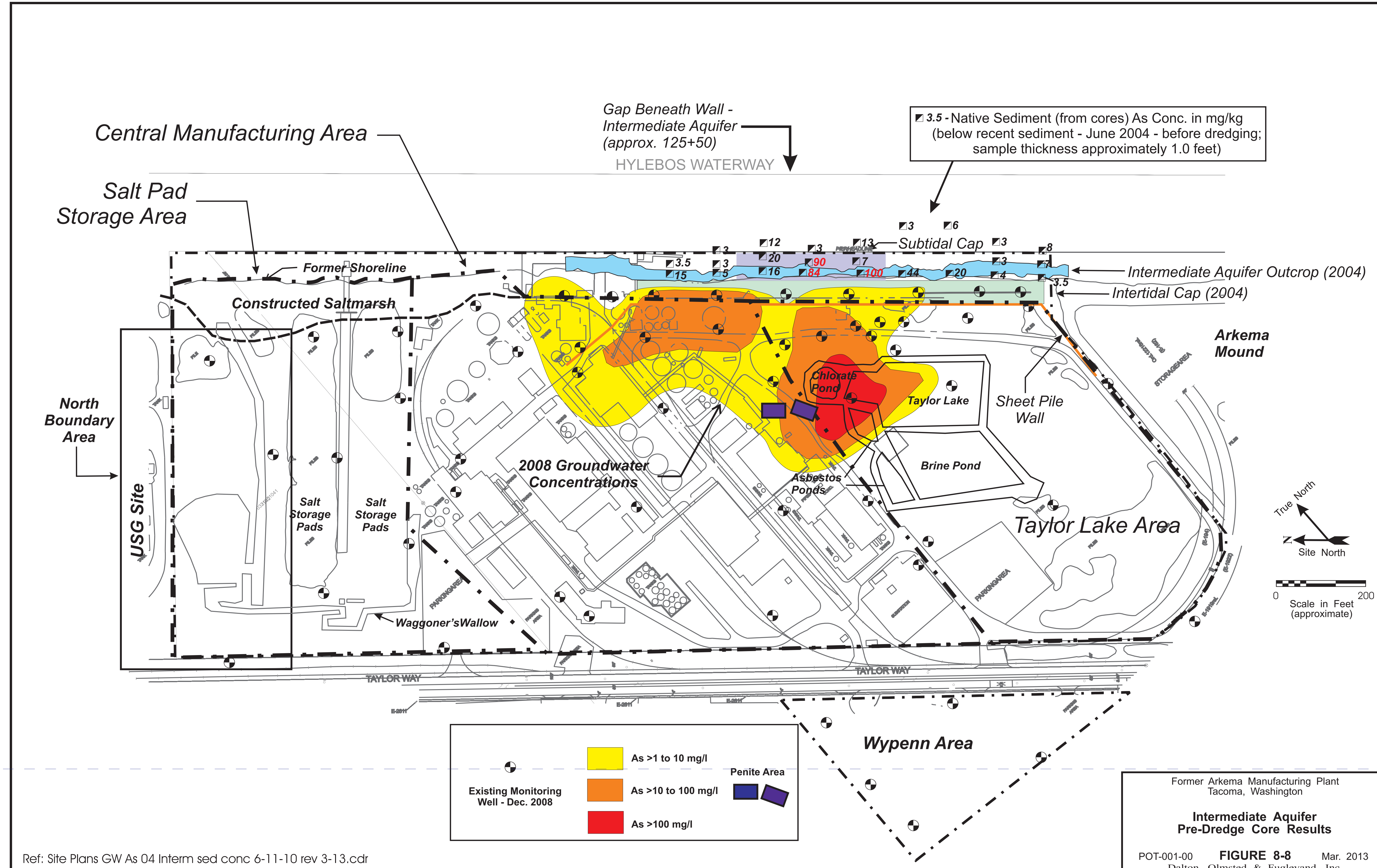
Ref: Section D-D'Rev 6-11-10 rev A-A 3-13.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Groundwater Concentrations Section A-A'

POT-001-00 **FIGURE 8-7** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



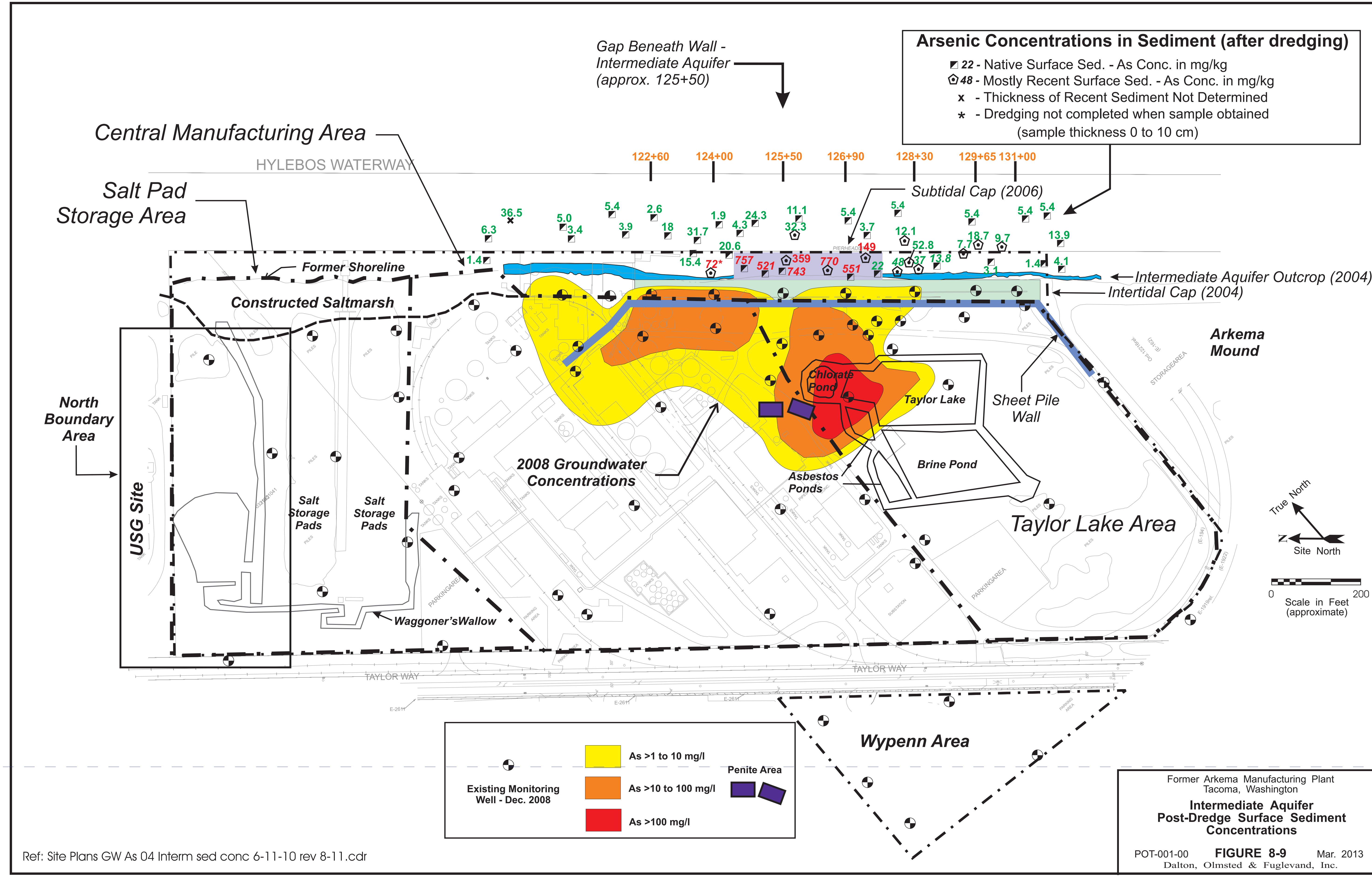
Former Arkema Manufacturing Plant
Tacoma, Washington

Intermediate Aquifer Pre-Dredge Core Results

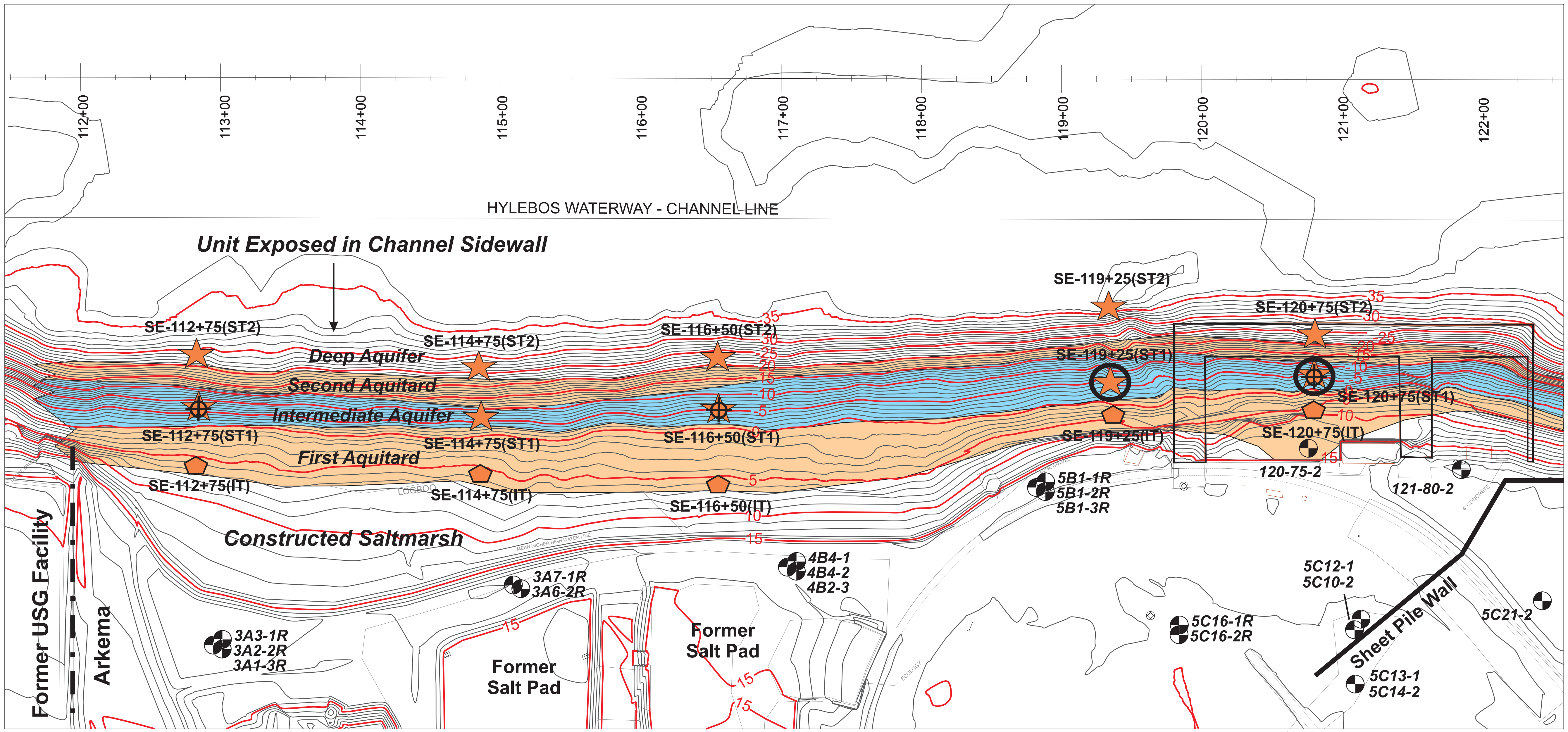
POT-001-00 **FIGURE 8-8** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Site Plans GW As 04 Interm sed conc 6-11-10 rev 3-13.cdr



Arsenic Concentrations in Sediment (after dredging)
22 - Native Surface Sed. - As Conc. in mg/kg
48 - Mostly Recent Surface Sed. - As Conc. in mg/kg
x - Thickness of Recent Sediment Not Determined
* - Dredging not completed when sample obtained
(sample thickness 0 to 10 cm)
Gap Beneath Wall - Intermediate Aquifer (approx. 125+50)
Central Manufacturing Area
HYLEBOS WATERWAY
Salt Pad Storage Area
122+60
124+00
125+50
126+90
128+30
129+65
131+00
Subtidal Cap (2006)
Former Shoreline
Constructed Saltmarsh
Intermediate Aquifer Outcrop (2004)
Intertidal Cap (2004)
Arkema Mound
North Boundary Area
USG Site
Chlorate Pond
Taylor Lake
Sheet Pile Wall
2008 Groundwater Concentrations
Asbestos Ponds
Brine Pond
Salt Storage Pads
Salt Storage Pads
Waggoner'sWallow
Taylor Lake Area
True North
Site North
0
200
Scale in Feet (approximate)
TAYLOR WAY
TAYLOR WAY
Wypenn Area
Existing Monitoring Well - Dec. 2008
As >1 to 10 mg/l
As >10 to 100 mg/l
As >100 mg/l
Penite Area
Ref: Site Plans GW As 04 Interm sed conc 6-11-10 rev 8-11.cdr
Former Arkema Manufacturing Plant
Tacoma, Washington
Intermediate Aquifer
Post-Dredge Surface Sediment Concentrations
POT-001-00
FIGURE 8-9
Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.



	Existing Monitoring Well		Intertidal (IT) Sediment Sample Location (0 to 10cm)
3A3-1R	Well No.		Subtidal Sediment Sample Location (0 to 10 cm)
- 1R	Upper Aquifer Well		Shallow Subtidal Core (sample 20 to 30 cm)
- 2R	Intermediate Aquifer Well		Porewater Sample Location
- 3R	Deep Aquifer Well		

True North

Site North

0 80

Scale in Feet (approximate)

Elevations - Feet MLLW

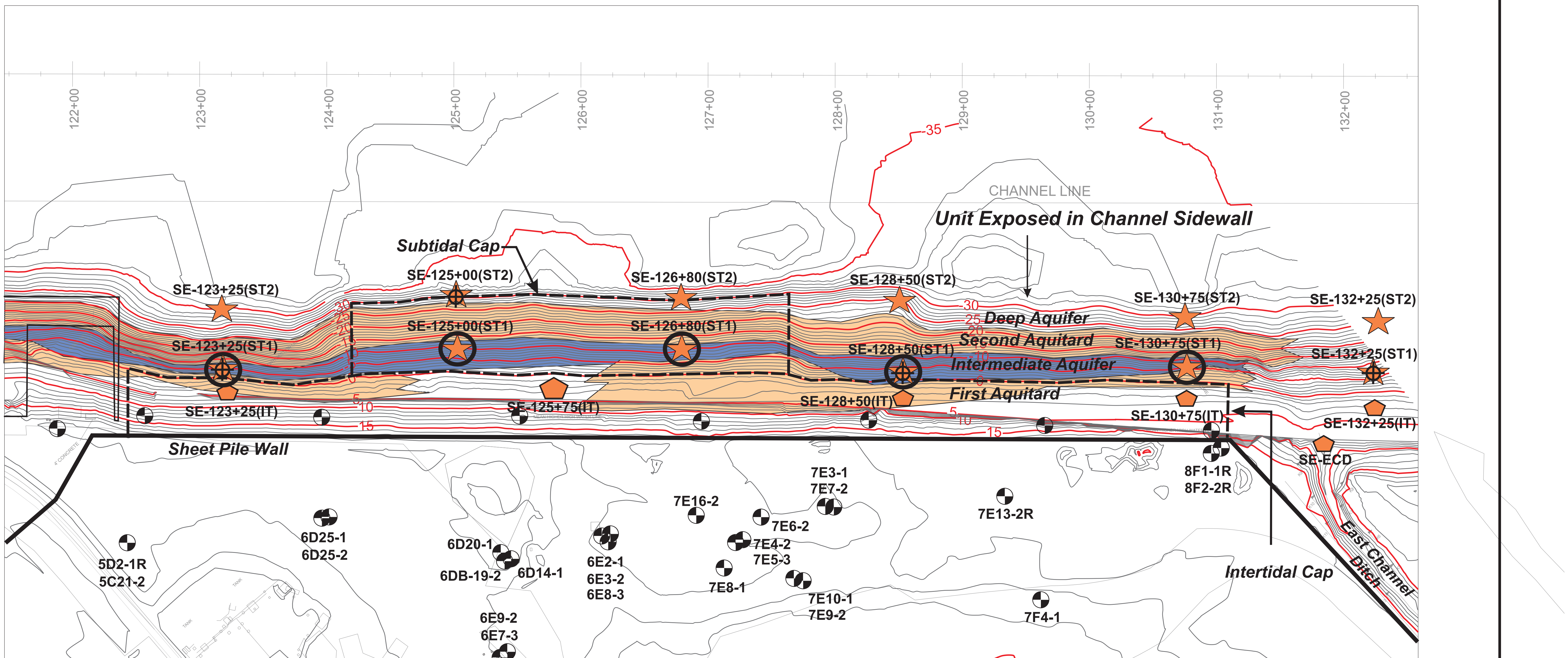
Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Shoreline Sampling Locations North Half

POT-001-00 **FIGURE 8-10a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Arkema Shoreline Sheet 1 Topo Base Sed Loc N.cdr



Existing Monitoring Well

3A3-1R Well No.

- 1R Upper Aquifer Well

- 2R Intermediate Aquifer Well

- 3R Deep Aquifer Well

Intertidal Sediment Sample Location (0 to 10cm)

Subtidal Sediment Sample Location (0 to 10cm)

Shallow Subtidal Core (sample 20 to 30 cm)

Porewater Sample Location

True North

Site North

0 80

Scale in Feet (approximate)

Elevations - Feet MLLW

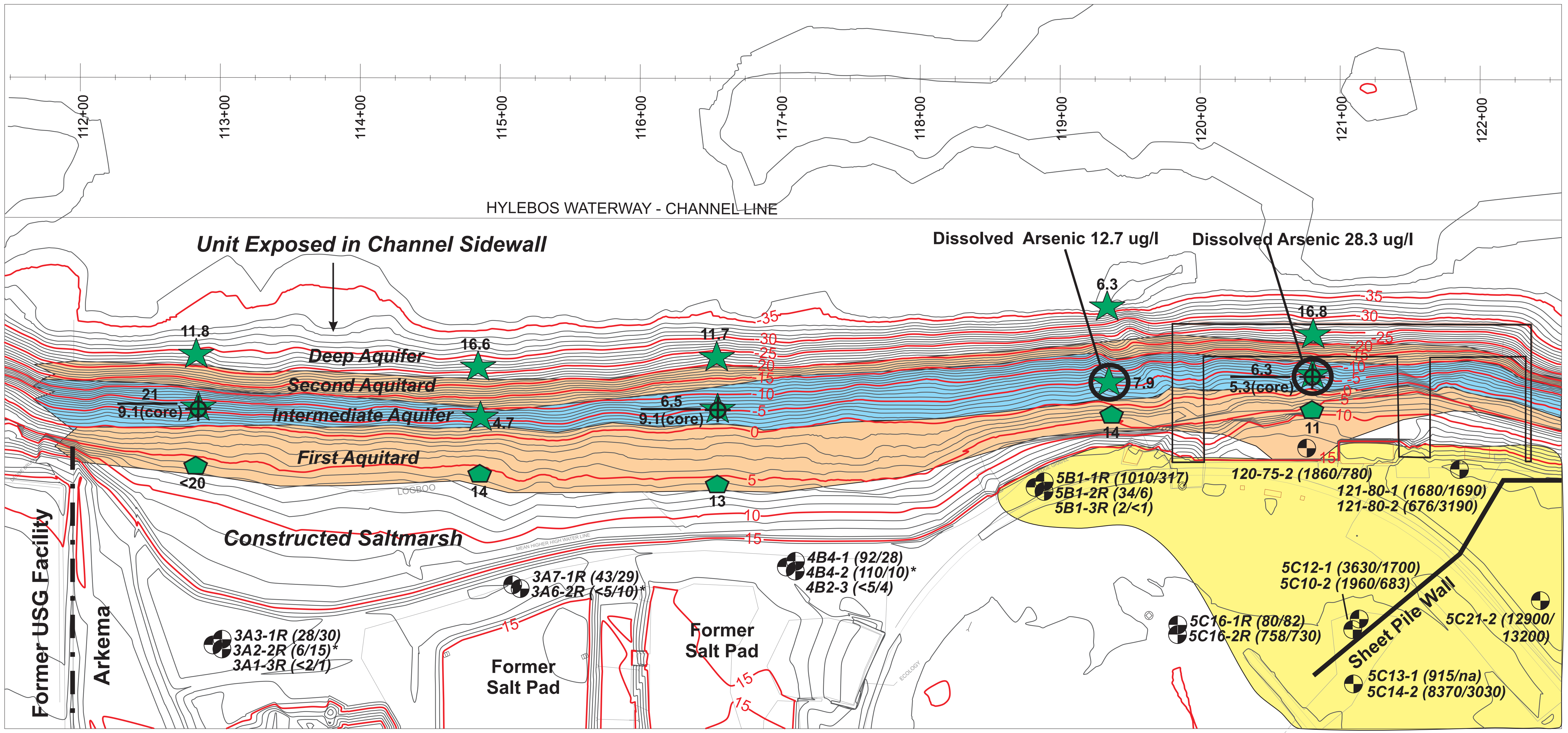
Ref: Arkema Shoreline Sheet 2 Topo Base Sed Loc S.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Arkema Shoreline Sampling Locations South Half

POT-001-00 **FIGURE 8-10b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



	Existing Monitoring Well
3A3-1R	Well No. (dissolved As 2008/2012 - ug/l)
- 1R	Upper Aquifer Well
- 2R	Intermediate Aquifer Well
- 3R	Deep Aquifer Well
*****	Result Impacted by High Chloride Concentrations
na	Not Analyzed
nd	Not Detected

Intertidal (IT) Sediment Sample Location (0 to 10cm)

Subtidal Sediment Sample Location (0 to 10 cm)

Shallow Subtidal Core (sample 20 to 30 cm)

Porewater Sample Location

19 Sediment Concentration (mg/kg) - (year collected)

Upland Dissolved Arsenic Concentration >1000 ug/l in one or more samples collected in 2008 and 2012

Sediment Concentrations Less Than Sediment Quality Objective of 57 mg/kg (August/September 2012)

0 80
Scale in Feet (approximate)

Elevations in Feet MLLW

True North
Site North

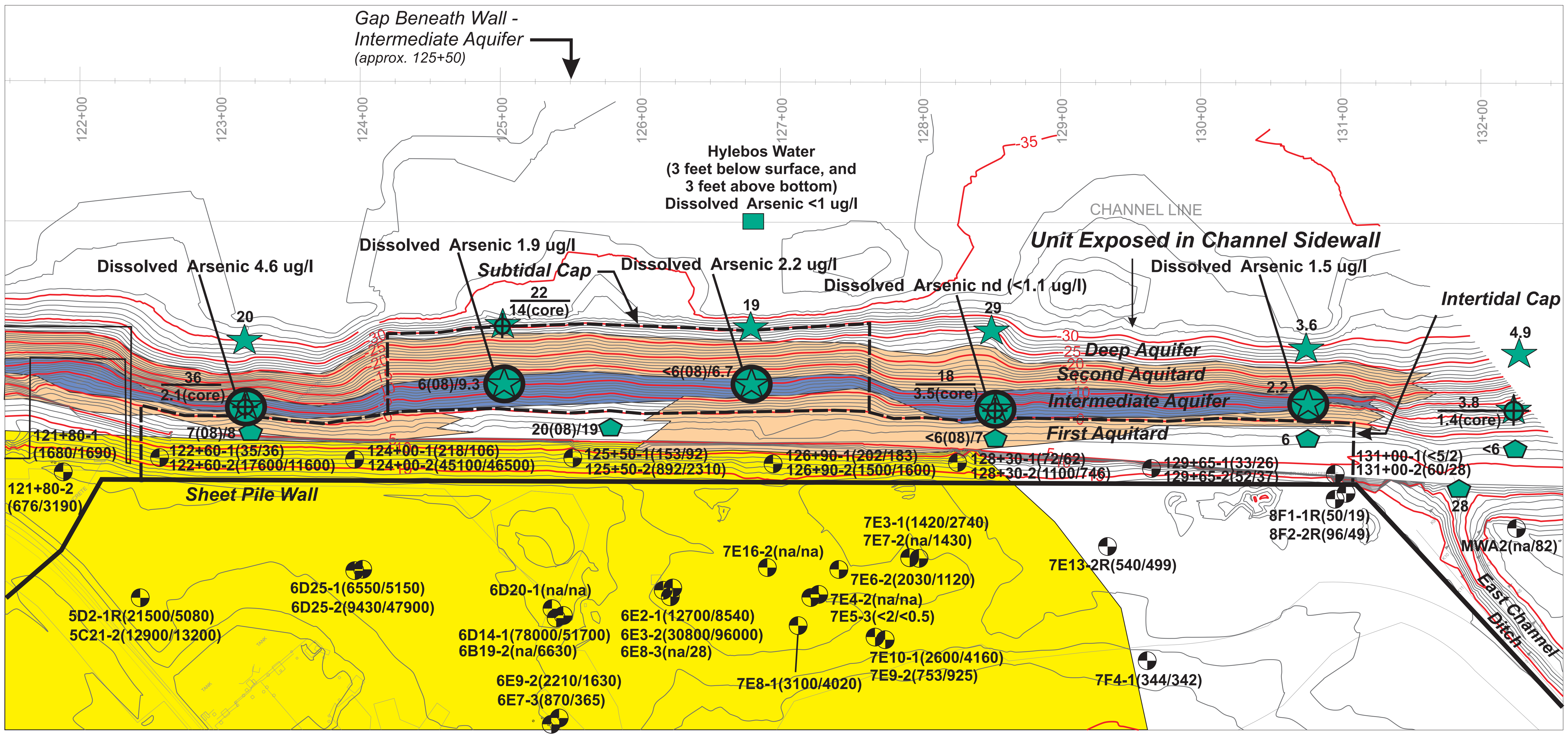
Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Concentrations
2012 Porewater and Shoreline Sediment
North Half

POT-001-00 **FIGURE 8-11a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Arkema Shoreline As N.cdr



	Existing Monitoring Well
3A3-1R	Well No. (dissolved As 2008/2012 - ug/l)
- 1R	Upper Aquifer Well
- 2R	Intermediate Aquifer Well
- 3R	Deep Aquifer Well
*	Result Impacted by High Chloride Concentrations
na	Not Analyzed
nd	Not Detected
	Surface Water Sample Location

	Intertidal (IT) Sediment Sample Location (0 to 10cm)
	Subtidal Sediment Sample Location (0 to 10 cm)
	Shallow Subtidal Core (sample 20 to 30 cm)
	Porewater Sample Location
20(08)/19	Sediment Concentration (mg/kg) - (year collected)
	Upland Dissolved Arsenic Concentration >1000 ug/l in one or more samples collected in 2008 and 2012

Sediment Less Than Sediment Quality Objective of 57 mg/kg; Porewater Less Than 5 ug/l (August/September 2012)

0 80
Scale in Feet
(approximate)

Elevations in Feet MLLW

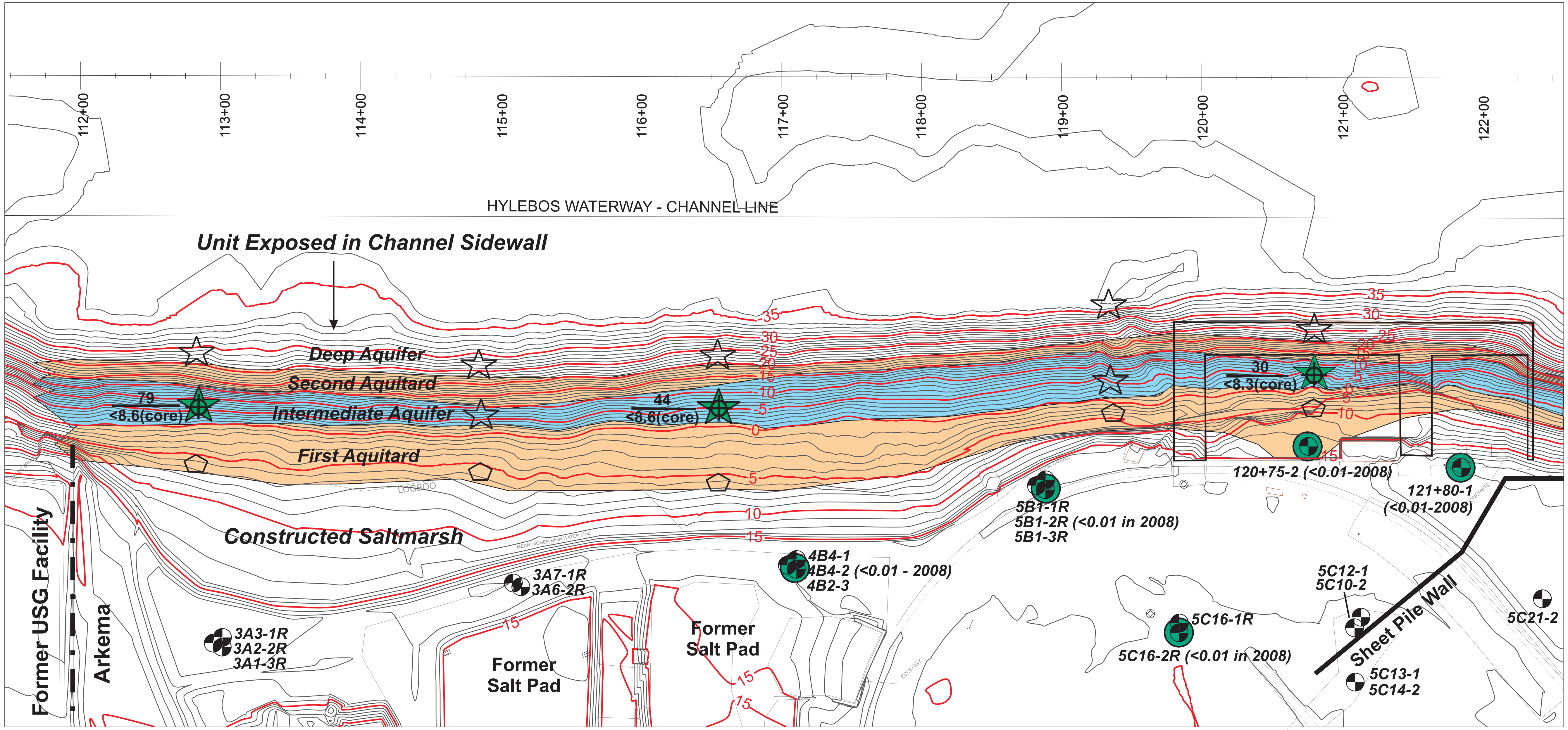
True North
Site North

Former Arkema Manufacturing Plant
Tacoma, Washington

Arsenic Concentrations
2012 Porewater and Shoreline Sediment
South Half

POT-001-00 **FIGURE 8-11b** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

Ref: Arkema Shoreline As S.cdr



Existing Monitoring Well

3A3-1R Well No. (Total PCBs - ug/l)

- 1R Upper Aquifer Well

- 2R Intermediate Aquifer Well

- 3R Deep Aquifer Well

PCBs Not Detected in 2008 Groundwater Sample

Intertidal (IT) Sediment Sample Location (0 to 10cm)

Subtidal Sediment Sample Location (0 to 10 cm)

Shallow Subtidal Sediment Core (sample 20 to 30 cm)

Sediment Less Than Sediment Quality Objective of 300 ug/kg; (August/September 2012)

True North

Site North

0 80

Scale in Feet (approximate)

Elevations in Feet MLLW

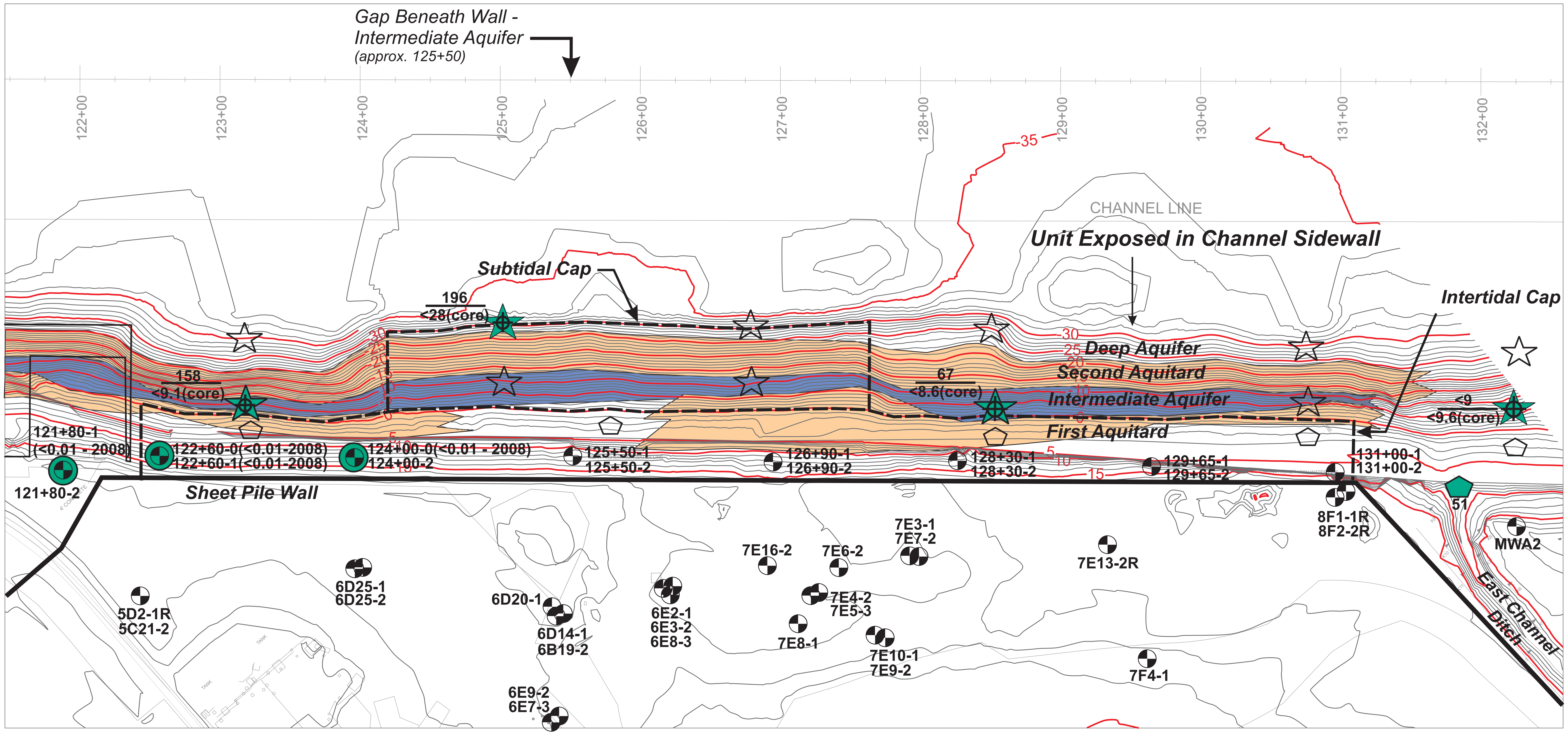
Former Arkema Manufacturing Plant
Tacoma, Washington

Total PCB Concentrations 2012 Shoreline Sediment North Half

POT-001-00 **FIGURE 8-12a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Arkema Shoreline PCB N.cdr



Existing Monitoring Well

3A3-1R Well No. (Total PCBs - ug/l)

- 1R Upper Aquifer Well

- 2R Intermediate Aquifer Well

- 3R Deep Aquifer Well

PCBs Not Detected in 2008 Groundwater Sample

Intertidal (IT) Sediment Sample Location (0 to 10cm)

Subtidal Sediment Sample Location (0 to 10 cm)

Shallow Subtidal Core (sample 20 to 30 cm)

54 Sediment Concentration (mg/kg)

Sediment Less Than Sediment Quality Objective of 300 ug/kg; (August/September 2012)

True North

Site North

0 80

Scale in Feet (approximate)

Elevations in Feet MLLW

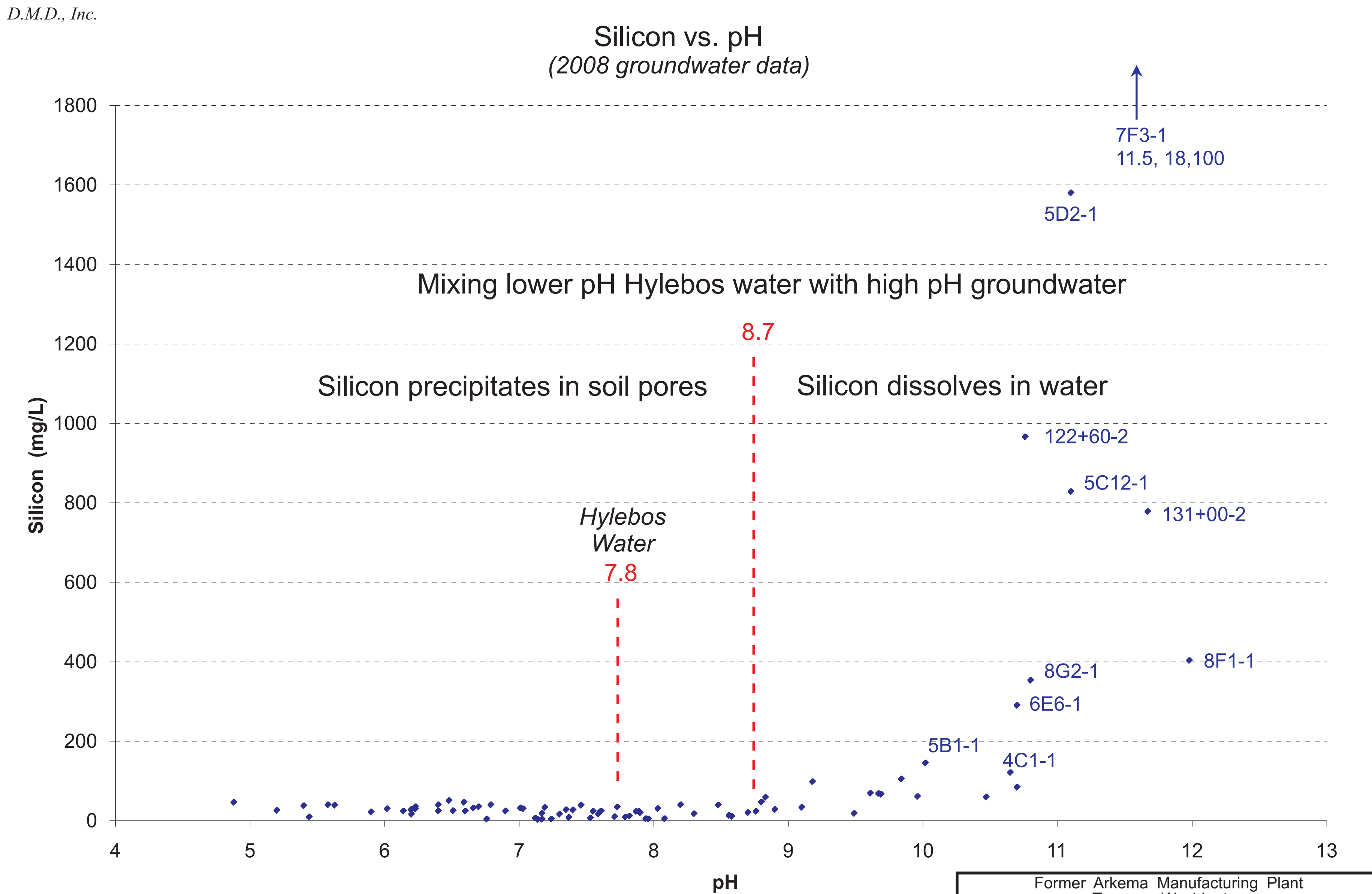
Former Arkema Manufacturing Plant
Tacoma, Washington

Total PCB Concentrations
2012 Shoreline Sediment
South Half

POT-001-00 **FIGURE 8-12b** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Arkema Shoreline PCB S.cdr



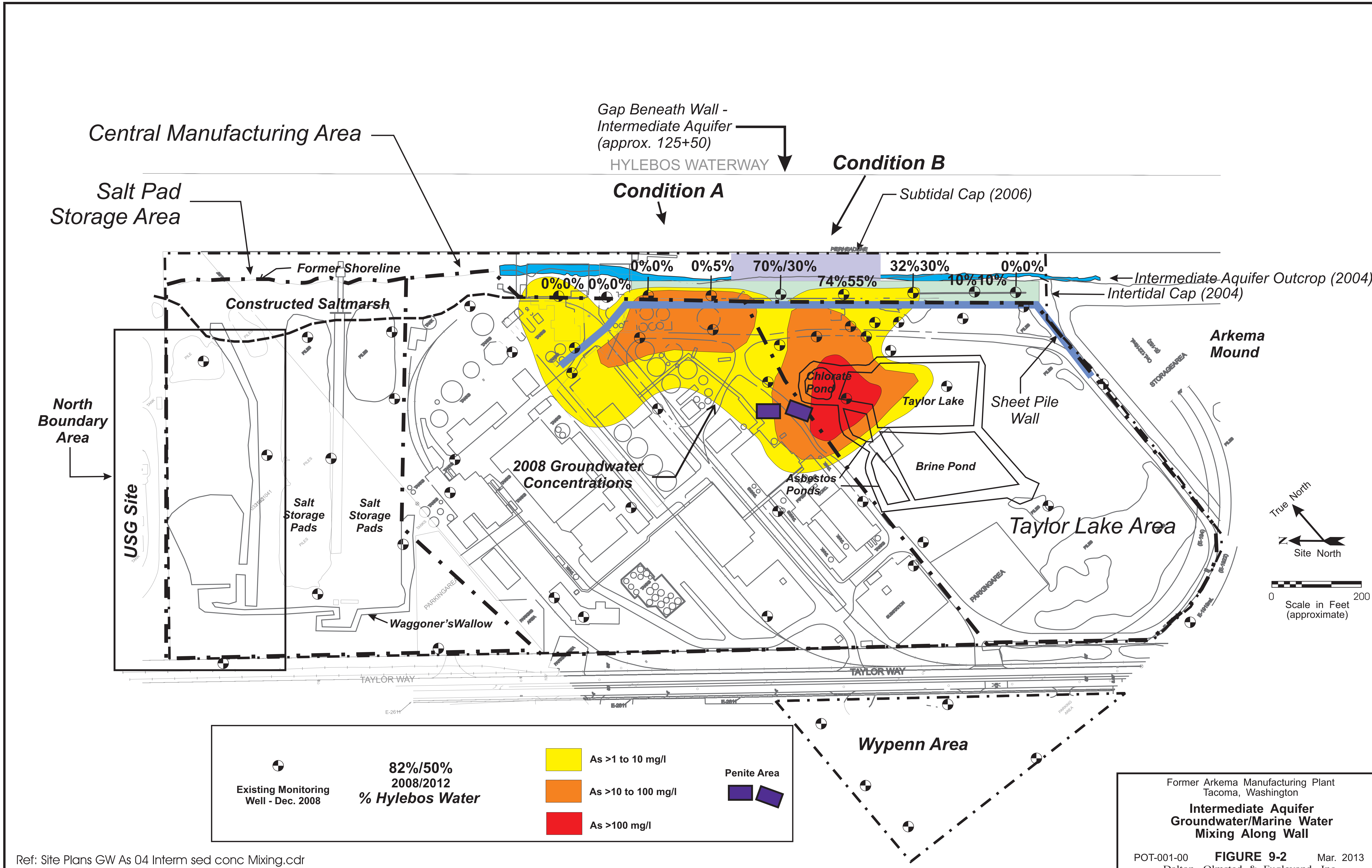
Former Arkema Manufacturing Plant
Tacoma, Washington

Silicon vs. pH Solubility

POT-001-00 **FIGURE 9-1** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Si vs pH 2008 Data.cdr



Ref: Site Plans GW As 04 Interm sed conc Mixing.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

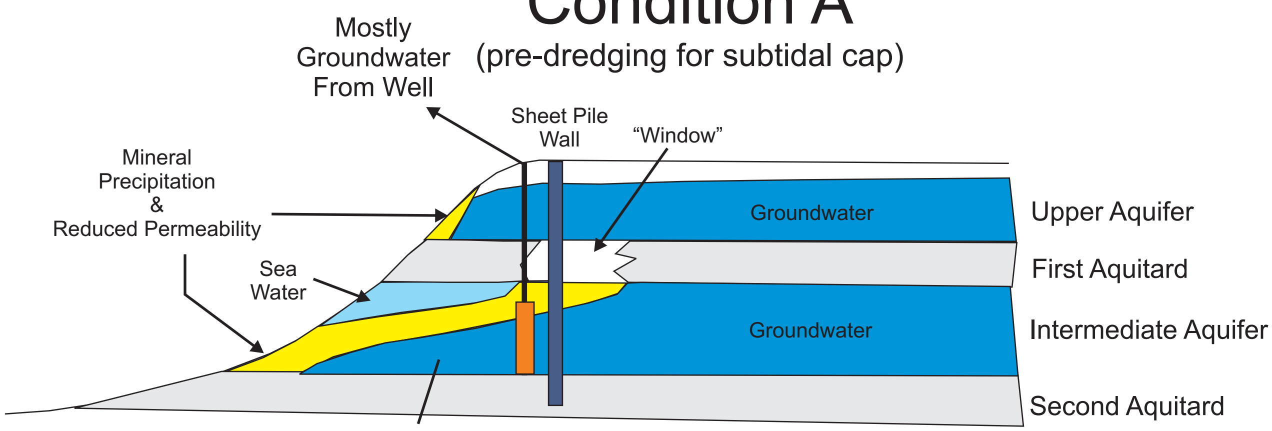
Intermediate Aquifer Groundwater/Marine Water Mixing Along Wall

POT-001-00 **FIGURE 9-2** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Condition A

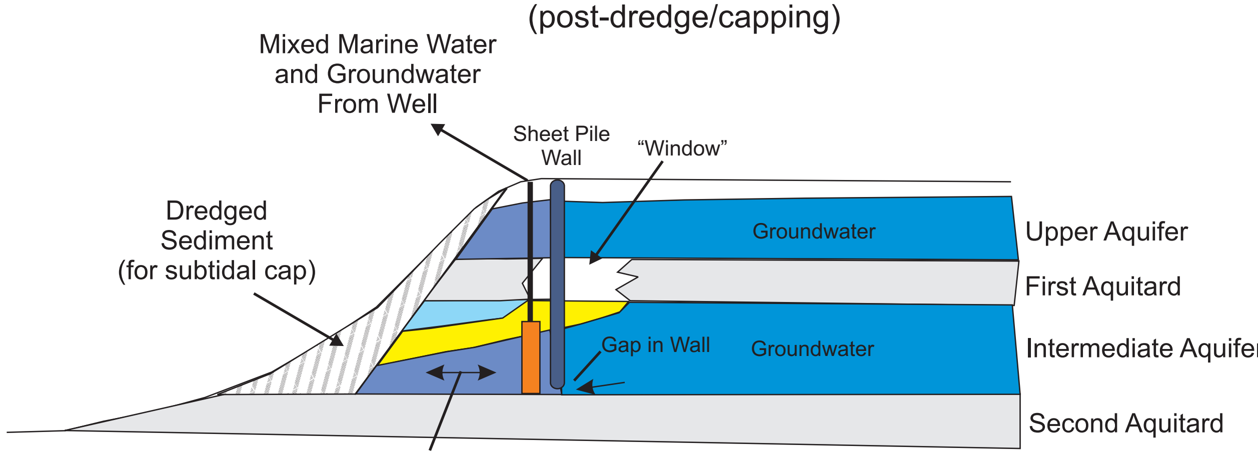
(pre-dredging for subtidal cap)



Adapted: Intera 1995

Condition B

(post-dredge/capping)



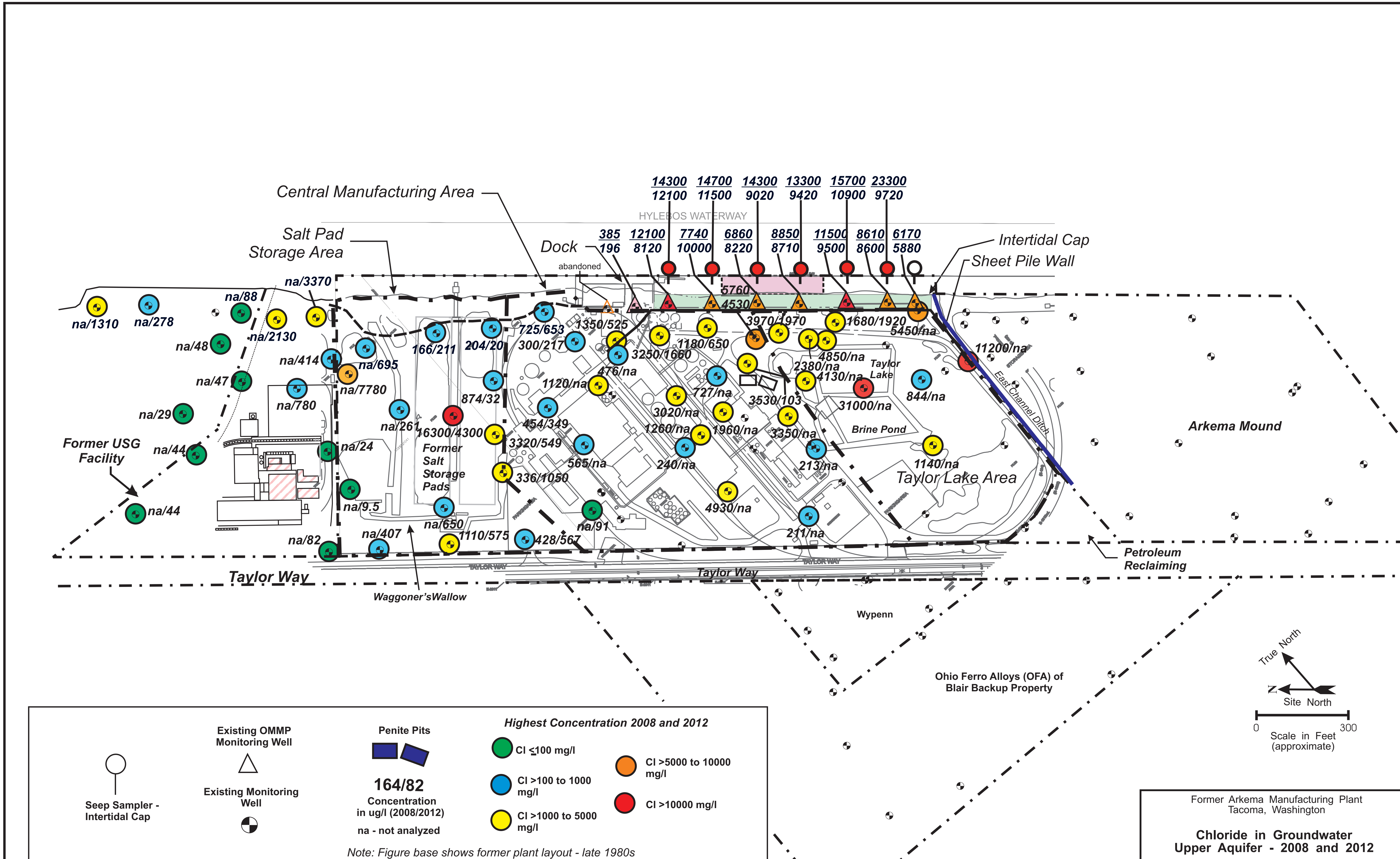
Ref: Mixing Model 6-11-10

Former Arkema Manufacturing Plant
Tacoma, Washington

Shoreline Mixing Conceptual Model

POT-001-00 **FIGURE 9-3** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.



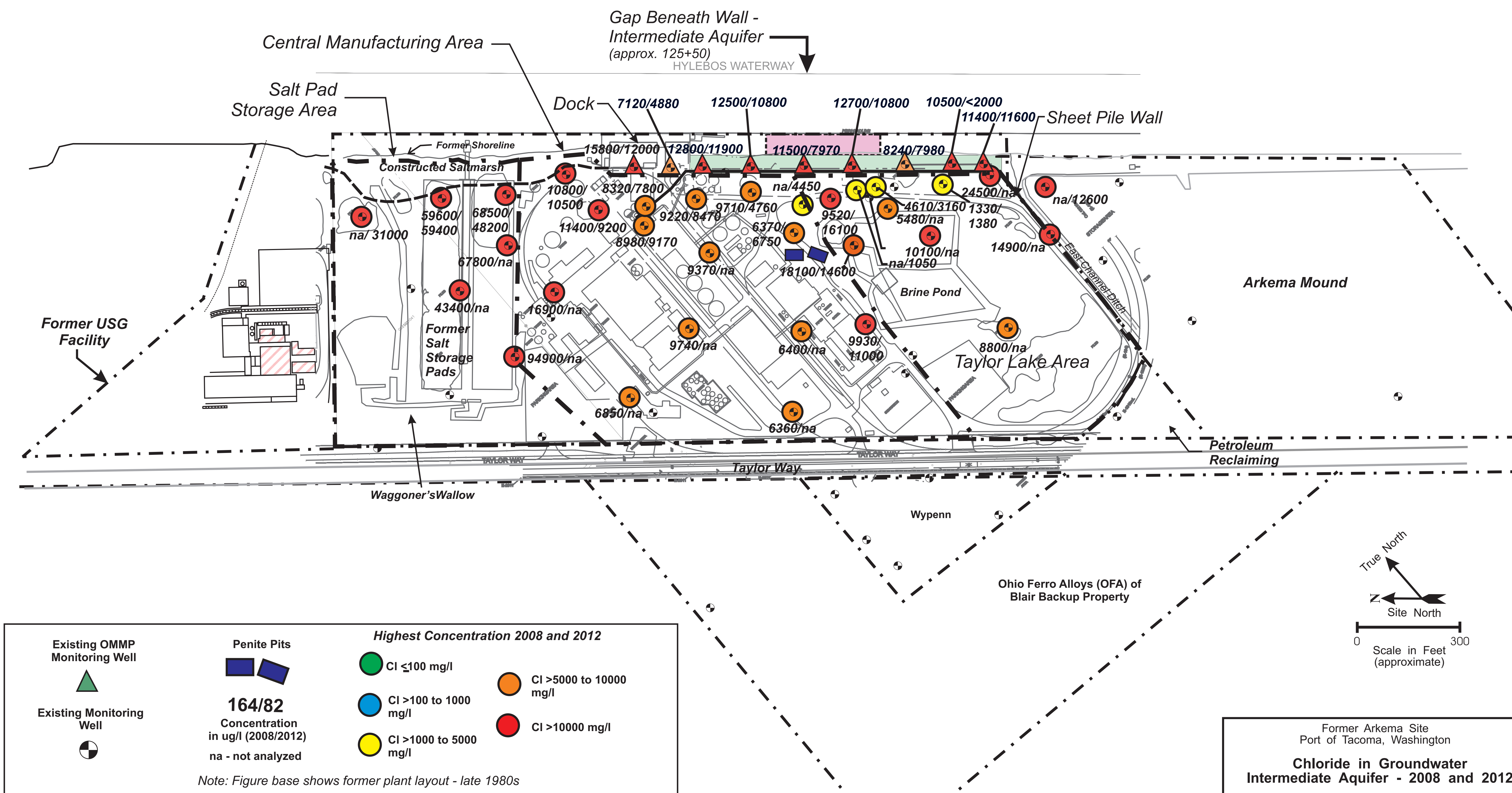
Ref: GW Chloride Upper Aquifer 2012a.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Chloride in Groundwater
Upper Aquifer - 2008 and 2012

POT-001-00 **FIGURE 9.4a** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

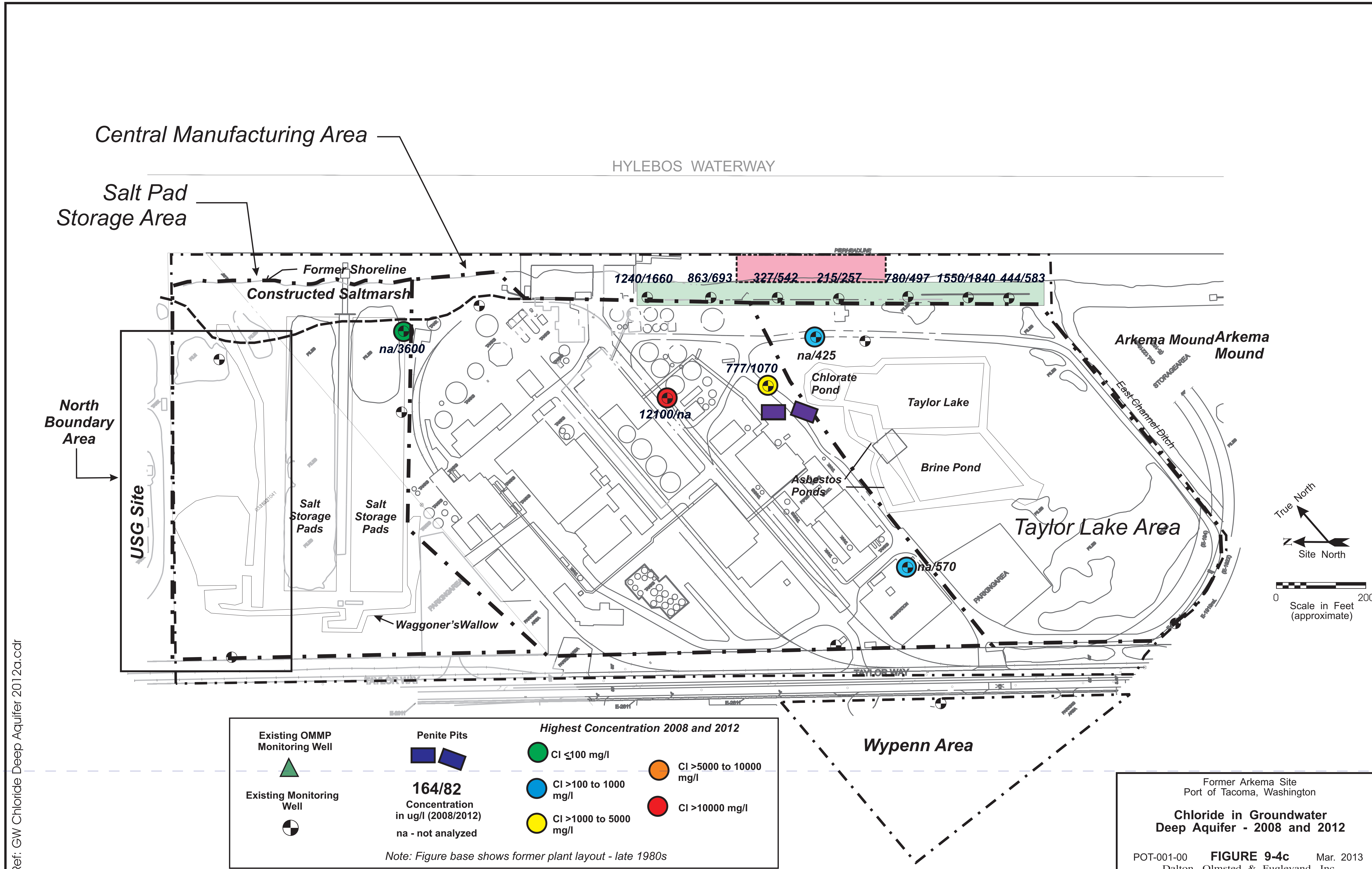


Former Arkema Site
Port of Tacoma, Washington

Chloride in Groundwater
Intermediate Aquifer - 2008 and 2012

POT-001-00 **FIGURE 9-4b** Mar. 2013
Dalton, Olmsted & Fuglevand, Inc.

Ref: GW Chloride Interm Aquifer 2012a.cdr



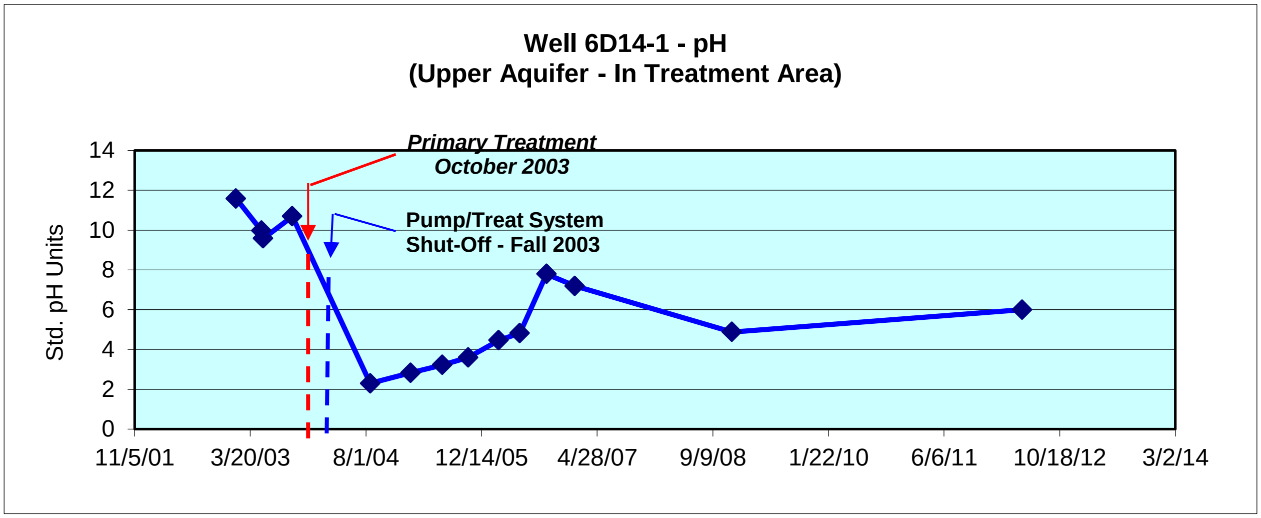
Former Arkema Site
Port of Tacoma, Washington

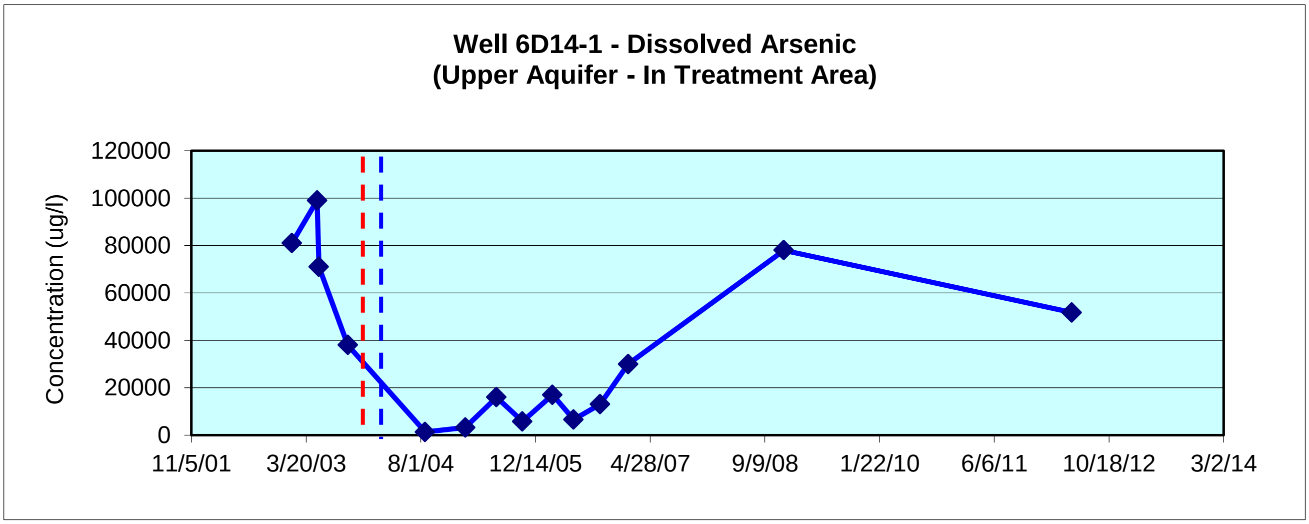
Chloride in Groundwater Deep Aquifer - 2008 and 2012

POT-001-00 **FIGURE 9-4c** Mar. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: GW Chloride Deep Aquifer 2012a.cdr





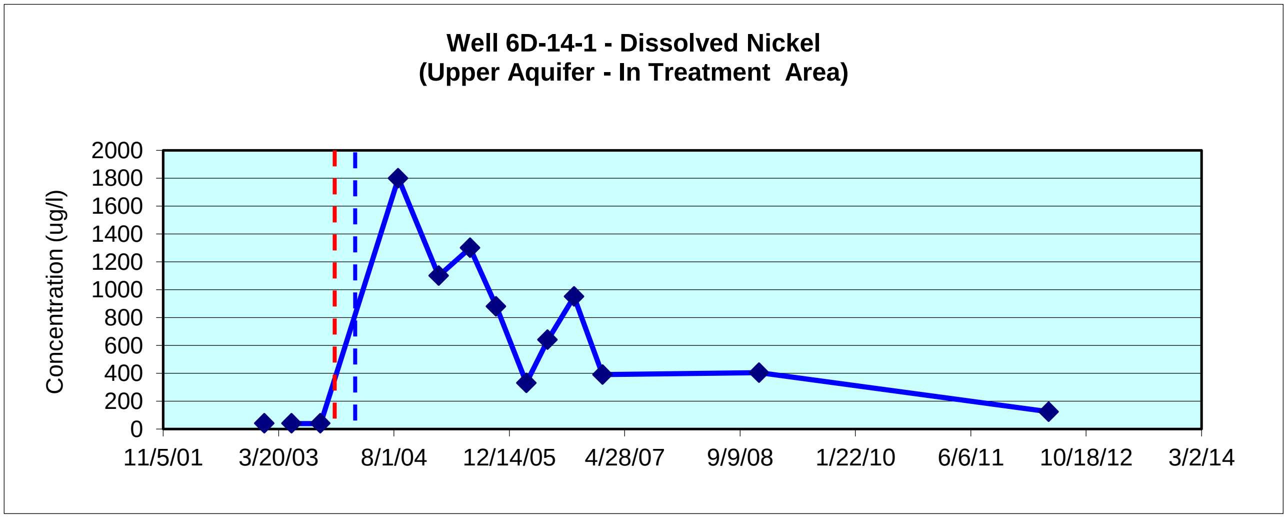
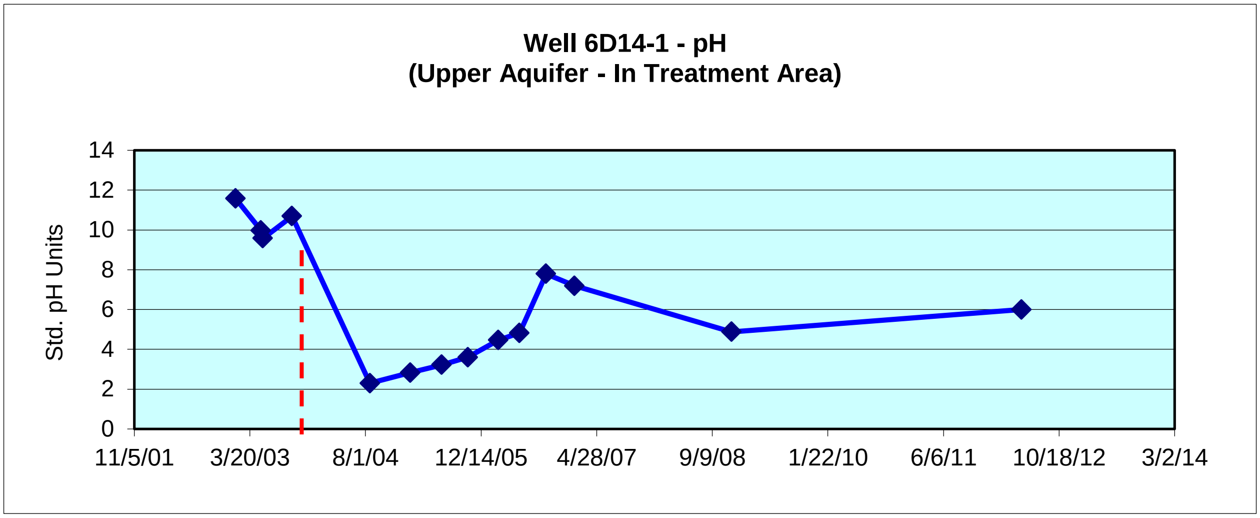
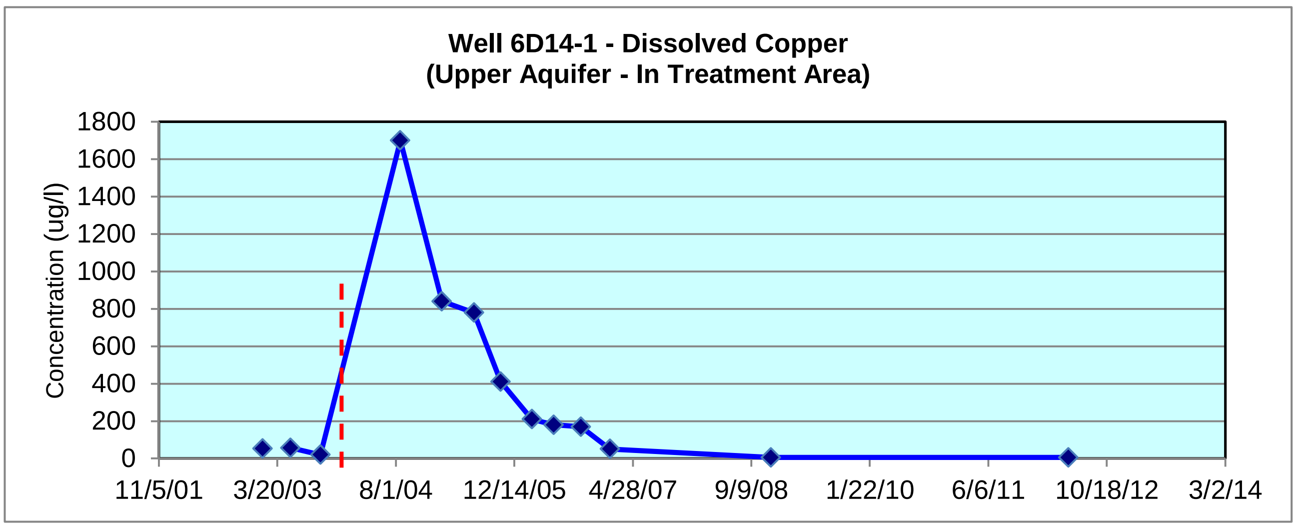


FIGURE 9.5
Water Chemistry Trends
Well 6D14-1





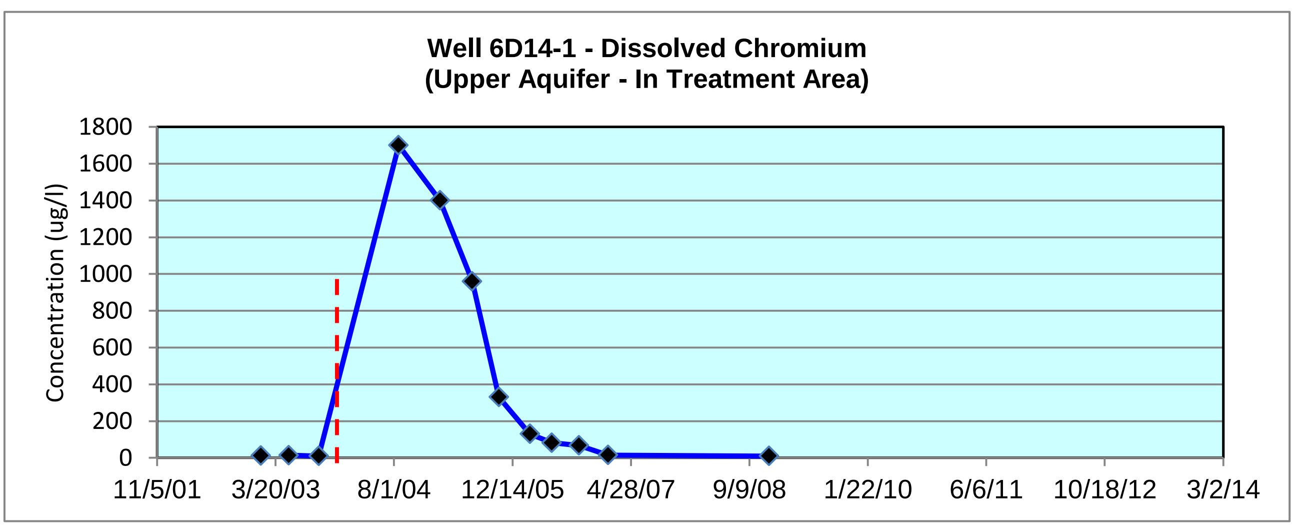
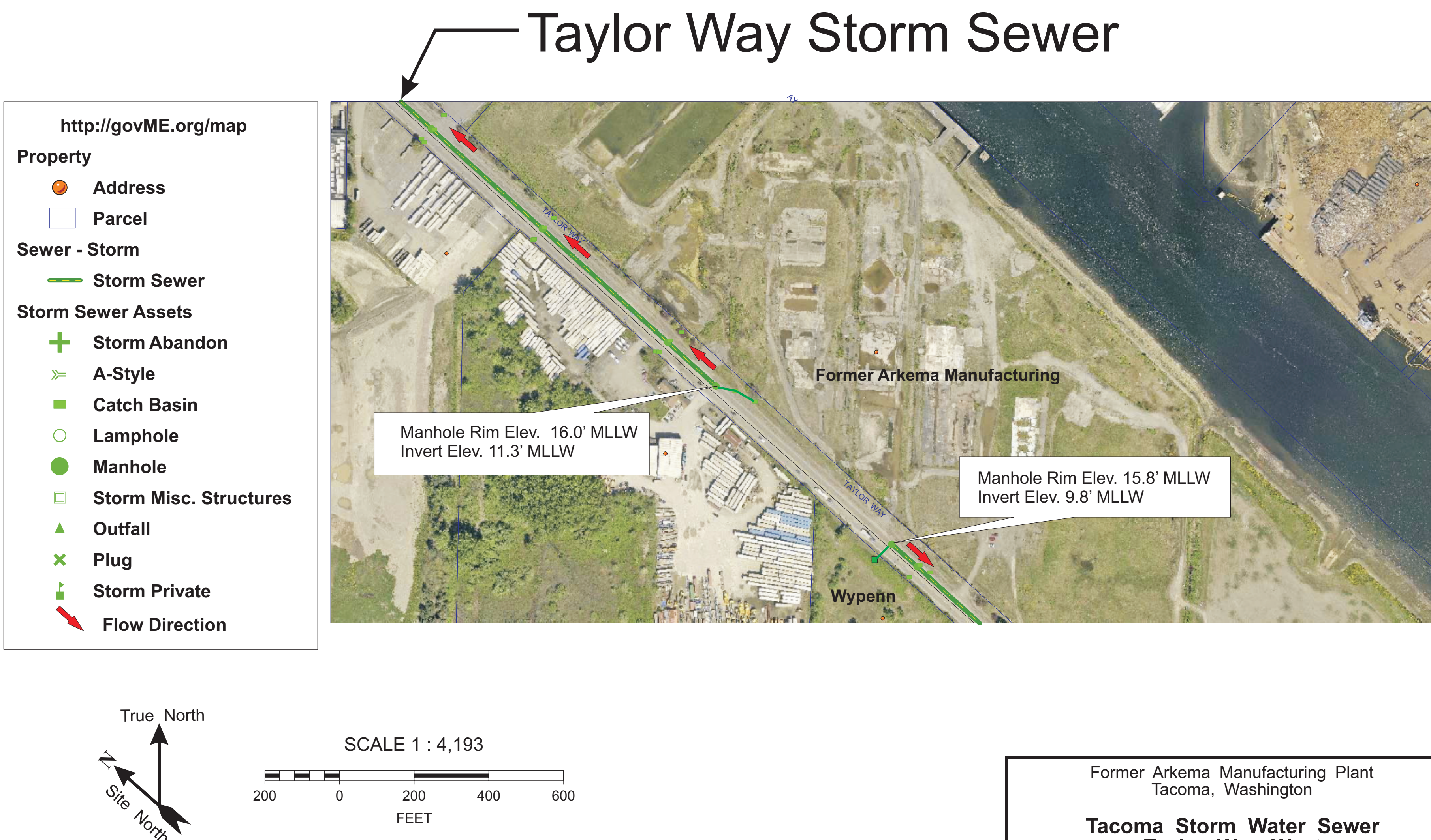


FIGURE 9.5
Water Chemistry Trends
Well 6D14-1



Ref: AKM Taylor Way Storm Sewer West.cdr

Former Arkema Manufacturing Plant
Tacoma, Washington

Tacoma Storm Water Sewer
Taylor Way West

POT-001-00 **FIGURE 10-1** March 2013

Dalton, Olmsted & Fuglevand, Inc.

Taylor Way Storm Sewer

http://govME.org/map

Property

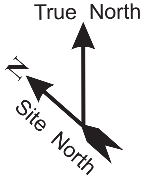
- **Address**
- **Parcel**

Sewer - Storm

- **Storm Sewer**

Storm Sewer Assets

- **Storm Abandon**
- **A-Style**
- **Catch Basin**
- **Lamphole**
- **Manhole**
- **Storm Misc. Structures**
- **Outfall**
- **Plug**
- **Storm Private**
- **Flow Direction**



SCALE 1 : 4,193

200 0 200 400 600

FEET

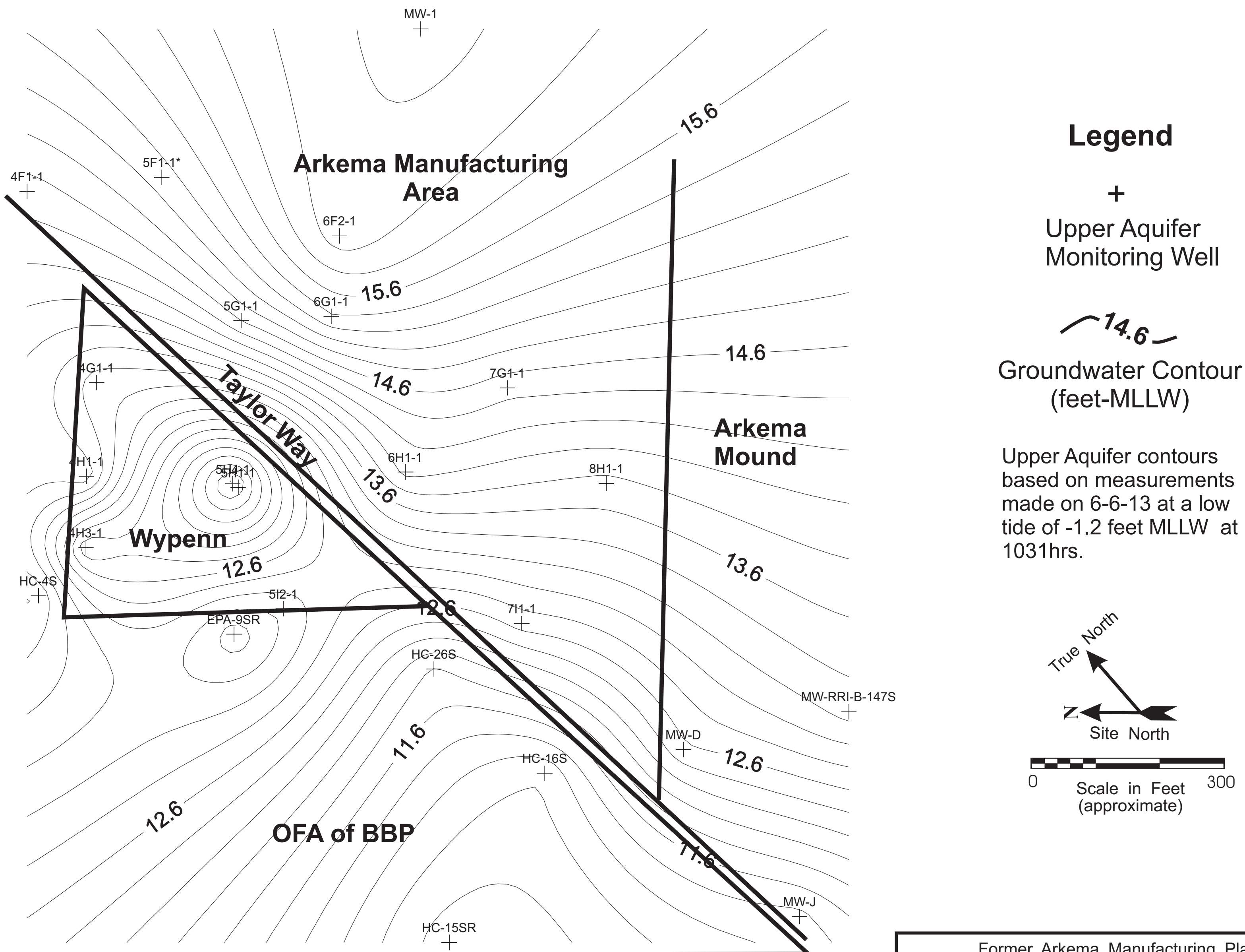
Former Arkema Manufacturing Plant
Tacoma, Washington

Tacoma Storm Water Sewer
Taylor Way East

POT-001-00 **FIGURE 10-2** March 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: AKM Taylor Way Storm Sewer East.cdr



Former Arkema Manufacturing Plant
Tacoma, Washington

Wypenn Groundwater Contours
June 2013

POT-001-00 **FIGURE 10-3** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: Contours 6-6-13 UA.cdr

Taylor Way Storm Sewer

http://govME.org/map

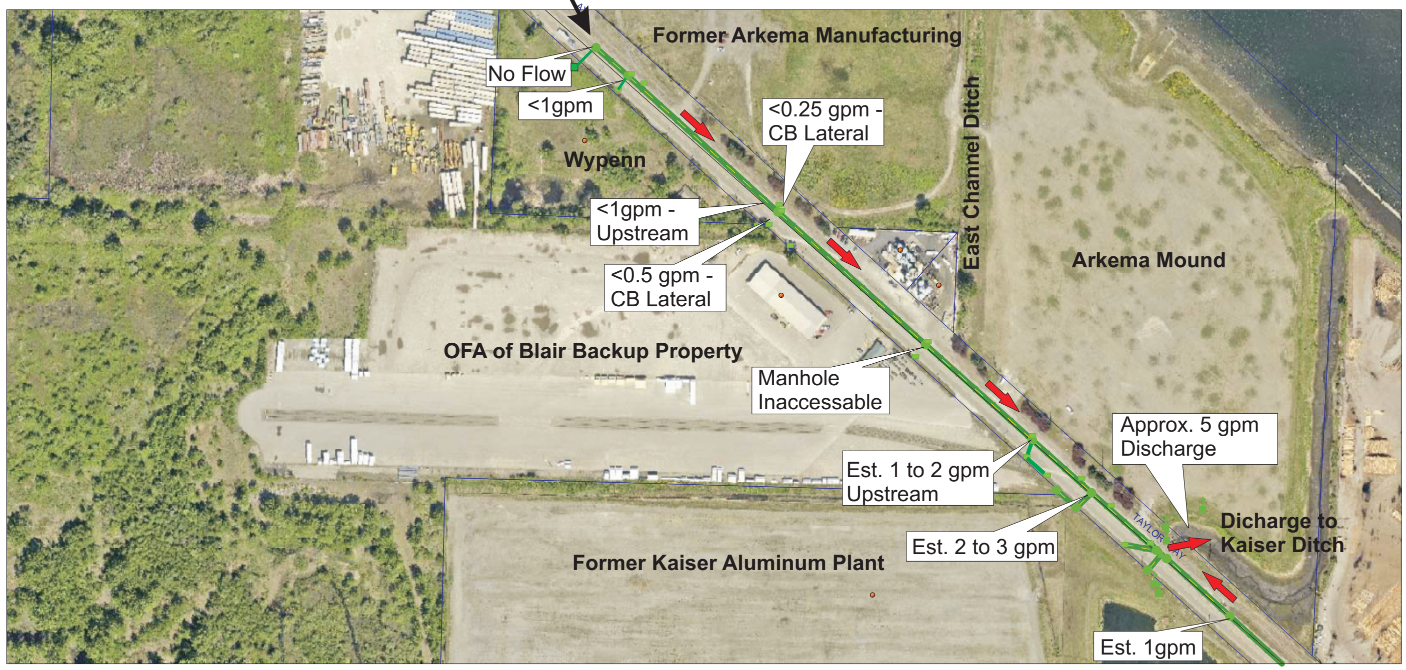
Property
- Address
- Parcel

Sewer - Storm
- Storm Sewer

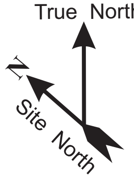
Storm Sewer Assets
- Storm Abandon
- A-Style
- Catch Basin
- Lamphole
- Manhole
- Storm Misc. Structures
- Outfall
- Plug
- Storm Private

Flow Direction

gpm Gallon Per Minute



Note: Observations made on July 9, 2013 between 1300 and 1500 hrs., after 12 days of dry weather. Low tide was -1.1 feet MLLW at 1221 hrs.



SCALE 1 : 4,193

200 0 200 400 600

FEET

Former Arkema Manufacturing Plant
Tacoma, Washington

Estimated Flows
Tacoma Storm Water Sewer
Taylor Way East

POT-001-00 **FIGURE 10-4** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.

Ref: AKM Taylor Way Storm Sewer East July 9 Ob.cdr

RI/FS Boundary

Ref: Arkema Proposed RI FS Site Boundary.cdr

Former Arkema Manufacturng Plant
Port of Tacoma, Washington

RI/FS Site Boundary

POT-001-00 **FIGURE 13-1** Aug. 2013

Dalton, Olmsted & Fuglevand, Inc.