Appendix V

Exposure Pathway Assessment Report

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Exposure Pathway Assessment

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Section 1.0 Introduction

An Exposure Pathway Assessment was conducted in accordance with Ecology and USEPA guidance. The assessment included both human health exposure pathway assessment (HHEPA) and ecological health exposure pathway assessment (EHEPA) and evaluated potential impacts on OCC Property (605 and 709 Alexander Avenue) and off OCC Property. The purpose and goals of the assessment, and the organization of the assessment, are discussed in Sections 1.1 and 1.2, respectively.

1.1 Purpose and Goals of the Exposure Pathway Assessment

The purpose of the assessment was to identify media and locations that may need corrective action, risk management measures, or further evaluation during remedy design. For this purpose, risk-based concentrations (RBCs) were developed and used to identify potentially impacted media and locations. The RBCs were developed to be protective of all potential human and ecological receptors exposed to Constituents of Concern (COCs) in on-OCC Property and off-OCC Property media under current and continued future industrial use, assuming no additional remedial actions are taken.

Typically, risk assessments include development of either: (a) RBCs for direct use in remedial decision-making; or (b) development of quantitative risk estimates that are used to identify media and locations requiring corrective action followed by development of RBCs to help guide the remedial process. For this Site, a screening-level exposure pathway assessment was considered the most appropriate approach to help streamline and render the remedial decision process more efficient. The reasons for this selection are as follows:

a) Multiple receptors were included in this assessment, and for certain of these receptors (i.e., outdoor industrial/commercial worker and trespasser), identification of exposure areas and determining areal average contaminant levels (i.e., development of 95 percent [%] upper confidence levels [UCL] in risk estimates) is appropriate. However, for other receptors such as the indoor worker and construction worker, potential exposures can be much more localized. In these cases, areal averaging of contaminant concentrations is arguably inappropriate. Therefore, for consistency, a screening-level approach was considered appropriate for all receptors.

b) For certain pathways, the State of Washington Model Toxics Control Act (MTCA) specifies that media concentrations need to be compared to screening criteria. In particular, because groundwater at the Site is non-potable and shallow groundwater could potentially discharge to surface water via seeps and subtidal discharge along the embankment immediately adjacent to the Hylebos Waterway, MTCA requires that groundwater concentrations should not exceed applicable surface water criteria. Therefore, a screening-level approach for the groundwater-to-surface water pathway is required by MTCA. As noted previously, for consistency a screening-level approach was considered appropriate for all receptors.

c) In many locations, impacts from multiple chemicals were evident that exceeded RBCs developed for the screening-level evaluation. In these media and locations, development of quantitative risk estimates would not likely add to, or help inform, decision-making related to the need for corrective action or risk management measures.

d) Vapor intrusion (VI) pathway investigation is in progress and will more directly determine the need for mitigation relative to that exposure pathway. The results of the VI pathway investigation to date are documented in the *Vapor Investigation Report* (CRA, 2013c), a copy of which is provided as an appendix to the Site Characterization Report (SCR).

For the reasons listed above, a screening-level exposure pathway assessment was deemed most appropriate to identify media and locations that may need corrective action, risk management measures, or further evaluation during remedy design.

The specific goals of the exposure pathway assessment are:

- Determine which of the potentially completed exposure pathways identified in the Conceptual Site Model (CSM) may adversely impact human health and the environment
- Develop RBCs for those pathways that are identified as complete
- Provide a basis for identifying which media and locations may need corrective action, risk management measures, or further evaluation during remedy design
- Provide a basis for evaluating and comparing the effectiveness of remedial alternatives to mitigate any adverse impacts to human health and the environment

1.2 Organization of the Exposure Pathway Assessment

This Exposure Pathway Assessment is organized as follows:

- Section 1.0: Introduction

  Presents the purpose, goals, and organization of this Exposure Pathway Assessment.
- Section 2.0: Site Characterization

  Presents the COCs and CSMs.
- Section 3.0: Human Health Exposure Pathway Assessment

  Presents a summary of the exposure settings, identifies the potential exposure pathways, quantifies exposure based on the exposure assumptions, and presents the toxicity data used to develop the human health RBCs.

- Section 4.0: Ecological Health Exposure Pathway Assessment

  Presents a summary of the exposure settings, identifies the potential exposure pathways, quantifies exposure based on the exposure assumptions, and presents the toxicity data used.
- Section 5.0: Development of Site-Specific Risk-Based Standards and Assessment of Potential Needs for Further Action

  Presents a summary of the lowest RBCs that are applicable to the various Site media, and an assessment of potential needs for further action.
- Section 6.0: Summary/Conclusions

  Presents a summary of the results of this Exposure Pathway Assessment.

A list of references cited in this Exposure Pathway Assessment is presented in Section 7.0.

Section 2.0 Site Characterization

This section is structured as follows:

Section 2.1	Constituents of Concern
Section 2.2	Conceptual Site Models
Section 2.3	Deed Restrictions for the OCC Property

2.1 Constituents of Concern

COCs have been established for the Site based upon historical facility operations, investigations, and characterizations. Tables 2.1 through 2.5 present the COCs for each of the major Site media/areas including:

1. Upland Groundwater (Table 2.1)
2. Embankment Area/Subtidal Groundwater (Table 2.2)
3. Surface Water (Table 2.3)
4. Sediment/Porewater (Table 2.4)
5. Soil (Table 2.5)

2.2 Conceptual Site Models

In order to evaluate the significance of the impacted media at the Site, the potential pathways by which receptors may come into contact with these media must be determined. The combination of factors (chemical source, media of concern, release mechanisms, and potential receptors) that could produce a complete exposure pathway and lead to uptake of chemicals at the Site is assessed in the CSM. The human health CSM is discussed in Section 2.2.1 and the ecological health CSM is discussed in Section 2.2.2. The overall CSM is discussed in Section 2.2.3.

2.2.1 Human Health Conceptual Site Model

The OCC Property and non-OCC Property were evaluated separately due to the institutional controls that have been implemented on the OCC Property through the use of deed restrictions.

The Site is located in the industrial tideflats area of Tacoma, Washington. The zoning of the properties which comprise the Site is "S-10" (Port Industrial Shoreline District), "M-3" (Heavy Industrial District), and "PMI" (Port Maritime Industrial). Restrictive covenants restricting land use on the properties to non-residential industrial use are contained and set forth in the Quit Claim Deed (Corrected) recorded on April 28, 1997, in the records of the Pierce County Auditor (Recording No. 9704280734). Pertinent property owned by the POT is the subject of a restrictive covenant recorded on May 5, 2003, in the records of the Pierce County Auditor (Recording No. 200305050452) that prohibits groundwater extraction, supply, or use for drinking or other human consumption or domestic use of any kind.

The nearest residential properties are approximately 1 mile to the east, on the bluff across the Hylebos Waterway from the Site, 3/4 of a mile across the Hylebos Waterway to the northeast, and approximately 3 miles to the south.

Current land uses of the properties that encompass the Site include:

1. Mariana Property: The existing groundwater treatment plant is located on the northern portion of the property. Portions of the existing groundwater extraction and injection systems, as well as groundwater monitoring wells, are located on the property.
2. Port of Tacoma: The properties owned by the POT are used for various industrial and commercial activities. Portions of the existing extraction and injection systems, as well as groundwater monitoring wells, are located on the property.
3. United States Navy: There is no current land use of this property.
4. Puyallup Tribe of Indians: This property includes two marinas used for the storage and berthing of private boats.

A CSM for potential human exposure pathways at the Site is presented on Figure 2.1 and identifies all potentially complete exposure pathways given the conditions at the Site. The human health CSM was developed based on the potential routes of exposure posed by the presence of chemicals within soil and groundwater at the Site. The current and foreseeable future land use of the Site is commercial/industrial. Therefore, the identified receptors that may be present at the Site include a trespasser, industrial/commercial worker, and construction/utility worker. Because a groundwater plume extends beneath the adjacent water body, there is also the potential for exposure to recreational users that may use the water body for recreational purposes, as well as fishermen who may consume fish caught from the water body. The trespasser, industrial/commercial worker, construction/utility worker, recreational user, and fisher exposure pathways are described further below.

Trespasser

The trespasser exposure scenario is developed to reflect the infrequent and occasional trespasser exposure patterns typical of an adolescent who could potentially gain access to the Site via trespassing. The trespasser could be exposed to surface soil through combined incidental ingestion, dermal contact, and inhalation of soil particulates. The trespasser could also be exposed to sediment through combined incidental ingestion and dermal contact. In addition, the trespasser could also be exposed to volatiles in soil and groundwater through inhalation of ambient air impacted by volatilization of COCs from soil and groundwater and migration to ambient air.

Industrial/Commercial Worker

The industrial/commercial worker is an adult working primarily indoors (and possibly a limited amount outdoors) at the Site. It is assumed that the majority of the industrial/commercial worker's time will be spent within an on-Site building. It is expected that the industrial/commercial worker would be exposed to indoor air that may be impacted by volatile chemicals present in soil and groundwater while working indoors.

During the limited outdoor activities, such as conducting landscaping duties or general maintenance activities, dermal contact and incidental ingestion could occur as contact is made with surface soil or sediment through exposed skin on the head, hands, and forearms. Inhalation of volatile chemicals in ambient air that were emitted from soil and groundwater, or inhalation of chemicals in windblown soil particulate could also occur during the time spent outdoors. The outdoor activities of the industrial/commercial worker will be restricted to surface activities and, therefore, there is no potential for direct contact with groundwater at the Site.

Construction/Utility Worker

The construction/utility worker receptor is assumed to be an adult conducting ground intrusive activity (such as the construction of building foundations and/or installation or maintenance of subsurface utilities) to a depth that would expose groundwater. The base of the excavation could become flooded with impacted groundwater and incidental ingestion and dermal contact with chemicals in groundwater could occur. In addition, inhalation exposure to volatile chemicals emitted from exposed groundwater could also occur during the excavation activities.

The construction/utility worker could potentially be exposed to Site surface and subsurface soils through incidental ingestion and dermal contact with exposed skin on the head, hands, and forearms. In addition, inhalation exposure could occur as chemicals in the soil (surface and subsurface) volatilize to air in the immediate vicinity of the excavation and are subsequently inhaled by the worker. Inhalation of chemicals in soil particulate could also occur.

Recreational User

The recreational user consists of a person who visits the nearby water body on a regular basis during part of the year (e.g., late spring to early fall) for recreational purposes (i.e., swimming). The recreational user is exposed primarily through incidental ingestion and dermal contact exposure to chemicals in surface water. The recreational user could also be exposed through the inhalation of ambient air to chemicals that volatilize from surface water.

Fisher

As the water body may be used for fishing, the fisher exposure to chemicals that have partitioned or bioaccumulated in ingested fish or shellfish is considered to be a potentially complete exposure pathway.

The human health CSM shown on Figure 2.1 presents a detailed summary of the exposure media, exposure pathways, exposure routes, and exposed receptors included in the HHEPA without consideration of current or future institutional controls except for restrictions involving land and groundwater use (see Section 2.3). The following media and potential human exposures (i.e., complete pathways) were identified for evaluation in the HHEPA:

- Industrial/commercial worker inhalation exposure to chemicals in indoor air due to migration of volatile chemicals in soil and groundwater
- Trespasser and industrial/commercial worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface soil
- Trespasser and industrial/commercial worker direct contact (incidental ingestion and dermal contact) exposure to chemicals in sediment
- Trespasser and industrial/commercial worker inhalation exposure to chemicals in ambient air due to migration of volatile chemicals in groundwater
- Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface and subsurface soil

- Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in groundwater
- Recreational user direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface water
- Fisher ingestion exposure to chemicals in ingested fish tissue

2.2.2 Ecological Health Conceptual Site Model

Currently, there is little terrestrial habitat at the Site, and this general lack of terrestrial habitat is expected to continue with future land-use. Adjacent to the Site, terrestrial areas are also primarily highly developed, unnatural areas, so it is unlikely that wildlife from adjacent areas would forage at the Site. Potential exposure of wildlife to soil-based contaminants is also very limited, now and into the future, by largely impermeable surfaces that cover much of the Site. Given all of these factors, exposure pathways from contaminants in soil to terrestrial ecological receptors are considered functionally incomplete.

There are two possible exceptions to this. First, the chemicals in soil might pose complete exposure pathways if they migrate, via erosion or groundwater flow, to the adjacent aquatic habitat. The soil-to-groundwater-to-surface-water pathway will be considered with the screening of groundwater, seeps, sediment porewater, and seepage meter water, as described below. Erosion from the Site should be curtailed by a combination of storm water management and surface covers. The second potential exception is the surface material from the top of the embankment down to the high water mark. However, direct exposure pathways, from chemicals in these materials to terrestrial ecological receptors, are limited by the very small area and the highly disturbed nature of the habitat. Exposure is further limited because much of this area is covered with riprap and debris, and the little bit of open ground is ruderal vegetation that provides meager habitat. Given this, it was assumed that current exposure pathways to bank materials above the water line are effectively incomplete.

Currently, there are direct and complete exposure pathways from upland sources of Site COCs to ecological receptors in the adjacent Hylebos Waterway. Notably, a contaminated groundwater plume extends from the Site to intertidal and subtidal areas of the Hylebos Waterway, where some of the plume (associated with shallow groundwater) discharges to the Hylebos Waterway. Once discharged to the Hylebos Waterway, aquatic ecological receptors can be potentially exposed to contaminants in groundwater. Thus, ecological receptors will be evaluated for potential exposure to Site COCs present in the groundwater plume that may impact sediment and water quality in the Hylebos Waterway. Aquatic biota could also be exposed to Site COCs in contaminated sediments present along the intertidal and subtidal areas that were not dredged during the Hylebos Cleanup.

To be conservative and make use of available sampling data, exposure media were defined very conservatively. For example, surface sediment and sediment porewater were defined for the purpose of screening as samples taken anywhere within 3 feet of the mudline. This is very conservative because biota are generally exposed to chemicals in only the top several inches of sediment and associated porewater. Thus, for this ecosystem, the biologically active zone of sediments has been defined as the top 10 centimeters (cm) (about 4 inches). Similarly, COCs present in all on-Site groundwater samples were screened even though portions of the impacted shallow groundwater may not discharge to the Hylebos Waterway. To provide a baseline evaluation (i.e., one in the absence of remedial measures), however, this pathway was considered complete. In addition, groundwater samples from all depths were screened even though it is the shallow groundwater that has the highest probability of discharging to the Hylebos Waterway. Within the groundwater plume, groundwater flow directions are predominantly downward below an elevation of approximately -60 feet NGVD due to the elevated groundwater density plume and downward gravity-driven density-dependent flow. Lastly, groundwater concentrations of total metals and total SVOCs (e.g., HCB, HCBD) were screened even though these results potentially contain large amounts of sorbed COCs that are neither readily bioavailable nor mobile in groundwater.

In contrast, some sample data and media were not screened because exposure pathways are incomplete. Thus, bulk soil samples collected more than 3 feet below the mudline were excluded from the evaluation. These deeper soil samples are considered too deep to pose an exposure threat to aquatic biota.

Figure 2.2 presents the aquatic ecological CSM for the Hylebos Waterway. The CSM includes consideration of direct toxic effects (e.g., toxicity to aquatic organisms from chemicals in the water column and sediment) and indirect food web exposure pathways (e.g., toxicity to consumers of aquatic life that bioaccumulate chemicals from the water column and sediment).

2.2.3 Overall Conceptual Site Model

The chemical impacts at the Site include soil, soil vapor, groundwater, sediment, and surface water contamination. The nature and extent of the chemical impacts have been identified and defined by the various investigations conducted at the Site. The CSM identifies the potential exposure pathways that could be complete based upon the chemical and hydrogeologic characterization of the Site, as well as the continued industrial/commercial use of the Site. The overall CSM is illustrated schematically on Figure 2.3 with respect to the release mechanisms, exposure routes, and receptors from the primary impacted areas of the Site.

2.3 Deed Restrictions for the OCC Property

Draft deed restrictions, detailed in Appendix A, that have been proposed for implementation at the OCC Property include the following:

1. No groundwater use except when used as part of remedy

2. Industrial land use only
3. No excavation or below grade construction without appropriate worker health and safety plans and training as detailed in the Soil and Groundwater Management Plan presented in Appendix B
4. No excavation or below grade construction without the proper handling, characterization, and disposal of the excavated soil/materials as detailed in the Soil and Groundwater Management Plan presented in Appendix B
5. Relocation and reuse of soils consistent with the corrective measures and the Soil and Groundwater Management Plan presented in Appendix B
6. No future buildings with basements or crawlspaces
7. Soil vapor intrusion in any future building construction addressed using barriers or other engineering controls/monitoring
8. Maintenance and replacement, as needed, of surface covers to prevent direct contact and inhalation exposure to Site soils, and to reduce infiltration of precipitation into the soil
9. A Washington Industrial Safety and Health Act and U.S. Occupational Safety and Health Administration (WISHA/OSHA) compliant worker health, safety and training program to address current and future health and safety issues related to indoor air in the existing on-OCC Property buildings

While these restrictions have not been executed in a deed restriction, they have been implemented on the OCC Property. Implementation of the above restrictions has resulted in the removal of the following complete exposure pathways on the OCC Property:

- Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface and subsurface soil
- Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in groundwater

These exposure pathways will not be evaluated in the HHEPA for the OCC Property. However, as these restrictions apply only to the OCC Property these exposure pathways would need to be evaluated for all off-OCC Property receptors.

In addition, potable groundwater use is not evaluated in this HHEPA due to the restrictions regarding groundwater use that are in place for both the OCC properties and the Port of Tacoma properties. The Port of Tacoma has a restrictive covenant in place, which restricts the uses of groundwater on the Port of Tacoma properties (Appendix C). The Port of Tacoma restrictive covenant specifies that groundwater on the Port of Tacoma property shall not be extracted, supplied, or used for drinking or other human consumption or domestic use of any kind. This is consistent with the recorded restrictive covenant discussed above that prohibits groundwater extraction, supply, or use for drinking or other human consumption or domestic use of any kind.

Although restrictions have been imposed on the OCC Property regarding use of an OSHA-compliant program to address indoor air issues, recent comments from USEPA indicated that an OSHA-compliant program is not considered sufficient to address potential indoor air issues related to subsurface contamination. Therefore, evaluation of the VI pathway was included in the HHEPA for on-OCC Property.

It should be noted that surface soil exposures for the OCC Property are being evaluated conservatively assuming no surface covers are currently in place. This approach was considered appropriate to help guide future decisions related to corrective action, risk management measures, or further evaluation in remedy design.

Section 3.0 Human Health Exposure Pathway Assessment

The HHEPA was performed in accordance with the following Ecology and USEPA guidance:

- Washington State Department of Ecology's (Ecology's), Model Toxics Control Act Statute and Regulation (MTCA) (WAC, 2007)
- USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part) A, EPA/540/1-89/002, December 1989
- USEPA RAGS Supplemental Guidance, Standard Default Exposure Factors, Interim Final, OSWER Directive 9285.6-03, March 25, 1991a
- USEPA Exposure Factors Handbook, EPA/600/P-95/002Fa, August 1997a
- USEPA RAGS Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments, Final, Publication 9285.7-O1D, December 2001
- USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, December 2002
- USEPA RAGS Part E, Supplemental Guidance, Dermal Risk Assessment, Final, July 2004a
- USEPA RAGS Part F, Supplemental Guidance for Inhalation Risk Assessment, Final, January 2009
- USEPA Child-Specific Exposure Factors Handbook, September 2008a

Section 3.1 presents the COCs by media. Section 3.2 presents the exposure assessment. Section 3.3 presents the equations used in the development of RBCs. Section 3.4 presents the receptor-specific exposure assumptions applied in the development of RBCs. Section 3.5 presents the human health toxicity values used for each identified COC. Section 3.6 presents the development of the human-health RBCs for all exposure media. Section 3.7 presents the uncertainty analysis.

3.1 Constituents of Concern

For the purposes of this Exposure Pathway Assessment, the Site has been divided into the OCC Property and off-OCC Property. The COCs identified previously in Section 2.1 for the various media will be carried through the HHEPA.

The soil data considered in the HHEPA consisted of all soils less than or equal to 10 feet below ground surface (bgs) (based on the maximum expected depth of excavation for utilities).

The sediment data considered in the HHEPA consisted of all sediment data collected within 3 feet of the Hylebos Waterway mudline, located above the approximate lowest tide elevation of -10.32 feet NGVD (-4 feet MLLW).

The groundwater data considered in the HHEPA consisted of all groundwater data collected during the period of January 2002 through October 2013. For monitoring wells, the most recent groundwater data for each COC collected during this period was considered. A shallow groundwater data set was derived consisting of all groundwater data collected within 25 feet of the upland ground surface, and was used in the HHEPA to evaluate volatilization of COCs from groundwater to indoor air and from groundwater to ambient air. The evaluation was limited to shallow groundwater because only the shallow groundwater will directly impact these media. All deeper volatile impacts would need to pass through the shallow groundwater prior to impacting indoor air or ambient air. This shallow groundwater data set was also used to evaluate the groundwater-to-surface water pathway because hydraulic monitoring shows that there is the potential for shallow groundwater adjacent to the embankment along the Hylebos Waterway to discharge to surface water within the Hylebos Waterway by seeps through the embankment and by shallow subtidal groundwater discharge along the embankment. In addition, shallow fresh groundwater at the northern end of the peninsula will discharge to Commencement Bay. The hydraulic monitoring showed that deep impacted groundwater does not directly discharge to the Hylebos Waterway or Commencement Bay. On the Site, downward vertical hydraulic gradients occur deep below the surface due to density effects caused by the elevated groundwater densities associated with the anthropogenic density plume (ADP). Lateral migration deep below the surface to Commencement Bay is restricted by inland-directed hydraulic gradients that result from naturally-occurring inland salt water migration from Commencement Bay.

With respect to surface water, no specific surface water dataset was available.

The soil, sediment, and groundwater data were divided into on-OCC Property and off-OCC Property data. The occurrence and distribution (minimum, maximum, and detection frequency) of the COCs identified in the various media are summarized in the following tables:

i) On-OCC Property Soil - Table 3.1
ii) On-OCC Property Sediment - Table 3.2
iii) On-OCC Property Shallow Groundwater - Table 3.3
iv) Off-OCC Property Soil - Table 3.4
v) Off-OCC Property Sediment - Table 3.5
vi) Off-OCC Property Shallow Groundwater - Table 3.6
vii) On/off-OCC Site Groundwater - Table 3.7

It should be noted that pH has been identified as a COC in all media; however, currently there are no toxicological reference values for evaluating human exposure to media with pH outside the normal ranges for soil and groundwater. As a result, pH has not been evaluated in the HHEPA. It is acknowledged that contact with low or high pH material could potentially cause irritation or tissue damage at the point of contact and that direct contact with media with high (≥11.5) or low pH (≤2) should be precluded as part of the final remedy. It should be noted however that pH impacted media was evaluated in the EHEPA.

3.2 Exposure Assessment

Exposure is defined as the contact of a receptor (i.e., person, animal, or other flora or fauna) with a chemical or physical agent. The exposure assessment is the estimation of the magnitude, frequency, duration, and routes of exposure. An exposure assessment provides a systematic analysis of the potential exposure mechanisms by which a receptor may be exposed to chemical or physical agents at or originating from a study area. The objectives of an exposure assessment are as follows:

1. Characterization of exposure setting (see Section 3.2.1)
2. Identification of potential exposure pathways (see Section 3.2.2)
3. Exposure scenarios and completed exposure pathways (see Section 3.2.3)

3.2.1 Characterization of Exposure Setting

As part of the HHEPA process, potential exposure pathways are determined through an evaluation of the physical setting of the Site and the potentially exposed populations. A detailed description of the physical setting of the Site is presented in the SCR. The consideration of site-specific factors related to land usage is important in the development of realistic current and future exposure scenarios and calculation of cancer risk and hazard quotient estimates. The current and future potential land uses that are reasonably expected for the Site determine which populations may potentially be exposed.

Current Land Use

The current potentially exposed population includes persons who may infrequently trespass on the Site, industrial/commercial workers, recreational users, and fishers.

Future Land Use

The Site, which is currently zoned industrial, will remain under industrial/commercial land use in the future. The future potentially exposed population for the Site includes potential trespassers, industrial/commercial workers, recreational users, and fishers. It is possible that future development of the Site may necessitate some below-grade excavation or construction activity and/or utility installation and servicing. Such activities conducted on-OCC Property are addressed by restrictions which require appropriate worker health and safety plans and training. However, since these restrictions do not apply to off-OCC Property, short-term future potential construction/utility worker exposures to off-OCC Property conditions were evaluated in the HHEPA.

3.2.2 Identification of Potential Exposure Pathways

An exposure pathway describes a mechanism by which humans may come into contact with site-related COCs. An exposure pathway is complete (i.e., it could result in a receptor contacting a COC) if all of the following four elements are present:

1. A source or a release from a source (e.g., COCs released to soil during historical operations [see Section 3.2.2.1])
2. A probable environmental migration route of a site-related COC (e.g., leaching or partitioning from one medium to another [see Section 3.2.2.2])
3. An exposure point where a receptor may come in contact with a site-related COC (e.g., surface and subsurface soil [see Section 3.2.2.3])
4. A route by which a site-related COC may enter a potential receptor's body (e.g., ingestion, dermal contact, or inhalation [see Section 3.2.2.4])

If any of these four elements are not present, then the exposure pathway is considered incomplete and would not contribute to the total exposure from the Site.

3.2.2.1 Release Mechanisms

The potential mechanisms of contaminant release at the Site are:

- Potential release of contaminants from exposed sediment or contaminated surficial soil through contact with surface water
- Potential release of contaminants from the soil to ambient air by volatilization and wind erosion
- Potential release of contaminants from the groundwater by volatilization and subsequent transport through the unsaturated zone to ambient air or indoor air
- Potential release of contaminants from impacted groundwater discharged to surface water
- Potential release of contaminants from impacted groundwater to sediments
- Potential release of contaminants from subsurface soils to groundwater

3.2.2.2 Fate and Transport in Receiving Media

Many factors control the partitioning of a chemical in the environment. An understanding of the general fate and transport characteristics of the COCs is important when predicting future theoretical exposure, linking sources with currently contaminated media, and identifying potentially complete pathways to Site media. Therefore, the fate and transport analysis conducted at this stage of the exposure assessment is meant to identify media that are likely to receive site-related COCs. The potential contaminant transport mechanisms at the Site are:

- Movement with wind
- Movement with sediment
- Movement during future Site re-development
- Movement with groundwater
- Movement of VOCs in soil vapor

Potential Migration of Soil And Groundwater COCs To Air

Volatile constituents in soil and groundwater may volatize and migrate into indoor air. The soil and groundwater concentrations that are protective of indoor air concentrations for industrial/commercial workers for off-OCC Property areas were calculated using the Johnson & Ettinger (J&E) Model (USEPA, 2004b). Appendix D presents the methodology and assumptions used to estimate the soil and groundwater concentrations that are protective of indoor air.

Volatile COCs in soil and groundwater could also volatilize to ambient air. The groundwater concentrations of the COCs that are protective of ambient air were determined by multiplying the risk-based ambient air concentration for each COC by their chemical-specific volatilization factors (VFs) calculated according to methodology provided by the American Society for Testing and Materials, ASTM (2010).

Potential Migration of Groundwater COCs to Surface Water

Hydraulic monitoring conducted at the Site shows the potential for shallow groundwater adjacent to the embankment along the Hylebos Waterway to discharge to surface water within the Hylebos Waterway by seeps through the embankment and by shallow subtidal groundwater discharge along the embankment. In addition, shallow fresh groundwater at the northern end of the peninsula will discharge to Commencement Bay. The hydraulic monitoring also showed that deep impacted groundwater does not directly discharge to the Hylebos Waterway or Commencement Bay. Downward vertical hydraulic gradients occur deep below the surface due to density effects caused by the elevated groundwater densities associated with the ADP. Lateral migration deep below the surface to Commencement Bay is restricted by inland-directed hydraulic gradients that result from naturally-occurring inland salt water migration from Commencement Bay.

However, constituents present in groundwater seeps could impact surface water quality. Since groundwater at the Site is considered to be non-potable because of covenants that are in place and shallow groundwater discharges to the Hylebos Waterway via seeps and subtidal discharge along the embankment, the preliminary groundwater cleanup levels presented in the SCR are based on surface water cleanup levels as required by MTCA. The preliminary surface water cleanup levels for the Site, presented in the SCR, were derived in accordance with MTCA Method B to be protective of human health for the consumption of organisms.

Because hydraulic monitoring shows that deep Site-related groundwater does not directly discharge to the Hylebos Waterway and only shallow groundwater discharges to the Hylebos Waterway via seeps and subtidal discharge along the embankment, analytical results from shallow groundwater (≤25 feet below ground surface) on-OCC and off-OCC Property were used to evaluate potential impacts on surface water. For the purposes of this HHEPA and consistent with MTCA, no mixing in surface water was assumed. This approach is regarded as conservative because it does not include consideration of mixing of groundwater with surface water in the development of groundwater RBCs.

However, since shallow groundwater discharging to the Hylebos Waterway via seeps and subtidal discharge is considerably diluted by surface water, recreational user direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to surface water were not evaluated in the HHEPA.

3.2.2.3 Potential Exposure Points

After contaminated or potentially contaminated media have been identified, the exposure points are determined by identifying whether or not the potentially exposed population can contact these media.

The exposure domain is the area within which the potentially exposed population may contact the contaminated media. For example, ingestion of surface soil by a current trespasser is complete only in areas that are not covered. Therefore, the exposure domain for surface soil ingestion by a current trespasser would include only the areas not under a cover. However, the surface soil exposure domain conservatively included all surface soil data to evaluate the exposure to Site surface soils for the trespasser. This approach was chosen in order to assist in decision-making regarding any needed corrective action, risk management measures, or further evaluation during remedy design.

The indoor air pathway was evaluated for current and future industrial/commercial buildings located on- and off-OCC Property. This pathway was evaluated considering a typical small industrial/commercial building that could be constructed anywhere within off-OCC Property. As indicated in Section 2.3, a restriction for all future buildings on OCC Property will require implementing VI barriers in the foundations or other controls regardless of whether or not the proposed location has been evaluated for potential VI. The results of VI pathway investigation to date are documented in the *Vapor Investigation Report* (CRA, 2013c), a copy of which is provided as an appendix to the SCR.

3.2.2.4 Potential Exposure Routes

In general, human receptors may be exposed to different environmental media, including soil, groundwater, sediment, air, and biota contacting the other contaminated media. Based on the physical conditions of the Site, potential exposure routes associated with exposure to Site soil, groundwater, and sediment may include direct contact (incidental ingestion, dermal contact, and inhalation of particulates and/or vapors) and inhalation of volatile COCs migrating to indoor air (via soil and groundwater).

3.2.3 Exposure Scenarios and Completed Exposure Pathways

Based on an understanding of the four components of an exposure pathway and the current/future conditions of the Site, human exposure pathways were identified. As presented in the above sections, the potential human populations considered relevant to this HHEPA based on current and/or future Site conditions include a trespasser, an industrial/commercial worker, a construction/utility worker, a recreational user, and a fisher. The HHEPA CSM shown on Figure 2.1 and discussed in Section 2.2.1 presents a detailed summary of the exposure media, exposure pathways, exposure routes, and exposed receptors considered in the HHEPA.

In consideration of the restrictions on the OCC Property, the following media and potential human exposures were identified for quantitative evaluation for on and off OCC Property:

Media and Potential Human Exposure	***on-OCC Property***	***off-OCC Property***
Industrial/commercial worker inhalation exposure to chemicals in indoor air due to migration of volatile chemicals in soil and groundwater	√	√
Trespasser and industrial/commercial worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface soil	√	√
Trespasser and industrial/commercial worker direct contact (incidental ingestion and dermal contact) exposure to chemicals in sediment	√	√
Trespasser and industrial/commercial worker inhalation exposure to chemicals in ambient air due to migration of volatile chemicals in groundwater	√	√
Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface and subsurface soil		√
Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in groundwater		√
Fisher ingestion exposure to chemicals in ingested fish tissue	√	√

3.3 Equations Used in the Development of Risk-Based Concentrations

To quantify exposure, potential exposure scenarios were developed using guidance presented in the following Ecology and USEPA documents:

i) Washington State Department of Ecology's (Ecology's), Model Toxics Control Act Statute and Regulation (MTCA) (WAC, 2007).

ii) USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

iii) USEPA, 1991a: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual – Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9258.6-03.

iv) USEPA, 1991b: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), Publication 9285.7-01B.

v) USEPA, 1995a: Assessing Dermal Exposure from Soil, Region III Technical Guidance Manual Risk Assessment, EPA/903-K-95-003, December 1995.

vi) USEPA, 2000a: Region 4 Human Health Risk Assessment Bulletins - Supplement to RAGS, Section 4: Exposure Assessment, May 2000.

vii) USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

viii) USEPA, 2004a: RAGs Volume 1, Human Health Evaluation Manual, Part E; Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

ix) USEPA, 2004b: Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings, office of Emergency and Remedial Response, Washington, DC, February 22.

x) USEPA, 2008a: Child Specific Exposure Factors Handbook, September 2008.

xi) USEPA, 2009: RAGs Volume 1, Human Health Evaluation Manual, Part F; Supplemental Guidance for Inhalation Risk Assessment, EPA-540-R-070-002, January 2009.

The exposure factors used in the development of the RBCs protective of the human receptors are based on the default Ecology and/or USEPA assumptions. In instances where Ecology and/or USEPA documents did not present necessary factors, or where more appropriate scientific data were not available, professional judgment was used to develop conservative assumptions that are representative of the Reasonable Maximum Exposure (RME) and are protective of human health.

RBCs were developed for each receptor/medium/COC. For each COC, two RBCs were initially developed if toxicity reference values were available: one protective of carcinogenic health impacts using a target cancer risk of 1.0×10^{-6} and a second protective of non-carcinogenic health impacts using a target non-cancer hazard index of 1.0. The ultimate RBC was determined to be the lower of RBCs for carcinogenic and non-carcinogenic health impacts. While MTCA specifies the use of a cancer risk level of 1.0×10^{-5} for industrial sites, it is important to note that this risk level applies to both individual constituents and the cumulative effect from exposure to multiple carcinogenic constituents. Because multiple COCs were frequently identified at a number of locations at the Site, a cancer risk level of 1.0×10^{-6} was used to address potential cumulative effects. The equations used to develop RBCs are presented in Sections 3.3.1 through 3.3.5. Section 3.3.6 presents the equations and exposure input parameters that were used to develop RBCs for non-carcinogenic exposure to lead.

Appendix E provides a comparison of the Site-specific RBCs developed in this HHEPA to the concentrations calculated using the MTCA risk equations with default values. Where appropriate, the differences in the two RBCs are discussed and/or explained.

The equations used are discussed in the following sections:

Section 3.3.1	Indoor Air/Ambient Air
Section 3.3.2	Soil
Section 3.3.3	Groundwater
Section 3.3.4	Sediment
Section 3.3.5	Groundwater (Surface Water)
Section 3.3.6	Lead

3.3.1 Indoor Air/Ambient Air

Indoor air RBCs were developed for inhalation exposure of the industrial/commercial worker receptor to COCs in indoor air. These indoor air RBCs were then used to back-calculate RBCs in soil and groundwater that are protective of indoor air. In addition, ambient air RBCs were developed for inhalation exposure of the trespasser and industrial/commercial (outdoor) worker receptors to COCs that had volatilized from groundwater and migrated to ambient air.

The equations used for the development of indoor air and ambient air RBCs are presented below for the receptors indicated above.

<u>Trespasser and (Indoor and Outdoor) Industrial/Commercial Workers</u>

Carcinogenic Endpoint:

$$\mathrm{RBC}_{\mathrm{IA/AA}} = \frac{\mathrm{TR} \times \mathrm{ATc}}{\mathrm{EF} \times \mathrm{ED} \times \mathrm{FT} \times \mathrm{URF}}$$

Non-Carcinogenic Endpoint:

$$\mathrm{RBC}_{\mathrm{IA/AA}} = \frac{\mathrm{THQ} \times \mathrm{ATnc}}{\mathrm{EF} \times \mathrm{ED} \times \mathrm{FT} \times (1/\mathrm{RfC}\ \ )}$$

Where:

$\mathrm{RBC}_{\mathrm{IA/AA}}$ = Risk-Based Concentration in indoor air/ambient air based on inhalation exposure micrograms per cubic meter [$\mu g/m^3$]
TR = Target Cancer Risk (unitless)
THQ = Target Hazard Quotient (unitless)
ATc = Averaging Time - carcinogenic (years)
ATnc = Averaging Time - non-carcinogenic (years)
URF = Unit Risk Factor - inhalation - chemical-specific ($\mu g/m^3)^{-1}$

RfC = Reference Concentration - inhalation - chemical-specific (µg/m^3)
FT = Fraction Time Exposed - inhalation (hours/24 hours)
EF = Exposure Frequency (unitless)
ED = Exposure Duration (years)

Soil and groundwater concentrations protective of the industrial/commercial worker exposure to impacted indoor air were back-calculated using the derived RBCs for indoor air and attenuation factors developed using the J&E Model (USEPA, 2004b) as described in Appendix D.

Groundwater concentrations protective of the trespasser and industrial/commercial worker exposure to impacted ambient air were calculated by dividing the ambient air RBC by a chemical-specific VF which was developed according to methodology provided by ASTM (2010).

3.3.2 Soil

Soil RBCs were developed for exposure of the trespasser, industrial/commercial worker, and construction/utility worker receptors to COCs in soil. The RBCs in soils for these receptors were developed for the incidental ingestion, dermal contact, and inhalation routes of exposure based on the following equations:

Trespasser, Industrial/Commercial Worker and Construction/Utility Worker

Carcinogenic Endpoint:

$$RBC_{soil} = \frac{TR \times ATc}{EF \times ED \times ((CSF \times SIR \times ABS_o)/ABW) + ((CSF \times SA \times AF \times ABS_d \times EV \times CF)/ABW) + (URF \times FT \times (1/VF or PEF)))}$$

Non-Carcinogenic Endpoint:

$$RBC_{soil} = \frac{THQ \times ATnc}{EF \times ED \times (((1/RfD) \times SIR \times ABS_o)/ABW) + (((1/RfD) \times SA \times AF \times ABS_d \times EV \times CF)/ABW) + ((1/RfC) \times FT \times (1/VF or PEF)))}$$

Where:

RBC$_{soil}$ = Risk-Based Concentration in soil based on ingestion, dermal contact, and inhalation exposure (mg/kg)
TR = Target Cancer Risk (unitless)
THQ = Target Hazard Quotient (unitless)
ABW = Average Body Weight (kg)
ATc = Averaging Time – carcinogenic (years)
ATnc = Averaging Time - non-carcinogenic (years)
CSF = Cancer Slope Factor – oral/dermal - chemical-specific (mg/kg/day)$^{-1}$
URF = Unit Risk Factor - inhalation– chemical-specific (mg/m^3)$^{-1}$
RfD = Reference Dose Factor – oral/dermal - chemical-specific (mg/kg/day)

RfC = Reference Concentration – inhalation – chemical-specific (mg/m^3)
ABS_o = Absorption Factor - oral - chemical-specific (%/100)
ABS_d = Absorption Factor - dermal - chemical-specific (%/100)
SIR = Soil Ingestion Rate (mg/day)
CF = Conversion Factor (1.0E-06 kg/mg)
SA = Surface Area Exposed (cm^2)
AF = Adherence Factor (mg/cm^2-event)
FT = Fraction Time Exposed – inhalation (hours/24 hours)
EF = Exposure Frequency (unitless)
ED = Exposure Duration (years)
EV = Event Frequency (events/day)
PEF = Particulate Emission Factor – inhalation (m^3/kg)
VF = Volatilization Factor - inhalation - chemical-specific (m^3/kg).

Both the VF and Particulate Emission Factor (PEF) were used to estimate ambient air concentrations of COCs based on the concentrations in soil. The VF is chemical specific. Both the VF and PEF were calculated using the equations presented in USEPA (2002).

3.3.3 Groundwater

Groundwater RBCs were developed for exposure of the construction/utility worker to COCs in groundwater during excavation activities. The RBCs in groundwater were developed for the ingestion, dermal contact, and inhalation routes of exposure based on the following equations:

<u>Construction/Utility Worker</u>

Carcinogenic Endpoint:

$$RBC_{gw} = \frac{TR \times ATc}{EF \times ED \times [((CSF \times WIR)/ABW) + ((CSF \times SA \times DA_{event} \times EV \times CF)/ABW) + (FT \times URF \times (1/VF)))]}$$

Non-Carcinogenic Endpoint:

$$RBC_{gw} = \frac{THQ \times ATnc}{EF \times ED \times [(((1/RfD) \times WIR)/ABW) + (((1/RfD) \times SA \times DA_{event} \times EV \times CF)/ABW) + ((1/RfC) \times FT \times (1/VF)))]}$$

Where:

RBC_{gw} = Risk-Based Concentration in groundwater based on ingestion, dermal, and inhalation exposure (mg/L)
TR = Target Cancer Risk (unitless)
THQ = Target Hazard Quotient (unitless)
ABW = Average Body Weight (kg)

ATc = Averaging Time - carcinogenic (years)

ATnc = Averaging Time - non-carcinogenic (years)

CSF = Cancer Slope Factor – oral/dermal - chemical-specific $(mg/kg/day)^{-1}$

URF = Unit Risk Factor – inhalation – chemical-specific $(mg/m^3)^{-1}$

RfD = Reference Dose Factor – oral/dermal - chemical-specific (mg/kg/day)

RfC = Reference Concentration – inhalation – chemical-specific (mg/m^3)

WIR = Water Ingestion Rate (L/day)

SA = Surface Area Exposed (cm^2)

DA_{event} = Dermal Absorbed per Event (cm/event)

VF = Volatilization Factor (L/m^3)

CF = Conversion Factor (1.0E-03 L/cm^3)

FT = Fraction Time Exposed – inhalation (hours/24 hours)

EF = Exposure Frequency (unitless)

ED = Exposure Duration (years)

EV = Event Frequency (events/day)

3.3.4 Sediment

Sediment RBCs were developed for exposure of the trespasser and industrial/commercial worker receptors to COCs in sediment. The RBCs in sediment were developed for the ingestion and dermal contact routes of exposure based on the following equations:

<u>Trespasser and Industrial/Commercial Worker</u>

Carcinogenic Endpoint:

$$RBC_{sed} = \frac{TR \times ATc}{EF \times ED \times [((CSF \times SIR \times ABS_o)/ABW) + ((CSF \times SA \times AF \times ABS_d \times EV \times CF)/ABW)])}$$

Non-Carcinogenic Endpoint:

$$RBC_{sed} = \frac{THQ \times ATnc}{EF \times ED \times [(((1/RfD) \times SIR \times ABS_o)/ABW) + (((1/RfD) \times SA \times AF \times ABS_d \times EV \times CF)/ABW))]}$$

Where:

RBC_{sed} = Risk-Based Concentration in sediment based on ingestion and dermal exposure (mg/L)

TR = Target Cancer Risk (unitless)

THQ = Target Hazard Quotient (unitless)

ABW = Average Body Weight (kg)

ATc = Averaging Time - carcinogenic (years)

ATnc = Averaging Time - non-carcinogenic (years)

CSF = Cancer Slope Factor – oral/dermal - chemical-specific $(mg/kg/day)^{-1}$
RfD = Reference Dose Factor – oral/dermal - chemical-specific (mg/kg/day)
SIR = Sediment Ingestion Rate (mg/day)
ABS_o = Absorption Factor - oral - chemical-specific (%/100)
ABS_d = Absorption Factor - dermal - chemical-specific (%/100)
SA = Surface Area Exposed (cm^2)
AF = Adherence Factor (mg/cm^2-event)
CF = Conversion Factor (1.0E-06 mg/kg)
FT = Fraction Time Exposed – inhalation (hours/24 hours)
EF = Exposure Frequency (unitless)
ED = Exposure Duration (years)
EV = Event Frequency (events/day)

3.3.5 Groundwater (Surface Water)

Hydraulic monitoring shows that deep Site-related groundwater does not directly discharge to the Hylebos Waterway or Commencement Bay due to observed downward vertical hydraulic gradients deep below the surface and inland-directed hydraulic gradients caused by naturally-occurring inland salt water migration from Commencement Bay. However, because groundwater at the Site is considered to be non-potable and shallow groundwater discharges to the Hylebos Waterway via seeps and subtidal discharge along the embankment adjacent to the Hylebos Waterway, the preliminary groundwater cleanup levels presented in the SCR were based on the surface water cleanup levels. The surface water cleanup levels were developed in accordance with MTCA Method B to be protective of human health for the consumption of organisms. Specifically, they consider COC partitioning to, or bioaccumulation in, fish tissue with subsequent human consumption of impacted fish tissue. As such, these groundwater cleanup levels reflect surface water concentrations that are protective of the fish consumption pathway. As noted in Section 3.2.2.2, mixing of groundwater with surface water was not included in development of the groundwater cleanup levels, and therefore, the levels are regarded as conservative.

3.3.6 Lead

The RBC for lead in soil was developed for adult exposure to lead based on the following equation (USEPA, 2003a):

$$RBC = \frac{((PbB_{95fetal}/(GSD_i^{1.645} \times R_{fetal/maternal}) - PbB_{adult,0})) \times AT}{(BKSF \times IR \times AF \times EF)}$$

Where:

RBC = Risk-Based Concentration for lead in soil (μg/g)
$PbB_{95fetal}$ = 95th percentile target blood lead (PbB) concentration in the fetus (μg/dL). The goal is intended to ensure that $PbB_{95fetal}$ does not exceed 10 μg/dL.

GSD_i = Individual Geometric Standard Deviation, an exponent of 1.645 represents the standard normal deviate used to calculate the 95th percentile from a lognormal distribution of blood lead concentration.

$R_{fetal/maternal}$ = Mean ratio of fetal to maternal PbB

$PbB_{adult,0}$ = Baseline blood lead concentration (μg/dL) (appropriate average concentration for individual)

AT = Averaging Time (days/year); the total period during which contact may occur

BKSF = Biokinetic Slope Factor (μg/dL blood lead increase per μg/day lead uptake)

IR = Ingestion Rate of soil (g/day)

EF = Exposure Frequency for contact with soil (days/yr)

AF = Absolute Absorption Fraction of lead in soil (unitless)

3.4 Exposure Scenario Factors

The following sections outline the exposure factors used to develop the RBCs protective of the various human receptors that may frequent the Site.

The receptors are discussed in the following sections:

Section 3.4.1	Trespasser
Section 3.4.2	Industrial/Commercial Worker
Section 3.4.3	Construction/Utility Worker
Section 3.4.4	Fisher
Section 3.4.5	Adult Lead Exposure Input Parameters

3.4.1 Trespasser

Exposure Frequency and Duration

Exposure factors used in the calculation of RBCs for COCs in ambient air, soil, and sediment for the adolescent trespasser are summarized in the following table.

Exposure Factor	***Units***	***Trespasser***	***Reference***
		Adolescent	
Soil/Sediment Ingestion Rate (SIR)	mg/day	100	USEPA, 2002
Adherence Factor (AF)	mg/cm^2	0.2	WAC, 2007
Absorption Factor - dermal (ABSd)	%/100	Chemical-specific	WAC, 2007
Surface Area Exposed (SA)	cm^2	3,900	USEPA, 2008a
Fraction Time Exposed – Inhalation (FT)	unitless	3.4/24	USEPA, 2008a (a)
Exposure Frequency (EF)	unitless	0.14	USEPA, 2008a (a)
Exposure Duration (ED)	years	10	USEPA, 2008b

Exposure Factor	***Units***	***Trespasser***	***Reference***
		Adolescent	
Average Body Weight (ABW)	kg	45	USEPA, 2008b
Averaging Time - carcinogenic (ATc)	years	75	WAC, 2007
Averaging Time – non-carcinogenic (ATnc)	years	10	USEPA, 2008b
Conversion Factor (CF)	kg/mg	1.00E-06	WAC, 2007
Particulate Emission Factor (PEF)	m^3/kg	site-specific	USEPA, 2002
Volatilization Factor (VF)	m^3/kg	chemical-specific	USEPA, 2002

Notes:

(a) The basis for the FT is the 50th percentile value from Table 16-1, Recommended Values for Activity Factors – Time Outdoors (total). The time spent outdoors for a 6 to 11 year old adolescent of 100 minutes/day equates to 1.7 hours. The FT is based on double the time spent outdoors [(100/60 × 2].

(b) The basis for the EF is the 50th percentile value from Table 16-1, Recommended Values for Activity Factors – Time Outdoors (total). The time spent outdoors for a 6 to 11 year old adolescent of 100 minutes/day from out of a possible 365 days equates to 25.3 days. The exposure frequency is based on double the time spent outdoors over an exposure period of 365 days [(25.3 × 2)/365].

All exposure factors and equations used in the calculation of RBCs for the COCs in ambient air, soil, and sediment for an adolescent trespasser are also summarized in the following tables:

- Table 3.11: Derivation of Risk-Based Concentrations (RBCs) for Ambient Air from Groundwater – Trespasser Inhalation Exposure
- Table 3.16: Derivation of Risk-Based Concentrations (RBCs) for Soil – Trespasser Oral, Dermal, and Inhalation Exposure
- Table 3.29: Derivation of Risk-Based Concentrations (RBCs) for Sediment – Trespasser Oral and Dermal Exposure

To develop RBCs for shallow groundwater that are protective of ambient air exposures, the RBCs for ambient air (Table 3.11) were divided by their chemical-specific VFs calculated according to methodology provided by the ASTM (2010). The equations and inputs for the calculated RBCs for shallow groundwater and chemical-specific VFs are presented in Tables 3.13 and 3.14, respectively.

Inhalation of soil particulates is evaluated through the use of a PEF to estimate ambient air concentrations of COCs. The PEF was calculated using the approach presented in USEPA (2002). The equations and inputs for the calculated PEF values are presented in Table 3.17.

Inhalation of COCs volatilizing from soil is evaluated through the use of a VF to estimate ambient air concentrations. The VF is chemical specific and was calculated using the approach presented in USEPA (2002). Site-specific soil and chemical-specific properties were used in calculating the VF. The equations and inputs for the calculated VF values are presented in Table 3.18.

3.4.2 Industrial/Commercial Worker

Exposure Frequency and Duration

Exposure factors used in the calculation of RBCs for COCs in indoor air, ambient air, soil, and sediment for industrial/commercial worker are summarized in the following table.

Exposure Factor	*Units*	*Industrial/Commercial Worker*	*Reference*
Soil/Sediment Ingestion Rate (SIR)	mg/day	50	WAC, 2007
Adherence Factor (AF)	mg/cm^2	0.2	WAC, 2007
Absorption Factor - dermal (ABSd)	%/100	Chemical-specific	WAC, 2007
Surface Area Exposed (SA)	cm^2	2,500	WAC, 2007
Fraction Time Exposed – Inhalation (FT)	Unitless	8/24	Professional Judgment (a)
Exposure Frequency (EF)	unitless	0.7	WAC, 2007 (b)
Exposure Duration (ED)	years	20	WAC, 2007
Average Body Weight (ABW)	kg	70	WAC, 2007
Averaging Time – carcinogenic (ATc)	years	75	WAC, 2007
Averaging Time – non-carcinogenic (ATnc)	years	20	WAC, 2007
Conversion Factor (CF)	kg/mg	1.00E-06	WAC, 2007
Particulate Emission Factor (PEF)	m^3/kg	site-specific	USEPA, 2002
Volatilization Factor (VF)	m^3/kg	chemical-specific	USEPA, 2002

Notes:
(a) Professional Judgment; assumed 8-hour workday.
(b) Based on assumption of 5 days per week for 52 weeks over an exposure period of 365 days.

All exposure factors and equations used in the calculation of RBCs for the COCs in indoor air, ambient air, soil, groundwater, and sediment for an industrial/commercial worker are also summarized in the following tables:

- Table 3.8: Derivation of Risk-Based Concentration (RBCs) for Indoor Air from Soil and Groundwater – Industrial/Commercial Worker Inhalation Exposure
- Table 3.12: Derivation of Risk-Based Concentration (RBCs) for Ambient Air from Groundwater – Industrial/Commercial Worker Inhalation Exposure
- Table 3.19: Derivation of Risk-Based Concentration (RBCs) for Soil – Industrial/Commercial Worker Oral, Dermal, and Inhalation Exposure
- Table 3.30: Derivation of Risk-Based Concentration (RBCs) for Sediment – Industrial/Commercial Worker Oral and Dermal Exposure

To develop RBCs for shallow groundwater that are protective of ambient air exposures, the RBCs for ambient air (Table 3.12) were divided by their chemical-specific VFs calculated according to methodology provided by the ASTM (2010). The equations and inputs for the calculated RBCs for shallow groundwater and chemical-specific VFs are presented in Tables 3.15 and 3.14, respectively.

Inhalation of soil particulates is evaluated through the use of a PEF to estimate ambient air concentrations of COCs. The PEF was calculated using the approach presented in USEPA (2002). The equations and inputs for the calculated PEF values are presented in Table 3.20.

Inhalation of COCs volatilizing from soil is evaluated through the use of a VF to estimate ambient air concentrations of COCs. The VF is chemical specific and was calculated using the approach presented in USEPA (2002). Site-specific soil and chemical-specific properties were used in calculating VFs. The equations and inputs for the calculated VF values are presented in Table 3.21.

Soil and groundwater RBCs protective of indoor air for the industrial/commercial worker were back-calculated using the derived indoor air RBCs (Table 3.8) and attenuation factors from the J&E Model, as presented in Appendix D.

3.4.3 Construction/Utility Worker

Exposure Frequency and Duration

Exposure factors used in the calculation of RBCs for COCs in soil and groundwater that are protective for a construction/utility worker performing ground intrusive activities are summarized in the following table.

Exposure Factor	*Units*	*Construction/Utility Worker*	*Reference*
Soil Ingestion Rate (SIR)	mg/day	330	USEPA, 2002
Adherence Factor (AF)	mg/cm^2	0.3	USEPA, 2002
Absorption Factor - dermal (ABSd)	%/100	Chemical-specific	WAC, 2007
Surface Area Exposed (SA)	cm^2	3,300	USEPA, 2002
Fraction Time Exposed – Inhalation (FT)	unitless	8/24	Professional Judgment (a)
Exposure Frequency (EF)	unitless	0.25	Professional Judgment (b)
Exposure Duration (ED)	years	1	Professional Judgment (c)
Average Body Weight (ABW)	kg	70	WAC, 2007
Averaging Time - carcinogenic (ATc)	years	75	WAC, 2007
Averaging Time – non-carcinogenic (ATnc)	years	1	WAC, 2007
Conversion Factor (CF)	kg/mg	1.00E-06	WAC, 2007
Particulate Emission Factor (PEF)	m^3/kg	site-specific	USEPA, 2002
Volatilization Factor (VF)	m^3/kg	chemical-specific	USEPA, 2002
Water Ingestion Rate (WIR)	L/day	0.02	VDEQ, 2002
Event Frequency (EV)	event/day	1	USEPA, 2004a
Exposure Time (ET)	unitless	4/24	Professional Judgment (d)
Conversion Factor (CF)	L/cm^3	0.001	
Volatilization Factor (VF)	L/m^3	chemical-specific	Refer to Table 3.31

Notes:

(a) Professional Judgment; assumed 8-hour workday.

(b) Professional Judgment; based on assumption of 5 days per week for 18 weeks over an exposure period of 365 days.

(c) Professional Judgment; assumes construction campaign occurs within a 1-year time period.

(d) Professional Judgment; assumes half of a worker's 8-hour work day spent in direct contact with groundwater.

All exposure factors and equations used in the calculation of RBCs for the COCs in soil and groundwater for the construction/utility worker are also summarized in the following tables:

- Table 3.22: Derivation of Risk-Based Concentrations (RBCs) for Soil – Construction/Utility Worker Oral, Dermal, and Inhalation Exposure
- Table 3.25: Derivation of Risk-Based Concentrations (RBCs) for Groundwater – Construction/Utility Worker Ingestion, Dermal, and Inhalation Exposure

Inhalation of soil particulates is evaluated through the use of a PEF to estimate ambient air concentrations of COCs. The PEF was calculated using the equations and inputs presented in USEPA (2002). The equations and inputs for the calculated PEF values are presented in Table 3.23.

Inhalation of COCs volatilizing from soil is modeled through the use of a VF to estimate ambient air concentrations of COCs. The VF is chemical specific and was calculated using the approach presented in USEPA (2002). Site-specific soil and chemical-specific properties were used in calculating VFs. The equations and inputs for the calculated VF values are presented in Table 3.24.

Inhalation of COCs in vapors originating from groundwater is evaluated through the use of a VF to estimate ambient air concentrations. The VF is chemical specific and was calculated using the approach presented in Appendix F. Site-specific groundwater and chemical-specific properties were used in calculating the VF. The equations and inputs for the calculated VF values are presented in Table 3.27.

3.4.4 Fisher

As stated in Section 3.3.5, because groundwater at the Site is considered to be non-potable and shallow groundwater discharges to the Hylebos Waterway via seeps and subtidal discharge along the embankment adjacent to the Hylebos Waterway, the preliminary groundwater cleanup levels presented in the SCR were based on the surface water cleanup levels. The surface water cleanup levels were developed in accordance with MTCA Method B to be protective of human health for the consumption of organisms. Specifically, they consider COC partitioning to, or bioaccumulating in, fish tissue with subsequent human consumption of impacted fish tissue. As such, these groundwater cleanup levels reflect surface water concentrations that are protective of the fish consumption pathway.

The preliminary groundwater cleanup levels are presented in Table 3.31.

3.4.5 Adult Lead Exposure Input Parameters

The basis for selection of input parameters for the adult lead model presented in Section 3.3.6 is discussed below.

1. Mean Ratio of Fetal to Maternal PbB ($R_{fetal/maternal}$):

   Various studies have estimated an average fetal-to-maternal PbB ratio of 0.9 based on a weight of evidence approach. This value has also been used by USEPA in applying the Adult Exposure Model (USEPA, 2003a). The value of 0.9 was used in the modeling.

2. Individual Geometric Standard Deviation ($GSD_{i,adult}$):

   This parameter is used to assess variability in blood lead concentrations among different individuals. Few data are available regarding GSD values reflecting individual variability. Instead, GSD values reflecting community variability (which would be expected to be greater than individual variability) are frequently applied to estimate individual variability. Various studies have indicated that community GSDs may range from approximately 1.8 to 2.1 (unitless) depending on the demographics. A value for GSD of 1.8 was used in this modeling based on the USEPA's *Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters* (USEPA, 2009) guidance.

3. Baseline PbB Value ($PbB_{adult,0}$):

   This parameter is specific to the population in the area of interest. At this time, no source of data describing blood lead levels for the population in the vicinity of the Site has been identified. Therefore, published reference data were used to determine a representative value. A value of 1.0 μg/dL was used for this input parameter based on USEPA's *Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters* (USEPA, 2009) guidance.

4. Biokinetic Slope Factor (BKSF):

   The TRW adopted a BKSF of 0.4 μg/dL per μg/day, derived for the baseline human health risk assessment for the California Gulch Superfund Site (USEPA, 2003a). The default value of 0.4 for the parameter BKSF was used in the modeling.

5. Soil Absolute Absorption Fraction of Lead (AF_s):

   The TRW uses 12% as the absorbed fraction of lead from soil for adults, based on an absorption factor for soluble lead of 0.20 and a relative bioavailability of 0.6 (soil/soluble). This value was used to evaluate the soil.

6. Soil Ingestion Rate (IR_s):

   A soil ingestion rate of 0.33 g/day was applied for a construction worker at the Site (USEPA, 2002). The soil ingestion rate for trespasser and industrial/commercial worker used in the modeling were 0.1 g/day or 100 mg/day (USEPA, 2002) and 0.05 g/day or 50 mg/day (WAC, 2007) respectively.

7. Exposure Frequency (EF_S and EF_W):

   The WAC (2007) specifies a default value of 260 days/year for industrial/commercial workers exposure to soil while at work. However, for the construction worker scenario, an exposure frequency of 90 days/year (5 times per week for 18 weeks) was used for soil exposure in the modeling. For the trespasser, a soil exposure frequency of 50.6 days/year was used in the modeling, based on amount of time spent outdoors (USEPA, 2008a).

8. Averaging Time (AT):

   The TRW specifies a default averaging time of 365 days/year for use in estimating exposure for an industrial/commercial worker. This averaging time was used in the modeling for the industrial/commercial worker. However, for the construction worker scenario, an averaging time of 126 days/year was used based on the 90-day per year exposure frequency.

All exposure factors and equations used in the calculation of the RBCs for lead in soil for the trespasser, industrial/commercial worker, and construction/utility worker receptors are also summarized in the following table:

- Table 3.28: Risk-Based Concentration (RBC) for Lead in Soil and Groundwater Based on The Adult Lead Model

3.5 Toxicity Assessment

The toxicity values used in risk evaluations for non-carcinogenic effects are chronic toxicity values, generally referred to as a reference dose (RfD) and reference concentration (RfC). An RfD or RfC is an estimate (with uncertainty spanning approximately an order of magnitude or greater) of a daily exposure level for the human population, including sensitive sub-populations, that is not likely to cause an appreciable risk of deleterious effects during a lifetime of exposure. Chronic RfDs or RfCs are specifically developed to be protective for long-term exposure to a chemical (e.g., a Superfund program guideline is 7 years to a lifetime).

For evaluation of carcinogenic effects, cancer slope factors (CSF) and inhalation unit risk factors (URF) are used. A CSF or URF is a plausible upper-bound estimate of the probability of a carcinogenic response per unit intake of a chemical over a lifetime of exposure. A CSF or URF is used to estimate an upper-bound probability of an individual potentially developing cancer as a result of a lifetime exposure to a particular level of a potential carcinogen.

Toxicity is discussed in the following sections:

Section 3.5.1 Non-Carcinogenic Hazards
Section 3.5.2 Carcinogenic Risks

3.5.1 Non-Carcinogenic Hazards

For substances suspected to cause non-carcinogenic chronic effects, the health criteria are usually expressed as acceptable chronic daily intake levels or RfDs (in units of mg/[kg-day]) or acceptable chronic exposure levels or RfCs (in units of mg/m^3) below which, no adverse effects are expected. Therefore, toxicity values for non-cancer health effects are based on a threshold concept or a level of exposure to a chemical below which no toxic effects are expected.

As noted previously, chronic RfDs and RfCs are defined as an estimate (with an uncertainty spanning an order of magnitude or greater) of a daily exposure level for the human population, including sensitive sub-populations, which poses no appreciable risk of deleterious effects over a lifetime of exposure. RfDs and RfCs are typically derived from studies in humans or laboratory animals. Uncertainty factors are used (a) to extrapolate animal toxicity data to humans, (b) to protect sensitive sub-populations of humans, and (c) to account for database quality.

To derive an RfD or RfC, a critical study is selected that usually includes the highest dose/concentration level administered to laboratory animals that did not cause observable adverse effects after repeated (usually lifetime) exposure. This is called a No-Observed Adverse Effect Level (NOAEL). The NOAEL is then divided by uncertainty (safety) factors, and sometimes an additional modifying factor, to obtain the RfD or RfC. In general, an uncertainty factor of 10 is used to extrapolate laboratory animal results to humans and another factor of 10 to account for sensitive human populations. Additional uncertainty factors of 10 are included if the critical study only identified a Lowest-Observed Adverse Effect Level (LOAEL) instead of the NOAEL, or if the critical study was a subchronic (less than a lifetime) study. A modifying factor (MF) of 1 to 10 may also be included to address data sets lacking certain key studies. These factors are multiplied together and used along with the NOAEL or LOAEL to derive an RfD or RfC as follows:

$$\text{RfD or RfC} = \frac{\text{NOAEL or LOAEL}}{\text{UF}_1 \times \text{UF}_2 \times \text{UF}_3 \ldots}$$

RfDs and RfCs are developed for the oral and the inhalation exposure routes, respectively. These are an oral reference dose (RfDo) in units of mg/kg-day, and RfC in units of mg/m^3.

Oral RfDs are used to estimate human health effects for both oral and dermal exposure routes and RfDs used in this Exposure Pathway Assessment are presented in Table 3.32. Oral RfDs were adjusted consistent with USEPA (2004a) for the dermal pathway. The RfCs are used for the inhalation exposure route and RfCs used in this Exposure Pathway Assessment are presented in Table 3.33.

3.5.2 Carcinogenic Risks

CSFs and inhalation URFs are quantitative estimates of carcinogenic potency. Slope factors and URFs relate the lifetime probability of cancer to the lifetime exposure dose/concentration of a substance. CSFs and URFs are estimated using mathematical extrapolation models, and are presented as risk per dose or mg/(kg-day) (i.e., mg carcinogen per kg body weight per day) for oral CSFs and risk per concentration or mg/m^3 for inhalation URFs. The mathematical extrapolation models assume low dose linearity and thus may not be appropriate for some suspect carcinogens, in particular those that function as promoters. In addition, the body's natural repair processes and defense mechanisms may decrease cancer risk at low exposure levels. Thus, the risks at lower exposure levels are likely overestimated using linear low-dose modeling.

When adequate human epidemiology data are available, maximum likelihood estimates (MLEs) are used to generate a CSF or URF. However, when animal data are used to derive a CSF or URF, the 95% UCL on the MLE is used. Therefore, the true risk to humans, while not identified, is not likely to exceed the upper-bound estimate. This is a conservative estimate, and in some cases the true slope may be zero (i.e., no carcinogenic risk).

Historically, known or suspect human carcinogens were evaluated and identified by the Carcinogen Assessment Group using the USEPA Weight-of-Evidence approach for carcinogenicity classification (USEPA, 1997b). Most constituents currently listed in the USEPA *Integrated Risk Information System* (IRIS) still retain this classification. The USEPA classification was based on an evaluation of the likelihood that the agent is a human carcinogen. The evidence was characterized separately for human and animal studies as follows:

Group A - Known Human Carcinogen (sufficient evidence of carcinogenicity in humans)
Group B - Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)
Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)
Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)
Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in animal studies)

Currently, USEPA uses a *weight of evidence* narrative to explain the human carcinogenic potential of a chemical, and the conditions that characterize its expression. For this purpose, USEPA uses the following descriptors:

Carcinogenic to Humans:

- Strong evidence of human carcinogenicity

Likely to Be Carcinogenic to Humans:

- Evidence is adequate but not sufficient of Carcinogenic to Humans classification

Suggestive Evidence of Carcinogenic Potential:

- Evidence is suggestive of carcinogenicity but the data are judged not sufficient for a stronger conclusion

Inadequate Information to Assess Carcinogenic Potential:

- Data are judged inadequate for applying one of the other descriptors

Not Likely to Be Carcinogenic to Humans:

- Available data are considered robust for deciding that there is no basis for human hazard concern

The COCs in this Exposure Pathway Assessment were classified utilizing the system currently used by USEPA for that COC. The oral and dermal CSFs for COCs included in this Exposure Pathway Assessment are presented in Table 3.34. Oral CSFs were adjusted consistent with USEPA (2004a) for the dermal pathway. URFs are used for the inhalation exposure route, and URFs for COCs included in this Exposure Pathway Assessment are presented in Table 3.35.

A lifetime cancer risk estimate is derived by multiplying a CSF or URF by the lifetime estimated daily intake or exposure level, which provides an estimate of the probability that the intake or exposure level over the exposure duration will cause cancer during the lifetime of the exposed individual. This increased cancer risk is expressed as a probability, for example, as 1×10^{-5} or 1.0E-05 (one in one hundred thousand increased cancer risk). This is an upper bound estimate of the risk, based on very conservative exposure assumptions and conservative mathematical modeling of data from animal experiments or epidemiological studies. Theoretically a 1×10^{-5} added upper bound risk of cancer means there is the possibility of one additional incidence of cancer in a population of 100,000 people exposed to a chemical according to the conservative exposure assumptions used in the evaluation - often involving daily or exposures of 5 days/week for 50 weeks/year for 25 to 30 years. These are very conservative exposure assumptions that potentially overestimate cancer risks, and, in fact, the true cancer risk might be zero.

3.6 Development of Human Health Risk-Based Concentrations

Human health RBCs were developed for all COCs identified at the Site. The following sections present the RBCs for the various receptors potentially impacted by COCs in on-OCC Property and off-OCC Property media. As identified previously, with restrictions in place, certain exposure pathways are considered to be incomplete for the OCC Property.

The factors used in the derivation of the RBCs were previously presented in Section 3.4. In the development of RBCs, the target risk level, hazard quotient, exposure factors, and toxicity reference values were used to back calculate soil, groundwater, and sediment concentrations that are protective of human health for all receptors.

The RBCs, when compared to concentrations on the OCC Property and the off-OCC Properties can be used in the development of appropriate corrective action or risk management measures beyond the current restrictions and/or remedial technologies for the OCC Property, as necessary. While development of RBCs does not indicate that cleanup is required, these values serve as additional information to consider when weighing the different land development options and/or cleanup options.

In order to arrive at a final land usage decision at the Site, the available information needs to be weighed to arrive at a final decision regarding active remediation, management controls, further evaluation during remedy design, etc. To assist in arriving at such a decision, RBCs were developed for all Site COCs.

RBC are developed in the following sections:

Section 3.6.1	Soil
Section 3.6.2	Groundwater
Section 3.6.3	Sediment
Section 3.6.4	Groundwater (Surface Water)
Section 3.6.5	Evaluation of Indoor Air and Vapor Investigation Data

3.6.1 Soil

The human receptors and exposure pathways considered in the development of the soil RBCs were:

1. Industrial/commercial worker exposure to COCs in indoor air (from shallow soil) through inhalation - Section 3.6.1.1
2. Trespasser exposure to COCS in soil through ingestion, dermal contact, and soil vapor/particulate inhalation - Section 3.6.1.2
3. Industrial/commercial worker exposure to COCs in shallow soils through ingestion, dermal contact, and soil vapor/particulate inhalation - Section 3.6.1.3

4. Construction/utility worker exposure to COCs in shallow soils through ingestion, dermal contact, and soil vapor/particulate inhalation - Section 3.6.1.4

3.6.1.1 Industrial/Commercial Worker Soil to Indoor Air Pathway

Table 3.9 presents the derivation of industrial/commercial worker RBCs for the soil-to-indoor air pathway. These RBCs were derived based on a default industrial/commercial building. This table also presents a comparison of calculated soil-to-indoor air RBCs to the maximum on- and off-OCC Property shallow soil concentrations. Table 3.8 presents the derivation of the risk-based indoor air concentrations used for the industrial/commercial worker to develop these RBCs. As noted previously, a vapor investigation is in progress and the results to date are documented in the *Vapor Investigation Report* (CRA, 2013c), a copy of which is provided as an appendix to the SCR. The recommendations from that report are summarized in Section 3.6.5.

The industrial/commercial worker soil-to-indoor air RBCs and maximum on-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum On-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	0.0109	**0.29**
1,1-Dichloroethene	0.3010	0.008
Benzene	0.0029	**5.3**
Carbon Tetrachloride	0.0021	**0.99**
Chloroform	0.0010	**11**
cis-1,2-Dichloroethene	NV	0.045
Ethylbenzene	27.1	**36**
Methylene Chloride	1.48	**5**
Tetrachloroethene	0.0754	**62**
trans-1,2-Dichloroethene	0.1980	0.003
Trichloroethene	0.0081	**21**
Vinyl Chloride	0.0007	**0.0075**
1,2,4-Trichlorobenzene	0.286	**2.3**
Hexachlorobenzene	0.405	**1.4**
Hexachlorobutadiene	0.788	**28**
Pentachlorophenol	24,645	2.51
4,4'-DDE	14294	0.0073
4,4'-DDT	14294	0.0059
Mercury	0.0016	**1.2**

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs for the soil–to–indoor air pathway were exceeded by 1,1,2,2-tetrachloroethane, benzene, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, 1,2,4-trimethylbenzene, hexachlorobenzene, hexachlorobutadiene, and mercury in on-OCC Property soil. Figure 3.1 shows the location of exceedances of RBCs in on-OCC Property shallow soil.

The industrial/commercial worker soil-to-indoor air RBCs and maximum off-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum off-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	0.0109	**3.10**
Benzene	0.0029	**30.0**
Ethylbenzene	27.1	**72.0**
Methylene Chloride	1.48	1.30
Tetrachloroethene	0.0753	**0.17**
Trichloroethene	0.0081	0.0027
Mercury	0.0016	**0.1090**

Note:
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs developed for the soil–to–indoor air pathway were exceeded by 1,1,2,2-tetrachloroethane, benzene, ethylbenzene, tetrachloroethene, and mercury in off-OCC Property soil. Figure 3.2 shows the location of exceedances of RBCs in off-OCC Property shallow soil.

3.6.1.2 Trespasser Soil Exposure Pathway

Table 3.16 presents the derivation of trespasser RBCs for soil and presents a comparison of soil RBCs to the maximum on-OCC Property and off-OCC Property shallow soil concentrations. Calculation of the chemical-specific VF and Site-specific PEF values used in the derivation of the RBCs are presented in Tables 3.18 and 3.17, respectively. The derivation of the trespasser RBC for lead in soil is presented in Table 3.28.

The trespasser soil RBCs and maximum on-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum On-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	15.1	0.29
1,1-Dichloroethene	2,879	0.008
Benzene	24.8	5.3
Carbon Tetrachloride	23.2	0.99
Chloroform	9.03	**11**
cis-1,2-Dichloroethene	6,397	0.045
Ethylbenzene	37,540	36
Methylene Chloride	6,885	5
Tetrachloroethene	873	62
trans-1,2-Dichloroethene	1,200	0.003
Trichloroethene	42.8	21
Vinyl Chloride	11.7	0.0075
1,2,4-Trichlorobenzene	925	2.3
bis(2-Ethylhexyl)phthalate	673	0.62
Hexachlorobenzene	5.32	1.4
Hexachlorobutadiene	85.1	28
Pentachlorophenol	23.0	2.5
Total PCBs	4.71	**15.6**
4,4'-DDE	27.5	0.0073
4,4'-DDT	27.7	0.0059
2,3,7,8-TCDD (TEQ)	0.0000724	**0.00085**
Antimony	925	22.1
Arsenic	11.6	**228**
Cadmium	1,154	39.1
Chromium	3,468,654	1,200
Copper	92,497	7,070
Lead	4847(1)	**28,000**
Mercury	121	1.2
Nickel	45,476	962
Silver	11,562	19.5
Thallium	NV	0.21
Zinc	693,731	10,200

Notes:
NV, No Value as there is no toxicity values
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the trespasser RBCs for soil were exceeded by chloroform, total PCBs, 2,3,7,8-TCDD (TEQ), arsenic, and lead in on–OCC Property shallow soil. Figure 3.3 shows the location of the exceedances of the RBCs in on-OCC Property shallow soil.

The trespasser soil RBCs and maximum off-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum off-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	15.1	3.1
Benzene	24.8	**30**
Ethylbenzene	37,540	72
Methylene Chloride	6,885	1.3
Tetrachloroethene	873	0.17
Trichloroethene	42.8	0.0027
Total PCBs	4.71	0.0054
Antimony	925	2.51
Arsenic	11.6	6.38
Cadmium	1,154	0.706
Chromium	3,468,654	16.4
Copper	92,497	283
Lead	4847(1)	899
Mercury	143	0.109
Nickel	45,476	25.3
Silver	11,562	0.257
Thallium	NV	0.059
Zinc	693,731	438

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the trespasser RBCs for soil were exceeded by benzene in off–OCC Property shallow soil. Figure 3.4 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil.

3.6.1.3 Industrial/Commercial Worker Soil Exposure Pathway

Table 3.19 presents the derivation of industrial/commercial worker RBCs for soil and presents a comparison of the soil RBCs to the maximum on-OCC Property and off-OCC Property shallow soil concentrations. Calculation of the chemical-specific VF and Site-specific PEF values used in the derivation of the RBCs is presented in Tables 3.21 and 3.20, respectively. The derivation of the industrial/commercial worker RBC for lead in soil is presented in Table 3.28.

The industrial/commercial worker soil RBCs and maximum on-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum On-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	1.04	0.29
1,1-Dichloroethene	351	0.008
Benzene	1.56	**5.3**
Carbon Tetrachloride	1.48	0.99
Chloroform	0.55	**11**
cis-1,2-Dichloroethene	3,975	0.045
Ethylbenzene	5,128	36
Methylene Chloride	771	5
Tetrachloroethene	56.9	**62**
trans-1,2-Dichloroethene	146	0.003
Trichloroethene	2.81	**21**
Vinyl Chloride	0.98	0.0075
1,2,4-Trichlorobenzene	118	2.3
bis(2-Ethylhexyl)phthalate	179	0.62
Hexachlorobenzene	1.06	**1.4**
Hexachlorobutadiene	11.3	**28**
Pentachlorophenol	6.1	2.5
Total PCBs	1.25	**15.6**
4,4'-DDE	7.16	0.0073
4,4'-DDT	7.35	0.0059
2,3,7,8-TCDD (TEQ)	0.0000192	**0.00085**
Antimony	533	22.1
Arsenic	3.33	**228**
Cadmium	658	39.1
Chromium	2,000,000	1,200
Copper	53,333	7,070
Lead	1,886(1)	**28,000**
Mercury	20.5	1.2
Nickel	23,911	962
Silver	6,667	19.5
Thallium	NV	0.21
Zinc	400,000	10,200

Notes:
NV, No Value as there is no toxicity values
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the industrial/commercial worker RBCs for soil were exceeded by benzene, chloroform, tetrachloroethene, trichloroethene, hexachlorobenzene, hexachlorobutadiene, total PCBs, 2,3,7,8-TCDD (TEQ), arsenic, and lead in on–OCC Property shallow soil. Figure 3.5 shows the location of the exceedances of the RBCs in on-OCC Property shallow soil.

The industrial/commercial worker soil RBCs and maximum off-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum off-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	1.04	**3.1**
Benzene	1.56	**30**
Ethylbenzene	5,128	72
Methylene Chloride	771	1.3
Tetrachloroethene	56.9	0.17
Trichloroethene	2.81	0.0027
Total PCBs	1.25	0.0054
Antimony	533	2.51
Arsenic	3.33	**6.38**
Cadmium	658	0.706
Chromium	2,000,000	16.4
Copper	53,333	283
Lead	1886(1)	899
Mercury	20.5	0.109
Nickel	23,911	25.3
Silver	6,667	0.257
Thallium	NV	0.059
Zinc	400,000	438

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the industrial/commercial worker RBCs for soil were exceeded by 1,1,2,2-tetrachloroethane, benzene, and arsenic in off–OCC Property shallow soil. Figure 3.6 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil.

3.6.1.4 Construction/Utility Worker Soil Exposure Pathway

Table 3.22 presents the derivation of the construction/utility worker RBCs for soil and presents a comparison of the soil RBCs to the maximum off-OCC Property shallow soil concentrations. Calculation of the chemical-specific VF and Site-specific PEF values used in the derivation of the RBCs are presented in Tables 3.24 and 3.23, respectively. The derivation for the construction/utility worker RBC for exposure to lead in soil is presented in Table 3.28.

The construction/utility worker soil RBCs and maximum off-OCC Property shallow soil concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum off-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	63	3.1
Benzene	105	30
Ethylbenzene	18,843	72
Methylene Chloride	2,673	1.3
Tetrachloroethene	488	0.17
Trichloroethene	20	0.0027
Total PCBs	20	0.0054
Antimony	295	2.51
Arsenic	36	6.38
Cadmium	275	0.706
Chromium	1,106,719	16.4
Copper	29,513	283
Lead	285$^{(1)}$	**899**
Mercury	39	0.109
Nickel	3,669	25.3
Silver	3,689	0.257
Thallium	NV	0.059
Zinc	221,344	438

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the construction/utility worker RBCs for soil were exceeded by lead in off–OCC Property shallow soil. Figure 3.7 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil.

3.6.2 Groundwater

The human receptors and exposure pathways considered in the development of the groundwater RBCs were:

1. Industrial/commercial worker exposure to COCs in indoor air (from shallow groundwater) through inhalation - Section 3.6.2.1
2. Trespasser exposure to COCs in ambient air (from shallow groundwater) through inhalation - Section 3.6.2.2
3. Industrial/commercial worker exposure to COCs in ambient air (from shallow groundwater) through inhalation - Section 3.6.2.3

4. Construction/utility worker exposure to COCs in shallow groundwater through ingestion, dermal contact, and groundwater vapor inhalation - Section 3.6.2.4

3.6.2.1 Industrial/Commercial Worker Groundwater to Indoor Air Pathway

Table 3.10 presents the derivation of industrial/commercial worker RBCs for the groundwater-to-indoor air pathway. These RBCs were derived based on a default industrial/commercial building. This table also presents a comparison of the groundwater-to-indoor air RBCs with the maximum on-OCC Property and off-OCC Property shallow groundwater concentrations. Table 3.8 presents the derivation of the risk-based indoor air concentrations used to develop these RBCs for the industrial/commercial worker.

As noted previously, a vapor investigation is in progress and the results to date are documented in the *Vapor Investigation Report* (CRA, 2013c), a copy of which is provided as an appendix to the SCR. The recommendations from that report are summarized in Section 3.6.5.

The industrial/commercial worker groundwater-to-indoor air RBCs and maximum on-OCC Property shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (µg/L)***	***Maximum On-OCC Property Shallow Groundwater Concentration (µg/L)***
1,1,2,2-Tetrachloroethane	71.0	**5,480**
1,1,2-Trichloroethane	60.2	**166**
1,1-Dichloroethene	1834	1,000
Benzene	23.8	**2,300**
Carbon Tetrachloride	6.0	**200**
Chloroform	10.4	**79,800**
cis-1,2-Dichloroethene	NV	320,000
Ethylbenzene	45,401	440
Methylene Chloride	39,330	846
Tetrachloroethene	278	**170,000**
trans-1,2-Dichloroethene	1,931	**3,100**
Trichloroethene	27.3	**190,000**
Vinyl Chloride	6.08	**490,000**
Hexachlorobutadiene	11.3	10.8
Pentachlorophenol	15,210,257	3.1
Mercury	30.4	0.54

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs for the groundwater–to–indoor air pathway were exceeded by 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride in on–OCC Property shallow groundwater. Figure 3.8 shows the location of exceedances of the RBCs in on-OCC Property shallow groundwater.

The industrial/commercial worker groundwater-to-indoor air RBCs and maximum off-OCC Property shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (μg/L)***	***Maximum off-OCC Property Shallow Groundwater Concentration (μg/L)***
1,1-Dichloroethene	1,834	590
Benzene	23.8	**2,400**
Chloroform	10.4	**4,400**
cis-1,2-Dichloroethene	NV	140,000
Ethylbenzene	45,401	310
Methylene chloride	39,330	9,500
Tetrachloroethene	278	**170,000**
trans-1,2-Dichloroethene	1,931	**7,600**
Trichloroethene	27.3	**13,000**
Vinyl chloride	6.08	**20,000**
Mercury	30.4	0.089

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs developed for the groundwater–to–indoor air pathway were exceeded by benzene, chloroform, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride in off–OCC Property shallow groundwater. Figure 3.9 shows the location of exceedances of the RBCs in off-OCC Property shallow groundwater.

3.6.2.2 Trespasser Groundwater to Ambient Air Pathway

Table 3.13 presents the derivation of trespasser RBCs for the groundwater-to-ambient air pathway and presents a comparison of the groundwater-to-ambient air RBCs with the maximum on-OCC Property and off-OCC Property shallow groundwater concentrations. Calculation of the chemical-specific VF values used in the derivation of the RBCs is presented in Table 3.14. Table 3.11 presents the derivation of the risk-based ambient air concentrations used to develop these RBCs for the trespasser.

The trespasser groundwater-to-ambient air RBCs and maximum shallow on-OCC Property groundwater concentrations are summarized below:

Constituent of Concern	***RBC (µg/L)***	***Maximum On-OCC Property Shallow Groundwater Concentration (µg/L)***
1,1,2,2-Tetrachloroethane	228,348	5,480
1,1,2-Trichloroethane	459,332	166
1,1-Dichloroethene	13,779,061	1,000
Benzene	303,869	2,300
Carbon Tetrachloride	94,555	200
Chloroform	120,635	79,800
cis-1,2-Dichloroethene	NV	320,000
Ethylbenzene	316,410,846	440
Methylene Chloride	30,2405,812	846
Tetrachloroethene	4,267,216	170,000
trans-1,2-Dichloroethene	13,404,082	3,100
Trichloroethene	389,618	190,000
Vinyl Chloride	87,159	**490,000**
Hexachlorobutadiene	161,956	10.8
Pentachlorophenol	6,027,522,978	3.1
Mercury	201,259	0.54

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, trespasser RBCs developed for the groundwater–to–ambient air pathway were exceeded by vinyl chloride in on–OCC Property shallow groundwater. Figure 3.10 shows the location of exceedances of the RBCs in on-OCC Property shallow groundwater.

The trespasser groundwater-to-ambient air RBCs and maximum off-OCC Property shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (µg/L)***	***Maximum off-OCC Property Shallow Groundwater Concentration (µg/L)***
1,1-Dichloroethene	13,779,061	590
Benzene	303,869	2,400
Chloroform	120,635	4,400
cis-1,2-Dichloroethene	NV	140,000
Ethylbenzene	316,410,846	310
Methylene Chloride	30,2405,812	9,500
Tetrachloroethene	4,267,216	170,000
trans-1,2-Dichloroethene	13,404,082	7,600
Trichloroethene	389,618	13,000
Vinyl Chloride	87,159	20,000
Mercury	201,259	0.089

Note:
NV, No Value as there is no toxicity values

As shown in the above table, there were no exceedances of trespasser RBCs for the groundwater–to–ambient air pathway for any of the COCs in off–OCC Property shallow groundwater.

3.6.2.3 Industrial/Commercial Worker Groundwater to Ambient Air Pathway

Table 3.15 presents the derivation of industrial/commercial worker RBCs for the groundwater-to-ambient air pathway, and presents a comparison of the groundwater-to-ambient air RBCs with the maximum on-OCC Property and off-OCC Property shallow groundwater concentrations. Calculation of the chemical-specific VF values used in the derivation of the RBCs is presented in Table 3.14. Table 3.12 presents the derivation of the risk-based ambient air concentrations used to develop these RBCs for the industrial/commercial worker.

The industrial/commercial worker groundwater-to-ambient air RBCs and maximum on-OCC Property shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (μg/L)***	***Maximum On-OCC Property Shallow Groundwater Concentration (μg/L)***
1,1,2,2-Tetrachloroethane	9,705	5,480
1,1,2-Trichloroethane	19,522	166
1,1-Dichloroethene	1,171,220	1,000
Benzene	12,914	2,300
Carbon Tetrachloride	4,019	200
Chloroform	5,127	**79,800**
cis-1,2-Dichloroethene	NV	320,000
Ethylbenzene	26,894,922	440
Methylene Chloride	16,065,309	846
Tetrachloroethene	181,357	170,000
trans-1,2-Dichloroethene	1,139,347	3,100
Trichloroethene	16,559	**190,000**
Vinyl Chloride	3,704	**490,000**
Hexachlorobutadiene	6,883	10.8
Pentachlorophenol	256,169,727	3.1
Mercury	17,107	0.54

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs for the groundwater–to–ambient air pathway were exceeded by chloroform, trichloroethene, and vinyl chloride in on–OCC Property shallow groundwater. Figure 3.11 shows the location of exceedances of the RBCs in on-OCC Property shallow groundwater.

The industrial/commercial worker groundwater-to-ambient air RBCs and maximum off-OCC Property shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (μg/L)***	***Maximum off-OCC Property Shallow Groundwater Concentration (μg/L)***
1,1-Dichloroethene	1,171,220	590
Benzene	12,914	2,400
Chloroform	5,127	4,400
cis-1,2-Dichloroethene	NV	140,000
Ethylbenzene	26,894,922	310
Methylene Chloride	16,065,309	9,500
Tetrachloroethene	181,357	170,000
trans-1,2-Dichloroethene	1,139,347	7,600
Trichloroethene	16,559	13,000
Vinyl Chloride	3,704	**20,000**
Hexachlorobutadiene	6,883	ND
Mercury	17,107	0.089

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs developed for the groundwater–to–ambient air pathway were exceeded by vinyl chloride in off–OCC Property shallow groundwater. Figure 3.12 shows the location of exceedances of the RBCs in off-OCC Property shallow groundwater.

3.6.2.4 Construction/Utility Worker Groundwater Exposure Pathway

Table 3.25 presents the derivation of construction/utility worker RBCs for exposure to shallow groundwater during ground intrusive activities and presents a comparison of the groundwater RBCs with the maximum off-OCC Property shallow groundwater concentrations. Calculation of the dermal contact exposure (DAevent) parameter and the VF used in the derivation of the RBCs are presented in Tables 3.26 and 3.27, respectively. The derivation for the construction/utility worker RBC for lead in shallow groundwater is presented in Table 3.28.

The groundwater RBCs and maximum off-OCC Property shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (μg/L)***	***Maximum off-OCC Property Shallow Groundwater Concentration (μg/L)***
1,1-Dichloroethene	9,420	590
Benzene	359	**2,400**
Chloroform	199	**4,400**
cis-1,2-Dichloroethene	3,356	**140,000**
Ethylbenzene	20,534	310
Methylene Chloride	12,254	9,500
Tetrachloroethene	1,257	**170,000**
trans-1,2-Dichloroethene	3,097	**7,600**
Trichloroethene	106	**13,000**
Vinyl Chloride	183	**20,000**
Total PCBs	0.26	0.094
2,3,7,8-TCDD TEQs	4.23E-06	6.30E-08
Antimony	1,302	2.33
Arsenic	163	138
Cadmium	1,628	0.65
Chromium	4,883,721	6,350
Copper	130,233	117
Lead	2,822(1)	9.04
Mercury	24.1	0.089
Nickel	168,675	1,160
Silver	23,490	0.145
Thallium	NV	0.77
Zinc	1,409,396	118

Notes:
NV, No Value
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the construction/utility worker RBCs for groundwater were exceeded by benzene, chloroform, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride, in off–OCC Property shallow groundwater. Figure 3.13 shows the location of exceedances of the RBCs in off-OCC Property shallow groundwater.

3.6.3 Sediment

The human receptors and exposure pathways considered in the development of the sediment RBCs were:

1. Trespasser exposure to COCs in intertidal sediment through incidental ingestion and dermal contact - Section 3.6.3.1
2. Industrial/Commercial Worker exposure to COCs in intertidal sediment through incidental ingestion and dermal contact - Section 3.6.3.2

3.6.3.1 Trespasser Sediment Exposure Pathway

Table 3.29 presents the derivation of sediment RBCs for the trespasser and presents a comparison of sediment RBCs to the maximum on-OCC Property and off-OCC Property intertidal sediment concentrations. The trespasser RBC for lead in soil was also used for lead sediment. Derivation of the RBC for lead in soil is presented in Table 3.28.

The trespasser sediment RBCs and maximum on-OCC Property intertidal sediment concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum On-OCC Property Intertidal Sediment Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	93.3	0.0639
1,1-Dichloroethene	159,935	0.00932
Carbon Tetrachloride	343	0.211
Chloroform	774	4.82
cis-1,2-Dichloroethene	6,397	0.217
Tetrachloroethene	8,882	8.11
trans-1,2-Dichloroethene	63,974	0.0112
Trichloroethene	405	0.494
Vinyl Chloride	33.3	0.0145
1,2,4-Trichlorobenzene	12,556	0.086
bis(2-Ethylhexyl)phthalate	673	1.8
Hexachlorobenzene	5.89	0.77
Hexachlorobutadiene	121	2.3
Pentachlorophenol	23.0	0.29
Total PCBs	4.71	**6.25**
4,4'-DDD	39.2	2.2
4,4'-DDE	27.7	0.74
4,4'-DDT	27.7	0.0034
Antimony	925	50
Arsenic	11.6	**140**
Cadmium	1,156	3.6
Chromium	3,468,654	160
Copper	92,497	2,500
Lead	4,847(1)	**150,000**
Mercury	694	1.4
Nickel	46,249	450
Silver	11,562	2
Thallium	NV	0.0415
Zinc	693,731	1,500

Notes:
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the trespasser RBCs for sediment were exceeded by total PCBs, arsenic, and lead in on-OCC Property intertidal sediment. Figure 3.14 shows the location of the exceedances of the RBCs in on-OCC Property intertidal sediment.

The trespasser sediment RBCs and maximum off-OCC Property intertidal sediment concentrations for detected COCs are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum off-OCC Property Intertidal Sediment Concentration (mg/kg)***
Tetrachloroethene	8,882	0.00212
Trichloroethene	405	0.013
Total PCBs	4.71	**26.0**
2,3,7,8-TCDD (TEQ)	0.0000724	0.000057

Notes:
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the trespasser RBCs for sediment was exceeded by total PCBs in off-OCC Property intertidal sediment. Figure 3.15 shows the location of exceedances of the RBCs in off-OCC Property intertidal sediment.

3.6.3.2 Industrial/Commercial Worker Sediment Exposure Pathway

Table 3.30 presents the derivation of industrial/commercial worker RBCs for sediment and presents a comparison of the sediment RBCs with the maximum on-OCC Property and off-OCC Property intertidal sediment concentrations. The industrial/commercial worker RBC for lead in soil was also used for lead sediment. Derivation of the RBC for lead in soil is presented in Table 3.28.

The sediment RBCs and maximum on-OCC Property intertidal sediment concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum On-OCC Property Intertidal Sediment Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	27.3	0.0639
1,1-Dichloroethene	99,379	0.00932
Carbon Tetrachloride	106	0.211
Chloroform	240	4.82
cis-1,2-Dichloroethene	3,975	0.217
Tetrachloroethene	2,597	8.11
trans-1,2-Dichloroethene	39,752	0.0112
Trichloroethene	119	0.494

Constituent of Concern	***RBC (mg/kg)***	***Maximum On-OCC Property Intertidal Sediment Concentration (mg/kg)***
Vinyl Chloride	10.4	0.0145
1,2,4-Trichlorobenzene	6,667	0.086
bis(2-Ethylhexyl)phthalate	179	1.8
Hexachlorobenzene	1.56	0.77
Hexachlorobutadiene	32.1	2.3
Pentachlorophenol	6.1	0.29
Total PCBs	1.25	**6.25**
4,4'-DDD	10.4	2.2
4,4'-DDE	7.35	0.74
4,4'-DDT	7.35	0.0034
Antimony	533	50
Arsenic	3.33	**140**
Cadmium	667	3.6
Chromium	2,000,000	160
Copper	53,333	2,500
Lead	1,886(1)	**150,000**
Mercury	400	1.4
Nickel	26,667	450
Silver	6,667	2
Thallium	NV	0.0415
Zinc	400,000	1,500

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) See Table 3.28 for development of RBC based on Adult Lead Model.

As shown in the above table, the industrial/commercial worker RBCs for sediment were exceeded by total PCBs, arsenic, and lead in on-OCC Property intertidal sediment. Figure 3.16 shows the location of the exceedances of the RBCs in on-OCC Property intertidal sediment.

The sediment RBCs and maximum off-OCC Property intertidal sediment concentrations are summarized below:

Constituent of Concern	***RBC (mg/kg)***	***Maximum off-OCC Property Intertidal Sediment Concentration (mg/kg)***
Total PCBs	1.25	**26.0**
2,3,7,8-TCDD (TEQ)	0.0000192	**0.000057**

Notes:
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the industrial/commercial worker RBCs for sediment were exceeded by total PCBs and 2,3,7,8-TCDD (TEQ) in off-OCC Property intertidal sediment. Figure 3.17 shows the location of the exceedances of the RBCs in off-OCC Property intertidal sediment.

3.6.4 Groundwater (Surface Water)

Fisher exposure to groundwater (from the shallow groundwater-to-surface water pathway) through ingestion of fish from the Hylebos Waterway was considered in the development of the groundwater (surface water) RBCs.

Table 3.31 presents the groundwater RBCs for the fisher based on consumption of fish from the Hylebos Waterway. As presented in Section 3.3.5, the groundwater RBCs are based on preliminary surface water cleanup levels developed in accordance with MTCA Method B to be protective of human health for the consumption of organisms. Table 3.31 also presents a comparison of groundwater RBCs with the maximum shallow groundwater concentrations at the Site.

The fisher groundwater RBCs (based on preliminary surface water clean levels) and maximum shallow groundwater concentrations are summarized below:

Constituent of Concern	***RBC (μg/L)***	***On/off-OCC Property Shallow Groundwater (μg/L)***
1,1,2,2-Tetrachloroethane	4	**5,480**
1,1,2-Trichloroethane	16	**166**
1,1-Dichloroethene	3.2	**1,000**
Benzene	51	**2,400**
Carbon Tetrachloride	1.6	**200**
Chloroform	470	**79,800**
cis-1,2-Dichloroethene	NV	320,000
Ethylbenzene	2,100	440
Methylene Chloride	590	**9,500**
Tetrachloroethene	3.3	**170,000**
trans-1,2-Dichloroethene	10,000	7,600
Trichloroethene	30	**190,000**
Vinyl Chloride	2.4	**490,000**
Hexachlorobutadiene	18	11
Pentachlorophenol	3.0	**3.1**
Total PCBs	0.2	0.09
2,3,7,8-TCDD (TEQ)	0.00001	**0.000015**
Antimony	640	19
Arsenic	1	**208**
Cadmium	8.8	2
Chromium	50	**6,350**
Copper	2.4	**286**
Lead	8.1	**968**

Constituent of Concern	***RBC (μg/L)***	***On/off-OCC Property Shallow Groundwater (μg/L)***
Mercury	0.2	**1**
Nickel	8.2	**1,160**
Silver	25,926	0.38
Thallium	1	**12**
Zinc	81	**310**

Notes:
NV, No Value as there is no toxicity values
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.

As shown in the above table, the groundwater RBCs for the fisher based on preliminary surface water cleanup levels were exceeded by 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene, benzene, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, pentachlorophenol, 2,3,7,8-TCDD (TEQ), arsenic, chromium, copper, lead, mercury, nickel, thallium, and zinc conservatively assuming no mixing of shallow Site groundwater with surface water. Figure 3.18 shows the location of exceedances of the preliminary cleanup levels for groundwater.

3.6.5 Evaluation of Indoor Air and Vapor Investigation Data

Tables 3.36 and 3.37 compare the indoor air concentrations measured in August 2010 within the existing on-OCC Property buildings to occupational exposure levels (OELs) (i.e., WISHA and OSHA PELs), and indoor industrial/commercial worker RBCs for detected constituents, respectively. Appendix G presents the memorandum summarizing the indoor air sampling.

The WISHA and OSHA PELs, maximum indoor air concentrations, and industrial/commercial RBCs for detected constituents are summarized below:

Constituent of Concern	***WISHA PEL(1)***	***OHSA PEL(1)***	***WISHA/OHSA PEL (units)***	***Maximum On-OCC Property Indoor Air Concentration***
1,1,2,2-Tetrachloroethane	1	5	ppm	ND (0.01)
1,1,2-Trichloroethane	10	10	ppm	ND (0.01)
1,1-Dichloroethene	1	NV	ppm	ND (0.01)
Benzene	1	1	ppm	ND (0.01)
Carbon tetrachloride	2	10	ppm	ND (0.01)
Chloroform (Trichloromethane)	2	50(3)	ppm	ND (0.01)
cis-1,2-Dichloroethene	NV(2)	NV(2)	ppm	ND (0.01)
Ethylbenzene	100	100	ppm	ND (0.01)
Methylene chloride	25	25	ppm	ND (0.01)
Tetrachloroethene	25	100	ppm	0.011(4)
trans-1,2-Dichloroethene	NV(2)	NV(2)	ppm	ND (0.01)
Trichloroethene	50	100	ppm	ND (0.01)

Constituent of Concern	***WISHA PEL(1)***	***OHSA PEL(1)***	***WISHA/OHSA PEL (units)***	***Maximum On-OCC Property Indoor Air Concentration***
Vinyl chloride	1	1	ppm	ND (0.01)
bis(2-Ethylhexyl)phthalate	5	5	mg/m^3	ND (0.063
1,2,4-Trichlorobenzene	5(3)	NV	ppm	ND(4)
Hexachlorobenzene	NV(6)	NV(6)	ppm(6)	ND (0.00048)
Hexachlorobutadiene	0.02	NV	ppm	ND(5)
Pentachlorophenol	0.5	0.5	mg/m^3	0.001(7)
Mercury	0.05	0.1(3)	mg/m^3	ND (0.00077)

Notes:
NV, Not Established Value
ND (), Not Detected (maximum detection limit)
ppm = parts per million
mg/m^3 = milligram per cubic meter
(1) 8-hour time-weighted average (TWA) PELs unless otherwise noted.
(2) The OSHA and WISHA PEL for 1,2-dichloroethylene (CAS No. 540-59-0), which is a mixture of cis- and trans- isomers, is 200 ppm.
(3) Ceiling PEL.
(4) The indoor industrial/commercial worker RCB for tetrachloroethene is 61.8 $\mu g/m^3$, which is equivalent to 0.009 ppm at 25°C.
(5) Quantitation limits were not available for hexachlorobutadiene and bis(2-ethylhexyl)phthalate.
(6) The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) for hexachlorobenzene is 0.002 mg/m^3.
(7) The indoor industrial/commercial worker RCB for pentachlorophenol is 3.15 $\mu g/m^3$, which is equivalent to 0.0003 ppm at 25°C.

As shown in the above table, the indoor air concentrations measured in August 2010 were either not detected or below the applicable WISHA and OSHA PEL values. As discussed previously in Section 2.3, the following restrictions are in place on the OCC Property to address the current indoor air exposure within the existing buildings and any future building that may be constructed on OCC Property in the future:

- Health and safety issues related to indoor air in the existing on-OCC Property buildings are monitored by an WISHA/OSHA-compliant worker health, safety and training program
- VI into any future building construction will be addressed using barriers or other engineering controls/monitoring

These indoor air concentrations were also compared to the risk-based indoor air concentrations that are protective of an industrial/commercial worker. As shown in Table 3.37, only pentachlorophenol and tetrachloroethene were detected within the existing on-OCC Property buildings at concentrations above the indoor air RBCs protective of an industrial/commercial worker.

Additional indoor air and ambient air testing was undertaken in September 2012. Samples were collected from the shower and file rooms in the existing OCC building. An ambient air sample was also collected. This information and the resultant evaluation were reported to USEPA and Ecology previously and are therefore only summarized here.

The WISHA and OSHA PELs, industrial/commercial RBCs, and maximum indoor air concentrations are summarized below:

Constituent of Concern	***WISHA PEL[(1)] µg/m³***	***OHSA PEL[(1)] µg/m³***	***Industrial/ Commercial RBC µg/m³***	***Maximum Concentration µg/m³***	***Location***
1,1,1-Trichloroethane	--	--	--	0.062	Shower Room
Benzene	3,195	3,195	2.1	**2.2**	Shower Room
Trichloroethene	268,687	537,374	3.9	**4.1**	File Room
Toluene	--	--	--	4.7	File Room
Tetrachloroethene	169,563	678,254	61.8	11	File Room
Ethylbenzene	434,213	434,213	4,286	1.5	File Room
m,p-Xylenes	--	--	--	4.1	Shower Room
Styrene	--	--	--	0.84	Shower Room
o-Xylene	--	--	--	2	Shower Room
1,2,4-Trimethylbenzene	NV	NV	8.6	1.7	Shower Room
1,4-Dichlorobenzene	--	--	--	8.7	Shower Room

Notes:
--, OEL and RBC not obtained or calculated because constituent was not a site-related COC.
NV, Not Established Value
BOLD, Maximum Concentration exceeds RBC.
(1) 8-hour time-weighted average (TWA) PELs unless otherwise noted.

As shown in the above table, the indoor air concentrations for Site-related COCs measured in September 2012 were below the WISHA and OSHA PEL values. In addition, the maximum detected concentrations of benzene and trichloroethene only slightly exceeded their respective indoor air RBCs for an industrial/commercial worker.

The *Vapor Investigation Report* (CRA, 2013c) summarizes vapor sampling activities performed to assess vapor concentrations at nine buildings located on- and off-OCC Property. Figure 3.19 identifies the buildings investigated, including the Army Reserve Facility (ARF), Buildings 326, 407, 532, 592, 595, and 596, and the Guard Shack located on properties owned and/or controlled by the Port of Tacoma (POT), and the OCC Office Building. The Vapor Investigation consisted of the collection of sub-slab vapor, indoor air, and outdoor air samples. The buildings were selected based on their proximity to the groundwater VOC plume, which is either below (regardless of depth) or within 100 ft of the buildings, and a component of groundwater flow towards Commencement Bay further to the north of the Properties.

The first round of sampling at the nine buildings was performed over the period of April 17 through 26, 2013. The second round of sampling at five buildings (Buildings 326, 532, 592, 595, and 596) was performed over the period of June 24 through July 9, 2013. The two sampling events were conducted approximately 2 months apart (April and June/July) to capture potential variability of sub slab, indoor air, and outdoor air VOC concentrations over time. The month of April is a colder period than June/July.

The analytical results were compared to current MTCA Method B screening levels originally presented in Ecology's Draft VI Guidance (Ecology, 2009; Table B-1), the IA short-term screening level for TCE (8.4 micrograms per cubic meter [μg/m^3]), and USEPA's November 2012 Regional Screening Levels (RSLs).

Additional details on the sampling and analysis of the data are presented in the *Vapor Investigation Report* prepared by CRA (CRA, 2013c), a copy of which is provided as an appendix to the SCR. The report's recommendations for additional work at the nine buildings are as follows (see Figure 3.19):

Mitigation by GSH (3)	326, 532, OCC office
Additional Monitoring by GSH (5):	407, 595, ARF, 592, 596
No Further Action by GSH (1):	Guard Shack

3.7 Uncertainty Analysis

The purpose of this section is to provide a summary and discussion regarding the uncertainties associated with the HHEPA evaluation. The various uncertainties are discussed below in the following sections:

Section 3.7.1	Sampling Procedure Bias
Section 3.7.2	Exposure Scenario Assumptions
Section 3.7.3	Dose Response
Section 3.7.4	Theoretical Nature of Risk Estimates

3.7.1 Sampling Procedure Bias

The sampling strategy is a factor that impacts the health evaluation for chemicals at the Site. Often, samples are collected from locations that are visibly contaminated or where contamination is expected and not from areas of the Site that are potentially uncontaminated. This creates a sampling bias toward worst-case (higher) concentrations in the sampled media. The utilization of such biased data in the HHEPA increases the conservative or health-protective nature of the health risk and hazard assessment.

3.7.2 Exposure Scenario Assumptions

This section discusses the uncertainty associated with the primary exposure scenario assumptions such as land use and frequency of exposure. Because the exposure scenarios are often not based on actual exposure data, but rather on assumptions about future exposure patterns, they can require professional judgment. USEPA has compiled data on exposure patterns over time and the exposure values used in the HHEPA are considered conservative in nature.

The major uncertainties regarding the physical exposure scenarios used in the HHEPA are summarized as follows:

1. Maximum detected concentrations have been used as exposure point concentrations to compare to RBCs. Although the use of maximum values is generally recognized as an appropriate conservative screening approach, it should be recognized that this procedure will likely overestimate actual exposure by orders of magnitude, particularly where the maximum value may be an outlier or indication of a hot spot.
2. Long-term exposure point concentrations are inherently uncertain because COC concentrations are assumed to remain constant over time. The assumptions that the measured concentrations are equivalent during sampling and exposure over the duration of exposure will overestimate the intake and resulting risk.

3.7.3 Dose Response

One of the major uncertainties in estimating potential risks is the application of published toxicity information. Factors introducing uncertainty associated with toxicity value application are as follows:

1. Applicability of animal toxicity data - chemicals may be assumed to be human carcinogens based on animal studies even when there is limited or no available evidence that the chemical is a human carcinogen.
2. Differences in chemical exposure concentrations - CSFs are derived from high concentration animal studies and therefore may not be applicable to low concentration exposures in humans.
3. Assumptions in toxicity values - CSFs are developed in a conservative manner, based on mathematical modeling and low-dose linearity. Moreover, modeled upper bound estimates are used. This approach is expected to overestimate actual cancer risk although the extent of the overestimation is unclear.

3.7.4 Theoretical Nature of Risk Estimates

A human health risk assessment assigns a numerical value to the excess probability (above background cancer rates) of a case of cancer developing in a population exposed to a specified amount of chemical that is a known or suspect carcinogen. This numerical value is presented as an upper limit excess cancer risk such as 1.0E-05, or one additional cancer case in one hundred thousand people exposed to the chemical at the specific concentration for the defined exposure frequency and duration. However, it is highly unlikely that an individual will be exposed to a chemical consistent with the default regulatory exposure factors due to such issues as inclement weather, work practices, job changes, etc. Therefore, true risks would be lower than those calculated using default regulatory exposure factors although the extent of the overestimation is unknown.

Section 4.0 Ecological Health Exposure Pathway Assessment

The EHEPA was conducted in accordance with guidance from the State of Washington and the USEPA. The primary Washington guidance was the Department of Ecology's, "*Model Toxics Control Act Statute and Regulation, revised November 2007*", which provides general information on Ecological Risk Assessments (ERAs) for terrestrial areas. WAC 173-204 provides specific information pertaining to risk assessments for sediments. In addition, the EHEPA follows the basic structure outlined in USEPA guidance (USEPA, 1997c). The USEPA structure is generally consistent with the methodology outlined by Washington State.

USEPA's methodology consists of eight steps:

Step 1. Screening-level problem formulation and ecological effects evaluation
Step 2. Screening-level exposure estimate and risk calculation
Step 3. Baseline ERA problem formulation
Step 4. Study design and data quality objective process
Step 5. Field verification of sampling design
Step 6. Site investigation and analysis phase
Step 7. Risk characterization
Step 8. Risk management

A typical ERA is an iterative analysis, progressing from very conservative screening analyses, based on default assumptions, to less conservative assessments progressively relying on site-specific information. Subsequent steps in the ERA process also become progressively more focused, on most-problematic constituents of potential ecological concern (COPECs) and the biota most likely to be affected. After each iteration, risk assessors and risk managers can come to one of three conclusions:

1. Unacceptable risks do not occur
2. Unacceptable risks occur
3. Information is insufficient to decide 1 or 2

Risks can be dismissed as unlikely if the first is concluded. Remediation or risk management is warranted if the second conclusion is reached. If the third conclusion is reached, the risk assessors and risk managers may decide to retain that risk and collect additional information. Alternately, they may decide to cease ERA activities and pursue remediation or risk management.

In general, ERAs following USEPA guidance consist of a Screening Level ERA (SLERA) and a Baseline ERA (BERA). The SLERA consists of the first two of USEPA's 8-step process, sometimes with elements of Step 3. The BERA consists of Steps 3 through 8. SLERAs are generally limited to analyses, generally very conservative analyses, of chemical concentrations in abiotic media (e.g., sediment, soil, surface water) that are collected as part of the normal RI/FS process. SLERAs are, by intent, quite conservative. Hence, more information on biota (e.g., tissue concentrations, bioassay toxicity, or community structure) is often required to refine estimates of risk. At this point, consultation with the regulators is mandated to determine what and how additional biota information will be collected. This consultation, data collection, and analyses constitute the BERA.

This section is structured as follows:

Section 4.1	Structure of the EHEPA
Section 4.2	Step 1: Screening-Level Problem Formulation
Section 4.3	Step 2: Screening-Level Exposure Estimate/Risk Calculation
Section 4.4	Step 3: Streamlined Risk Problem Formulation

4.1 Structure of the EHEPA

For a number of reasons, the typical 8-Step ERA structure is not optimum for this Site.

First, there is essentially no terrestrial habitat now nor will there be with likely future land-uses. There is also little to no terrestrial habitat near the Site. Thus, the EHEPA will focus on the aquatic species and aquatic habitat in the adjacent Hylebos Waterway. Second, even within the aquatic habitat of the Hylebos Waterway, Site-related risks are further limited because a significant amount of remediation has already occurred at the Site. This previous remediation includes dredging of the Hylebos Waterway and ongoing extraction and treatment of groundwater. Thus, the EHEPA can focus on un-dredged nearshore areas and continuing groundwater inputs. Third, potential risks of the groundwater inputs may not require a detailed ecological risk assessment since the primary groundwater contaminants are chlorinated solvents. Chlorinated solvents are generally considerably less problematic to ecological receptors than to human receptors[1]. Hence, clean-up levels for chlorinated solvents protective of human health will generally be more than sufficiently protective of ecological receptors, even when the latter are based on typical, conservative SLERA methods.

Lastly, the intent of this EHEPA differs from a typical ERA. A typical ERA occurs before any risk assessment or remediation has occurred. However, a considerable amount of risk assessment and remediation has already occurred at the Site. Primary COCs have already been identified, preliminary

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[1] This is because human health assessments of many VOCs focus on very low incidences (i.e., one in a million) of cancer. In contrast, ecological risk is assessed at VOC concentrations that cause mortality, albeit to a small percent of individual organisms. These 10^{-6} cancer rates occur at much lower exposures than those that cause mortality.

clean-up levels have been developed, and much remediation has already been completed (e.g., dredging of contaminated sediments and ongoing extraction and treatment of on-Site groundwater). Given the preceding risk assessments and remediation, the EHEPA presented below assumes that some potential for unacceptable ecological risks occurs, notably for highly contaminated groundwater in the middle of the Site. Rather than assessing whether risk occurs, the intent of this EHEPA was to determine whether i) post-remediation ecological risks still occur; and ii) if so, where these residual risks occur.

Consequently, the following EHEPA follows USEPA's general structure with some modification. Note that USEPA guidance specifically recognizes that the 8-Step process might not be useful for all situations and, thus, recommends flexibility in application. In this case, the EHEPA for the Site resembles a SLERA in that it is intended to be completed on an abbreviated schedule with little or no additional data. At the same time, the EHEPA includes some less conservative BERA elements, and makes use of available data on macrobenthos surveys and sediment bioassays in interpreting the potential risks of chemical concentrations. In addition, the EHEPA also attempts to refine risks in terms of areas and chemicals requiring further analyses or remediation. Thus, the EHEPA consists of the following steps, corresponding roughly to the first three steps of the USEPA 8-step process.

Step 1. Formulate the screening-level problem and evaluate the ecological effects: This first step consists of a basic description of the Site and its habitat, plant and animal communities, and known hazards and their likely modes of ecotoxicity. This information is combined into a preliminary CSM.

Step 2. Estimate the screening-level exposure and calculate risk: The second step includes the exposure estimate and screening risk calculation. The EHEPA compares the contaminant concentrations in each medium of concern to conservative ecotoxicity screening values (ESVs). The result is a screening quotient (SQ). A screening quotient less than 1 indicates the constituent is unlikely to cause adverse ecological effects. Given the conservatism of the EHEPA, SQ values greater than 1.0 imply that risks to ecological receptors cannot be dismissed based on current information, not that there is a significant potential for adverse ecological effects.

Note that SQ values are usually generated with maximum, 95% UCL, or mean concentrations of the available sample data. This screening is then used to identify potentially problematic chemicals. However, COCs for this Site have already been identified. The intent of the EHEPA is primarily identification of problematic areas. Consequently, SQ values for primary COCs were generated for individual samples to identify specific areas that could potentially pose risk and/or require further evaluation.

Step 3. Risk Problem Formulation. This step generally follows Step 3 of USEPA's 8 step process. Thus, the conservatively calculated risks, estimated in Step 2, were re-examined to determine whether they are likely to occur or are due to very conservative assumptions. Furthermore, available data on bioassay toxicity and macrobenthos community structure from nearby locations in the Hylebos Waterway and

Commencement Bay were consulted to refine assessments based on observed chemical concentrations. Step 3 will end with a preliminary assessment of risks, specifically which area and sample media can be eliminated from further consideration. The results of the EHEPA were considered in relation to the results of the HHEPA.

4.2 Step 1: Screening-Level Problem Formulation

This section is structured as follows:

Section 4.2.1	Environmental Setting
Section 4.2.2	Rare, Threatened, and Endangered Species
Section 4.2.3	Contaminants Known or Suspected to Occur at the Site
Section 4.2.4	Fate, Transport, and Ecotoxicity of Suspected Contaminants of Potential Ecological Concern
Section 4.2.5	Preliminary Ecological Conceptual Site Model
Section 4.2.6	Selection of Assessment Endpoints

4.2.1 Environmental Setting

The Site is located near the end of a man-made peninsula. Originally, the Site and adjacent waterways were undeveloped tidal mudflats of Commencement Bay. Between 1920 and 1936, several upland peninsulas were formed in the tidal mudflat with placement of approximately 16 feet of dredge material, primarily sand, as part of an upland expansion project. At the same time, the mudflat on either side of the peninsula was dredged to accommodate ship traffic, converting the remaining area of mudflat to relatively deep water. The peninsula upon which the Site is located is bounded by the Blair Waterway and the Hylebos Waterway. Shallow impacted groundwater under the Site flows toward the surrounding surface water bodies, primarily to the Hylebos Waterway.

In general, the shoreline of the Hylebos Waterway within the Site consists of riprap within the intertidal zone. Thus, this habitat is best described as rocky intertidal. Biota inhabiting this area are sessile species adapted to periodic immersion and strong attachment (e.g., attached algae, mussels and other shellfish) or mobile species (e.g., crabs, fish) that move in and out with the tides. Food chains in the rocky intertidal are dominated by filter-feeders and grazers on attached algae. Thus, exposure to Site COCs in these areas is primarily via chemicals in surface water.

Further down the embankment, the habitat transitions from almost completely rocky to almost completely fine sediments and sand in the subtidal zone. At the bottom of the intertidal zone, the benthic habitat is typically about as much fine sediment as rocks, and the subtidal zone is almost entirely fine sediments. The intertidal and subtidal areas at the Site and along most of the Hylebos Waterway are apparently too erosive to support higher plants and macroalgae such as kelp in the fine sediments. Thus, the food chains in the fine sediment microhabitats will likely be dominated by filter-feeders and deposit feeders. These species' exposure to the Site's COCs is primarily due to a combination of overlying surface water and sediment porewater/upwelling groundwater.

Similarly, most of the shoreline along this length of the Hylebos Waterway is developed for industries and shipping. Shorelines along these areas appear also to be hardened and contain little terrestrial habitat. However, there is a recreational boat marina on the northeast side of the Hylebos Waterway and slightly upstream (i.e., toward the head of the Hylebos Waterway) of this marina is a tidal marsh. The shorelines along these areas do not appear to be hardened.

The Hylebos Creek discharges at the head of the Hylebos Waterway. Hylebos Creek has a watershed area of approximately 29 square miles. The discharge of freshwater from the creek is generally small compared to tidal flushing in the Hylebos Waterway, so the salinity of the Hylebos Waterway in the vicinity of the Site is similar to that in Commencement Bay, about 23 parts per thousand. For such a small stream, Hylebos Creek and its tributaries were once a productive salmonid breeding area supporting "several thousand coho, and chum salmon plus perhaps hundreds of chinook salmon, steelhead and cutthroat trout" (Kerwin, 1999). However, the habitat in Hylebos Creek has been severely degraded by a number of factors: residential development, erosion and frequent flooding, channelization, permitted and unpermitted destruction of wetlands, bogs and streams, and by previous logging and burning. Although all the previously mentioned salmonid species can be found in Hylebos Creek today, the current production of salmonids has been "vastly reduced" (Kerwin, 1999).

4.2.2 Rare, Threatened, and Endangered Species

The Site and adjacent terrestrial areas have little to no terrestrial habitat and, thus, are unlikely to harbor terrestrial species of concern (i.e., those listed as "rare", "threatened" or "endangered" by federal or state authorities). On the other hand, a number of aquatic and semi-aquatic species are threatened or endangered in Washington State, and several of these species occur, at least temporarily, in the Hylebos Waterway. Notable amongst these are two salmonid species of concern in Puget Sound: chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Oncorhynchus mykiss).* Chinook salmon and steelhead trout are federally "threatened" and chinook salmon are a candidate for listing in Washington State. Coho salmon (*Oncorhynchus kisutch)* from the nearby lower Columbia River are federally threatened. All of these species can be found, although currently in low numbers, in Hylebos Creek. These salmonid species of concern will potentially use the Hylebos Waterway as they migrate to and from the ocean and up Hylebos Creek.

4.2.3 Contaminants Known or Suspected to Occur at the Site

COCs for different media and different areas of the Site have been determined based upon evaluation of data from previous remedial investigations at the Site. The Site COCs are presented in Tables 2.1 through 2.5.

4.2.4 Fate, Transport, and Ecotoxicity of Suspected Contaminants of Potential Ecological Concern

The physical fate and transport characteristics of different COCs are described in detail in the SCR. The following provides a general overview of the biological fate processes and ecotoxicity. Because the primary exposures/potential impacts at the Hylebos Waterway pertain to direct toxicity to benthic invertebrates and, to lesser extent, benthic fish, the following discussion focuses on direct toxicity to benthic invertebrates.

Note that the following discussion of toxicity for specific compounds does not consider their AET (apparent effects thresholds) or other co-occurrence sediment quality guidelines (Co-SQG), such as NOAA's ER-L and ER-M values. These values are ostensibly[2] based on the co-incidence of a specific chemical's concentrations with observed toxicity in sediments with multiple potential toxic agents. However, the AET calculation methods make no attempt to identify the actual toxic agent; therefore, they cannot be used as evidence of toxicity for specific compounds (e.g., see National Academy of Sciences, 2001; Wenning et al., 2005). In fact, AET-like values for most chemicals probably have nothing or almost nothing to do with the toxicity of that specific chemical[3] or, potentially, any chemical at all (Smith and Jones, 2006; Smith, 2007, 2008). Hence, these AET-type values are not relevant to discussions of potential toxicity of specific compounds.

VOCs

Given their solubility in water, VOCs generally pass freely across gill surfaces of aquatic biota. Thus, the bioaccumulation potential for VOCs is generally close to that predicted by equilibrium between body lipids and the freely dissolved concentrations in which the fish or benthic invertebrate lives. Most of the VOCs are rapidly metabolized by aquatic biota; thus, they will not biomagnify in either aquatic or terrestrial food chains.

VOC toxicity to aquatic life is thought to be primarily due to narcosis (DiToro et al., 2000; DiToro and McGrath, 2000; USEPA, 2003b; USEPA, and 2008c). Narcosis is a reversible, non-specific toxicity that occurs when neutral hydrophobic compounds are absorbed into the cell walls of organisms. At

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[2] Instead of co-occurrence with toxicity or impacted benthos, Smith and colleagues present strong evidence that the AETs/CoSQGs are actually based on a combination of overt bias and semi-random sampling of ambient concentrations. Specifically, AETs/CoSQGs for most compounds are based on sediment samples in which that specific compound is never or almost never toxic (Smith and Jones, 2006; Smith, 2007). For example, the AETs/CoSQGs for cadmium and mercury are largely or maybe totally based on sediment samples in which cadmium and mercury, respectively, are not toxic. Scientifically-defensible toxic endpoints cannot be estimated for a specific chemical with datasets that are mostly or totally devoid of toxic concentrations of that chemical (Smith and Jones 2011). Instead, AET/CoSQG values appear to be simply indexes of ambient concentrations in the environment. CoSQG values for metals are highly predictable from background concentrations (Smith and Jones, 2006). Lastly, values very much like observed CoSQGs can be generated with random sampling of background concentrations (Smith, 2008). This random sampling did not include any consideration of toxicity at all.

[3] For example, see Fuchsman et al., 1998 and 2006 for HCB and PCBs, respectively. See USEPA, 2005 for chromium.

sufficiently high concentrations, these molecules disrupt cellular functions. Because the effect is non-specific, the narcotic effect of different non-polar chemicals is additive. Toxicity depends on the total number of molecules, rather than the mass of each chemical. As a result, toxicity depends on the molar concentrations and inversely with the molecular weight of each compound. Since bioaccumulation from the water column is a positive function of hydrophobicity, water column toxicity of individual narcotic compounds is a positive function of Kow.

SVOCs

There are five SVOC COCs at the Site: 1,2,4–trichlorobenzene, bis(2-ethylhexyl)phthalate, hexachlorobenzene (HCB), hexachlorobutadiene (HCBD), and pentachlorophenol (PCP). However, while 1,2,4-trichlorobenzene is listed as a Site SVOC, its primary mode of toxicity is narcosis, so its toxicity was treated as described above for VOCs.

The potential for bioaccumulation varies across the other four compounds. Although all of these compounds will bioconcentrate (i.e., accumulate via passage across gill surface), the potential for bioaccumulation[4] across the gills is reduced by the low solubility/high hydrophobicity of these compounds except for PCP. Bioaccumulation of these SVOCs from the water column will be especially limited because water column concentrations of these compounds are expected to be very low. Therefore, other than benthic organisms exposed to sediment porewater, there is little potential for bioconcentration of these SVOCs. Bioaccumulation of bis(2-ethylhexyl)phthalate and PCP from food chain exposure is also not likely since both are rapidly metabolized by upper organisms. Thus, these two compounds tend to biodilute rather than biomagnify in food chains.

In contrast, HCB will biomagnify in aquatic food chains (USEPA, 1995b) and the bioaccumulation potential of HCBD is intermediate. HCBD is not expected to biomagnify in some food chains because it may be rapidly metabolized by some crustaceans, mammals, and birds (Burkhard et al., 1997). On the other hand, HCBD might biomagnify, weakly, in some aquatic food chains because it may not be metabolized well by finfish (Burkhard et al., 1997). Thus, this compound is variously reported to not biomagnify (USEPA, 2003b), to biomagnify weakly in fish (USEPA, 1995b; Burkhard et al., 1997), and to biodilute in Crustacea (Burkhard et al., 1997) and in some finfish food chains (Goldbach et al., 1976, cited in LeCloux, 2004).

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[4] Total bioaccumulation of organic chemicals by aquatic biota is due to bioconcentration – passive uptake across gills and other permeable body surfaces – and uptake across the gut from chemical in ingested food. For more soluble, less hydrophobic substances, passage across the gills is rapid such that these chemicals tend to reach equilibrium with body lipids and dissolved water column concentrations. Additional exposure via the food chain is typically much less than that across the gills. For sparingly soluble, very hydrophobic substances, food chain exposure may sometimes be considerably higher than bioconcentration across the gills. Some poorly metabolized, very hydrophobic substances biomagnify in food chains. Biomagnification occurs when higher concentrations of a chemical occur at each step in the food chain. In contrast, some very hydrophobic, readily metabolized chemicals biodilute. Biodilution occurs when there are lower concentrations at successive levels of the food chain.

Notwithstanding the potential for food chain bioaccumulation of HCB and, potentially, HCBD, exposure via the food chain is not expected to be significant in the Hylebos Waterway. Food chain exposure to these chemicals will be limited since elevated concentrations of HCB and HCBD are not wide spread and restricted to very small areas of sediments. In contrast, the predatory fish and birds and many components of their food chain will typically range over a much larger area.

The modes of toxicity of these compounds vary with the chemical and the receptors. However, HCB and the phthalates are non-polar organics that will likely exert narcotic effects (Russom et al., 1997; USEPA, 2008c)[5]. This is assumed to be the primary mode of toxicity to benthos. However, neither compound is likely to be toxic since toxic levels of both compounds are not reached at their solubility limit. This lack of toxicity has been demonstrated in both water and sediment exposure for the phthalate (Parkerton and Konkel, 2000; USEPA, 2006) and sediment exposures for HCB (Barber et al., 1997; Fuchsman et al., 1998).

PCP and HCBD exert toxicity via other mechanisms than non-polar narcosis (Russom et al., 1997). The water column toxicity of PCP is described in USEPA's water quality document (USEPA, 1986). This analysis produces a marine chronic criterion of 7.9 μg/L. Water column toxicity of HCBD is less well established, but a lowest chronic NOEC of 6.5 μg/L has been identified (Environment Canada, 2000). Using equilibrium partitioning, this value corresponds to a NOEC sediment concentration of about 4.0 mg/kg at the Site-specific carbon concentration in sediment of 1.145% carbon. This value is slightly higher than threshold toxicity values observed in two spiked-sediment bioassays conducted by Fuchsman et al., (2000). The lowest NOEC based on sediment dilution was slightly lower, about 0.63 mg/kg HCBD normalized to 1% organic carbon (Fuchsman et al., 2000). Thus, experimental data specific to HCBD would suggest sediment NOECs for most sensitive species ranging from about 0.73 to about 4.0 mg/kg.

PCBs, DDT and Metabolites, and Dioxin/Furans

All of these compounds are very hydrophobic and poorly metabolized by invertebrates and vertebrates. Thus, PCBs and DDT and its metabolites biomagnify in food chains (USEPA, 1995b). In contrast, the dioxin/furans do not biomagnify in food chains, and the more chlorinated congeners tend to biodilute as they move up the food chain (USEPA, 1993; Environment Canada, 2001; Wan et al., 2005).

In terms of modes of toxicity, the primary eco-toxicity of PCBs and dioxin/furans is generically termed dioxin-like toxicity. This mode of toxicity is established through interaction with a specific cellular receptor, the Aryl hydrocarbon (Ah) receptor (USEPA, 2000b). Binding to this Ah receptor leads to a series of cellular alterations. In turn, these cellular alterations produce a variety of toxic effects, such as

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[5] Note that both reference refers to structural analogues of bis(2-ethylhexyl)phthalate or hexachlorobenzene, not to these chemicals themselves.

weight loss, impacts on reproduction, liver cancer, skin and liver disease, etc. Primary eco-toxic effects pertain to impacts on reproduction.

Based on the lock-and-key relationship that exists between a cellular receptor and substrate, molecules exerting dioxin-like toxicity have a similar three-dimensional shape and all bind to the Ah receptor. Compounds that physically most resemble 2,3,7,8-TCDD tend to be more toxic, while those that differ significantly, in the number and placement of chlorines, tend to be less toxic. The relative toxicity of the dioxin-like compounds is also predictable by the affinity between the compound and the Ah receptor. Compounds that do not bind, or bind very, very weakly to the Ah receptor, do not add (or add very little) to dioxin toxicity.

The critical importance of the lock-and-key relationship also affects relative sensitivity of different taxa to dioxin-like toxicity. Notably, vertebrates have Ah receptors to which dioxins and furans readily bind. These taxa, especially the fish, mammals, and birds, are subject to the potent dioxin-like toxicity posed by dioxin/furans and PCBs. Toxicity to these taxa, often via the food chain, is the dominant ecotoxicity posed by PCBs and dioxin/furans.

In contrast, invertebrates and plants lack the Ah receptor (or have Ah-like receptors that do not bind readily to dioxins). Hence, 2,3,7,8-TCDD and other dioxin/furans are essentially nontoxic to various aquatic macroinvertebrates and plants (USEPA, 1993; Barber et al., 1998). For the same reason, PCB toxicity to macroinvetebrates is also low (Fuchsman et al., 2006) and probably due to another type of toxicity (non-polar narcosis). These authors proposed a benthic invertebrate NOEC for Aroclor 1254 of 15,000 μg/kg for sediments with 1% organic carbon.

The effects of DDT and its metabolites on ecological receptors are species dependent. In its review of DDT's direct toxicity to aquatic life, USEPA (1980) was able to estimate acute water quality criteria of 1.1 μg/L for freshwater and 0.13 μg/L for saltwater biota. Because no chronic studies had considered reproduction, no chronic criteria for protection of aquatic life from direct toxicity were estimated. However, some long-term bioassays have been conducted and "concentrations of DDT affecting three saltwater invertebrate species in long-term exposure did not differ greatly from 48- or 96-hour LC50 values" (USEPA, 1979). This suggests that chronic effect concentrations are not very much lower than the acute WQC described above.

The aquatic toxicities DDD and DDE are generally assumed to be about equal to that of DDT. However, experiments testing the toxicity of these three compounds to two species of benthic amphipods found that DDD and especially DDE were considerably less toxic than DDT (Lotufo et al., 2001). In subchronic (10-day) bioassays with *Hyalella*, the NOECs for DDD and DDE were about 6 and 40 times higher than the NOEC for DDT, about 0.064 μg/L. In 28-day bioassays with *Diporeia*, the NOECs for DDD and DDE were about 8 and over 90 times greater than the NOEC for DDT (0.221 μg/L).

Hyalella (an amphipod) is the most sensitive invertebrate species to DDT toxicity (Lotufo et al., 2001) suggesting that *Hyalella's* NOEC (0.064 µg/L) could be a threshold for DDT toxicity to all species. Consistent with this, concentrations of DDT protective of aquatic life from direct toxicity have been summarized by Suter and Tsao (1996). These authors suggest chronic aquatic values for DDT ranging from about 0.01 to 0.3 µg/L.

The toxicity of DDT and its metabolites to vertebrates, especially birds and mammals, is well known and well described in various summary documents (e.g., WHO, 1989).

Heavy Metals

The Site's COCs include a number of heavy metals. Except for mercury, none of the heavy metals bioaccumulate readily in food chains. The direct toxicity of heavy metals via water column exposure is well described by their water quality criteria (WQC). Application of the WQC to sediment porewater is conservative for several reasons. First, metals toxicity is largely a function of freely dissolved metals concentrations; therefore, WQC for metals should only be applied to filtered samples. Second, even filtered samples may overestimate potential impacts. Notably for example, sediment porewater, even when filtered, is typically rich in binding agents, such as organic carbon, that will reduce toxicity of metals. Third, true infaunal (benthos that live in, as opposed to on, the sediments) tend to be less sensitive to metals than more sensitive water column species. The latter tended to be the most sensitive species to metals that determined the WQC (DiToro et al., 1991).

Recent analyses have examined toxicity of heavy metals in sediments (USEPA 2005a). Since bound metals are relatively non-toxic, this theory suggests toxicity of divalent metals will not occur if the total binding capacity of the sediments exceeds the concentrations of simultaneously extractable metals (SEM). In many fine grained sediments, the binding capacity is dominated by AVS (acid volatile sulfide) and organic carbon (USEPA, 2005a).

4.2.5 Preliminary Ecological Conceptual Site Model

A preliminary ecological CSM was presented in Section 2.2.2.

4.2.6 Selection of Assessment Endpoints

According to USEPA (1997c), an assessment endpoint is "an explicit expression of the environmental value that is to be protected." More specifically, an assessment endpoint is some characteristic of a population, species, or group of species that can both be measured and affected by toxicity. According to guidance, selection of assessment endpoints should consider the following factors:

- Which ecosystems, communities, and/or species potentially occur at the Site

- Which contaminants are present and at what concentrations
- The relative sensitivity and exposure of different biota to the Site COCs
- Economic/societal importance of the ecosystems, communities, and/or species

In order to select assessment endpoints, the plant and animal species expected within the Hylebos Waterway were grouped into trophic levels and feeding guilds. A trophic level is one of the successive levels of nourishment in a food web or food chain. The first trophic level includes the primary producers. At this Site, the primary produces are mostly various kinds of algae and phytoplankton. In turn, the primary producers are consumed by the second trophic level, the herbivores, which includes many aquatic/benthic invertebrates. The third trophic level, the primary predators, consists of animals that primarily consume invertebrates. These are typically small fish and some predatory invertebrates such as crabs. The fourth trophic level consists of top carnivores – piscivorous fish and piscivorous wildlife.

At the base of the food web, in trophic level 1, is the aquatic plant community, which includes attached algae and phytoplankton as the primary producers. These biota are potentially impacted by Site COCs via direct toxicity. The primary producers may also bioaccumulate chemicals from the water column, which can then be passed up the food chain to the next trophic level, the aquatic/benthic invertebrates. Notwithstanding these potential effects, the EHEPA did not consider the primary producers in terms of either toxicity or bioaccumulation for several reasons. The bulk of primary production in the Hylebos Waterway is associated with phytoplankton (algae suspended in the water column). Phytoplankton occur in the water column where concentrations of Site COCs are very low due to the large scale dilution afforded by tidal currents. There is also some primary production of attached algae on the rock surfaces of the intertidal and upper subtidal. However, like the phytoplankton, the algae attached to rock surfaces are also primarily exposed to COCs in the water column.

Site COCs are at their highest concentration in sediments, due to the residual sediment contamination and groundwater discharge. Rooted plants and attached algae could, therefore, face exposure to Site COCs. However, the steep and able embankment of the Hylebos Waterway precludes growth of benthic plants and algae except for rock surfaces, and these plants and algae do not grow in the soft sediments at the bottom of the Hylebos Waterway. The rooted and attached algae of soft sediments are not considered important components of this Site, and, thus, were not considered reasonable assessment endpoints.

In contrast, benthic invertebrates are important components of the Hylebos Waterway ecosystem. Those that live on or in soft sediments are potentially exposed to Site COCs. And, while the benthos itself are generally not of high societal importance, these organisms are often important food items for fish species that are of high societal and economic importance. Thus, this trophic level will be considered in the EHEPA in terms of direct toxicity.

Trophic level 3 consists of the primary predators. These may include invertebrate-eating fish such as the English sole and other flatfish, as well as birds, such as gulls, feeding on benthos during low tides. Given the poor to non-existent terrestrial habitat at the Site itself and adjacent properties, the area was not considered suitable habitat for invertebrate eating mammals, such as raccoons. Exposure to invertivorous mammals was, therefore, not considered likely.

Trophic level 4 is considered to be the upper-most trophic level in the Hylebos Waterway. This level consists of top predators, such as piscivorous fish as well as fish-eating birds such as gulls and herons. These receptors may be exposed to chemicals that have been bioaccumulated in the animals they consume. These carnivores may also be exposed directly to chemicals in sediment while foraging and preening, and the fish also face direct exposure to chemicals in the water column. For the reasons described above, the area was not considered suitable habitat for fish-eating mammals, such as mink and otters. Exposure to piscivorous-eating mammals was, therefore, not considered.

Based on the discussion above, preliminary assessment endpoints were identified for the Hylebos Waterway aquatic habitat as follows:

- <u>Benthic Invertebrates</u> – benthic invertebrate productivity must be preserved. Benthic invertebrates play a critical role in nutrient cycling and are also an important food source for higher trophic level species.
- <u>Benthos-Eating Fish</u> – Benthivorous fish productivity is to be preserved as these fish transfer energy and nutrients from lower to higher trophic species, and they may influence the populations of lower trophic species through predation. They may also have economic significance.
- <u>Benthos-Eating Birds</u> – invertivorous birds are potentially subject to high bioaccumulation of chemicals through consumption of their prey, and they also play a role in regulating the populations of their prey.
- <u>Piscivorous Fish</u> - carnivore fish productivity is to be preserved as these fish may play a role in regulating the populations of lower aquatic trophic species through predation. This trophic level is also important to recreational anglers.
- <u>Piscivorous Birds</u> - carnivore productivity is to be preserved as carnivores play an important role in regulating the populations of lower trophic species through predation. The piscivorous birds such as the herons are also of societal importance.

While all of these assessment endpoints listed above are potentially exposed to Site COCs, the EHEPA will focus on risks to aquatic benthos of the fine sediments. As used here, the benthos will include the fine sediment-associated fish species, such as flounder and sole, as well as the benthic macroinvertebrates of the fine sediments (such as shellfish, amphipods, and aquatic worms). Of the assessment endpoints listed above, these benthos are the most exposed to Site COCs. The primary exposure pathway is from shallow contaminated groundwater discharging to the Hylebos Waterway via seeps and subtidal discharge along the embankment adjacent to the Hylebos Waterway. Thus, aquatic benthos of the fine sediments are most exposed and most sensitive to Site COCs. (In contrast, benthos inhabiting the rocky intertidal are primarily exposed to surface water.)

In contrast, three factors greatly limit exposure and potential risks to the other aquatic and semi-aquatic species in the Hylebos Waterway. First, groundwater influxes from the Site to the Hylebos Waterway are very small compared to tidal flushing. Hence, concentrations of Site COCs in the surface water of the Hylebos Waterway will be very much lower than concentrations in the discharging groundwater. Surface water concentrations of the VOCs will be further reduced by volatilization, which can rapidly decrease water column concentrations even more. Second, the primary Site COCs (VOCs and heavy metals) do not readily bioaccumulate. Thus, these chemicals tend to pose greatest risk via direct toxicity and generally pose little risk via food chain exposure. Finally, the Site COCs that do bioaccumulate readily (PCBs, HCB, dioxin/furans, DDT) do not move readily through groundwater. There are elevated concentrations of these bioaccumulating chemicals in surface sediments, presumably from past upland releases. While these chemicals will bioaccumulate in food chains, that potential at this Site is limited since these chemicals are found only in moderate concentrations and only in very limited areas of the Site. Thus, even for these bioaccumulating chemicals, the benthic fish and invertebrates of the fine sediments will be most exposed.

Therefore, the EHEPA will focus on assessing direct toxicity of Site COCs to benthos of the fine sediments. Protecting benthos, the most-exposed assessment endpoint, is assumed to provide protection of the other assessment endpoints described above from both direct toxicity and potential risks via the food chain.

4.3 Step 2: Screening-Level Exposure Estimate/Risk Calculation

In the following analyses, chemicals measured in various media will be compared to ESVs. ESVs are typically conservative threshold concentrations below which impacts are unlikely.

This section is structured as follows:

Section 4.3.1	Ecological Screening Values
Section 4.3.2	Screening of Analytical Data for Ecological Risk

4.3.1 Ecological Screening Values

This section is structured as follows:

Section 4.3.1.1 Porewater, Groundwater, Seeps, and Seepage Meter Water
Section 4.3.1.2 Sediment
Section 4.3.1.3 Correction Factors for Metals Concentrations in Water Media

4.3.1.1 Porewater, Groundwater, Seeps, and Seepage Meter Water

Preliminary clean-up levels for groundwater and surface waters have previously been developed for the Site. Concurrently, screening criteria for sediment porewater were developed based upon protection of sediment quality and surface water. However, these values are primarily based on human health endpoints and, thus, are not relevant to assessment of potential ecological risks. Moreover, the available science with respect to the ecotoxicity of non-polar organics (a primary group of COCs), has advanced since the preliminary cleanup levels were proposed (e.g., see USEPA, 2003b, 2008c). Thus, the following describes the water ESVs that will be used to screen sediment porewater, groundwater, seeps, and seepage meter samples. The water EVSs for metals are presented in Table 4.1 while those for organics are presented in Table 4.2.

For metals, the water ESVs were set equal to the more stringent of the Washington State and USEPA marine chronic aquatic life criteria. Note that the Washington criteria for mercury (0.025 μg/L) is actually a human health standard (USEPA, 1986). Therefore, the current USEPA marine criterion for protection of aquatic life was used as a Water ESV for mercury. No chronic value exists for silver; hence, the national acute criterion was used. No aquatic life value could be found for antimony. However, the current human health criterion of 640 μg/L was considered sufficiently protective of aquatic life. A similar value, 500 μg/L, has been proposed as a chronic marine aquatic life criterion (USEPA, 1998).

Water ESVs (Table 4.2) for the non-polar organics were Final Chronic Values (FCVs), based on the narcosis theory as developed and proposed by USEPA (USEPA, 2003b, 2008c). The narcosis theory suggests that most non-polar organics (e.g., BTEX, PAH, chlorinated and non-chlorinated VOCs) exert toxicity via a common mechanism – narcosis. Consequently, the limited toxicity dataset for any one narcotic chemical (e.g., naphthalene) on one or a small number of species could be combined with the more extensive data of other narcotic chemicals on other species. By this method, USEPA amassed an extensive toxicity database for many non-polar organics on many species. This summed toxicity information, on all narcotics and all species, was then used to generate safe water column concentrations, or FCVs, for each PAH (USEPA, 2003b) or non-PAH organic compounds (USEPA, 2008c). The FCVs for narcotics were generated in a manner similar to aquatic life water quality criteria. That is, the FCVs are intended to be protective of more sensitive species. When available, FCV values for specific chemicals were taken from USEPA (2008c). When FCV values were not available, values for specific chemicals were based on equations presented in USEPA (2008c) and log Kow values in USEPA (1995b or 1999).

Several factors should be considered when assessing the implications of these narcosis-based water EVSs (and sediment ESVs, which are described in the next section).

- The different narcotic chemicals exert toxicity through a common mechanism and pose additive toxicity. Thus, quotients of exposure concentrations to FCVs (or sediment equivalent) must be summed across all of the non-polar organics. As with typical screening analyses, values of the summed quotient, hereafter called the total organic SQ, less than or only nominally above 1.0 indicate little potential for toxicity. Total SQ values significantly above 1.0 suggest the potential for toxic effects.
- The FCVs for the narcotics are intentionally conservative. They are based on most sensitive species from a list of species that included invertebrates and vertebrates and infaunal, epibenthic, and water column species.
- True infaunal species, which are most exposed to porewater and groundwater discharge, tended to be less sensitive to narcotics than water column and epifaunal species (USEPA, 2003b). Thus, the most exposed biota tended to be less sensitive to narcotics. In addition, about 80% of species were two or more times less sensitive to narcotics than the FCV. Thus, a total SQ moderately greater than 1.0 does not necessarily predict likely toxicity.
- The narcosis-based method assumes that benthos are exposed to undiluted sediment porewater. In fact, even true infaunal benthos are generally exposed to a combination of sediment porewater and overlying surface water. Since the latter is less contaminated than porewater, the actual exposures to groundwater discharge, sediment porewater, and sediment bound COCs are generally lower than measured porewater concentrations.
- On the other hand, the narcosis screening method cannot account for unmeasured narcotics (e.g., PAHs) in porewater and sediment. These unmeasured narcotics could potentially result in the underestimation of potential toxicity.

One COC, pentachlorophenol, is a polar organic, for which the narcosis method may be inappropriate. Thus, the water ESV for pentachlorophenol was based on the USEPA water quality criteria for protection of aquatic life, 7.9 μg/L. HCBD toxicity is also due to different mechanisms that make it somewhat more toxic than a typical non-polar narcotic (Russom et al., 1997). Its water ESV was based on the lowest NOEC, 6.5 μg/L, identified by Environment Canada (2000). This ESV is lower and more conservative than that estimated for toxicity due to narcosis alone, about 30 μg/L. As discussed above, bis(2-ethylhexyl)phthalate, cannot, by itself, pose toxicity to aquatic organisms since its estimated toxicity threshold in water is higher than its solubility[6]. Thus, its porewater ESV was set equal to its

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[6] Scientifically-based analyses of bis(2-ethylhexyl)phthalate toxicity suggests that it cannot pose toxicity to aquatic organisms (Parkerton and Konkel 2000, USEPA 2006). As USEPA states, "There is a full set of aquatic life toxicity data that show that DEHP is not toxic to aquatic organisms at or below its solubility limit." Consistent with this assessment, the lack of toxicity in sediment exposures has been corroborated with experiments in both water and sediments (see Call et al., 2001a,b). Thus, there is strong evidence, based on good science, that DEHP in sediments poses no potential for direct toxicity to aquatic benthos.

water solubility, 340 μg/L (from USEPA, 2005b). Similarly, HCB alone cannot be toxic but it can contribute to toxicity in the presence of other narcotics. Its ESV was set equal to that estimated with the narcosis method. Although these ESVs for the SVOCs differ from the more typical narcosis ESVs for the VOCs, their individual quotients were added to the total narcotic quotient to conservatively account for their potential additive effect.

Note that in subsequent discussions, the VOCs and semi-volatile narcotics will be referred to as total organics. This term will not refer to the other organic COCs such as PCBs, dioxins/furans, DDT and its breakdown products. These other organic COCs have different primary modes of toxicity and, sometimes different target organisms. Thus, they are discussed separately.

With respect to other COCs, preliminary groundwater cleanup levels have been previously developed for DDT, DDE, DDD, PCBs, and 2,3,7,8-TCDD. Rather than risk based-values, these are default clean-up levels based on the lowest practical quantitation limits (PQLs) for these compounds in accordance with MTCA. These preliminary clean-up levels are not useful for assessment of ecological risk. Therefore, these default clean-up levels were evaluated to determine whether they are over-protective or under-protective of ecological receptors.

As noted in the SCR, the preliminary clean-up level for DDT and its breakdown products, 0.01 μg/L, is higher than the Washington chronic aquatic life criterion, 0.001 μg/L. Similarly, the preliminary clean-up level for PCBs, 0.2 μg/L, is higher than the Washington chronic aquatic life criterion of 0.03 μg/L. However, both Washington criteria are atypical chronic aquatic life criteria. Rather than protecting aquatic biota from direct toxicity, both criteria are based on maintaining safe concentrations in fish that are protective of human and avian fish consumers. Consequently, both criteria are applicable to surface water concentrations over some sufficiently large area necessary to support a population of fish and fish consumers.

In contrast, the primary exposure scenario at this Site pertains to direct toxicity to aquatic benthos from chemicals in surface sediments and relatively undiluted sediment porewater and groundwater. Concentrations of DDT protective of aquatic life from direct toxicity have been summarized by Suter and Tsao (1995). These authors suggest chronic aquatic values for DDT ranging from about 0.01 to 0.3 μg/L. Similarly, Suter and Tsao present potential chronic aquatic values for different Aroclors that range from just below and just above the current preliminary clean-up level for PCBs of 0.2 μg/L. Thus, the current preliminary clean-up levels for these PCBs and DDT, DDE, and DDD were considered sufficiently protective of ecological receptors from direct toxicity. They were retained without modification.

The preliminary clean-up level for 2,3,7,8-TCDD, 0.00001 μg/L, is also based on this compound's quantitation limit instead of a risk-based value. Fortunately, this value is comparable to a previously established water quality ESV (e.g., see USEPA, 1999, Environment Canada 2001, Grimwood et al., 1999, Grimwood and Dodds, 1995). These sources suggest toxicity thresholds for fish at water column concentrations of about 0.000010 μg/L to 0.000040 μg/L, comparable to the preliminary clean-up level of 0.000010 μg/L.

Application of this ESV to the Site data has the following complication. The dioxin/furans contamination at the Site includes a number of congeners in addition to TCDD. The total toxicity of all the dioxins and furans is therefore expressed in terms of dioxin/furan TEQ. The dioxin/furan TEQ at the Site is largely due to pentachlorodibenzofurans and hexachlorodibenzofurans. As discussed in the SCR and elsewhere (Van den Berg et al., 1998), there are problems with assessing risks with TEQ values for abiotic media. Notably, compared to TCDD, more chlorinated dioxin/furans tend to be bioaccumulated less efficiently, reducing their exposure and potential toxicity to biota. Thus, TEQ estimated from abiotic media will generally exaggerate potential risks if the TEQ is dominated by more chlorinated, less bioavailable dioxin/furans. To reflect this reduced exposure to biota, USEPA (1993, 1999) has recommended the use of bioaccumulation equivalence factors, or BEF, for different dioxin-furan congeners. The TEFs were adjusted by BEFs when calculating a total TEQ[7]. Since the primary receptors here are fish, the fish TEF system (Van den Berg et al., 1998) was used to calculate TEQ. These final TEF values were then compared to the most conservative water column ESV described above, 0.00001 μg/L.

4.3.1.2 Sediment

ESVs for metals in sediments, presented in Table 4.1, were based on Commencement Bay Sediment Quality Objectives (SQOs) previously established for the Site. These values, like all co-occurrence sediment quality guidelines, are problematic in terms of their scientific validity (Smith and Jones, 2006, Smith, 2006, 2008) and accuracy of prediction (USEPA, 2005a). Nonetheless, they will be retained to screen sediments in the interests of conservatism and continuity.

No SQO exists for thallium, so the Netherlands Maximum Permissible Concentration (MPC) of 2,600 μg/kg was used (Crommentuijn et al., 1997). This value was estimated based on equilibrium partitioning methods and available toxicity data for thallium in water column exposures. The MPC values have a good science basis and their derivation is transparent.

Except for PCBs and dioxin/furans, ESVs for organic chemicals in sediments were based on direct toxicity to benthic invertebrates from narcotic effects. The Commencement Bay SQO for DDT and its metabolites were considered very protective and used without modification. In contrast, ESVs for most VOC and SVOCs were based on the state-of-the-science narcosis method described above. Using equilibrium partitioning and the water ESV values described above, equivalent sediment concentrations were estimated as recommended in USEPA guidance (USEPA, 2003b, 2008c). Log Koc values for specific chemicals were taken from the SCR and Total Organic Carbon was set equal to the Site-specific value for sediment of 1.145%. For VOCs, the equilibrium partitioning sediment concentration was adjusted to

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[7] The BEF adjustment had only a moderate effect on total TEQ. Unadjusted TEQ values were about 20% to double those adjusted by BEFs.

account for the additional mass of water dissolved in the sediment porewater, as suggested by USEPA (2008c). This adjustment assumed that the sediments are 50% water, by mass. The resulting organic ESVs in sediments are presented in Table 4.2.

Exceptions to this were HCBD and PCP. The ESV for HCBD was based on the most conservative NOEC, 0.73 mg/kg, described in Section 4.2.4 above. The PCP ESV was based on the Commencement Bay SQO. As with exposure to water, exposures to sediment-bound VOCs and SVOCs were assumed to pose additive toxicity. Thus, the quotients for all of the VOCs and SVOCs were summed as an index of total narcotic toxicity.

Because invertebrates lack the Ah receptor that mediates dioxin-like toxicity, neither PCBs nor dioxins pose much threat of toxicity to benthic invertebrates. Rather, the primary toxicity of PCBs and dioxins is via bioaccumulation pathways and vertebrates. In the Hylebos Waterway, fish are likely the most sensitive biota to PCBs and dioxin/furans. Given this background, the EHEPA retained the current preliminary clean-up level of 300 μg/kg PCBs based on the following reasoning. This value is reasonably close to the proposed NOAA benchmark of 200 μg/kg in sediments based on protection of Chinook salmon. The latter value pertains to populations of mobile fish; hence, this value necessarily pertains to an average concentration over the home range of these fish rather than a clean-up level for localized sediment concentrations. A PCB clean-up level of 300 μg/kg would be sufficient to attain a post-remediation average less that the NOAA salmonid benchmark. When PCB congener analyses were conducted, total PCBs were estimated from total congeners as presented in the SCR.

As with ESVs for water, sediment benchmarks for dioxin/furans are problematic because they generally pertain to 2,3,7,8-TCDD. For example, conversion of the porewater ESV of 0.00001 μg/L produces an equivalent sediment concentration of 0.50 μg/kg (500 ng/kg). USEPA (1993) suggested that a more conservative sediment ESV, 60 ng/kg TCDD, would pose negligible risk to most sensitive fish, exposed to TCDD via sediment-based food chains.

Both values pertain to TCDD, and the dioxin/furan TEQ is dominated by pentachlorofurans and hexachlorofurans. As with water concentrations of dioxins/furans, relative bioavailability of different dioxin/furan congeners was accounted for by using the BEF methodology. Again, TEQ values were based on fish TEFs, and the final TEQ was compared to the more conservative sediment benchmark, 60 ng/kg TCDD, described above.

Sediment ESVs for all organic chemicals are found in Table 4.2.

4.3.1.3 Correction Factors for Metals Concentrations in Water Media

As discussed in the SCR, metals concentrations in water media (groundwater, seeps, sediment porewater, and seepage meter samples) appear to be biased high due to interferences associated with the Site's groundwater matrix. This bias was demonstrated with parallel analyses of the same groundwater samples performed using three different analytical methods. While there is general agreement between OCC and the Agencies that the metals concentrations in water may be biased high, there has not been any agreement regarding the manner in which the potentially biased data should be used for characterization and evaluation purposes. There is, however, an understanding that the potentially biased data should not be used as the primary driver for remedial activities in any portion of the Site.

Based upon the results of the laboratory study, OCC proposed correction factors for several of the COC metals. These proposed correction factors represented the average ratio of a metal's concentrations in the biased method analyses compared to the same metal's concentrations obtained from the unbiased analytical methods. These correction factors for arsenic and copper are, 1723 and 616, respectively, while those for chromium, nickel, and zinc are 21, 20, and 22, respectively. It should be noted that, the Agencies have not agreed with the proposed correction factors. For the purposes of this EHEPA, however, the proposed correction factors were used for screening the potentially biased metal data. As such, all metals concentrations in water media were corrected by dividing the measured concentrations by the above correction factors for these five metals.

No correction factors were applied to concentrations of lead, thallium, antimony, silver, and mercury in water. Lead and thallium were generally not detectable by any analytical method in the samples collected for the laboratory study. Correction factors could not, therefore, be calculated for these metals. Replicate analyses using the different analytical methods were not conducted for antimony, silver, or mercury, so, again, no correction factor could be estimated for these metals either. Consequently, the measured concentrations for lead, thallium, antimony, and silver were screened without any correction. However, matrix interferences may also be affecting the measured concentrations of these metals. Therefore, not correcting measured concentrations of antimony, lead, silver, and thallium likely adds to the conservatism of the screening.

Metals concentrations in solid media (bulk sediments, soil, sludge, and debris) were not corrected.

4.3.2 Screening of Analytical Data for Ecological Risk

Screening results are discussed below and summarized in tables and figures. Generally, these analyses consider different chemicals grouped by medium, except for the pH sample data, for which all media are considered together. The screening relies on the quotient method, in which an ecological SQ for each chemical is estimated as:

$$SQ = \frac{EEC}{ESV}$$

Where EEC is the estimated exposure concentration and ESV is the ecological screening value, which is also a concentration. In a typical screening ERA, the EEC is based on the maximum, mean, or 95% UCL concentration of each chemical detected in each medium. In this EHEPA, individual SQ values were generated for each sample by each compound. In the case of the organics and DDT and its metabolites, a final summed SQ value was calculated as the sum of quotients for all the compounds in that category. This summation of SQ values accounts for the additive toxicity posed by different compounds having the same or similar mode of toxicity. Because ESVs are typically very conservative, (i.e., they are biased toward identifying risk), an SQ equal to or less than 1.0 indicates with certainty that the constituent does not pose potential for risk at that specific location. In contrast, an ESQ greater than 1.0 does not imply that impacts to ecological receptors are likely at that location. An ESQ value greater than 1.0 only implies that potential ecological risk cannot be dismissed.

This general rule was modified as follows. As recommended by USEPA (USEPA, 2004c), SQ values are rounded to one significant digit, and SQs of 1.5 or less should not be considered sufficient evidence of exceedance. USEPA recommended this to reflect the uncertainty concerning both the quantification of chemical concentrations and the conservative nature of the ESVs. Thus, SQ values ranging between 1.0 and 1.5 are not considered noteworthy in the following discussions.

This section is structured as follows:

Section 4.3.2.1	Surface Sediment
Section 4.3.2.2	Seepage Meter Samples
Section 4.3.2.3	Sediment Porewater
Section 4.3.2.4	Seeps
Section 4.3.2.5	Groundwater
Section 4.3.2.6	pH Results in All Media

4.3.2.1 Surface Sediment

The entire data set of surface sediment samples was screened to calculate SQ values. In total, approximately 110 total sediment samples were collected within 3 feet of the sediment-water interface and analyzed for SVOC and/or VOCs (Table 4.3). Of these, 16 had total organic SQ values significantly above 1.0. As would be expected due to their higher solubility and relatively low eco-toxicity, only 5 of these exceedances were due to VOCs. Most exceedances were due to SVOCs. As shown on Figure 4.1, sediments with exceedances tended to occur along the embankment within the intertidal area. A notable exception is the exceedance at PT-7 in Area 5106. However, this exceedance is largely due to conservatism of the screening method. The high SVOC concentrations at this location were located 2 to 3 feet BML. The sediments were overlain by 2 feet of sediments that had considerably lower levels of organics (Table 4.3).

Twenty-five sediments were sampled for heavy metals, 18 of which had at least one metal concentration above its sediment ESV (Table 4.4). As with the organics, sediments with high concentrations tended to occur along the embankment within the intertidal zone (Figure 4.2). In almost all cases, lead had the highest concentrations, relative to its ESV, of any metal.

Sediment samples were also analyzed for PCBs, DDT and its breakdown products, and dioxin/furans. Of the 50 samples analyzed for PCBs, approximately a third had concentrations above the ESV of 300 μg/kg (Table 4.5), and 7 had PCB concentrations greater than 10 times the ESV. About 25 sediment samples were analyzed for DDT and its breakdown products, and approximately a quarter had a least one DDT-related compound greater than its ESV (Table 4.6). In most cases, these exceedances occurred in sediments located along the embankment within the intertidal zone. However, the two greatest PCB concentrations were located in subtidal sediments (Figure 4.3, Table 4.5), although both of these samples (PT-17A and 5209) were still located along the embankment.

Dioxin/furans samples were collected in intertidal and subtidal sediments at 28 locations. Only two samples had TEQ values greater than the ESV of 60 ng/kg: PT-17A and NL-29 had SQ values of about 8.0 and 4.0, respectively. However, the average TEQ value was below the ESV. Thus, dioxin/furans in surface sediments do not likely pose ecological risk.

Summary figures for SQ values for total organics (Figure 4.1), heavy metals (Figure 4.2), and PCBs (Figure 4.3) provide further perspective on the results of screening surface sediment samples. Specifically, both PCBs and metals concentrations in surface sediments tend not to be problematic in off-embankment areas, but there are occasionally high concentrations of some metals and PCBs in embankment area sediments. In contrast, concentrations of total organics tend to be below potentially toxic levels in almost all sediments

4.3.2.2 Seepage Meter Samples

Seepage meters were placed in 26 locations on the bottom of the Hylebos Waterway. Groundwater quality samples were collected at 19 of these locations. Approximately 150 water groundwater samples were collected during periods of groundwater discharge from these locations. The chemical concentrations measured in these samples were corrected to account for the dilution of the sample with water originally present in the seepage meters, and the corrected sample concentrations were screened against water ESVs. The resulting SQ values for total organics are presented in Table 4.7. As presented, none of the seepage meter groundwater samples came close to exceeding toxic levels for VOCs and other narcotics (Table 4.7). Similarly, the corrected metals concentrations measured in the seepage meter groundwater samples were generally below ESVs (Table 4.8). Lead was found at concentrations slightly higher than its ESV in about 20% of seepage meter samples. Mercury slightly exceeded its ESV in one sample.

These results are presented in summary figures that provide a spatial perspective. As shown on Figure 4.4, total organics in seepage meter samples at all locations were well below levels that would cause toxicity to benthos. However, as described above, concentrations of metals, primarily lead, were slightly above ESVs in several samples (Figure 4.5, Table 4.8). These slight exceedances tended to occur in samples collected along the embankments on both sides of the Hylebos Waterway. Note that multiple samples were sometimes collected at the same location, and the summary figure presents the maximum SQ obtained at any location.

4.3.2.3 Sediment Porewater

Groundwater was also sampled within the intertidal and subtidal zones at various depths BML. The groundwater samples collected within 3 feet of the mudline were conservatively assumed to reflect chemical concentrations present in sediment porewater to which biota might be exposed. In subsequent discussion, these samples will be referred to as sediment porewater. However, it should be emphasized that most of these sediment porewater samples are taken well below the top 10 cm in which most benthos live. In total, about 120 of the sediment porewater samples were analyzed for organics. Of these, only six had total SQ values greater than 1.0 (Table 4.9, Figure 4.6). All of these exceedances were due to VOCs. SVOCs were not problematic in sediment porewater. Approximately 75 of the sediment porewater samples were analyzed for metals. Only five of these had a metal concentration that exceeded its ESV (Table 4.10, Figure 4.7).

4.3.2.4 Seeps

Approximately 70 seep samples were collected and analyzed for VOCs and/or SVOCs during various investigations of the embankment and intertidal areas. None of these 70 samples produced a total organic SQ values greater than 1.0 (Table 4.11). Thus, seeps are not likely an ecologically significant source of organic chemicals to the Hylebos Waterway (Figure 4.8).

Concentrations of metals other than lead were not problematic in the approximately 60 seep samples that were analyzed for metals. In contrast, concentrations of lead in seeps often exceeded, and were sometimes well above, the lead ESV (Table 4.12, Figure 4.9).

These lead exceedances have uncertain significance to the biota in the Hylebos Waterway. Seep samples are biased samples (i.e., they pertain to areas that are visually different from the rest of the intertidal area. Seep samples are also unfiltered, while the ESV pertains to dissolved lead. In addition, seep samples are representative of very limited areas and, potentially, only occur during lower tides. On the other hand, lead was also present in higher concentrations in several embankment sediment samples (see Figure 4.2), and the lead concentrations in seeps often exceeded the lead ESV by a factor of 5 or more.

4.3.2.5 Groundwater

A large number of groundwater samples have been collected at the Site. The available groundwater data were screened against ESVs for all COCs, and summary tables and figures were produced. As shown in Table 4.13 and on Figure 4.10, high organic concentrations occur in the middle of the Site. The impacted groundwater plume is present in shallow groundwater under the Hylebos Waterway.

It should be noted that all on-Site groundwater data was screened even though portions of the impacted groundwater may not discharge to the Hylebos Waterway or Commencement Bay. Specifically, groundwater samples from all depths were screened even though only shallow groundwater discharges to the Hylebos Waterway or Commencement Bay. Within the groundwater plume nearest the Hylebos, groundwater flow directions are predominantly downward below an elevation of approximately -60 feet NGVD due to the elevated groundwater density plume and downward gravity-driven density-dependent flow. Consequently, screening of all groundwater data for ecological risk is very conservative and will need to be further evaluated during the evaluation of remedial alternatives.

Some of the groundwater samples collected from Waste Management Unit A and from the Salt Pad Area had high levels of VOCs (Table 4.13). At both locations, the resulting SQ values for total organics were often greater than 100. These results suggest that groundwater from both areas could be ecologically significant sources of VOCs if they were to migrate to the upper sediments of the Hylebos Waterway. High concentrations of total organics were also present in the EA borings, although SQ values for this area peaked at about 30. Most samples from the EA borings were at less than problematic concentrations.

In contrast, the groundwater screening demonstrates that groundwater samples collected from other parts of the Site are not ecologically significant sources of organics. For example, a large number of groundwater samples were collected during the 709/721 Alexander Avenue Investigation. None of these samples had ecologically significant levels of total organics. Similarly, approximately 60 samples from the Caustic House area and for the Plume Delineation sampling were analyzed for VOCs and other organics. None of these samples had ecologically problematic levels of VOCs.

The spatial pattern of SQ values for total organics in Site groundwater is illustrated on Figure 4.10. Note where groundwater samples were collected at multiple depths at a single location, only the maximum SQ calculated for each location is shown on this figure. As shown, most of all ecologically problematic locations for total organics in groundwater occur in the middle of the Site or in deep strata under the Hylebos. In all but a few cases, shallow groundwater samples around the perimeter of Site do not contain problematic levels of total organics.

Metals were also analyzed in many of these samples. Except for the N Landfill, few of the groundwater samples had ecologically problematic levels of metals (Table 4.14). Groundwater from the N Landfill area frequently has levels of lead and mercury that exceed their respective ESV. However, even here, only about 20% of the groundwater samples had potentially problematic concentrations of metals. Figure 4.11 further illustrates that in general, groundwater at the Site does not contain ecologically problematic concentrations of metals. Again, it should be noted that where groundwater samples were collected at multiple depths at a single location, only the maximum SQ calculated for each location is shown on this figure.

The other organics (DDTs, PCBs, and dioxin/furans) were sometimes analyzed in groundwater. However, these hydrophobic organics are not discussed in depth herein for the following reasons. First, these compounds were very infrequently detected or not detected at all in groundwater. Moreover, these very hydrophobic chemicals do not migrate readily in groundwater, making groundwater concentrations a tenuous index of ecological exposure.

4.3.2.6 pH Results in all Media

Chemicals released during historical chemical manufacturing have resulted in elevated groundwater pH values in a large portion of the Site. In some areas, the elevated pH groundwater has migrated to the intertidal and subtidal sediments. The pH of water was measured in all of the various media, and the resulting values were screened to the WQC of 8.5. Since pH is expressed on a log scale, the SQ was set equal to $10^{(\text{pHobserved} - 8.5)}$. For example, an observed pH of 9.5 would then generate an SQ value of 10, while a pH value of 11 would generate an SQ of 316.

Nine surface sediment samples were analyzed for pH. None of these had pH values above 8.5 (Table 4.15). Similarly, pH was measured in 151 seepage meter samples, and all were less than 8.5 (Table 4.16). pH was measured in approximately 90 sediment porewater samples (Table 4.17) and the pH in about 20% of these samples exceeded 8.5. Most of these exceedances occurred along the embankment within the subtidal zone adjacent to the N landfill. The pH of about 100 seep samples were measured and fifteen of them had pH values above 8.5 (Table 4.18, Figure 4.12). Finally, about 40% of the groundwater samples had pH values above 8.5 (Table 4.19, Figure 4.13).

The ecological significance of these elevated pH values is uncertain. While groundwater with elevated pH sometimes occurs very near the surficial sediments, the degree and areal extent to which aquatic biota are actually exposed to elevated pH is likely small. Notably, none of the surface sediment or seepage meter samples had elevated pH values. These results are consistent with observational evidence. In the lab tests as well as in the field, elevated pH groundwater is quickly neutralized when it comes in contact with seawater.

Elevated pH values occurred in about 20% of the sediment porewater and seep samples. However, the benthic biota are not exposed to the sediment porewater represented by these samples, since these samples were generally collected a foot or more below the biologically active sediment layer (i.e., top 10 cm). Benthic organisms are potentially exposed to seeps, but the seep samples are representative of very small areas and potentially only low tide (i.e., not chronic) exposures. The potential ecological effects of elevated pH in seeps are further limited because fish and mobile benthos will likely just avoid the limited areas where elevated pH is present (Peterson et al., 1989, Serafy and Harrell, 1993).

In summary, the potential ecological effects of elevated pH water are likely limited because complete exposure pathways between elevated pH water and ecological receptors are very limited in area and, thus, in the total number of benthic organisms exposed. Moreover, the significance of any potential ecological effects are further limited since the organisms exposed are not of high societal concern. Effects of elevated pH water on the finfish and mobile benthos (e.g., crabs), the societally-important resource of the Hylebos Waterway, are likely limited to very small-scale indirect effects on their food supply.

4.4 Step 3: Streamlined Risk Problem Formulation

Extensive sampling of several different media has been performed at this Site. The current dataset includes COC concentrations in surface sediments, groundwater, sediment porewater, seeps, and seepage meter water. As illustrated in the summary figures (Figures 4.1 to 4.13) and summary tables, screening of this large dataset produced exceedances of ESVs in at least a few samples for most all media for most of the COCs. Using the very conservative assumptions of a SLERA, ecological risks from most all of the COCs in most of these areas could not be dismissed.

However, Step 3 of the ERA process allows less conservative, more refined analyses. These less conservative, more refined analyses are intended to differentiate COCs and exposure pathways that pose a realistic potential for ecological impacts from those COCs and those pathways that were retained largely due to conservative methods. Notably, while previous analyses have, by default, focused on the highest concentrations, more realistic estimates of potential ecological risk should consider both the magnitude and frequency of exceedances. Slightly elevated SQ values, for example, actually predict little or no impact on biological populations since ESVs are typically quite conservative. Similarly, given the large number of samples, infrequent exceedances also predict little or no ecological impact since many more samples suggest that risks are low.

The previous analyses also conservatively screened data from all media, irrespective of a medium's potential validity in estimating exposure concentrations. In fact, the different media vary considerably in their ability to estimate exposure concentrations that Hylebos Waterway biota face. As described previously in the CSM, this EHEPA effectively deals with only one type of receptor – benthos – and one exposure medium – sediment porewater/upwelling groundwater in the surface sediments to which benthos are exposed (i.e., top 10 cm). Hence, all of the screened media – bulk sediment concentrations, groundwater, seeps, seepage meters samples, and even the "sediment porewater" – are surrogate measurements for sediment porewater to which biota are exposed. As discussed previously, many of the samples of "sediment porewater" are from groundwater taken well below the surface sediments in which biota actually live.

Of the sampled media, surficial sediments, sediment porewater, and seepage meter samples potentially offer the most accurate estimates of exposure concentrations actually faced by benthos, with the following caveats. Samples of both sediments and sediment porewater were often collected well below the surface sediments (i.e., top 10 cm) in which benthos actually live. Given ongoing fate processes, surface sediments and associated porewaters tend to be less contaminated than those found deep below the surface. In addition, bulk sediment chemistry is a problematic estimator for exposure to metals since it cannot distinguish between bioavailable and non-bioavailable metals. The metals ESVs for bulk sediment chemistry are also co-occurrence sediment quality guidelines. These guidelines have, at best, a weak scientific basis (Smith and Jones, 2006; Smith, 2007, 2008) and are inaccurate predictors of toxicity (USEPA, 2005a).

Analytical results from seepage meters should provide the most accurate estimates of exposure faced by benthic organisms. The seepage meter samples are reflective of the porewater in the surface sediments in which benthos actually live. However, seepage meter samples may exaggerate exposure concentrations faced by benthic biota. In terms of exaggeration, benthos are generally exposed to a combination of porewater and overlying surface water. Since the inflowing groundwater at this location is likely anoxic, this general rule likely applies at this location. In addition, the seepage meters were sampled only during periods of groundwater discharge, when porewater concentrations should be at their highest.

In contrast, the seep data and especially the groundwater data represent less accurate measures of real exposure concentrations faced by benthos. Seep samples are biased to areas of likely high concentrations and, once measured, pertain to a very small area (i.e., essentially the area of the seep itself). Seep samples were also not filtered, so the results are biased high for concentrations of all of the COCs except the VOCs and pH. The resulting samples are also, potentially, only applicable to low tides. A majority of the groundwater data represents groundwater that may or may not eventually discharge to the Hylebos Waterway. The actual concentration of groundwater that does discharge to upper sediment layers will be significantly reduced as a result of attenuation that will occur as it migrates. This effect is well illustrated by comparison of Figure 4.6 and 4.10. Figure 4.6 illustrates that total organic concentrations in the water actually reaching surficial sediments are generally always below problematic levels. In contrast, Figure 4.10 shows that groundwater under the surface sediments could be problematic if it ever discharged, without attenuation, to the surface.

Given this background, one can qualitatively assess the risks by considering the weight of evidence from all samples, giving more emphasis to more reliable samples of surface sediments, seepage meters, and sediment porewater. Less emphasis should be given to screening of chemicals in seeps and especially groundwater.

This more refined analysis would suggest that current ecological risks to the Hylebos from total organics can be dismissed with available data. While a few SQ values for total organics in surface sediments were greater than 1.0, these exceedances were infrequent and generally small (Figure 4.1). In addition, VOCs from past releases, such as in Area 5106, are unlikely to persist in surface sediments given their solubility. Moreover, current sources of VOCs to surface sediments and sediment porewater are likely low. Levels of total organics are almost always below ecologically problematic levels in more reliable sample media: seepage meters samples (Figure 4.4), sediment porewaters (Figure 4.6), and surface sediment (Figure 4.1). Levels were also below problematic levels in the seeps (Figure 4.8). In contrast, the least reliable predictor of exposure, groundwater, is the only medium in which organics frequently exceed ESVs (Figure 4.10). However, the bulk of these high VOC concentrations occur in deep groundwater strata well underneath the Hylebos and/or in the middle of the peninsula, well away from discharge to the Hylebos. The lack of significant discharge to the Hylebos is demonstrated by the generally low concentrations in media from the Hylebos. In total, then, these data suggest that ecological risks from total organics to the Hylebos are currently not likely.

There is, however, also a plume of concentrated VOCs in the very middle of the peninsula near its northern end (Figure 4.10). Given its proximity, this plume would appear to be discharging, or potentially discharging in the future, to Commencement Bay. Potential risks from this northern plume cannot be so easily discounted because the more reliable sampling data (e.g., surface sediments, water column, sediment porewater) do not exist for Commencement Bay. However, all sampling data from these wells at the northern edge of the peninsula were gathered in Table 4.20. As shown in that table, problematic concentrations of VOCs in these northern perimeter wells occur only in a small number of wells in the middle of the peninsula and only in very deep strata: 100 to 160 feet bgs which are equal to about -88 to -148 NGVD. The groundwater at these deeper strata is saline and dense and, thus, not likely to discharge to nearshore Commencement Bay. In contrast, the shallow groundwater in these more northerly wells may discharge to nearshore Commencement Bay sediments, but the VOCs concentrations in this shallow groundwater, even undiluted, would not be toxic to aquatic life (Table 4.20). Thus, current and near future risks from groundwater to Commencement Bay can probably also be dismissed with available information.

Similarly, ecological risks from metals can be dismissed as unlikely in sediments at the bottom of the channel and the eastern embankment. For samples collected below the intertidal and upper subtidal zones, metals concentrations in surface sediments, seepage meter water, and sediment porewater were generally below ESVs, suggesting little potential for ecological risks at the bottom of the Hylebos Waterway. These same conclusions apply to pH, PCBs, and DDT and its metabolites. Sampling data for pH demonstrates that it is always below problematic levels except along the western embankment of the Hylebos Waterway. Similarly, potentially problematic concentrations of PCBs and DDT and its metabolites are limited to the western embankment areas.

It should be noted that the conclusions above are relatively certain. Notably, the bottom of the channel has already been dredged to remove contaminants, and the efficacy of dredging was confirmed with confirmatory sampling and follow up bioassays. Moreover, the primary COCs at the Site are VOCs, and VOCs typically do not pose risks to aquatic biota. Further supporting this conclusion, the benthic macro-invertebrate community of the mid-channel sediments has recently been sampled. These samples show reasonably diverse healthy macroinvertebrate communities[8] (Partridge et al., 2010). Recent bioassays from these same mid-channel sediments also indicate a lack of toxicity.

These conclusions of no ecological risk are, however, limited by the following three caveats. First, while total organics currently pose no ecological risk, concentrations of total organics in groundwater under the middle of the Site are 10 to 100 times (or more) than the levels that could impact aquatic life. Consequently, the screening analyses suggest that continued, or improved, hydraulic containment of the VOC plume will likely be necessary to prevent ecological impacts in the future. Secondly, the conclusion that metals, pH, PCBs, and DDT and metabolites do not pose risks to aquatic life is limited to the bottom and eastern shore of the Hylebos Waterway. High, potentially problematic metals concentrations exist in various media along the western embankment within some intertidal and subtidal sediments to the bottom of the channel. High concentrations of metals, especially lead, are also found in seeps, intertidal and subtidal sediments, and to lesser extent, groundwater. Thus, risks from metals along the embankment intertidal and subtidal sediment area cannot be dismissed with the available information. Similarly, high DDT and PCB concentrations are present in a small number of sediment samples collected along the western embankment area.

Third, the conclusions depend on the correction factors applied to the metals concentrations in the different water media. Without these correction factors, water concentrations in all media, including seepage meter samples, would exceed water quality criteria for protection of aquatic life.

The western embankment area also contains debris, sludge, and sediments that contain levels of PCBs and DDT that are above ESVs. Whether these exceedances represent a likelihood of ecological risks cannot be determined with available information. Notably, the depth distribution and bioavailability of these chemicals is not currently known. As with the high metals concentrations, the exceedances of the bioaccumulative compounds should spur either more refined ecological risk assessment activities or remedial action.

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[8] Note that the Washington State analyses state that the macroinvertebrate communities in the Hylebos Waterway are "adversely affected" by "natural and/or anthropogenic stressors". However, chemical toxicity is not a likely cause of these adverse effects because i) chemicals are not at problematic concentrations; ii) bioassays show no toxic effects; and iii) across "affected" and "not affected" stations, there are no differences in levels of contamination.

In contrast, risks from dioxin/furans in these media can probably be dismissed with available information. Dioxin/furan concentrations were above ESVs in only few sediment samples. However, the average concentrations were below ESVs, suggesting little potential for risk to the population especially given the high level of conservatism in media screened and ESV.

With respect to the PCBs and DDT and metabolites, two factors should be considered. First, some of these samples are well above ESVs and preliminary clean-up levels. Notably, bulk sediment concentrations of lead in three locations were higher than 150 times the lead ESV, and six other samples had lead concentrations that were ten or more times greater than the lead ESV. Second, the high concentrations of the bioaccumulative organics sometimes coincide with each other and/or the high concentrations of heavy metals. Notably, for example, the most problematic location for dioxin/furans, PT-7, is also one of the most problematic locations for PCBs and total organics.

Section 5.0 Development of Site-Specific Risk-Based Standards and Assessment of Potential Needs for Further Action

This section is structured as follows:

Section 5.1	Development of Site-Specific Risk-Based Standards
Section 5.2	Assessment of Potential Needs for Further Action

5.1 Development of Site-Specific Risk-Based Standards

The HHEPA developed Site-specific RBCs for human receptors based on potential exposure to COCs identified in on-OCC Property and off-OCC Property soil, groundwater, and sediment. The EHEPA did not develop Site-specific RBCs. Therefore, the final Site-specific Risk-Based Standards (RBSs) for the various media will be the lowest calculated human health RBCs.

This section is structured as follows:

Section 5.1.1	Soil
Section 5.1.2	Sediment
Section 5.1.3	Groundwater

5.1.1 Soil

The selection of the RBSs for COCs in on-OCC Property and off-OCC Property shallow soil is presented in Tables 5.1 and 5.2, respectively. The selected RBS for each COC is the lowest of all human receptor RBCs, and these RBSs are summarized in the tables below.

As shown in Table 5.1, the RBSs for on-OCC Property shallow soils are based on RBCs for the trespasser and the indoor and outdoor industrial/commercial worker receptors. The final RBSs for on-OCC Property shallow soils are summarized in the following table along with a comparison to the maximum on-OCC Property shallow soil concentrations.

Final RBSs for on-OCC Property Shallow Soil

Constituent of Concern	***Final RBS [(1)] (mg/kg)***	***Maximum On-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	0.011	**0.29**
1,1-Dichloroethene	0.301	0.008
Benzene	0.0029	**5.3**
Carbon Tetrachloride	0.0021	**0.99**
Chloroform	0.001	**11**
cis-1,2-Dichloroethene	3,975	0.045
Ethylbenzene	27	**36**
Methylene Chloride	1.48	**5**
Tetrachloroethene	0.075	**62**
trans-1,2-Dichloroethene	0.198	0.003
Trichloroethene	0.008	**21**
Vinyl Chloride	0.0007	**0.0075**
1,2,4-Trichlorobenzene	0.29	**2.3**
bis(2-Ethylhexyl)phthalate	179	0.62
Hexachlorobenzene	0.40	**1.4**
Hexachlorobutadiene	0.79	**28**
Pentachlorophenol	6.1	2.5
Total PCBs	1.25	**15.6**
4,4'-DDE	7.16	0.0073
4,4'-DDT	7.35	0.0059
2,3,7,8-TCDD (TEQ)	0.0000192	**0.000846**
Antimony	533	22
Arsenic	3.33	**228**
Cadmium	658	39.1
Chromium	2,000,000	1,200
Copper	53,333	7,070
Lead	1886	**28,000**
Mercury	0.0016	1.2
Nickel	23,911	962
Silver	6,667	19.5
Thallium	NV	0.21
Zinc	400,000	10,200

Notes:
NV, No Value as there is no toxicity value
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.
(1) The final RBS is the lowest calculated human health based RBCs.

As indicated in the above table and Table 5.1, the maximum on-OCC Property shallow soil concentration of 1,1,2,2-tetrachloroethane, benzene, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, 1,2,4-trichlorobenzene, hexachlorobenzene, hexachlorobutadiene, total PCBs, 2,3,7,8-TCDD (TEQ), arsenic, and lead exceed their respective final RBSs. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for these COCs in shallow soil located on the OCC property.

As shown in Table 5.2, the RBSs for off-OCC Property shallow soils are based on the trespasser, the indoor and the outdoor) industrial/commercial workers, and construction/utility worker. The final RBSs for off-OCC Property shallow soils are summarized in the following table along with a comparison to the maximum off-OCC Property shallow soil concentrations for detected COCs.

Final RBSs for off-OCC Property Shallow Soil

Constituent of Concern	***Final RBS (Z) (mg/kg)***	***Maximum off-OCC Property Shallow Soil Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	0.011	**3.1**
Benzene	0.003	**30**
Ethylbenzene	27	**72**
Methylene Chloride	771	1.3
Tetrachloroethene	56.9	0.17
Trichloroethene	0.075	0.0027
Total PCBs	1.25	0.0054
Antimony	295	2.51
Arsenic	3.33	**6.38**
Cadmium	275	0.706
Chromium	1,106,719	16.4
Copper	29,513	283
Lead	285	**899**
Mercury	0.002	**0.109**
Nickel	3,669	25.3
Silver	3,689	0.257
Thallium	NV	0.059
Zinc	221,344	438

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) The final RBS is the lowest calculated human health based RBCs.

As indicated in the above table and Table 5.2, the maximum off-OCC Property shallow soil concentration for 1,1,2,2-tetrachloroethane, benzene, ethylbenzene, arsenic, lead, and mercury exceeds their respective final RBSs. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for shallow soil located off the OCC property.

5.1.2 Sediment

The selection of the RBSs for COCs in on-OCC Property and off-OCC Property intertidal sediment is presented in Tables 5.3 and 5.4, respectively. The selected RBS for each COC is the lowest of all human receptor RBCs, and these RBSs are summarized in the tables below.

As shown in Table 5.3, the RBSs for on-OCC Property intertidal sediments are based on the trespasser and industrial/commercial worker RBCs for sediment. The final RBSs for on-OCC Property intertidal sediments are summarized in the following table along with a comparison to the maximum on-OCC Property intertidal sediment concentration.

Final RBSs for on-OCC Property Intertidal Sediment

Constituent of Concern	***Final RBS [(1)] (mg/kg)***	***Maximum On-OCC Property Intertidal Sediment Concentration (mg/kg)***
1,1,2,2-Tetrachloroethane	27.3	0.0639
1,1-Dichloroethene	99,379	0.00932
Carbon Tetrachloride	106	0.211
Chloroform	240	4.82
cis-1,2-Dichloroethene	3,975	0.217
Tetrachloroethene	2,597	8.11
trans-1,2-Dichloroethene	39,752	0.0112
Trichloroethene	119	0.494
Vinyl Chloride	10.4	0.0145
1,2,4-Trichlorobenzene	6,667	0.086
bis(2-Ethylhexyl)phthalate	179	1.8
Hexachlorobenzene	1.56	0.77
Hexachlorobutadiene	32.1	2.3
Pentachlorophenol	6.1	0.29
Total PCBs	1.25	**6.25**
4,4'-DDD	10.4	2.2
4,4'-DDE	7.35	0.74
4,4'-DDT	7.35	0.0034
Antimony	533	50
Arsenic	3.33	**140**
Cadmium	667	3.6
Chromium	2,000,000	160
Copper	53,333	2,500
Lead	1886	**150,000**
Mercury	400	1.4
Nickel	26,667	450

Constituent of Concern	***Final RBS (1) (mg/kg)***	***Maximum On-OCC Property Intertidal Sediment Concentration (mg/kg)***
Silver	6,667	2
Thallium	NV	0.0415
Zinc	400,000	1,500

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) The final RBS is the lowest calculated human health based RBC.

As indicated in the above table and Table 5.3, the maximum on-OCC Property intertidal sediment concentrations for total PCBs, arsenic, and lead exceed their respective final RBS. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for these COCs in intertidal sediments located on the OCC property.

As shown in Table 5.4, the RBSs for off-OCC Property intertidal sediments are based on the trespasser and industrial/commercial worker RBCs. The final RBSs for off-OCC Property intertidal sediments are summarized in the following table along with a comparison to the maximum off-OCC Property intertidal sediment concentrations.

Final RBSs for off-OCC Property Intertidal Sediment

Constituent of Concern	***Final RBS (1) (mg/kg)***	***Maximum off-OCC Property Intertidal Sediment Concentration (mg/kg)***
Tetrachloroethene	2,597	0.00212
Trichloroethene	119	0.013
Total PCBs	1.25	**26.0**
2,3,7,8-TCDD (TEQ)	0.0000192	**0.000057**

Notes:
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.
(1) The final RBS is the lowest calculated human health based RBC.

As indicated in the above table and Table 5.4, the maximum off-OCC Property intertidal sediment concentrations for total PCBs and 2,3,7,8-TCDD (TEQ) exceed their respective final RBS. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for these COCs in intertidal sediment located off the OCC property.

5.1.3 Groundwater

The selection of the RBSs for COCs in on-OCC Property, off-OCC Property, and on/off-OCC Property groundwater is presented in Tables 5.5, 5.6, and 5.7, respectively. The selected RBS for each COC is the lowest of all human receptor RBCs, and these RBSs are summarized in the tables below.

As shown in Table 5.5, the RBSs for on-OCC Property shallow groundwater are based on the indoor and outdoor industrial/commercial workers, and the trespasser RBCs. The final RBSs for on-OCC Property shallow groundwater are summarized in the following table along with a comparison to the maximum on-OCC Property shallow groundwater concentration.

Final RBSs for on-OCC Property Shallow Groundwater

Constituent of Concern	***Final RBS [(1)] (μg/L)***	***Maximum On-OCC Property Shallow Groundwater Concentration (μg/L)***
1,1,2,2-Tetrachloroethane	71	**5,480**
1,1,2-Trichloroethane	60	**166**
1,1-Dichloroethene	1,834	1,000
Benzene	24	**2,300**
Carbon Tetrachloride	6	**200**
Chloroform	10	**79,800**
cis-1,2-Dichloroethene	NV	320,000
Ethylbenzene	45,401	440
Methylene Chloride	39,330	846
Tetrachloroethene	278	**170,000**
trans-1,2-Dichloroethene	1,931	**3,100**
Trichloroethene	27	**190,000**
Vinyl Chloride	6	**490,000**
Hexachlorobutadiene	11	10.8
Mercury	30	0.54

Notes:
NV, No Value as there is no inhalation toxicity value
BOLD, Maximum Concentration exceeds RBC.
[(1)] The final RBS is the lowest calculated human health based RBCs.

As indicated in the above table and Table 5.5, the maximum on OCC Property shallow groundwater concentrations of 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride exceed their respective final RBS. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for these COCs in shallow groundwater located beneath the OCC property.

As shown in Table 5.6, the RBSs for off-OCC Property shallow groundwater are based on the trespasser and the indoor and outdoor industrial/commercial workers, and the construction/utility worker RBCs. The final RBSs for off-OCC Property shallow groundwater are summarized in the following table along with a comparison to the maximum off-OCC Property shallow groundwater concentration.

Final RBSs for off-OCC Property Shallow Groundwater

Constituent of Concern	***Final RBS [(1)] (µg/L)***	***Maximum off-OCC Property Shallow Groundwater Concentration (µg/L)***
1,1-Dichloroethene	1,834	590
Benzene	23.8	**2,400**
Chloroform	10.4	**4,400**
cis-1,2-Dichloroethene	3,356	**140,000**
Ethylbenzene	20,534	310
Methylene chloride	12,254	9,500
Tetrachloroethene	277.8	**170,000**
trans-1,2-Dichloroethene	1,931	**7,600**
Trichloroethene	27.3	**13,000**
Vinyl chloride	6.08	**20,000**
Total PCBs	0.26	0.094
2,3,7,8-TCDD TEQs	4.23E-06	6.30E-08
Antimony	1,302	2.33
Arsenic	163	138
Cadmium	1,628	0.65
Chromium	4,883,721	6,350
Copper	130,233	117
Lead	2,822	9.04
Mercury	24.1	0.089
Nickel	168,675	1,160
Thallium	NV	0.77
Zinc	1,409,396	118

Notes:
NV, No Value as there is no toxicity values
BOLD, Maximum Concentration exceeds RBC.
(1) The final RBS is the lowest calculated human health based RBCs.

As indicated in the above table and Table 5.6, the maximum off-OCC Property shallow groundwater concentrations of benzene, chloroform, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride exceed their respective final RBS. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for these COCs in shallow groundwater located beneath the off-OCC property.

As shown in Table 5.7, the RBSs for on/off-OCC Property groundwater are based on the fisher exposure through ingestion of fish from the Hylebos Waterway. The final RBSs for on/off-OCC Property groundwater are summarized in the following table along with a comparison to the maximum groundwater concentration at the Site for detected COCs.

Final RBSs for on-/off-OCC Property Groundwater

Constituent of Concern	***Final RBS [(1)] (µg/L)***	***On/off-OCC Property Shallow Groundwater Concentration (µg/L)***
1,1,2,2-Tetrachloroethane	4	**5480**
1,1,2-Trichloroethane	16	**166**
1,1-Dichloroethene	3.2	**1000**
Benzene	51	**2400**
Carbon Tetrachloride	1.6	**200**
Chloroform	470	**79800**
cis-1,2-Dichloroethene	NV	320000
Ethylbenzene	2,100	440
Methylene Chloride	590	**9500**
Tetrachloroethene	3.3	**170000**
trans-1,2-Dichloroethene	10,000	7600
Trichloroethene	30	**190000**
Vinyl Chloride	2.4	**490000**
Bis(2-Ethylhexyl)phthalate	2.2	ND
Hexachlorobenzene	0.01	ND
Hexachlorobutadiene	18	10.8
Pentachlorophenol	3.0	**3.1**
Total PCBs	0.2	0.094
2,3,7,8-TCDD (TEQ)	0.00001	**0.000015**
Antimony	640	19
Arsenic	1	**208**
Cadmium	8.8	1.6
Chromium	50	**6350**
Copper	2.4	**286**
Lead	8.1	**968**
Mercury	0.2	**0.54**
Nickel	8.2	**1160**
Silver	25,926	0.378
Thallium	1	**12.2**
Zinc	81	**310**

Notes:
NV, No Value
TEQ, Toxic Equivalency
BOLD, Maximum Concentration exceeds RBC.
[(1)] The final RBSs are based on MTCA Method B to be protective of Human Health for consumption of fish.

As indicated in the above table and Table 5.7, the maximum on/off-OCC Property groundwater concentrations of 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene, benzene, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, pentachlorophenol, 2,3,7,8-TCDD (TEQ), arsenic, chromium, copper, lead, mercury, nickel, thallium, and zinc exceed their respective final RBS. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed for these COCs in groundwater. As stated previously, however, this evaluation conservatively assumes that there is no mixing of surface water with shallow groundwater discharging to the Hylebos Waterway via seeps and subtidal discharge along the embankment. The corrective action, risk management measures, or further evaluation during remedy design for the fisher exposure pathway will be addressed during evaluation of remedial alternatives.

5.2 Assessment of Potential Needs for Further Action

This Exposure Pathway Assessment demonstrates that corrective action, risk management measures, or further evaluation during remedy design may be needed to address potential exposure to various media on and off OCC Property. As shown above and in Tables 5.1 to 5.7, there are COCs with maximum concentrations above their respective RBCs and/or RBSs. Therefore, corrective action, risk management measures, or further evaluation during remedy design may be needed to address the following exposure pathways and media:

<u>On-OCC Property</u>

- Industrial/commercial worker exposure to COCs in soil via inhalation of volatiles that can migrate from soil to indoor air
- Trespasser exposure to COCs in soil via incidental ingestion and dermal contact
- Industrial/commercial worker exposure to COCs in soil via incidental ingestion and dermal contact
- Trespasser exposure to COCs in soil via inhalation of volatiles that can migrate from soil to ambient air
- Industrial/commercial worker exposure to COCs in soil via inhalation of volatiles that can migrate from soil to ambient air
- Trespasser exposure to COCs in sediment via incidental ingestion and dermal contact
- Industrial/commercial worker exposure to COCs in sediment via incidental ingestion and dermal contact
- Industrial/commercial worker exposure to COCs in shallow groundwater via inhalation of volatiles that can migrate from groundwater to indoor air
- Trespasser exposure to COCs in shallow groundwater via inhalation of volatiles that can migrate from groundwater to ambient air
- Industrial/commercial worker exposure to COCs in shallow groundwater via inhalation of volatiles that can migrate from groundwater to ambient air

Off-OCC Property

- Industrial/commercial worker exposure to COCs in soil via inhalation of volatiles that can migrate from soil to indoor air
- Trespasser exposure to COCs in soil via incidental ingestion and dermal contact
- Industrial/commercial worker exposure to COCs in soil via incidental ingestion and dermal contact
- Construction/utility worker exposure to COCs in soil via incidental ingestion and dermal contact
- Industrial/commercial worker exposure to COCs in sediment via incidental ingestion and dermal contact
- Industrial/commercial worker exposure to COCs in shallow groundwater via inhalation of volatiles that can migrate from groundwater to indoor air
- Industrial/commercial worker exposure to shallow groundwater via inhalation of volatiles that can migrate from groundwater to ambient air
- Construction/utility worker exposure to COCs in shallow groundwater via incidental ingestion, dermal contact and inhalation of volatiles that can migrate from groundwater to ambient air during ground intrusive activities

On/off-OCC Property

- Fisher exposure to shallow groundwater via ingestion of fish from the Hylebos Waterway

Section 6.0 Summary/Conclusions

This section is structured as follows:

Section 6.1	Human Health Exposure Pathway Assessment
Section 6.2	Ecological Health Exposure Pathway Assessment
Section 6.3	Potential Needs for Further Action

6.1 Human Health Exposure Pathway Assessment

In consideration of the restrictions on the OCC Property, the following media and potential human exposures were identified for quantitative evaluation for on and off OCC Property:

Media and Potential Human Exposure	***on-OCC Property***	***off-OCC Property***
Industrial/commercial worker inhalation exposure to chemicals in indoor air due to migration of volatile chemicals in soil and groundwater	√	√
Trespasser and industrial/commercial worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface soil	√	√
Trespasser and industrial/commercial worker direct contact (incidental ingestion and dermal contact) exposure to chemicals in sediment	√	√
Trespasser and industrial/commercial worker inhalation exposure to chemicals in ambient air due to migration of volatile chemicals in groundwater	√	√
Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in surface and subsurface soil		√
Construction/utility worker direct contact (incidental ingestion and dermal contact) and ambient air inhalation exposure to chemicals in groundwater		√
Fisher ingestion exposure to chemicals in ingested fish tissue	√	√

RBCs were developed for potential on-OCC Property and off-OCC Property receptors consistent with MTCA and USEPA guidance. These RBCs were then compared to maximum detected concentrations to determine the COCs, areas of the Site, exposure pathways, and media that may need corrective action, risk management measures, or further evaluation during remedy design.

This section is structured as follows:

Section 6.1.1 On-OCC Property
Section 6.1.2 Off-OCC Property
Section 6.1.3 On/Off-OCC Property

6.1.1 On-OCC Property

Based on the RBCs calculated for on-OCC Property receptors and media, the following conclusions can be made:

Soil

- The soil-to-indoor air RBCs developed for the industrial/commercial worker were exceeded by 1,1,2,2-tetrachloroethane, benzene, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, tetrachloroethene, trichloroethylene, vinyl chloride, 1,2,4-trimethylbenzene, hexachlorobenzene, hexachlorobutadiene, and mercury in on-OCC Property shallow soil. Figure 3.1 shows the location of the exceedances of the RBCs in on-OCC Property shallow soil. Based on the Vapor Investigation, the OCC Office Building was found to need mitigation measures as discussed previously.
- The soil direct contact RBCs developed for the trespasser were exceeded by chloroform, total PCBs, 2,3,7,8-TCDD (TEQ), arsenic, and lead in on-OCC Property shallow soil. Figure 3.3 shows the location of the exceedances of the RBCs in on-OCC Property shallow soil.
- The soil direct contact RBCs developed for the industrial/commercial worker were exceeded by benzene, chloroform, tetrachloroethene, trichloroethene, hexachlorobenzene, hexachlorobutadiene, total PCBs, 2,3,7,8-TCDD (TEQ), arsenic, and lead in on-OCC Property shallow soil. Figure 3.5 shows the location of the exceedances of the RBCs in on-OCC Property shallow soil.

Sediment

- The sediment direct contact RBCs developed for the trespasser were exceeded by total PCBs, arsenic, and lead in on-OCC Property intertidal sediment. Figure 3.14 shows the location of the exceedances of the RBCs in on-OCC Property intertidal sediment.
- The sediment direct contact RBCs developed for the industrial/commercial worker were exceeded by total PCBs, arsenic, and lead in on-OCC Property intertidal sediment. Figure 3.16 shows the location of RBC exceedances in on-OCC Property intertidal sediment.

Groundwater

- The groundwater-to-indoor air RBCs developed for the industrial/commercial worker were exceeded by 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride in on-OCC Property shallow groundwater. Figure 3.8 shows the location of exceedances of the RBCs in on-OCC Property shallow groundwater. Based on the Vapor Investigation, the OCC Office Building was found to need mitigation measures as discussed previously.

- The groundwater-to-ambient air RBCs developed for the trespasser were exceeded by vinyl chloride in on-OCC Property shallow groundwater. Figure 3.10 shows the location of exceedances of the RBCs in on-OCC Property shallow groundwater.
- The groundwater-to-ambient air RBCs developed for the industrial/commercial worker were exceeded by chloroform, trichloroethene, and vinyl chloride in on-OCC Property shallow groundwater. Figure 3.11 shows the location of exceedances of the RBCs in on-OCC Property shallow groundwater.

6.1.2 Off-OCC Property

Based on the RBCs calculated for off-OCC Property receptors and media, the following conclusions can be made:

Soil

- The soil-to-indoor RBCs developed for the indoor industrial/commercial worker were exceeded by 1,1,2,2-tetrachloroethane, benzene, ethylbenzene, tetrachloroethene, and mercury in off-OCC Property shallow soil. Figure 3.2 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil. Based on the Vapor Investigation, POT Buildings 326 and 532 were found to need mitigation measures as discussed previously.
- The soil direct contact RBCs developed for the trespasser were exceeded by benzene in off-OCC Property shallow soil. Figure 3.4 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil.
- The soil direct contact RBCs developed for the industrial/commercial worker were exceeded by 1,1,2,2-tetrachloroethane, benzene, and arsenic in off-OCC Property shallow soil. Figure 3.6 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil.
- The soil direct contact RBCs developed for the construction/utility worker were exceeded by lead in off-OCC Property shallow soil. Figure 3.7 shows the location of the exceedances of the RBCs in off-OCC Property shallow soil.

Sediment

- The sediment direct contact RBCs developed for the trespasser were exceeded by total PCBs in off-OCC Property intertidal sediment. Figure 3.15 shows the location of the exceedances of the RBCs in off-OCC Property intertidal sediment.
- The sediment direct contact RBCs developed for the industrial/commercial worker were exceeded by total PCBs and 2,3,7,8 TCDD (TEQ) in off-OCC Property intertidal sediment. Figure 3.17 shows the location of the RBC exceedances in off-OCC Property intertidal sediment.

Groundwater

- The groundwater-to-indoor air RBCs developed for the industrial/commercial worker were exceeded by benzene, chloroform, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride in off-OCC Property shallow groundwater. Figure 3.9 shows the location of exceedances of the RBCs in off-OCC Property groundwater. Based on the Vapor Investigation, POT Buildings 326 and 532 were found to need mitigation measures as discussed previously.
- The groundwater-to-ambient air RBCs developed for the trespasser were not exceeded for any COCs in off-OCC Property shallow groundwater.
- The groundwater-to-ambient air RBCs developed for the industrial/commercial worker were exceeded by vinyl chloride in off-OCC Property shallow groundwater. Figure 3.12 shows the location of exceedances of the RBCs in off-OCC Property shallow groundwater.
- The groundwater direct contact RBCs developed for the construction/utility worker were exceeded by benzene, chloroform, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride in off-OCC Property shallow groundwater. Figure 3.13 shows the location of exceedances of the RBCs in off-OCC Property shallow groundwater.

6.1.3 On/Off-OCC Property

The groundwater RBCs for the fisher based on preliminary surface water cleanup levels were exceeded by 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene, benzene, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, pentachlorophenol, 2,3,7,8-TCDD (TEQ), arsenic, chromium, copper, lead, mercury, nickel, thallium, and zinc conservatively assuming no mixing of shallow Site groundwater with surface waters. Figure 3.18 shows the location of exceedances of the preliminary cleanup levels for groundwater.

6.2 Ecological Health Exposure Pathway Assessment

This section is structured as follows:

Section 6.2.1	Identification of Complete Exposure Pathways and Potentially Affected Ecological Receptors
Section 6.2.2	Media Screened in the EHEPA
Section 6.2.3	Selection of Ecological Screening Values
Section 6.2.4	Summary of Ecological Screening

6.2.1 Identification of Complete Exposure Pathways and Potentially Affected Ecological Receptors

Potential ecological receptors and complete exposure pathways were identified based on consideration of the available habitat, and the distribution, fate and transport characteristics of the Site COCs. Exposure pathways between terrestrial ecological receptors and Site COCs in soil and groundwater were considered incomplete because of the following factors:

1. The upland portion of the Site has no functional terrestrial habitat and is subject to ongoing human activity that discourages habitation by terrestrial wildlife
2. Adjacent properties are similarly devoid of terrestrial habitat and also subject to human disturbance
3. Much of the upland portion of the Site is covered with impermeable covers or buildings that will prevent contact between ecological receptors and Site COCs in soil

Consequently, exposure to Site COCs and attendant risks to terrestrial ecological receptors was assumed to be negligible.

Ecologically significant exposures to biota in nearshore Commencement Bay sediments were also considered to be negligible even though a plume of high CVOC concentrations occurs at the northern end of the peninsula, proximate to Commencement Bay. However, the highest CVOC concentrations occur deep below the surface within the dense salt water zones of the ADP. These CVOCs migrated down into the salt water zones with the ADP. Given the relatively high density of the ADP and the depth below the surface, the high concentrations of CVOCs within the salt water zones will not likely discharge to nearshore Commencement Bay sediments. A much less concentrated CVOC plume exists at shallower depths within freshwater lens atop the ADP. These CVOCs will discharge to nearshore Commencement Bay sediments; however, the concentrations of CVOCs in the shallow fresh groundwater are below problematic levels.

Complete exposure pathways do exist between Site COCs and the biota of the nearby Hylebos Waterway. The EHEPA focused on potential risks to aquatic and semi-aquatic biota of the Hylebos Waterway. The following exposure pathways-receptors were explicitly considered:

1. The primary exposure pathway is from discharge of shallow contaminated groundwater to the Hylebos Waterway via seeps and subtidal discharge along the embankment in the immediate vicinity of the Hylebos Waterway. In turn, the primary ecological risks from shallow groundwater discharge to the Hylebos Waterway pertain to direct toxicity to the benthic macroinvertebrates and sediment-associated fish (e.g., sole and other flatfish) that reside in or on the sediments).

2. A secondary exposure pathway exists between aquatic biota and Site COCs in surface sediments located in the embankment area and Area 5106. Although Area 5106 was dredged, residual chemicals persist in some of the surface sediments. The chemical concentrations in the surface sediments; however, have likely naturally attenuated since the area was dredged. The primary Site COCs present in Area 5106 do not readily bioaccumulate, so this exposure pathway pertains primarily to direct toxicity to aquatic benthos.
3. There are also small areas in which bioaccumulative compounds (PCBs, dioxin/furans, DDT and its metabolites) have been released to embankment materials and intertidal sediments. The primary receptors considered for these chemical were benthic fish, which were assessed to be both most exposed and most sensitive to these chemicals.

Other aquatic and semi-aquatic biota are exposed to Site COCs. However, their exposures to Site COCs are greatly limited by tidal dilution, fate processes, and/or by the small areal extent of contamination. Hence, levels of Site COCs protective of benthic invertebrates and benthic fish were assumed to provide ample protection to the other biological communities of the Hylebos Waterway.

6.2.2 Media Screened in the EHEPA

Based on the complete exposure pathways identified above, the most critical exposures of Site COCs are to benthic macroinvertebrates and benthic fish. In turn, the most critical exposure medium is the sediments and associated porewater in the surface sediments in which benthic organisms actually live (i.e., top 10 cm). Chemical concentrations have been measured in a variety of media that can potentially be used to estimate, with varying degrees of validity, chemical concentrations in those top layers of sediments. These include groundwater, seeps, surficial sediments, seepage meter samples, and groundwater collected in the top 3 feet of sediments. Conservatively, the last is treated as sediment porewater even though most of these samples were collected from sediment strata 1 foot or more below the biological zone.

6.2.3 Selection of Ecological Screening Values

The Site COCs fall into four general groups: high pH, non-polar organics (VOCs and SVOCs), heavy metals, and bioaccumulating substances (PCBs, dioxin/furans, and DDT and metabolites). Potential toxic effects of these four groups were considered separately as follows. Potential toxicity of high pH was assessed with Washington State's water quality criterion (WQC) for protection of aquatic life. Similarly, potential effects of metals in water were assessed with WQC, while those in bulk sediment were assessed with Commencement Bay SQOs.

Potential risks from non-polar organics were screened based on recent USEPA guidance (USEPA, 2008c). This guidance suggests that most all of the SVOCs and VOCs have the same mode of toxicity (narcosis). The potential narcotic toxicity of all of the SVOCs and VOCs was summed to account for the potential additive toxicity of all of the organics. The method produces targets for each organic in the water column, which are applicable to groundwater, seepage, and sediment porewater concentrations. These water column targets were then extrapolated to bulk sediment concentrations using equilibrium partitioning and Site-specific concentrations of organic carbon in surface sediments. In turn, these sediment targets can be used to screen bulk sediment concentrations for toxicity from the organics. The screening levels for non-polar organics described above differ from those previously used at the Site. In general, the previously-used screening levels for sediments and porewater, pertain to human health risks and, thus, are not useful for assessing ecological risk.

Concentrations for bioaccumulative compounds including PCBs, DDT and metabolites, and dioxin/furans, were screened against the preliminary clean-up levels for the Site. In general, these clean-up levels were based on protection of human health rather than criteria protective of ecological receptors. However, these preliminary clean-up levels were found sufficiently protective of ecological receptors and were used for the EHEPA.

6.2.4 Summary of Ecological Screening

To make the screening more informative, chemical concentrations in individual samples of relevant media were screened against ESVs. This method identified the samples, media, areas, and chemicals that are potentially most problematic (i.e., having highest levels of chemicals compared to ESVs). In turn, these would be most warranting of further assessment or risk management or remediation. As noted above, individual samples of the five media were screened for potential risks from elevated pH, non-polar organics, metals, and the bioaccumulating substances.

Screening of pH

While pH was above the WQC in some samples, these exceedances tended to occur most often in undiluted groundwater, the least valid surrogate for surficial sediment porewater. In contrast, pH was never above the WQC in the media most relevant to actual exposure (surficial sediments and seepage meter samples), and only infrequently in sediment porewater and seeps. Consequently, elevated pH is not likely to cause ecologically significant impacts because exceedances were limited to very small areas and media that are less representative of actual exposure. In addition, societally important receptors such as finfish and crabs are not expected to be directly impacted by elevated pH. However, impacts to sedentary benthos caused by elevated pH in limited areas cannot be dismissed, although these small-scale impacts are not likely to pose population level risks even to sedentary benthos. Thus, it is uncertain whether these limited areas should prompt remediation and/or risk management.

Screening of Non-Polar Organics

Chemical concentrations of non-polar organics (SVOCs and VOCs) are almost always below ESVs in surface sediments, sediment porewater, seepage meter samples, and seeps. There are, however, infrequently elevated concentrations in some Area 5106 sediments and embankment intertidal sediments. Again, the areal extents of these exceedances are likely too small to cause population level impacts on benthos, but there might be ecological impacts at these limited locations. The concentrations of organics in groundwater under the Site frequently exceeded ESVs. Shallow impacted groundwater beneath will discharge to the Hylebos Waterway. Thus, there is a potential to exceed ESVs. In summary, non-polar organics likely do not currently pose ecologically significant impacts to aquatic life, although potential impacts in small localized areas are possible. As with pH, these potential localized impacts are not likely to cause population-level effects. Therefore, it is uncertain whether these small, localized areas may need remediation and/or risk management.

Screening of Metals

Based on metals concentrations in bulk sediments, most surface sediments are likely not toxic to benthos. However, a small number of sediment samples collected along the embankment exceeded their respective screening levels.

Concentrations of metals measured in water media (groundwater, sediment porewater, seeps, and seepage meter samples) appear to be biased high due to interferences associated with the Site's groundwater matrix. Therefore for the purposes of the EHEPA, empirically derived correction factors were applied to measured concentrations of arsenic, chromium, copper, nickel, and zinc. The corrected water concentrations were then compared to ESVs protective of aquatic life. The low level of potential risk associated with bulk sediment chemistry was generally corroborated by the corrected metals concentrations measured in seepage meter samples, groundwater, and sediment porewater. However, concentrations of metals in several embankment water samples were above the ESVs. In general, however, the exceedances were due to metals, such as lead and mercury, for which correction factors were not applied. Therefore, it is not known whether these exceedances are real or due to uncorrected matrix interference. Moreover, the levels of exceedances were often nominal - less than 5 times the ESV, suggesting little potential for toxicity. Nonetheless, risks from metals in the embankment sediments and water media could not be dismissed with available information. Therefore, these areas may need remediation and/or risk management.

Screening of Bioaccumulating Substances

Concentrations of PCBs, DDT and its metabolites, and dioxin-furans exceeded their respective ESVs in a small number of the embankment sediment samples. Again, the areal extent and magnitude of these exceedances are potentially too small to cause population level impacts, but ecological risks from these chemicals cannot be dismissed. Therefore, these areas may need some remediation and/or risk management.

6.3 Conclusions

Human and ecological exposures are discussed in Sections 6.3.1 and 6.3.2, respectively. Primary risk drivers are summarized in Section 6.3.3.

6.3.1 Human Exposures

Corrective action, risk management measures, or further evaluation during remedy design may be needed to mitigate potential human exposure to COCs in various media on and off OCC Property. Figures 6.1 through 6.7 present on-OCC and off-OCC Property locations where the concentration of one or more COCs exceeded the RBSs developed for the various Site media.

- Figures 6.1 and 6.6 present areas that may need further action based on indoor air inhalation exposure due to vapor intrusion of: a) COCs in soils (5 areas); or b) COCs in groundwater (5 areas), respectively. Based on the Vapor Investigation, POT Buildings 326 and 532 and the OCC Office Building were found to need mitigation measures as discussed previously.
- Figures 6.2 and 6.3 present areas that may need further action based on direct contact with COCs in: a) soils (5 areas); or b) sediments (2 areas), respectively.
- Figures 6.4 and 6.5 present areas that may need further action based on ambient air inhalation exposure to COCs volatilizing from: a) soil vapor-to-ambient air (4 areas); or b) groundwater-to-ambient air (3 areas), respectively.
- Figure 6.7 presents areas that may need further action based on direct contact with off-OCC Property shallow groundwater (4 areas).

As noted previously, Figure 3.18 presents locations that may need corrective action, risk management measures, or further evaluation during the remedy design to address the groundwater-to-surface water pathway.

6.3.2 Ecological Exposures

In general, the EHEPA did not find evidence of unacceptable ecological risk. Moreover, for the bulk of the Hylebos aquatic ecosystem (e.g., the water column everywhere and sediments of the dredged channel bottom and far shore embankment), ecological risks could be dismissed with certainty. However, ecological risks associated with some receptor/COC combinations in the nearshore embankment could not be dismissed with available data or could potentially pose risk under some future scenarios.

For example, pH exceeds ARARs in some seeps and sediment porewater samples of the embankment. These areas are probably too limited in size compared to the total sediment area and severity of impact to cause unacceptable ecological risk. Additionally, exceedances did not occur in more reliable indicators of actual exposure (e.g., surface sediment samples, seepage meter samples). Similarly, small areas of embankment sediment exceeded ESVs for bioaccumulating organics (e.g., PCBs, DDT, and metabolites). Again; however, these areas and levels of exceedance are probably both too limited to cause ecological impacts. In both cases, then, the receptor/COC combinations may need additional information/input to reduce the uncertainty about the ecological risk. For example, the Site-specific bioavailability of these bioaccumulative chemicals is uncertain and critical to refining estimates of risk. Alternately, these receptor/COC combinations may need risk management, especially in those areas where multiple contaminants are elevated.

Concentrations of metals in sediments, porewater, seeps, and groundwater were above screening levels in some areas of the nearshore embankment area. As with pH and bioaccumulating organics, the spatial extent and level of exceedances for heavy metals are both generally limited, again suggesting limited potential for ecologically significant risks. However, the assessment for metals is limited by uncertainty concerning the quantification of metals, which was apparently significantly impacted by matrix interference. Thus, potential risk to aquatic benthos from metals may need additional analyses to better assess actual metals concentrations and refine the risks from heavy metals.

A last issue pertains to VOCs and SVOCs. These COCs pose additive risk to aquatic life and were treated together in the EHEPA. In general, there were very little, if any, areas where these organics were found to be problematic in more reliable exposure media (e.g., surface sediments, porewater, or seepage meter samples). However, high concentrations of VOCs/SVOCs were found in groundwater under the Site adjacent to the Hylebos. This concentrated VOC/SVOC plume could cause ecologically significant effects if it discharged to the Hylebos, without attenuation.

6.3.3 Primary Risk Drivers

Figure 6.8 presents a schematic CSM of the various exposure pathways for both human and ecological receptors evaluated within the Exposure Pathway Assessment as well as the primary risk drivers in the Site media.

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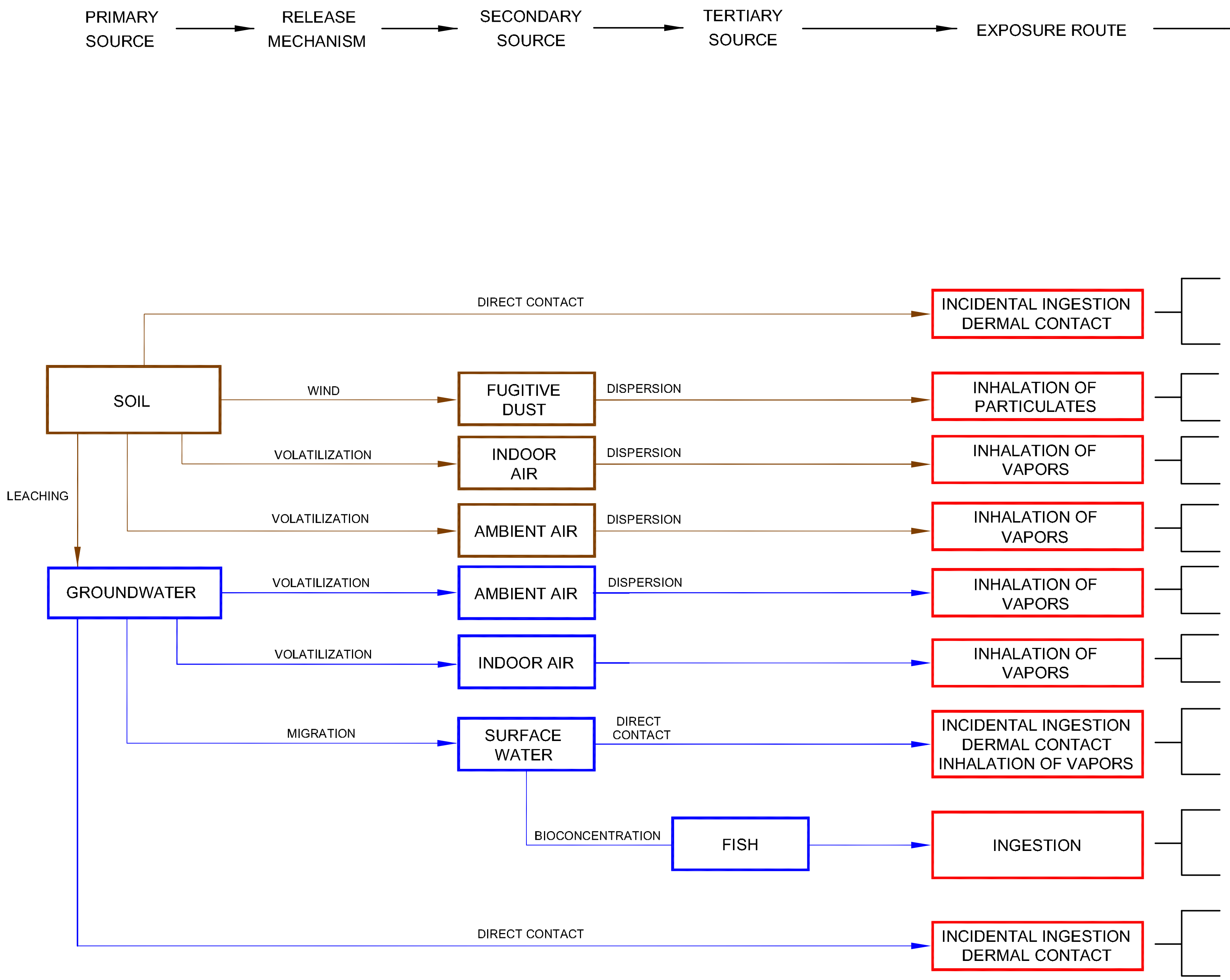


EXPOSURE ROUTE	POTENTIALLY EXPOSED RECEPTORS			
	TRESPASSERS	WORKERS		OFF-SITE RECREATIONAL USER
		INDUSTRIAL / COMMERCIAL	CONSTRUCTION / UTILITY	
INCIDENTAL INGESTION DERMAL CONTACT	●	●	●	–
INHALATION OF PARTICULATES	●	●	●	–
INHALATION OF VAPORS	–	●	–	–
INHALATION OF VAPORS	●	●	●	–
INHALATION OF VAPORS	●	●	●	–
INHALATION OF VAPORS	–	●	–	–
INCIDENTAL INGESTION DERMAL CONTACT INHALATION OF VAPORS	–	–	–	●
INGESTION	–	–	–	●
INCIDENTAL INGESTION DERMAL CONTACT	–	–	●	–

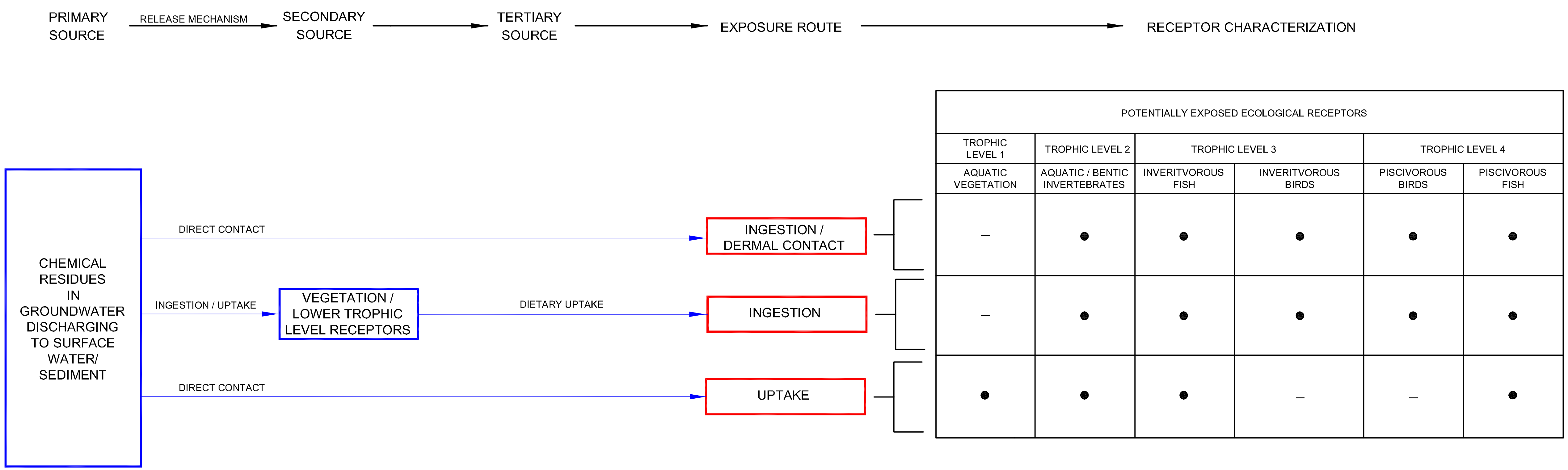
LEGEND

● POTENTIALLY COMPLETE EXPOSURE PATHWAY
– INCOMPLETE EXPOSURE PATHWAY
→ POTENTIAL EXPOSURE PATHWAY

figure 2.1

HUMAN HEALTH CONCEPTUAL SITE MODEL

Occidental Chemical Corporation, Tacoma, Washington



	POTENTIALLY EXPOSED ECOLOGICAL RECEPTORS					
	TROPHIC LEVEL 1	TROPHIC LEVEL 2	TROPHIC LEVEL 3		TROPHIC LEVEL 4	
	AQUATIC VEGETATION	AQUATIC / BENTIC INVERTEBRATES	INVERITVOROUS FISH	INVERITVOROUS BIRDS	PISCIVOROUS BIRDS	PISCIVOROUS FISH
INGESTION / DERMAL CONTACT	–	●	●	●	●	●
INGESTION	–	●	●	●	●	●
UPTAKE	●	●	●	–	–	●

LEGEND

● POTENTIALLY COMPLETE EXPOSURE PATHWAY
– INCOMPLETE EXPOSURE PATHWAY
→ POTENTIAL EXPOSURE PATHWAY

figure 2.2

AQUATIC ECOLOGICAL CONCEPTUAL SITE MODEL

Occidental Chemical Corporation, Tacoma, Washington

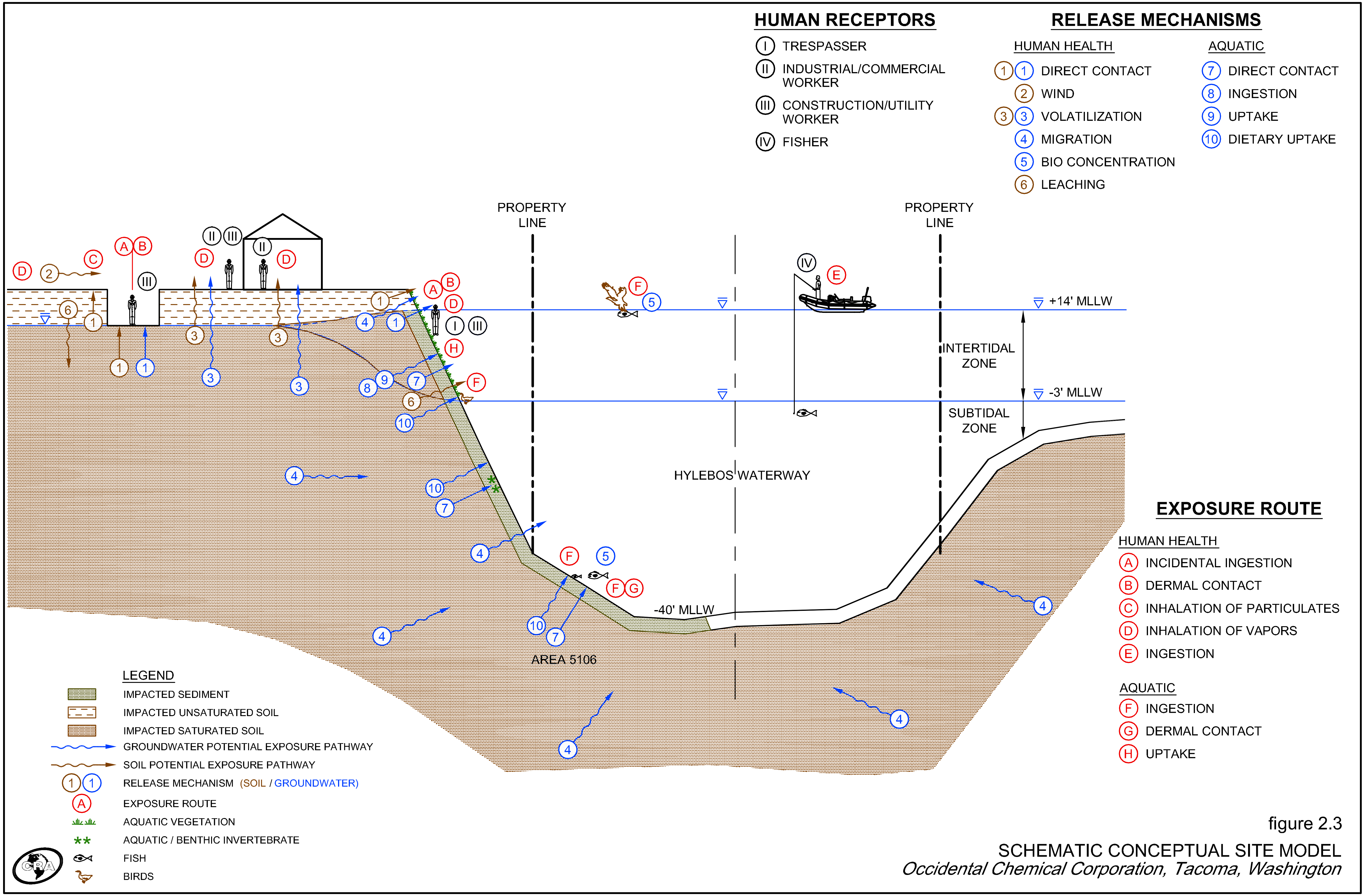


figure 2.3

SCHEMATIC CONCEPTUAL SITE MODEL

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA031 FEB 5/2014

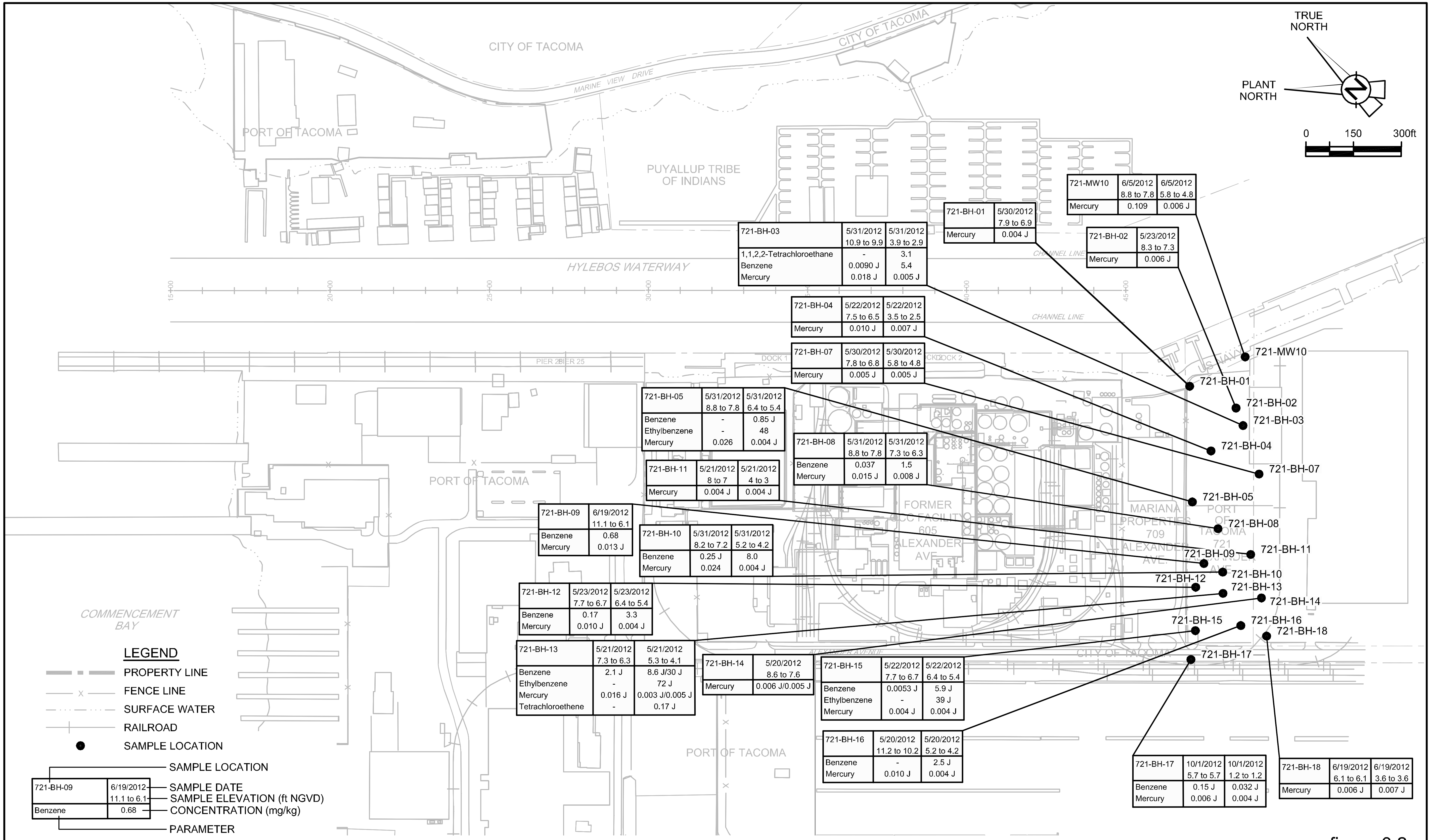
Chemical Name	RBC (mg/kg)
1,1,2,2-Tetrachloroethane	0.0109
1,2,4-Trichlorobenzene	0.286
Benzene	0.0029
Carbon tetrachloride	0.0021
Chloroform (Trichloromethane)	0.001
Ethylbenzene	27.1
Hexachlorobenzene	0.405
Hexachlorobutadiene	0.788
Mercury	0.0016
Methylene chloride	1.48
Tetrachloroethene	0.075
Trichloroethene	0.008
Vinyl chloride	0.0007

figure 3.1

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER SOIL TO INDOOR AIR RISK-BASED CONCENTRATIONS ON-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA013 FEB 6/2014



721-MW10	6/5/2012 8.8 to 7.8	6/5/2012 5.8 to 4.8
Mercury	0.109	0.006 J

721-BH-01	5/30/2012 7.9 to 6.9
Mercury	0.004 J

721-BH-02	5/23/2012 8.3 to 7.3
Mercury	0.006 J

721-BH-03	5/31/2012 10.9 to 9.9	5/31/2012 3.9 to 2.9
1,1,2,2-Tetrachloroethane	-	3.1
Benzene	0.0090 J	5.4
Mercury	0.018 J	0.005 J

721-BH-04	5/22/2012 7.5 to 6.5	5/22/2012 3.5 to 2.5
Mercury	0.010 J	0.007 J

721-BH-07	5/30/2012 7.8 to 6.8	5/30/2012 5.8 to 4.8
Mercury	0.005 J	0.005 J

721-BH-05	5/31/2012 8.8 to 7.8	5/31/2012 6.4 to 5.4
Benzene	-	0.85 J
Ethylbenzene	-	48
Mercury	0.026	0.004 J

721-BH-08	5/31/2012 8.8 to 7.8	5/31/2012 7.3 to 6.3
Benzene	0.037	1.5
Mercury	0.015 J	0.008 J

721-BH-11	5/21/2012 8 to 7	5/21/2012 4 to 3
Mercury	0.004 J	0.004 J

721-BH-09	6/19/2012 11.1 to 6.1
Benzene	0.68
Mercury	0.013 J

721-BH-10	5/31/2012 8.2 to 7.2	5/31/2012 5.2 to 4.2
Benzene	0.25 J	8.0
Mercury	0.024	0.004 J

721-BH-12	5/23/2012 7.7 to 6.7	5/23/2012 6.4 to 5.4
Benzene	0.17	3.3
Mercury	0.010 J	0.004 J

721-BH-13	5/21/2012 7.3 to 6.3	5/21/2012 5.3 to 4.1
Benzene	2.1 J	8.6 J/30 J
Ethylbenzene	-	72 J
Mercury	0.016 J	0.003 J/0.005 J
Tetrachloroethene	-	0.17 J

721-BH-14	5/20/2012 8.6 to 7.6
Mercury	0.006 J/0.005 J

721-BH-15	5/22/2012 7.7 to 6.7	5/22/2012 6.4 to 5.4
Benzene	0.0053 J	5.9 J
Ethylbenzene	-	39 J
Mercury	0.004 J	0.004 J

721-BH-16	5/20/2012 11.2 to 10.2	5/20/2012 5.2 to 4.2
Benzene	-	2.5 J
Mercury	0.010 J	0.004 J

721-BH-17	10/1/2012 5.7 to 5.7	10/1/2012 1.2 to 1.2
Benzene	0.15 J	0.032 J
Mercury	0.006 J	0.004 J

721-BH-18	6/19/2012 6.1 to 6.1	6/19/2012 3.6 to 3.6
Mercury	0.006 J	0.007 J

LEGEND

- PROPERTY LINE
- FENCE LINE
- SURFACE WATER
- RAILROAD
- ● SAMPLE LOCATION

721-BH-09	6/19/2012 11.1 to 6.1
Benzene	0.68

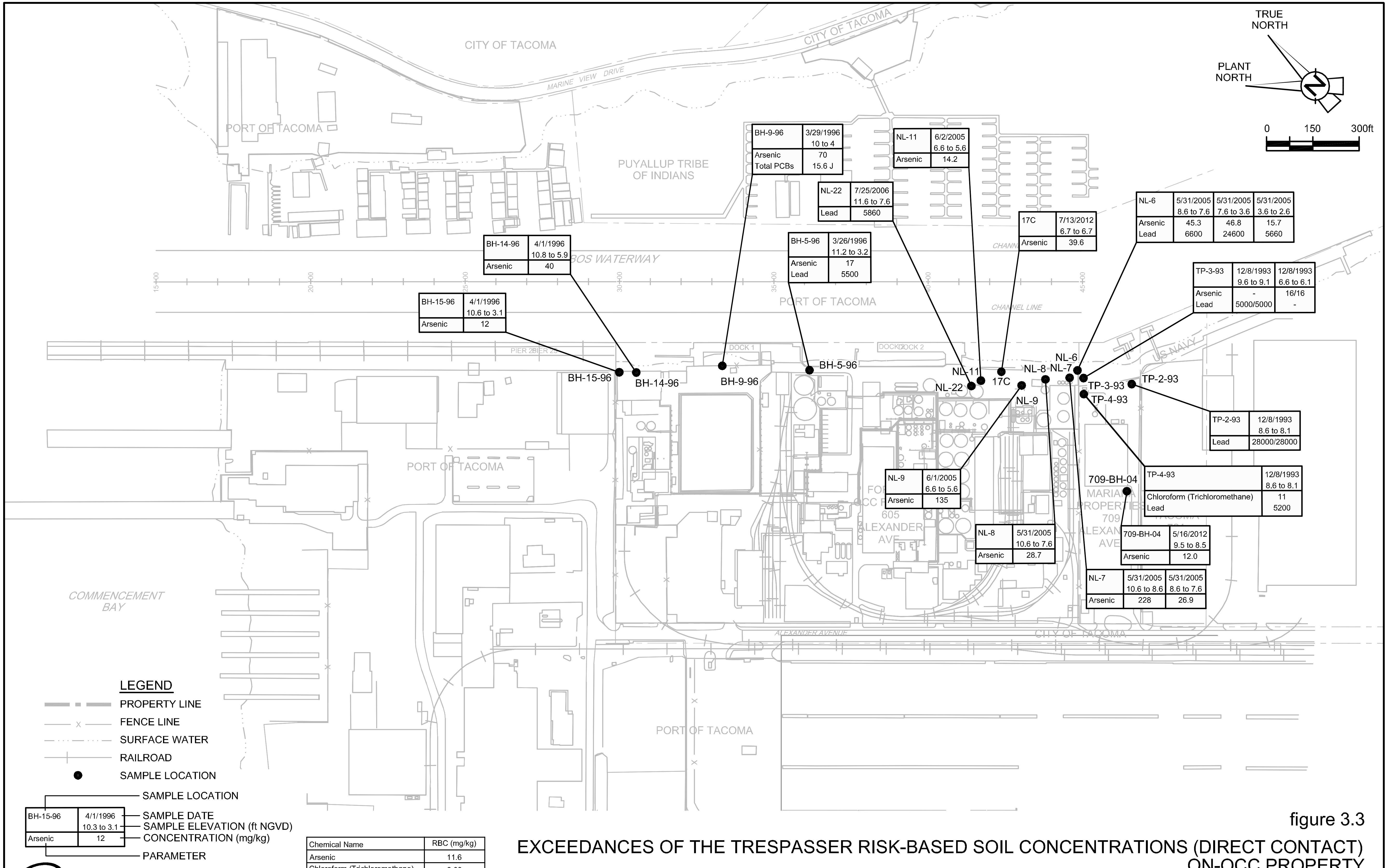
SAMPLE LOCATION
SAMPLE DATE
SAMPLE ELEVATION (ft NGVD)
CONCENTRATION (mg/kg)
PARAMETER

Chemical Name	RBC (mg/kg)
1,1,2,2-Tetrachloroethane	0.0109
Benzene	0.0029
Ethylbenzene	27.1
Mercury	0.0016
Tetrachloroethene	0.075

figure 3.2

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER SOIL TO INDOOR AIR RISK-BASED CONCENTRATIONS OFF-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington



Chemical Name	RBC (mg/kg)
Arsenic	11.6
Chloroform (Trichloromethane)	9.03
Lead	4847
Total PCBs	4.71

figure 3.3

EXCEEDANCES OF THE TRESPASSER RISK-BASED SOIL CONCENTRATIONS (DIRECT CONTACT)
ON-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

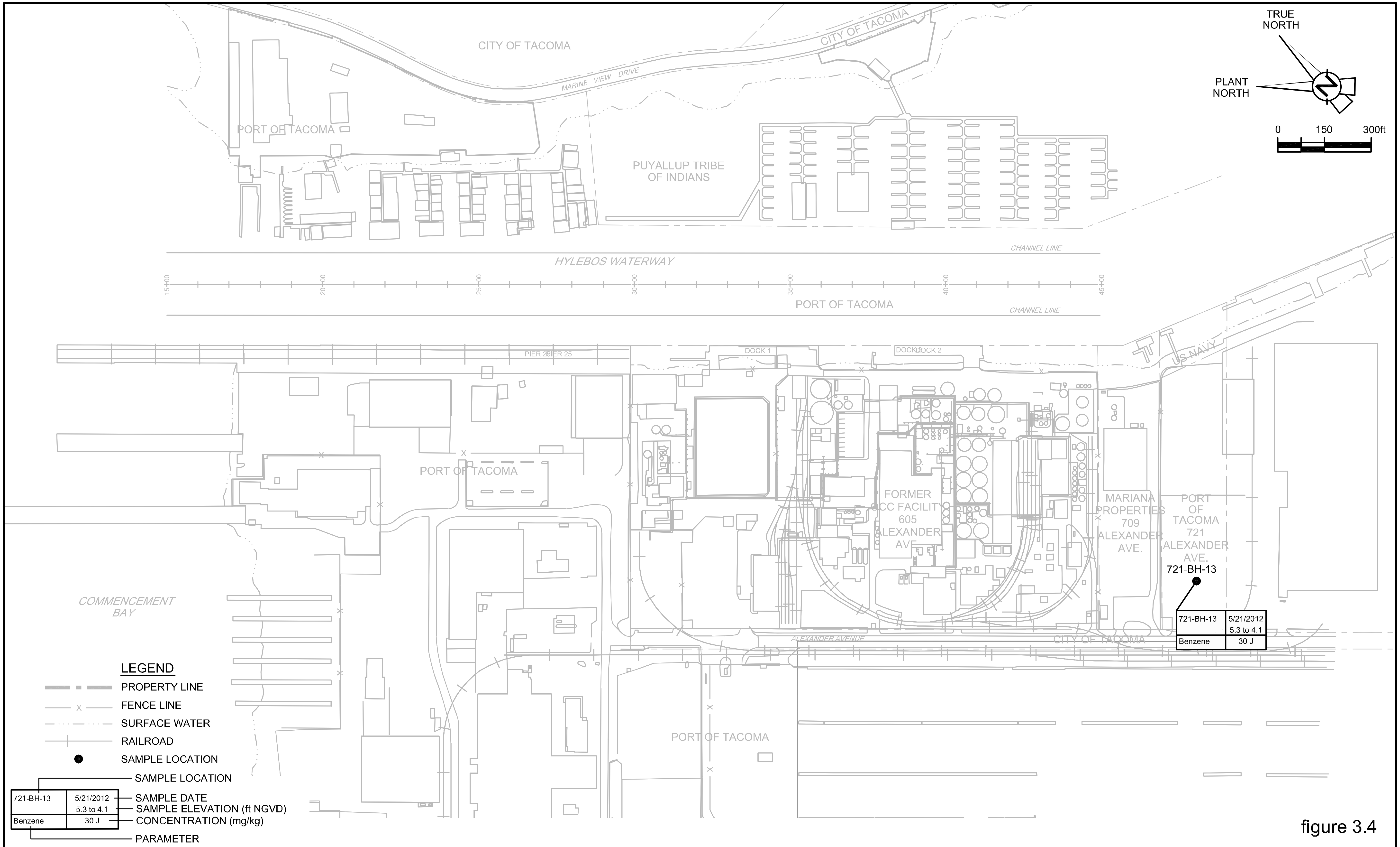


figure 3.4

EXCEEDANCES OF THE TRESPASSER RISK-BASED CONCENTRATIONS (DIRECT CONTACT)
OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

Chemical Name	RBC (mg/kg)
Benzene	24.8

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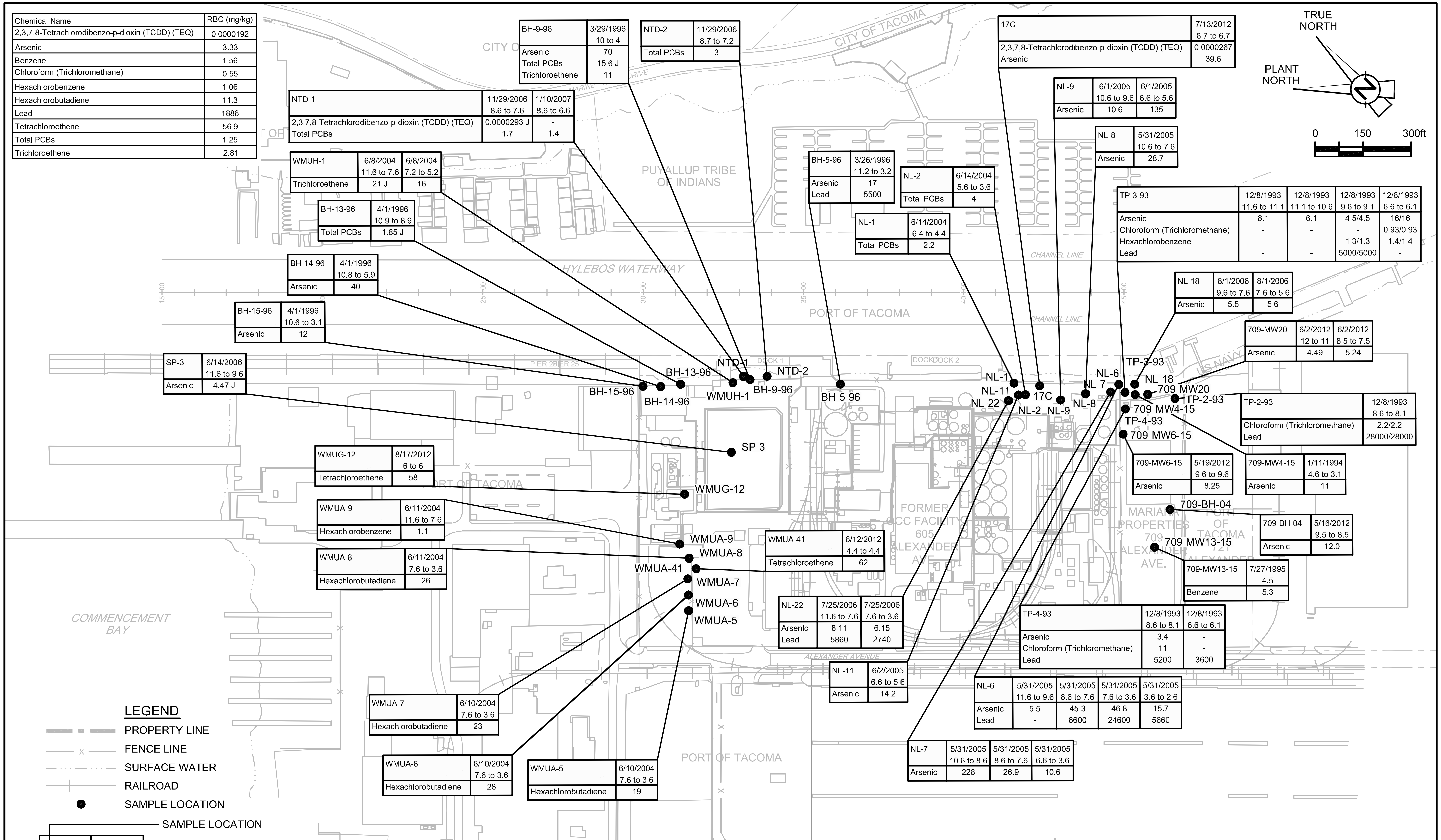
Chemical Name	RBC (mg/kg)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (TEQ)	0.0000192
Arsenic	3.33
Benzene	1.56
Chloroform (Trichloromethane)	0.55
Hexachlorobenzene	1.06
Hexachlorobutadiene	11.3
Lead	1886
Tetrachloroethene	56.9
Total PCBs	1.25
Trichloroethene	2.81



BH-9-96	3/29/1996 10 to 4
Arsenic Total PCBs Trichloroethene	70 15.6 J 11

NTD-2	11/29/2006 8.7 to 7.2
Total PCBs	3

17C	7/13/2012 6.7 to 6.7
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (TEQ) Arsenic	0.0000267 39.6

NTD-1	11/29/2006 8.6 to 7.6	1/10/2007 8.6 to 6.6
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (TEQ) Total PCBs	0.0000293 J 1.7	- 1.4

NL-9	6/1/2005 10.6 to 9.6	6/1/2005 6.6 to 5.6
Arsenic	10.6	135

NL-8	5/31/2005 10.6 to 7.6
Arsenic	28.7

WMUH-1	6/8/2004 11.6 to 7.6	6/8/2004 7.2 to 5.2
Trichloroethene	21 J	16

BH-5-96	3/26/1996 11.2 to 3.2
Arsenic Lead	17 5500

NL-2	6/14/2004 5.6 to 3.6
Total PCBs	4

BH-13-96	4/1/1996 10.9 to 8.9
Total PCBs	1.85 J

NL-1	6/14/2004 6.4 to 4.4
Total PCBs	2.2

TP-3-93	12/8/1993 11.6 to 11.1	12/8/1993 11.1 to 10.6	12/8/1993 9.6 to 9.1	12/8/1993 6.6 to 6.1
Arsenic Chloroform (Trichloromethane) Hexachlorobenzene Lead	6.1 - - -	6.1 - - -	4.5/4.5 - 1.3/1.3 5000/5000	16/16 0.93/0.93 1.4/1.4 -

BH-14-96	4/1/1996 10.8 to 5.9
Arsenic	40

NL-18	8/1/2006 9.6 to 7.6	8/1/2006 7.6 to 5.6
Arsenic	5.5	5.6

BH-15-96	4/1/1996 10.6 to 3.1
Arsenic	12

709-MW20	6/2/2012 12 to 11	6/2/2012 8.5 to 7.5
Arsenic	4.49	5.24

SP-3	6/14/2006 11.6 to 9.6
Arsenic	4.47 J

TP-2-93	12/8/1993 8.6 to 8.1
Chloroform (Trichloromethane) Lead	2.2/2.2 28000/28000

WMUG-12	8/17/2012 6 to 6
Tetrachloroethene	58

709-MW6-15	5/19/2012 9.6 to 9.6
Arsenic	8.25

709-MW4-15	1/11/1994 4.6 to 3.1
Arsenic	11

WMUA-9	6/11/2004 11.6 to 7.6
Hexachlorobenzene	1.1

709-BH-04	5/16/2012 9.5 to 8.5
Arsenic	12.0

WMUA-41	6/12/2012 4.4 to 4.4
Tetrachloroethene	62

WMUA-8	6/11/2004 7.6 to 3.6
Hexachlorobutadiene	26

709-MW13-15	7/27/1995 4.5
Benzene	5.3

NL-22	7/25/2006 11.6 to 7.6	7/25/2006 7.6 to 3.6
Arsenic Lead	8.11 5860	6.15 2740

TP-4-93	12/8/1993 8.6 to 8.1	12/8/1993 6.6 to 6.1
Arsenic Chloroform (Trichloromethane) Lead	3.4 11 5200	- - 3600

NL-11	6/2/2005 6.6 to 5.6
Arsenic	14.2

NL-6	5/31/2005 11.6 to 9.6	5/31/2005 8.6 to 7.6	5/31/2005 7.6 to 3.6	5/31/2005 3.6 to 2.6
Arsenic Lead	5.5 -	45.3 6600	46.8 24600	15.7 5660

WMUA-7	6/10/2004 7.6 to 3.6
Hexachlorobutadiene	23

NL-7	5/31/2005 10.6 to 8.6	5/31/2005 8.6 to 7.6	5/31/2005 6.6 to 3.6
Arsenic	228	26.9	10.6

WMUA-6	6/10/2004 7.6 to 3.6
Hexachlorobutadiene	28

WMUA-5	6/10/2004 7.6 to 3.6
Hexachlorobutadiene	19

LEGEND

▬ ▬	PROPERTY LINE
—x—	FENCE LINE
—··—	SURFACE WATER
—+—	RAILROAD
●	SAMPLE LOCATION

SP-3	6/14/2006 11.3 to 9.6
Arsenic	4.47 J

SAMPLE LOCATION
SAMPLE DATE
SAMPLE ELEVATION (ft NGVD)
CONCENTRATION (mg/kg)
PARAMETER

figure 3.5

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER RISK-BASED SOIL CONCENTRATIONS (DIRECT CONTACT)
ON-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

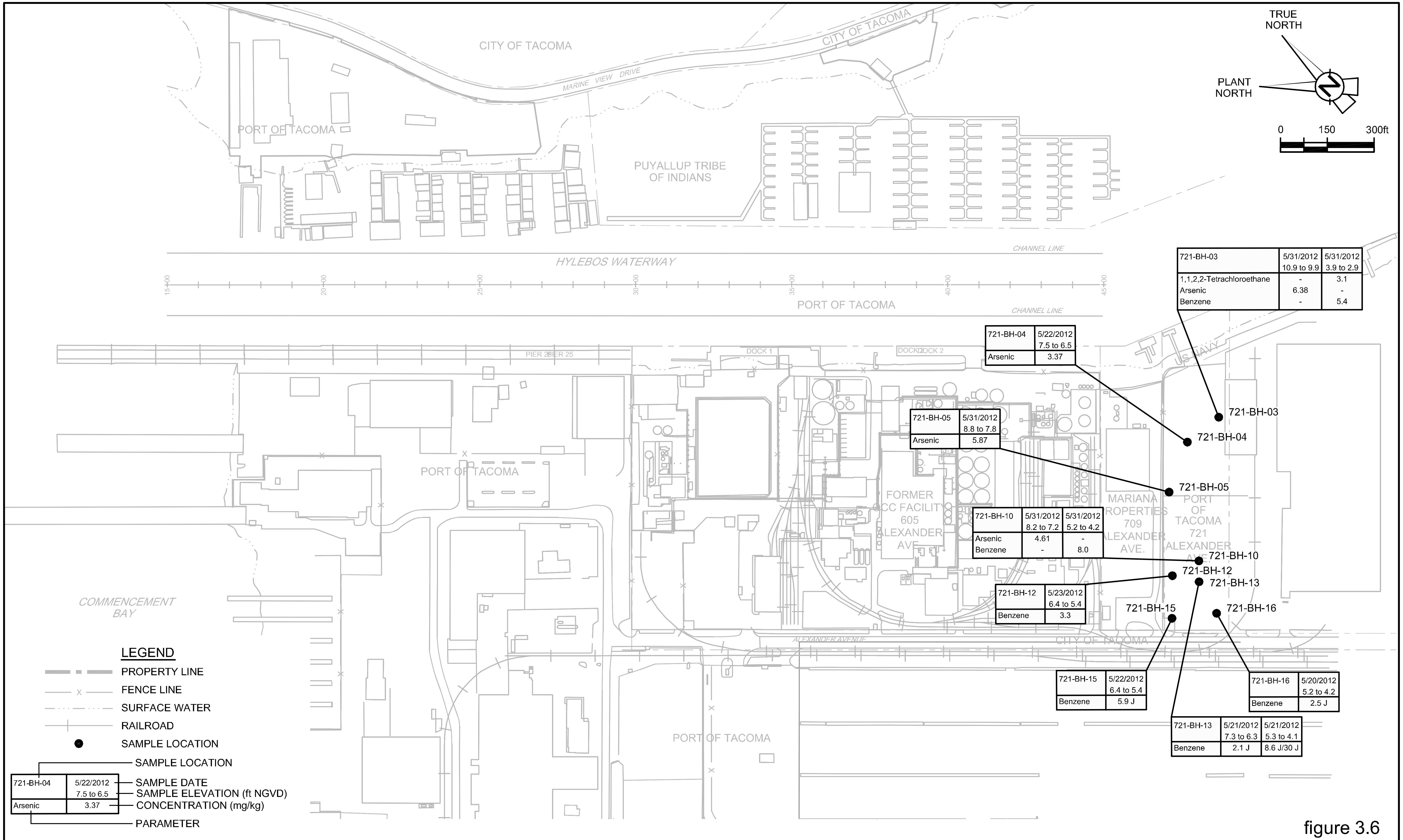
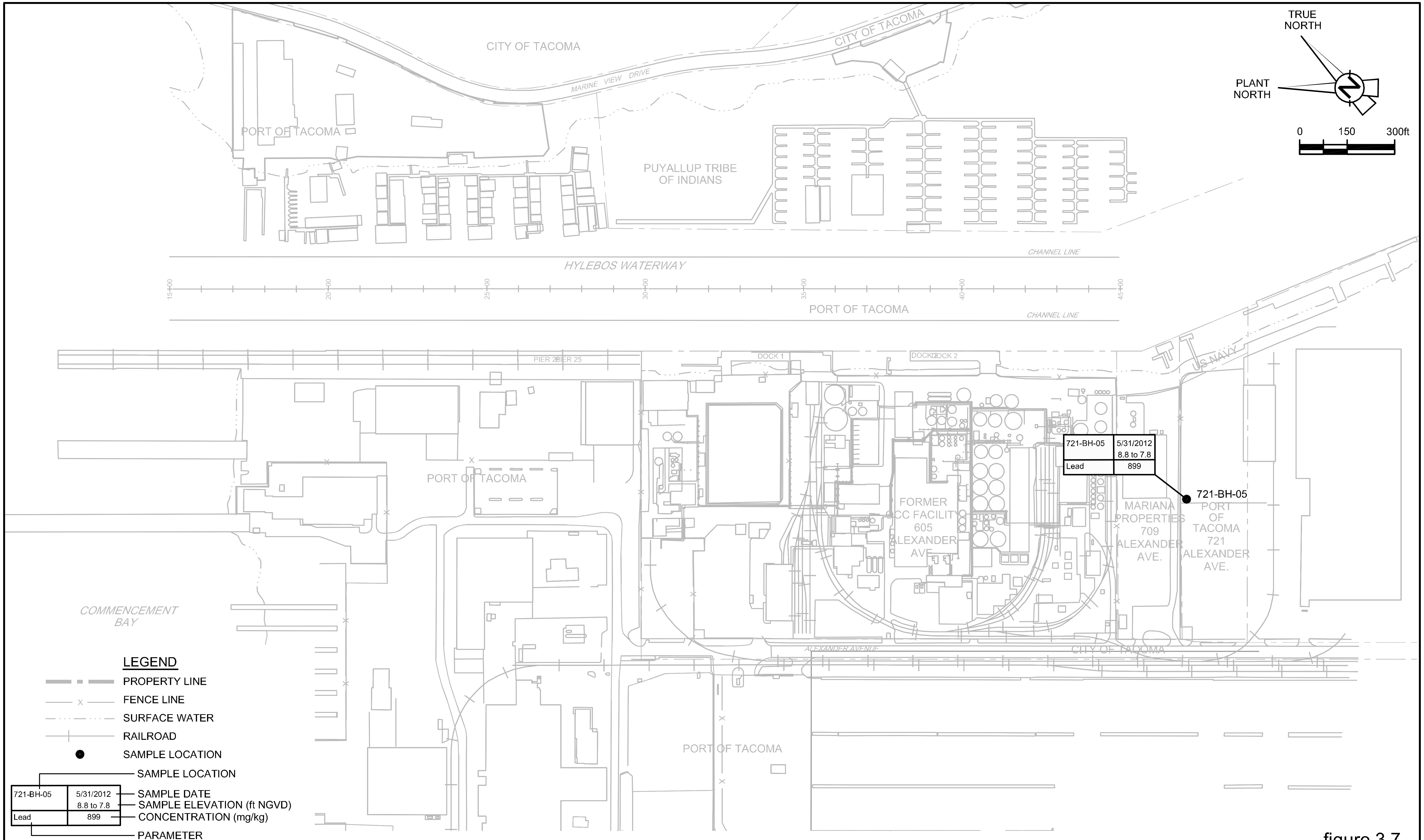


figure 3.6

Chemical Name	RBC (mg/kg)
1,1,2,2-Tetrachloroethane	1.04
Arsenic	3.33
Benzene	1.56

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER RISK-BASED SOIL CONCENTRATIONS (DIRECT CONTACT)
OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

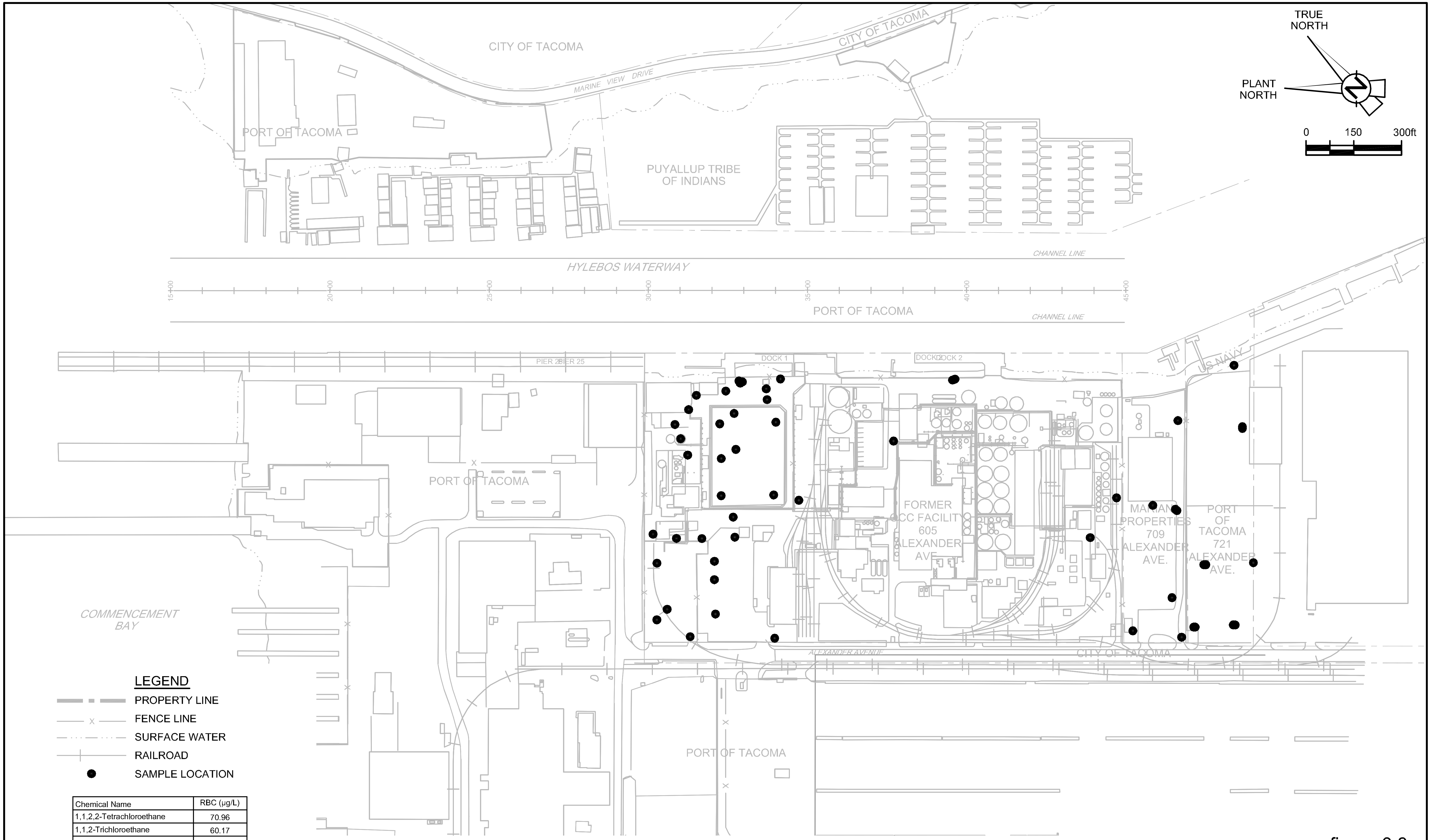


Chemical Name	RBC (mg/kg)
Lead	285

figure 3.7

EXCEEDANCES OF THE CONSTRUCTION/UTILITY WORKER RISK-BASED SOIL CONCENTRATIONS (DIRECT CONTACT)
OFF-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington

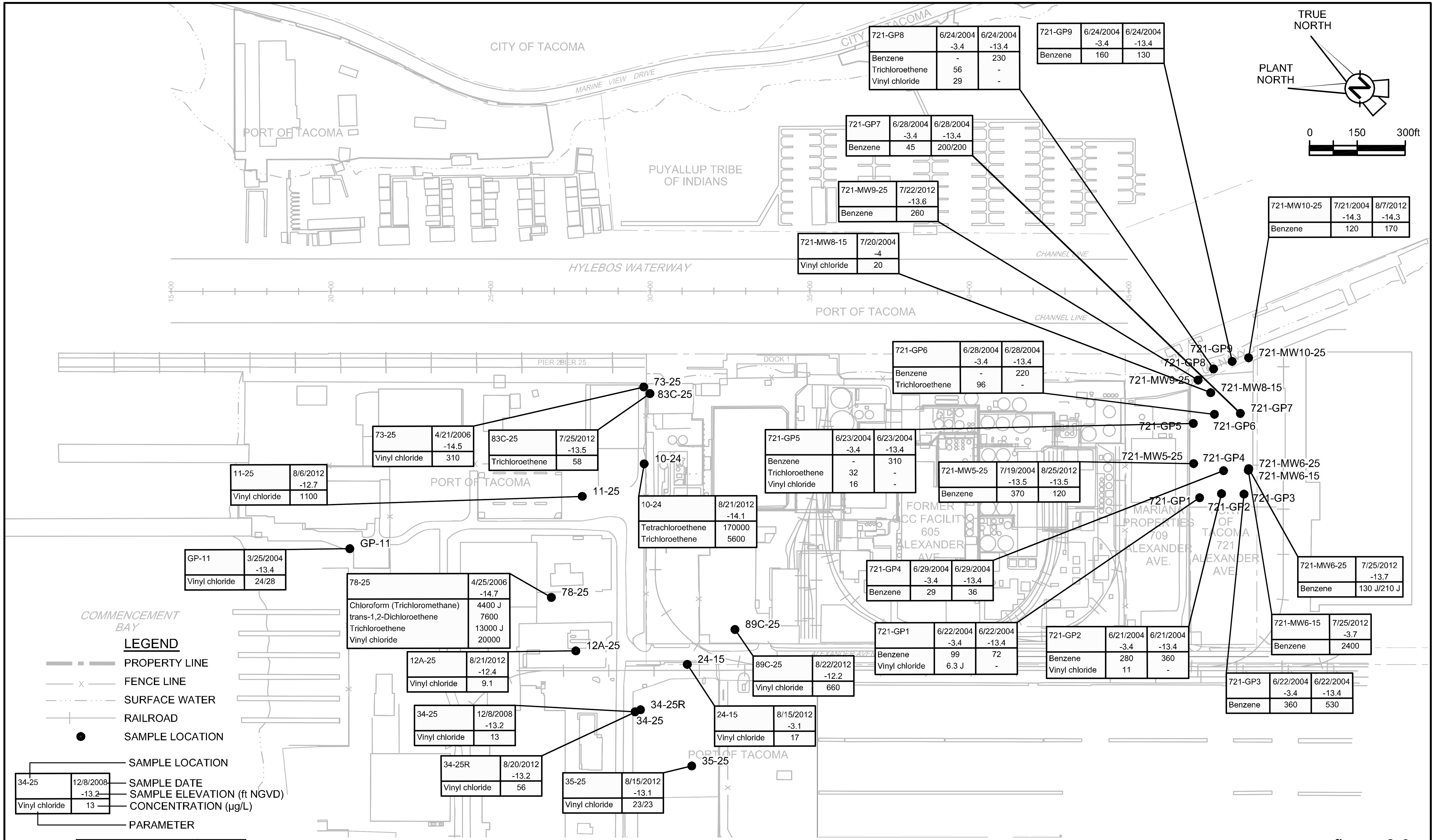


Chemical Name	RBC (µg/L)
1,1,2,2-Tetrachloroethane	70.96
1,1,2-Trichloroethane	60.17
Benzene	23.83
Carbon tetrachloride	6.04
Chloroform (Trichloromethane)	10.42
Tetrachloroethene	277.81
trans-1,2-Dichloroethene	1930.71
Trichloroethene	27.29
Vinyl chloride	6.08

figure 3.8

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER GROUNDWATER TO INDOOR AIR RISK-BASED CONCENTRATIONS
ON-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA017 FEB 6/2014

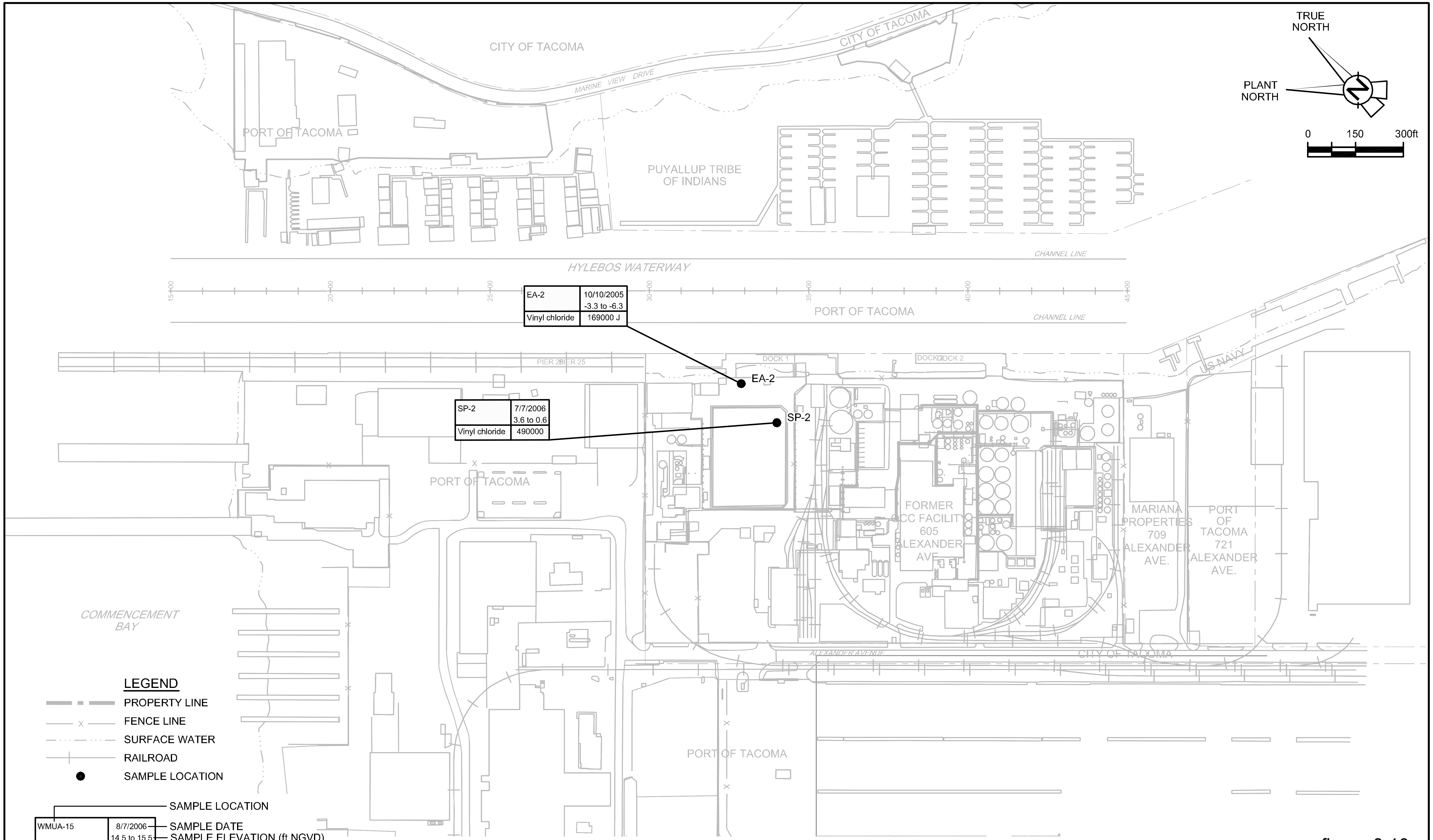


Chemical Name	RBC (µg/L)
Benzene	23.83
Chloroform (Trichloromethane)	10.42
Tetrachloroethene	277.81
trans-1,2-Dichloroethene	1930.71
Trichloroethene	27.29
Vinyl chloride	6.08

figure 3.9

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER GROUNDWATER TO INDOOR AIR RISK-BASED CONCENTRATIONS
OFF-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington



EA-2	10/10/2005 -3.3 to -6.3
Vinyl chloride	169000 J

SP-2	7/7/2006 3.6 to 0.6
Vinyl chloride	490000

LEGEND

PROPERTY LINE
FENCE LINE
SURFACE WATER
RAILROAD
● SAMPLE LOCATION

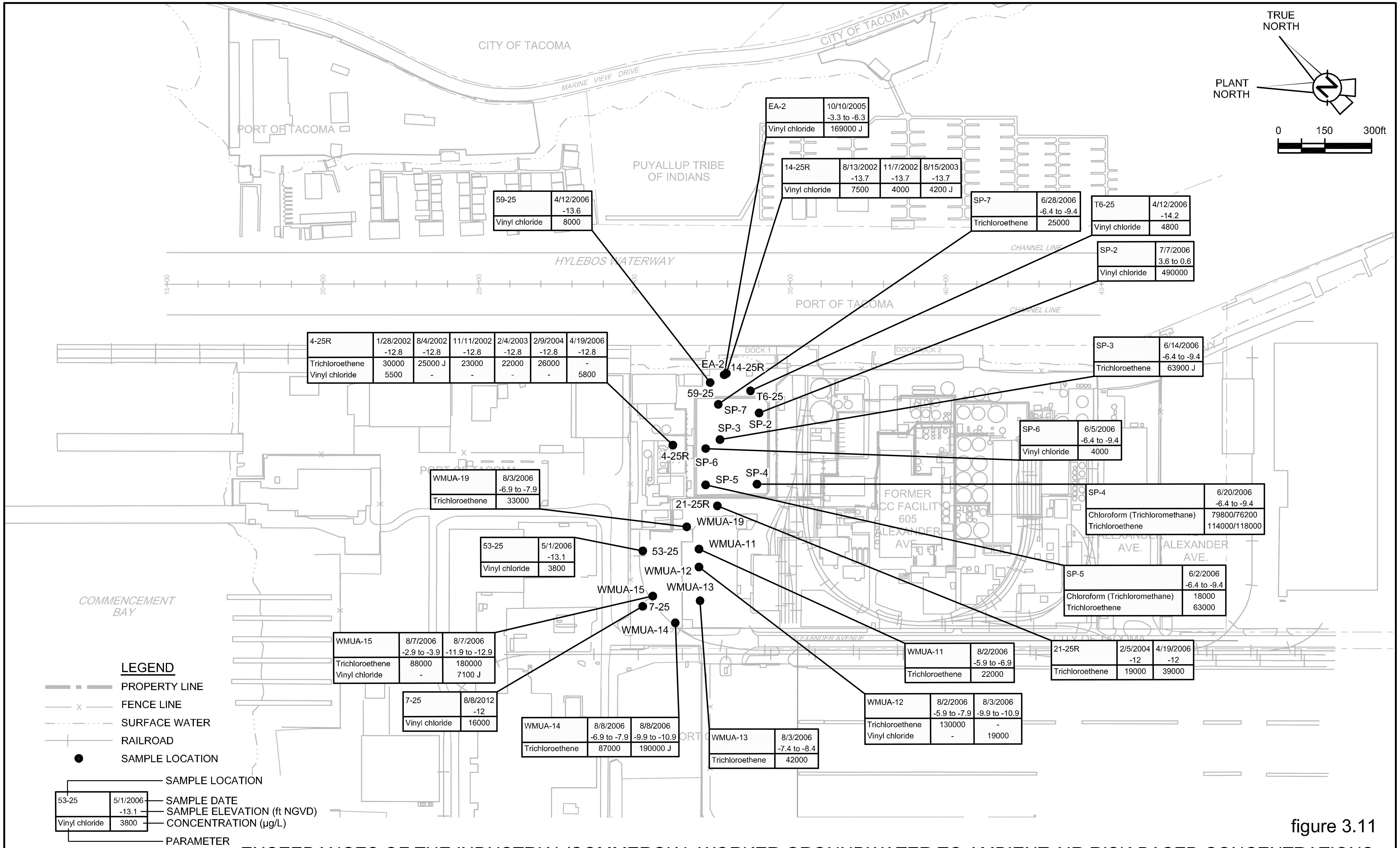
WMUA-15	8/7/2006 14.5 to 15.5
Tetrachloroethene	170000

SAMPLE LOCATION
SAMPLE DATE
SAMPLE ELEVATION (ft NGVD)
CONCENTRATION (µg/L)
PARAMETER

Chemical Name	RBC (µg/L)
Vinyl Chloride	87159

figure 3.10

EXCEEDANCES OF THE TRESPASSER GROUNDWATER TO AMBIENT AIR RISK-BASED CONCENTRATIONS
ON-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington



53-25	5/1/2006 -13.1
Vinyl chloride	3800

EA-2	10/10/2005 -3.3 to -6.3
Vinyl chloride	169000 J

14-25R	8/13/2002 -13.7	11/7/2002 -13.7	8/15/2003 -13.7
Vinyl chloride	7500	4000	4200 J

59-25	4/12/2006 -13.6
Vinyl chloride	8000

SP-7	6/28/2006 -6.4 to -9.4
Trichloroethene	25000

T6-25	4/12/2006 -14.2
Vinyl chloride	4800

SP-2	7/7/2006 3.6 to 0.6
Vinyl chloride	490000

4-25R	1/28/2002 -12.8	8/4/2002 -12.8	11/11/2002 -12.8	2/4/2003 -12.8	2/9/2004 -12.8	4/19/2006 -12.8
Trichloroethene	30000	25000 J	23000	22000	26000	-
Vinyl chloride	5500	-	-	-	-	5800

SP-3	6/14/2006 -6.4 to -9.4
Trichloroethene	63900 J

SP-6	6/5/2006 -6.4 to -9.4
Vinyl chloride	4000

WMUA-19	8/3/2006 -6.9 to -7.9
Trichloroethene	33000

SP-4	6/20/2006 -6.4 to -9.4
Chloroform (Trichloromethane)	79800/76200
Trichloroethene	114000/118000

53-25	5/1/2006 -13.1
Vinyl chloride	3800

SP-5	6/2/2006 -6.4 to -9.4
Chloroform (Trichloromethane)	18000
Trichloroethene	63000

WMUA-15	8/7/2006 -2.9 to -3.9	8/7/2006 -11.9 to -12.9
Trichloroethene	88000	180000
Vinyl chloride	-	7100 J

WMUA-11	8/2/2006 -5.9 to -6.9
Trichloroethene	22000

21-25R	2/5/2004 -12	4/19/2006 -12
Trichloroethene	19000	39000

7-25	8/8/2012 -12
Vinyl chloride	16000

WMUA-12	8/2/2006 -5.9 to -7.9	8/3/2006 -9.9 to -10.9
Trichloroethene	130000	-
Vinyl chloride	-	19000

WMUA-14	8/8/2006 -6.9 to -7.9	8/8/2006 -9.9 to -10.9
Trichloroethene	87000	190000 J

WMUA-13	8/3/2006 -7.4 to -8.4
Trichloroethene	42000

figure 3.11

Chemical Name	RBC (µg/L)
Chloroform (Trichloromethane)	5127
Trichloroethene	16559
Vinyl chloride	3704

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER GROUNDWATER TO AMBIENT AIR RISK-BASED CONCENTRATIONS ON-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington

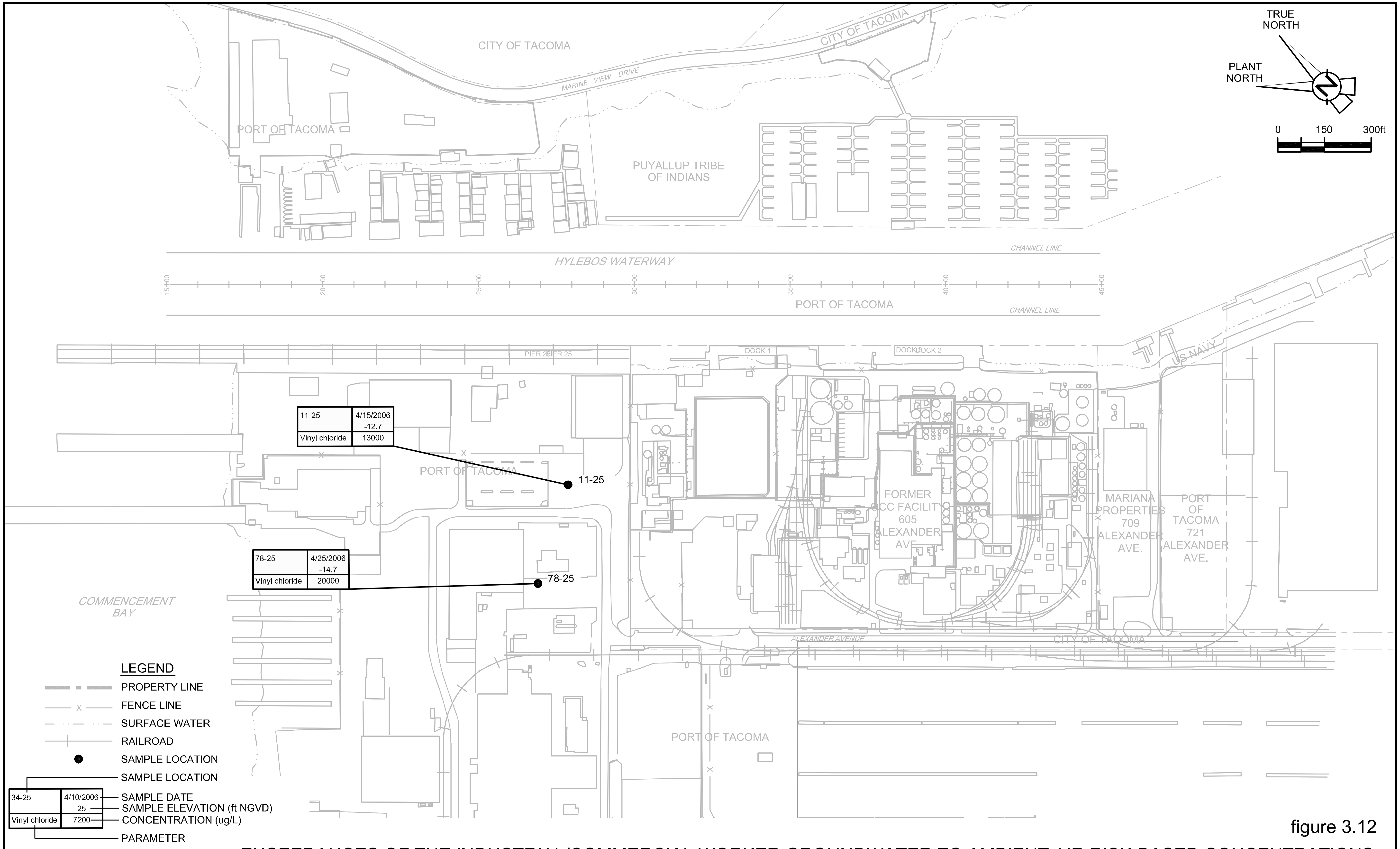
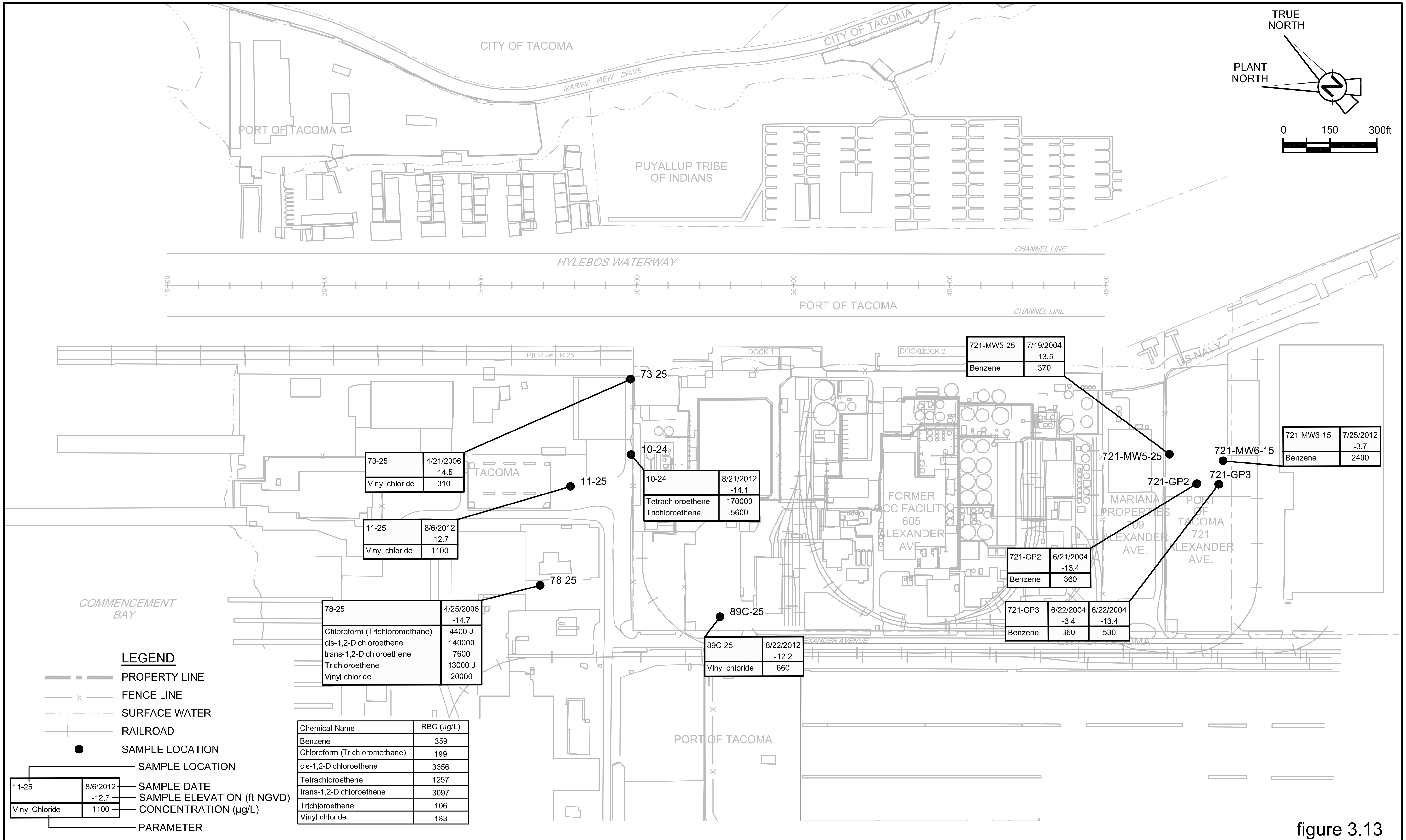


figure 3.12

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER GROUNDWATER TO AMBIENT AIR RISK-BASED CONCENTRATIONS
OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

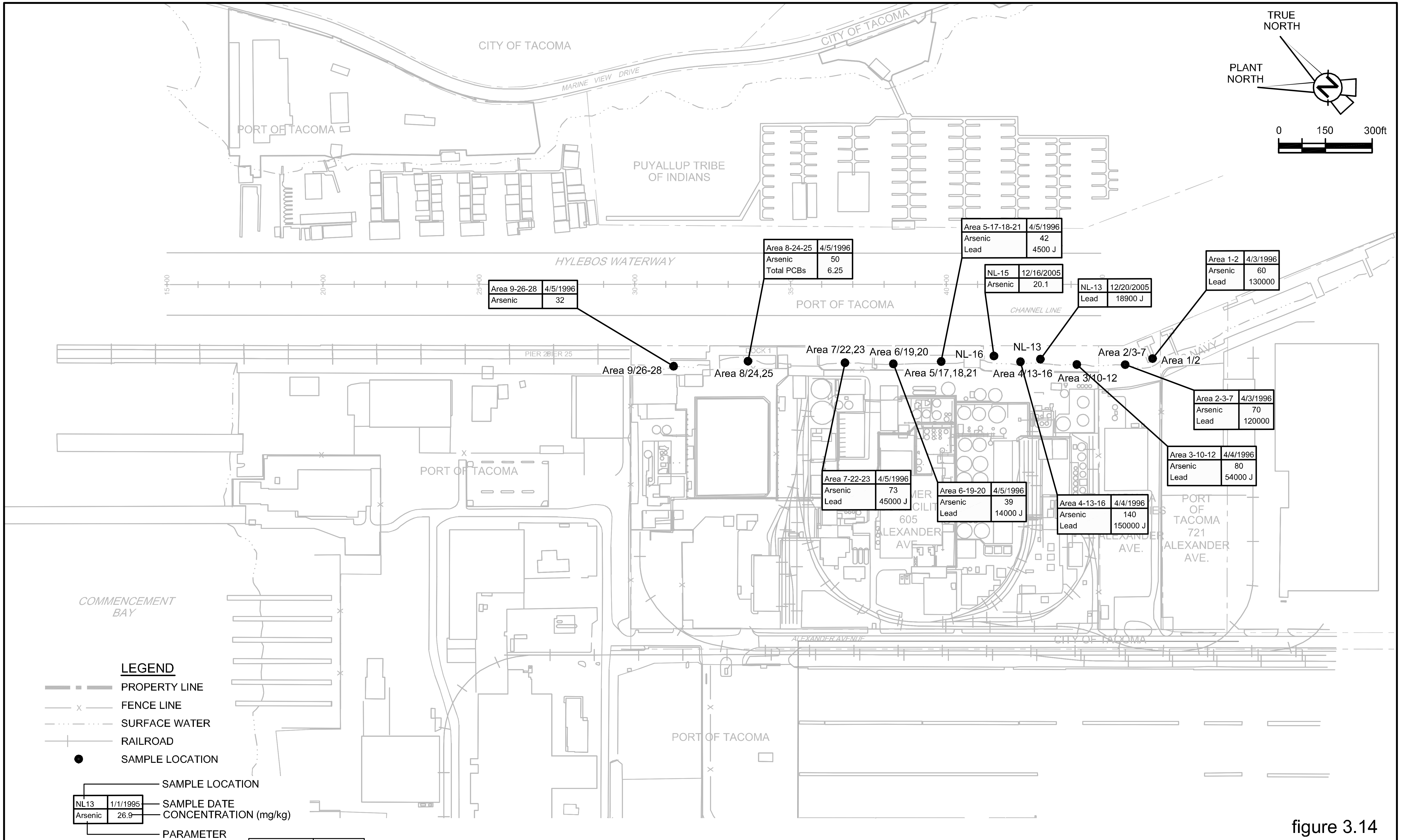
Chemical Name	RBC (ug/L)
Vinyl Chloride	3704



Chemical Name	RBC (µg/L)
Benzene	359
Chloroform (Trichloromethane)	199
cis-1,2-Dichloroethene	3356
Tetrachloroethene	1257
trans-1,2-Dichloroethene	3097
Trichloroethene	106
Vinyl chloride	183

figure 3.13

EXCEEDANCES OF THE CONSTRUCTION/UTILITY WORKER RISK-BASED GROUNDWATER CONCENTRATIONS (DIRECT CONTACT)
OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

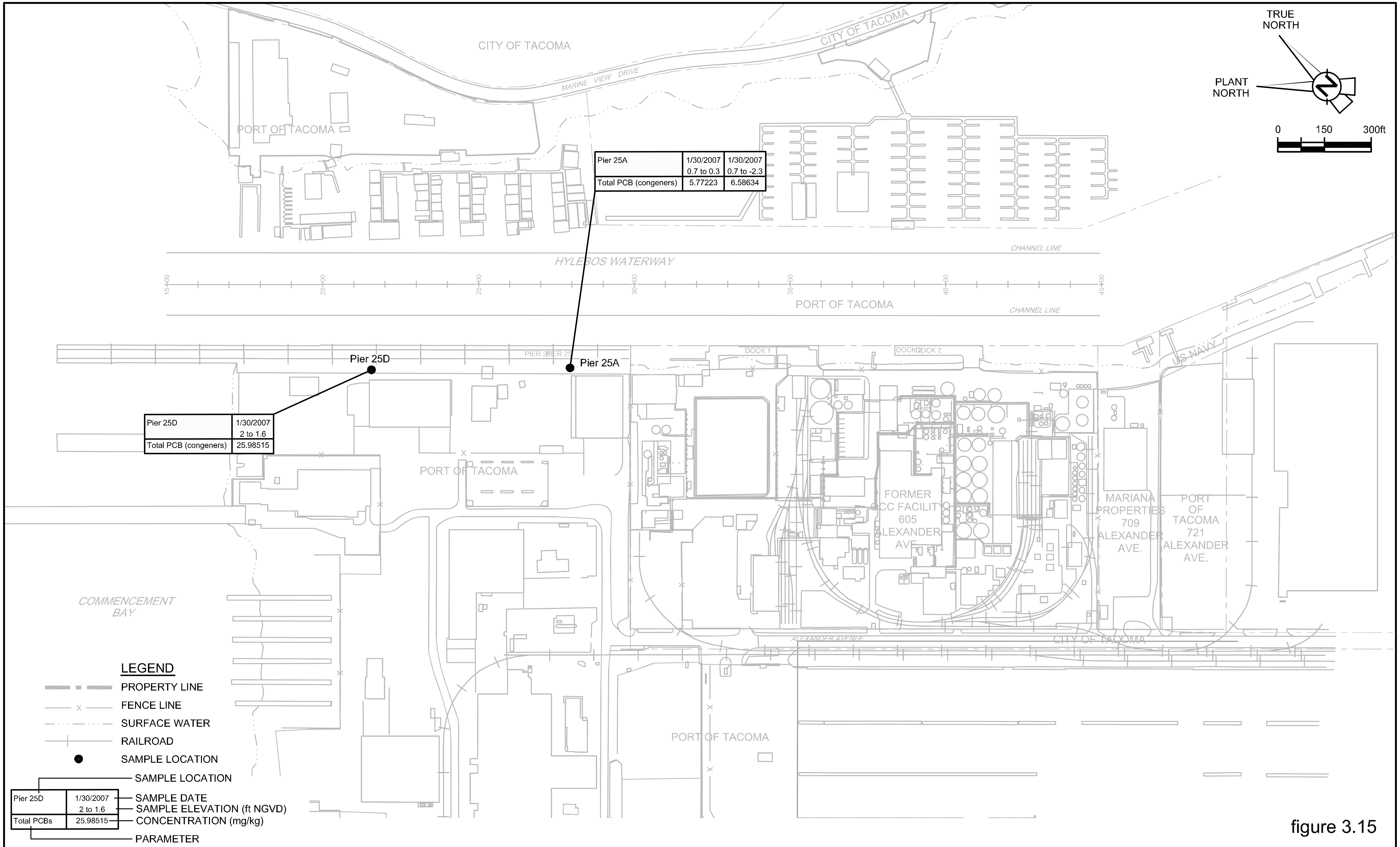


Chemical Name	RBC (mg/kg)
Arsenic	11.6
Lead	2072
Total PCBs	4.71

figure 3.14

EXCEEDANCES OF THE TRESPASSER RISK-BASED SEDIMENT CONCENTRATIONS (DIRECT CONTACT)
ON-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

CRA



Pier 25A	1/30/2007 0.7 to 0.3	1/30/2007 0.7 to -2.3
Total PCB (congeners)	5.77223	6.58634

Pier 25D	1/30/2007 2 to 1.6
Total PCB (congeners)	25.98515

Pier 25D	1/30/2007 2 to 1.6
Total PCBs	25.98515

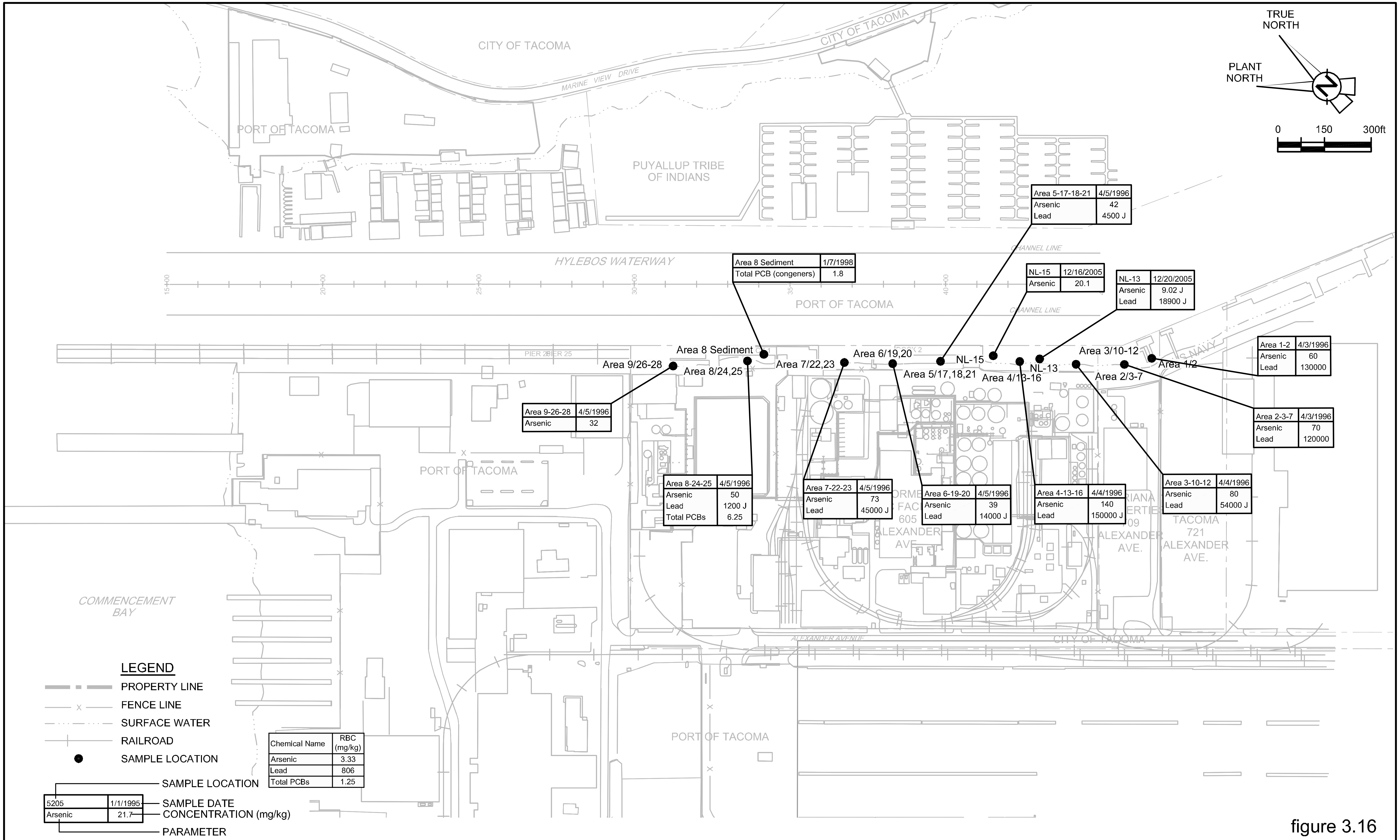
Chemical Name	RBC (mg/kg)
Total PCBs	4.71

figure 3.15

EXCEEDANCES OF THE TRESPASSER RISK-BASED SEDIMENT CONCENTRATIONS (DIRECT CONTACT)
OFF-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington

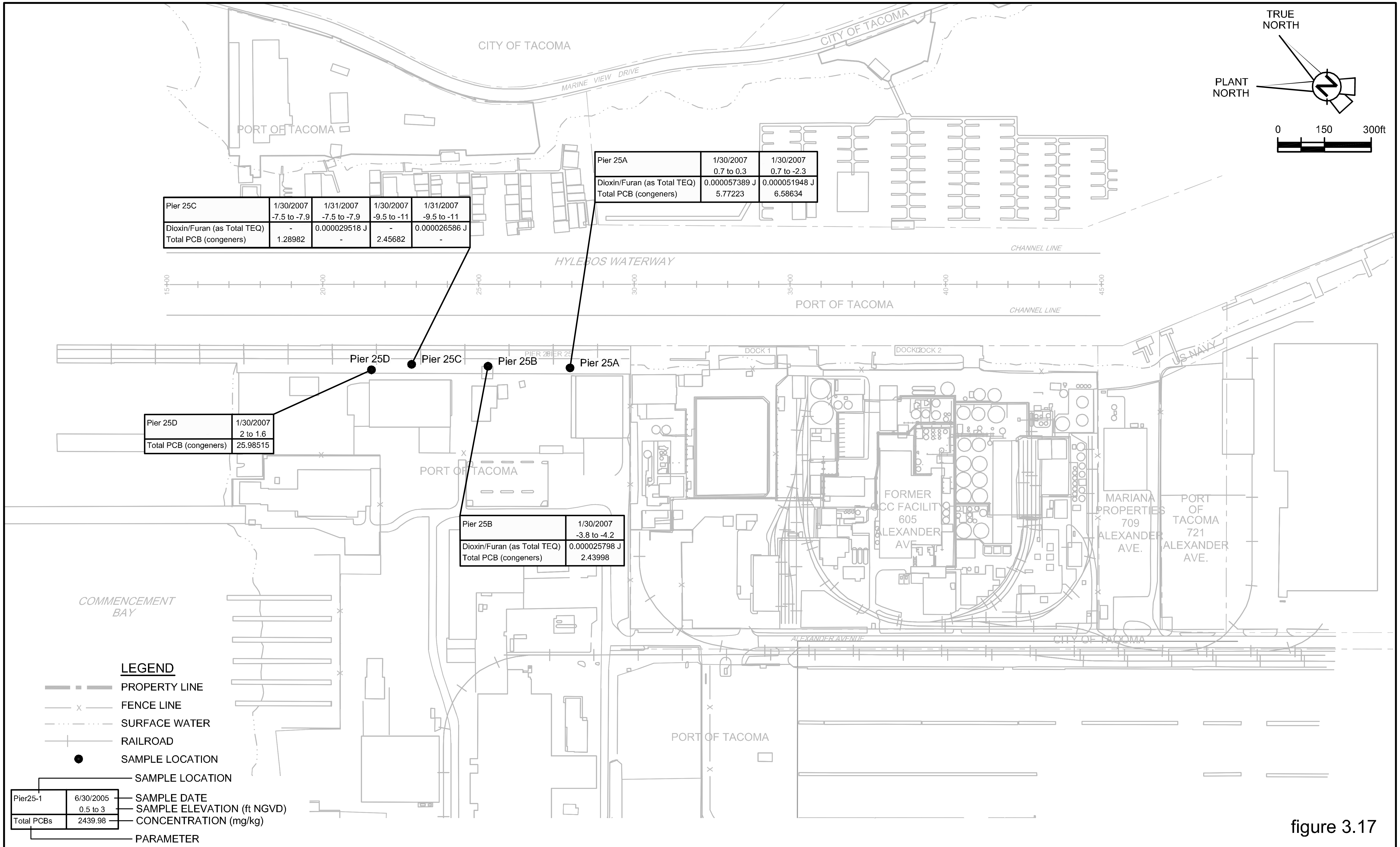
07843-M2(126)GN-WA012 FEB 6/2014



Chemical Name	RBC (mg/kg)
Arsenic	3.33
Lead	806
Total PCBs	1.25

figure 3.16

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER RISK-BASED SEDIMENT CONCENTRATIONS (DIRECT CONTACT)
ON-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington



Pier 25A	1/30/2007 0.7 to 0.3	1/30/2007 0.7 to -2.3
Dioxin/Furan (as Total TEQ)	0.000057389 J	0.000051948 J
Total PCB (congeners)	5.77223	6.58634

Pier 25C	1/30/2007 -7.5 to -7.9	1/31/2007 -7.5 to -7.9	1/30/2007 -9.5 to -11	1/31/2007 -9.5 to -11
Dioxin/Furan (as Total TEQ)	-	0.000029518 J	-	0.000026586 J
Total PCB (congeners)	1.28982	-	2.45682	-

Pier 25D	1/30/2007 2 to 1.6
Total PCB (congeners)	25.98515

Pier 25B	1/30/2007 -3.8 to -4.2
Dioxin/Furan (as Total TEQ)	0.000025798 J
Total PCB (congeners)	2.43998

Pier25-1	6/30/2005 0.5 to 3
Total PCBs	2439.98

figure 3.17

Chemical Name	RBC (mg/kg)
Dioxin/Furan (as Total TEQ)	0.0000192
Total PCBs	1.25

EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL WORKER RISK-BASED SEDIMENT CONCENTRATIONS (DIRECT CONTACT)
OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA004 FEB 6/2014

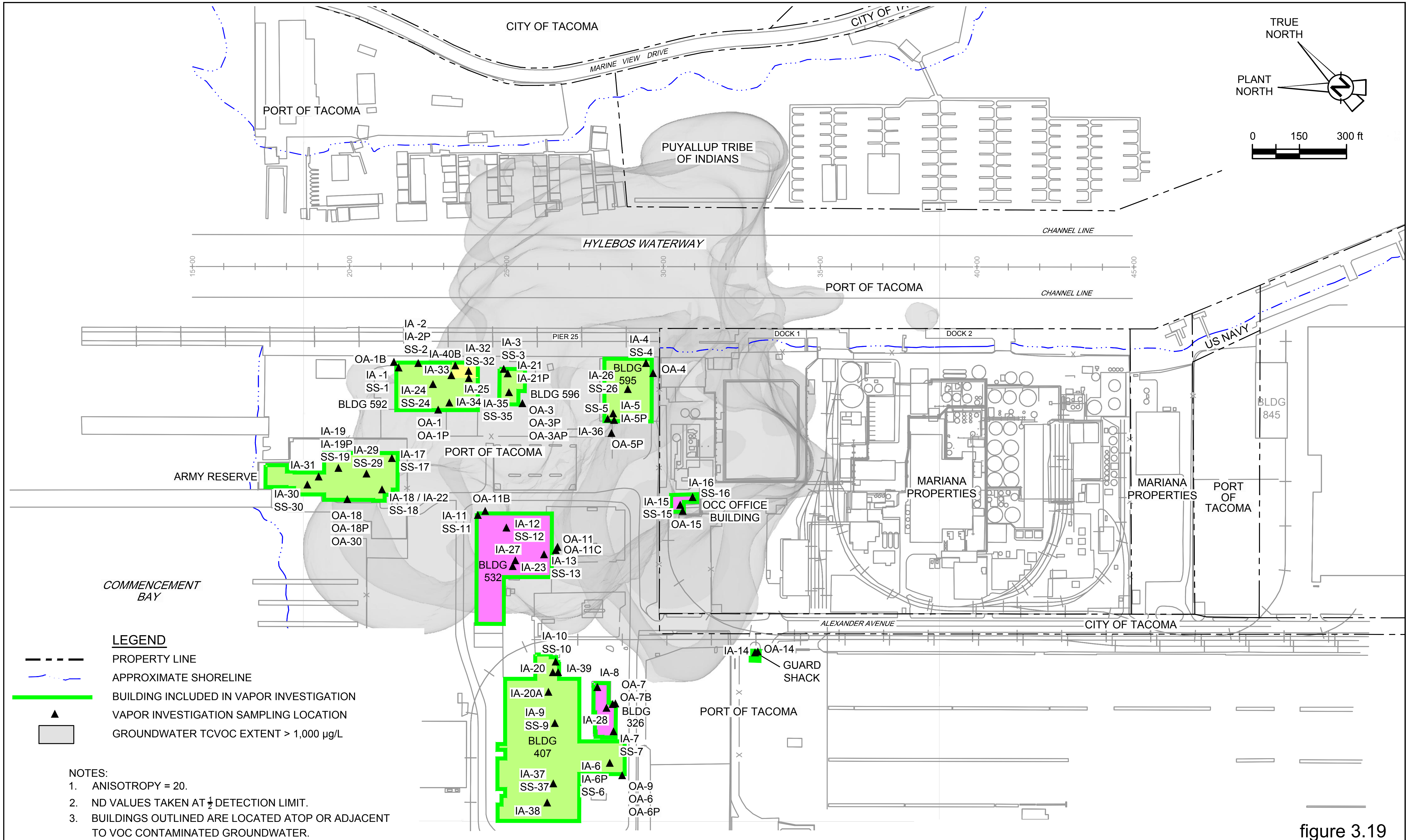
Chemical Name	RBC (µg/L)
1,1,2,2-Tetrachloroethane	4
1,1,2-Trichloroethane	16
1,1-Dichloroethene	3.2
Arsenic	1
Benzene	51
Carbon tetrachloride	1.6
Chloroform (Trichloromethane)	470
Chromium	50
Copper	2.4
Lead	8.1
Mercury	0.2
Methylene chloride	590
Nickel	8.2
Tetrachloroethene	3.3
Thallium	1
Trichloroethene	30
Vinyl chloride	2.4
Zinc	81

NOTE:
RISK BASED CONCENTRATIONS (RBC) ARE BASED UPON MTCA METHOD B SURFACE WATER CLEANUP LEVELS PROTECTIVE OF HUMAN HEALTH FOR THE CONSUMPTION OF ORGANISMS.

figure 3.18

EXCEEDANCES OF THE FISHER RISK-BASED GROUNDWATER CONCENTRATIONS
ON/OFF-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington



LEGEND

- PROPERTY LINE
- APPROXIMATE SHORELINE
- BUILDING INCLUDED IN VAPOR INVESTIGATION
- ▲ VAPOR INVESTIGATION SAMPLING LOCATION
- ▨ GROUNDWATER TCVOC EXTENT > 1,000 μg/L

NOTES:
1. ANISOTROPY = 20.
2. ND VALUES TAKEN AT $\frac{1}{2}$ DETECTION LIMIT.
3. BUILDINGS OUTLINED ARE LOCATED ATOP OR ADJACENT TO VOC CONTAMINATED GROUNDWATER.

RECOMMENDATIONS FOR ADDITIONAL WORK

- 🟪 MITIGATION BY GSH
- 🟨 CONFIRMATION MONITORING BY GSH
- 🟩 NO FURTHER ACTION BY GSH

figure 3.19

GENERAL LOCATIONS FOR VAPOR INVESTIGATION SAMPLES AND RECOMMENDATIONS FOR ADDITIONAL WORK
Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA047 AUG 5/2014

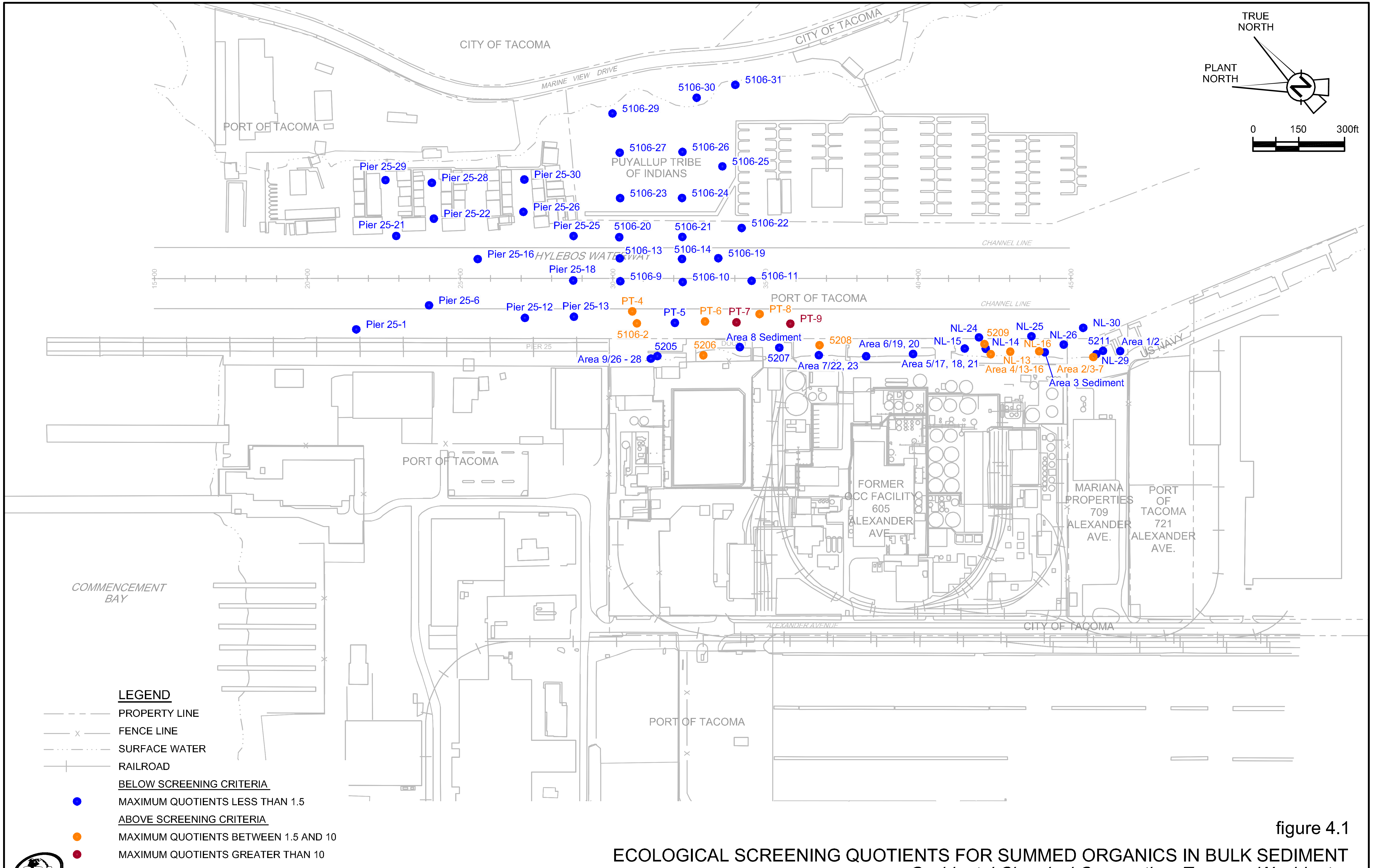
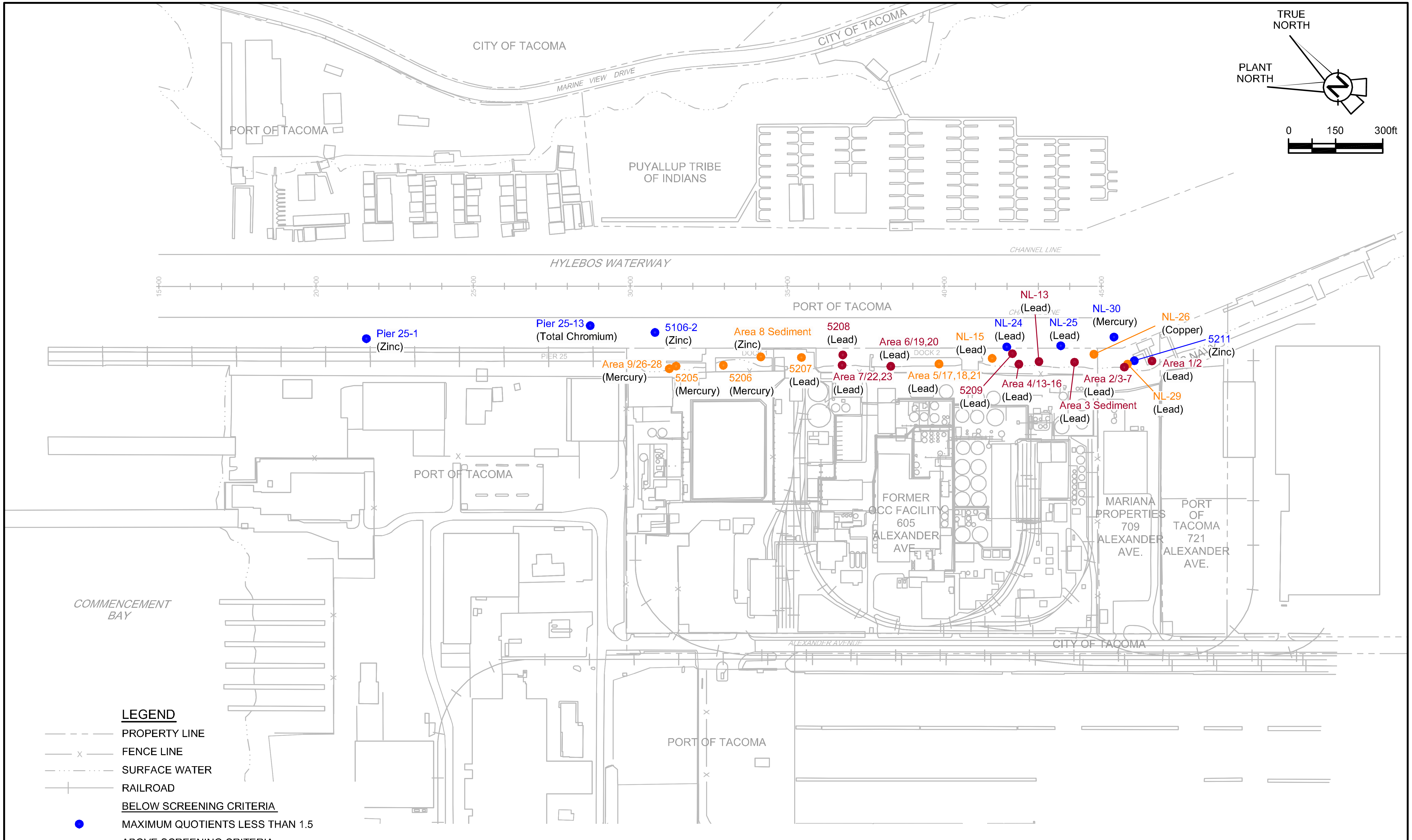


figure 4.1

ECOLOGICAL SCREENING QUOTIENTS FOR SUMMED ORGANICS IN BULK SEDIMENT

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA033 FEB 5/2014



LEGEND

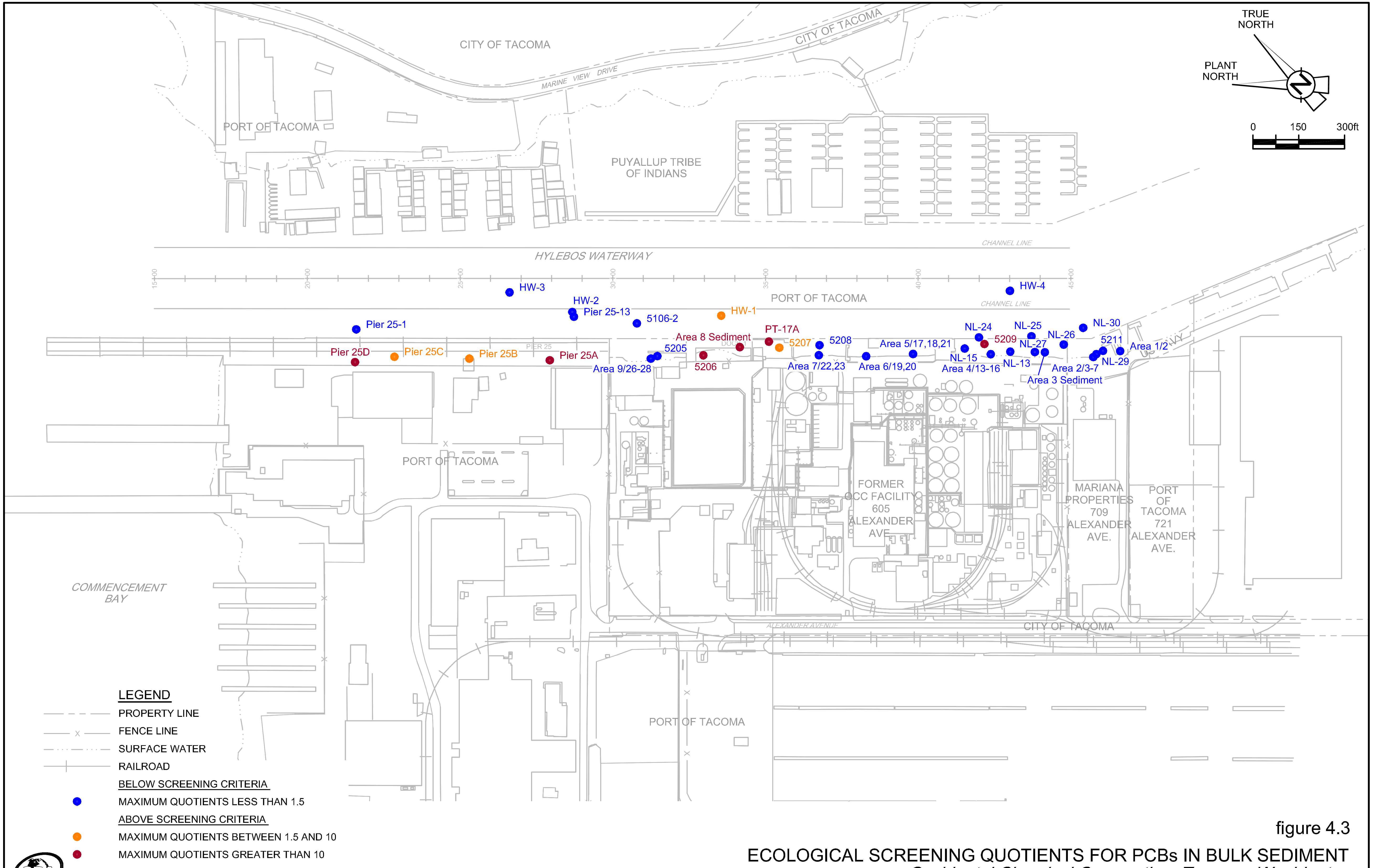
— · —	PROPERTY LINE
—x—	FENCE LINE
— ·· —	SURFACE WATER
—+—	RAILROAD
	BELOW SCREENING CRITERIA
●	MAXIMUM QUOTIENTS LESS THAN 1.5
	ABOVE SCREENING CRITERIA
●	MAXIMUM QUOTIENTS BETWEEN 1.5 AND 10
●	MAXIMUM QUOTIENTS GREATER THAN 10
(Lead)	PROBLEMATIC CHEMICAL

figure 4.2

ECOLOGICAL SCREENING QUOTIENTS FOR METALS IN BULK SEDIMENT

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA034 FEB 5/2014



LEGEND

PROPERTY LINE

FENCE LINE

SURFACE WATER

RAILROAD

BELOW SCREENING CRITERIA

● MAXIMUM QUOTIENTS LESS THAN 1.5

ABOVE SCREENING CRITERIA

● MAXIMUM QUOTIENTS BETWEEN 1.5 AND 10

● MAXIMUM QUOTIENTS GREATER THAN 10

figure 4.3

ECOLOGICAL SCREENING QUOTIENTS FOR PCBs IN BULK SEDIMENT

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA035 FEB 6/2014

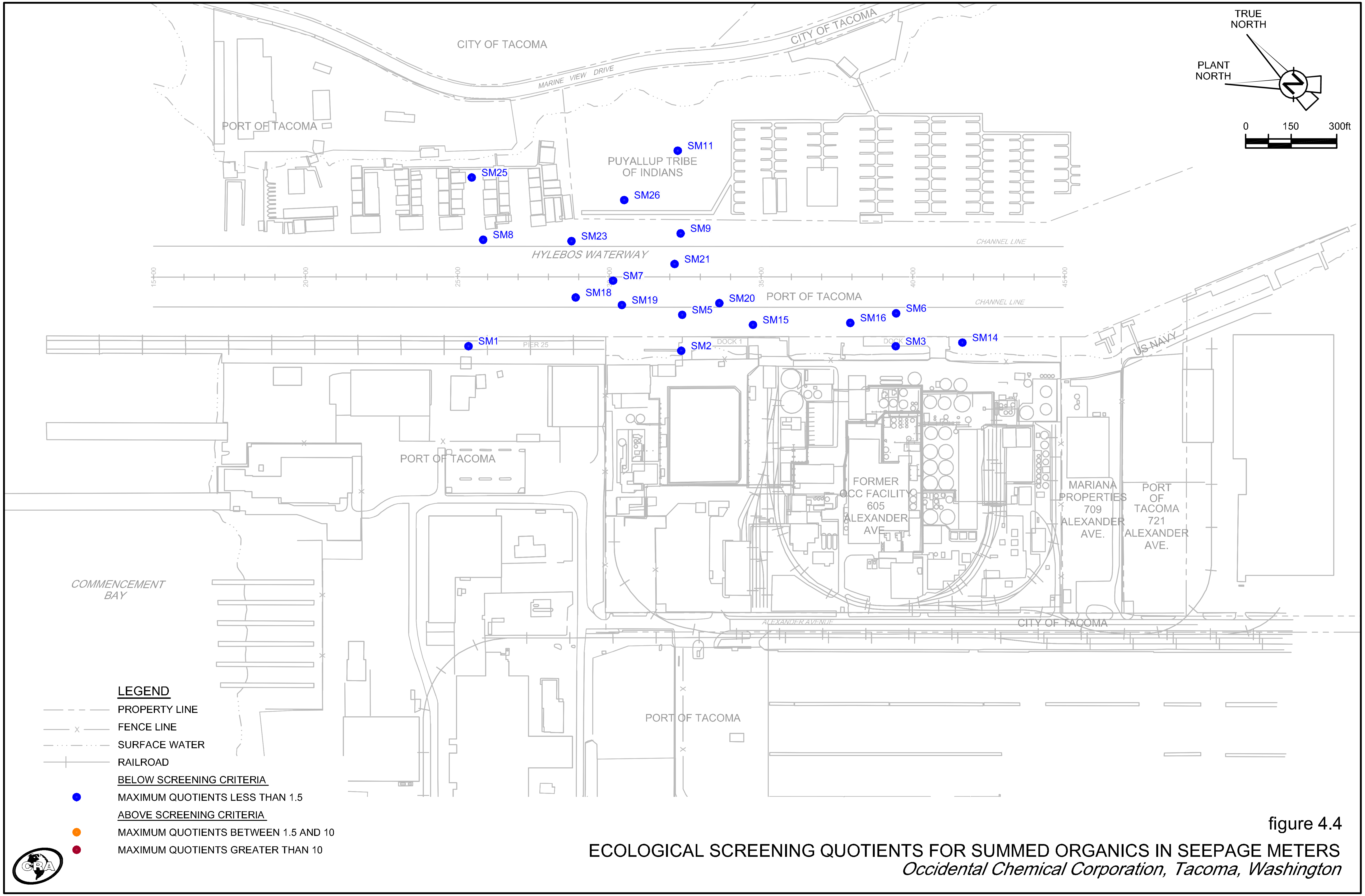


figure 4.4

ECOLOGICAL SCREENING QUOTIENTS FOR SUMMED ORGANICS IN SEEPAGE METERS

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA036 FEB 6/2014

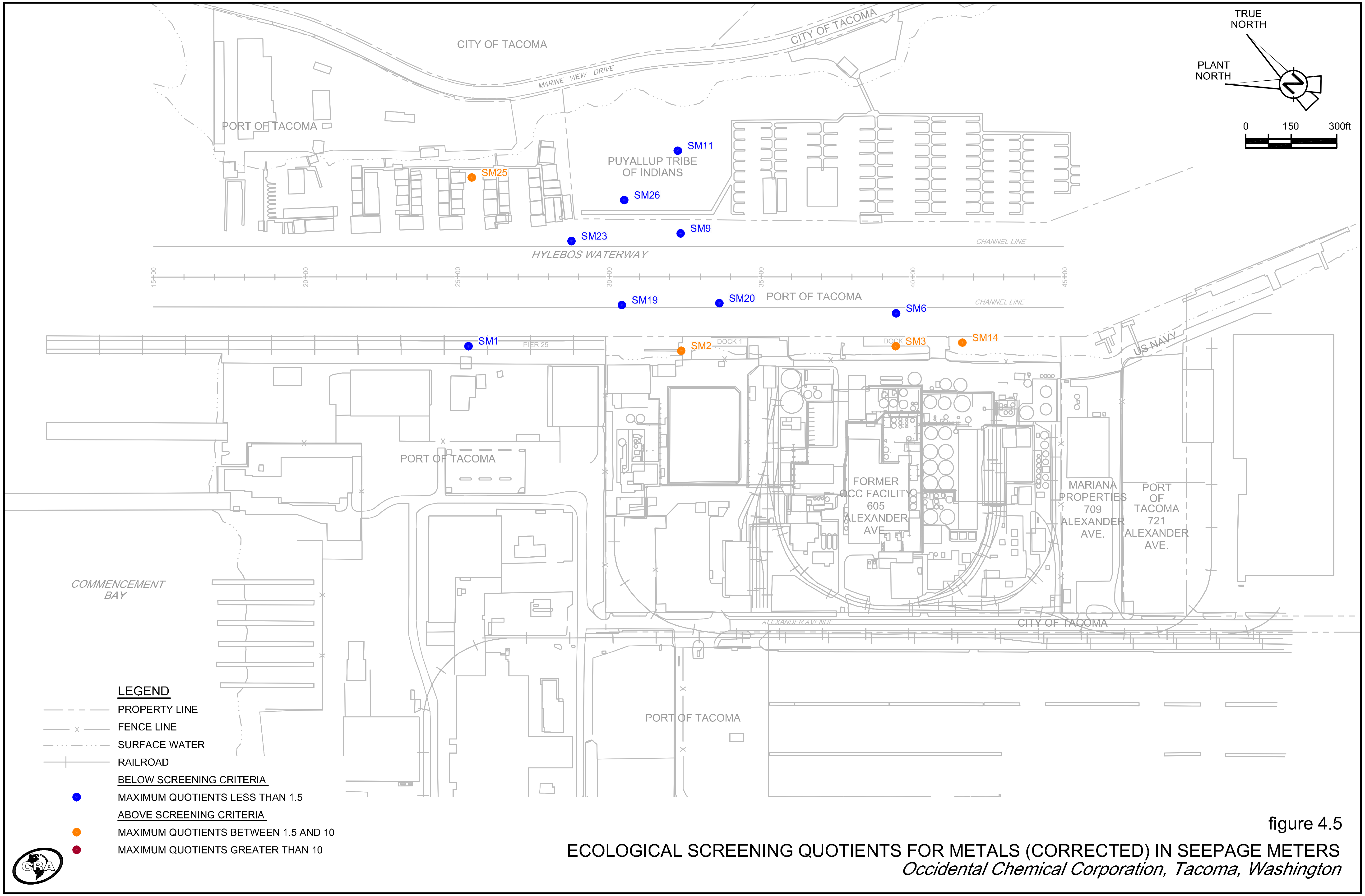


figure 4.5

ECOLOGICAL SCREENING QUOTIENTS FOR METALS (CORRECTED) IN SEEPAGE METERS

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA037 FEB 6/2014

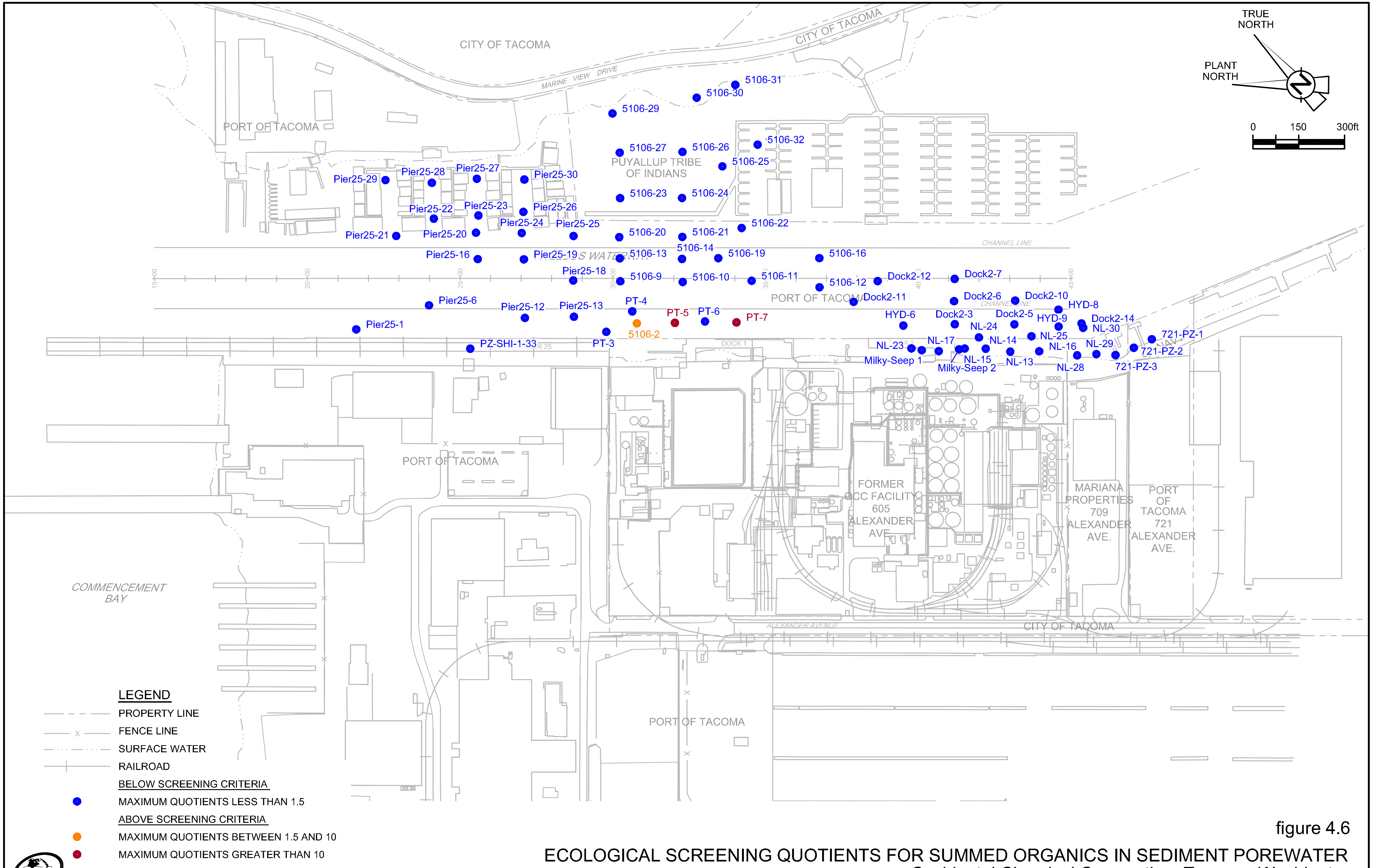


figure 4.6

ECOLOGICAL SCREENING QUOTIENTS FOR SUMMED ORGANICS IN SEDIMENT POREWATER

Occidental Chemical Corporation, Tacoma, Washington

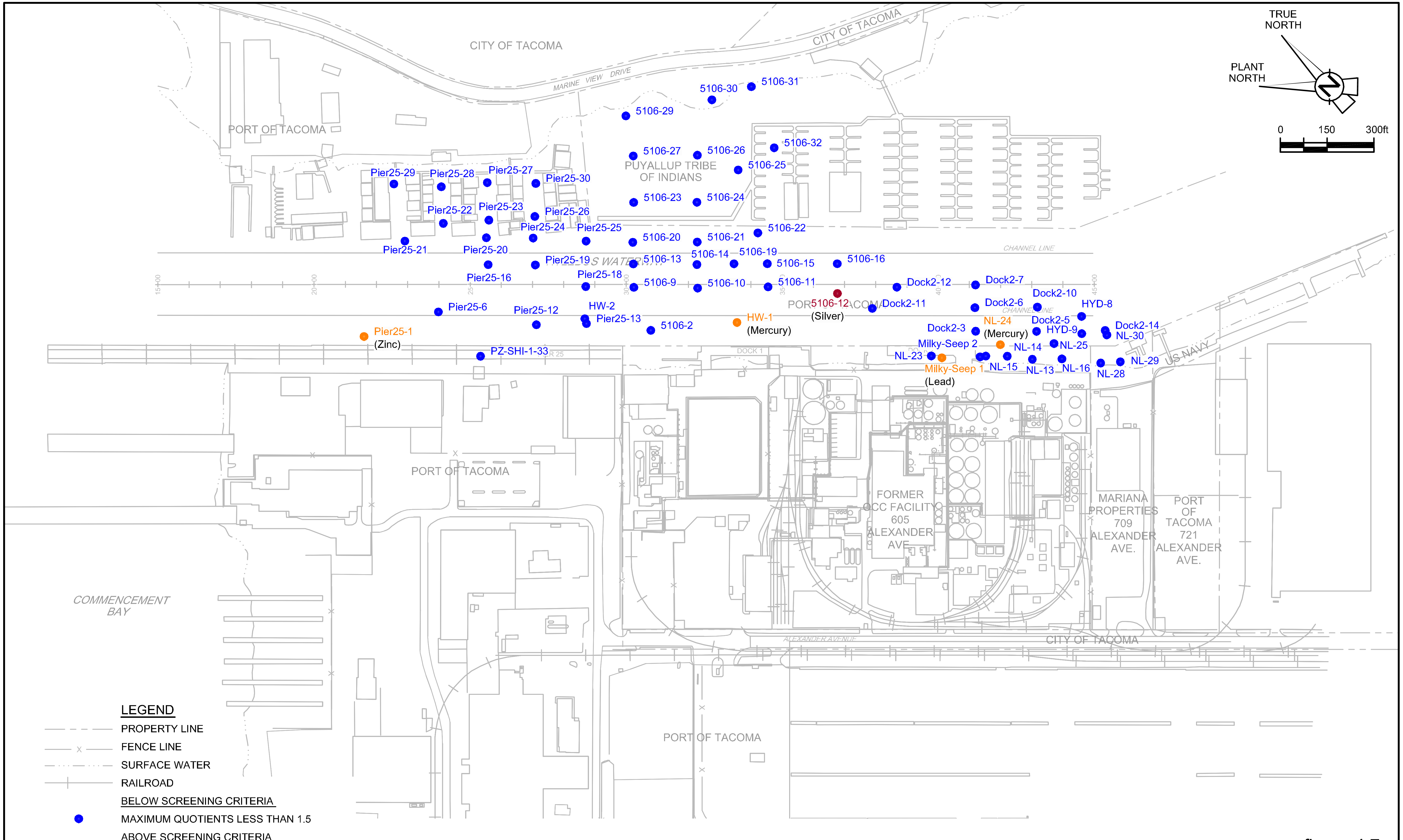


figure 4.7

ECOLOGICAL SCREENING QUOTIENTS FOR METALS (CORRECTED) IN SEDIMENT POREWATER

Occidental Chemical Corporation, Tacoma, Washington

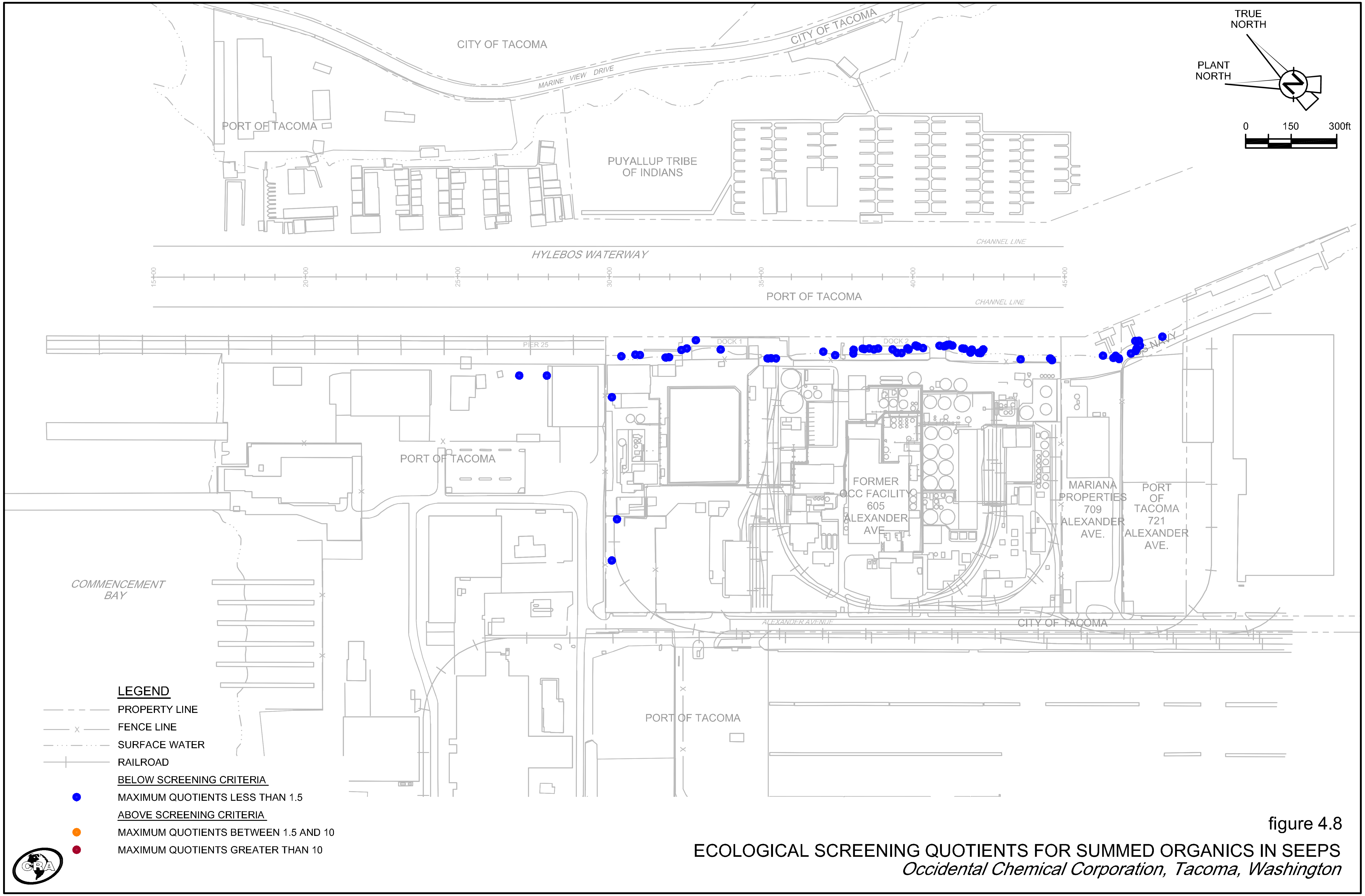
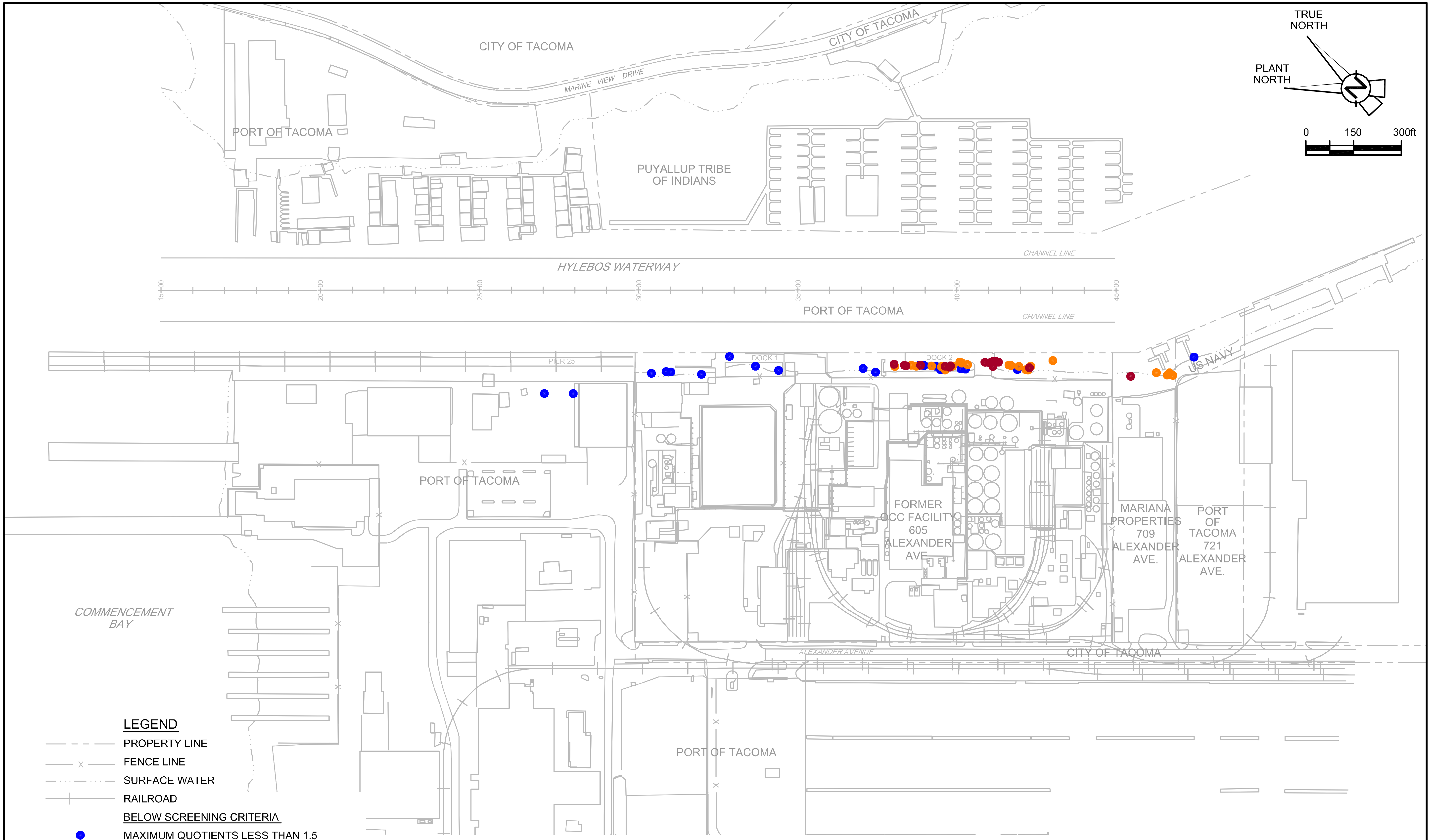


figure 4.8

ECOLOGICAL SCREENING QUOTIENTS FOR SUMMED ORGANICS IN SEEPS

Occidental Chemical Corporation, Tacoma, Washington



LEGEND

PROPERTY LINE

FENCE LINE

SURFACE WATER

RAILROAD

BELOW SCREENING CRITERIA

● MAXIMUM QUOTIENTS LESS THAN 1.5

ABOVE SCREENING CRITERIA

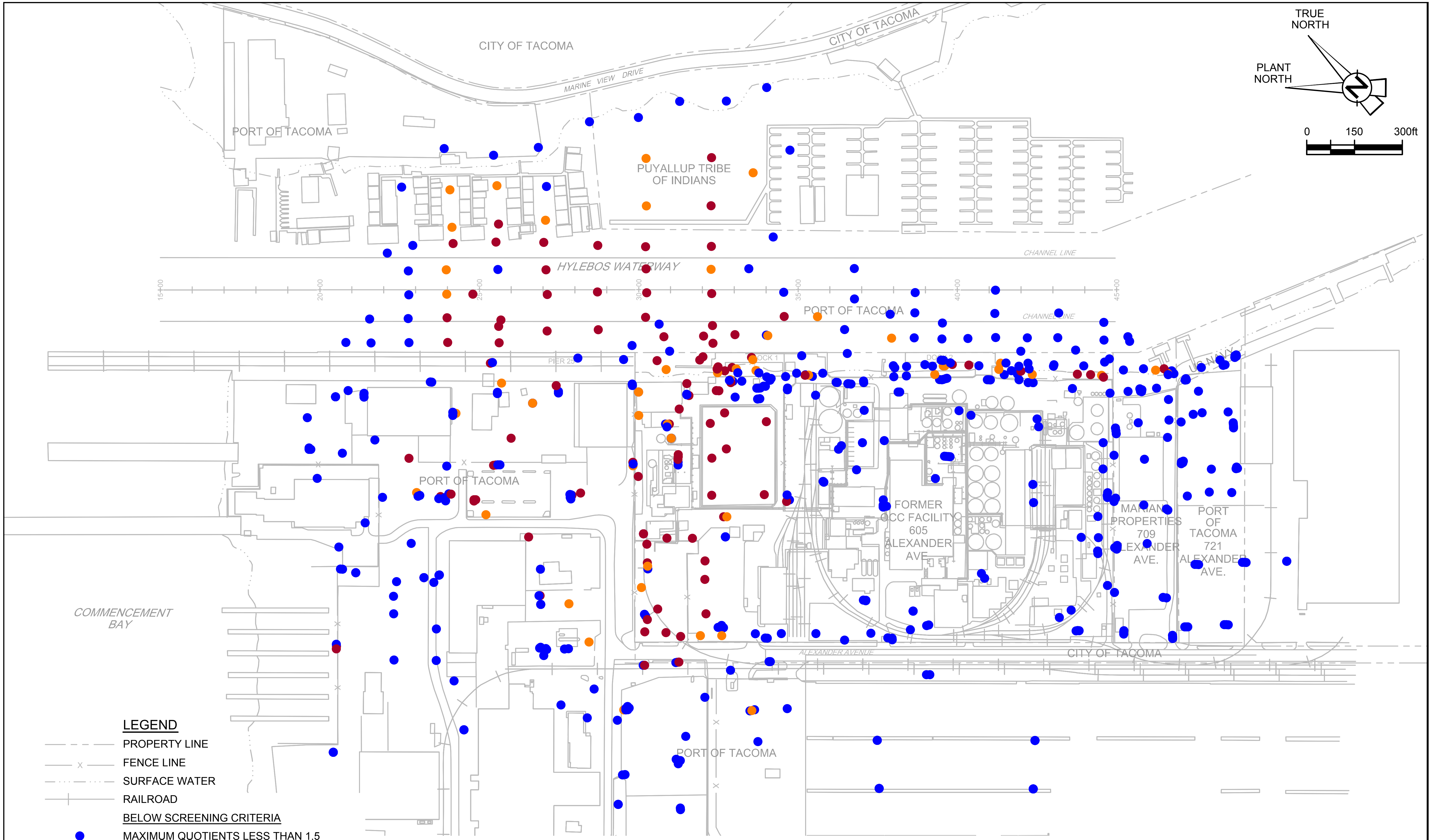
● MAXIMUM QUOTIENTS BETWEEN 1.5 AND 10

● MAXIMUM QUOTIENTS GREATER THAN 10

figure 4.9

ECOLOGICAL SCREENING QUOTIENTS FOR METALS (CORRECTED) IN SEEPS

Occidental Chemical Corporation, Tacoma, Washington



LEGEND

PROPERTY LINE
FENCE LINE
SURFACE WATER
RAILROAD

BELOW SCREENING CRITERIA

● MAXIMUM QUOTIENTS LESS THAN 1.5

ABOVE SCREENING CRITERIA

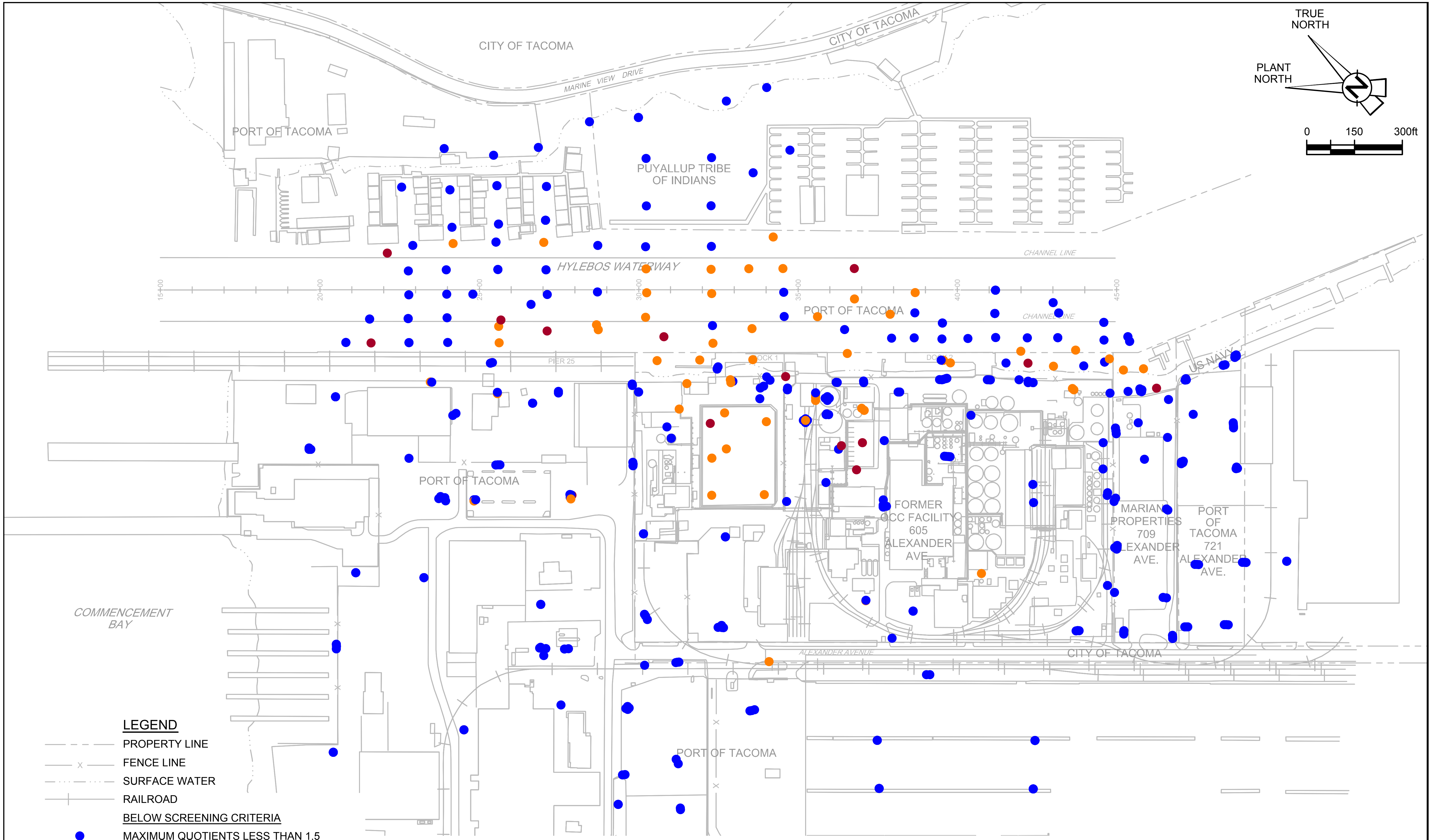
● MAXIMUM QUOTIENTS BETWEEN 1.5 AND 10
● MAXIMUM QUOTIENTS GREATER THAN 10

figure 4.10

ECOLOGICAL SCREENING QUOTIENTS FOR SUMMED ORGANICS IN GROUNDWATER
Occidental Chemical Corporation, Tacoma, Washington

CRA

07843-M2(126)GN-WA042 FEB 7/2014



LEGEND

PROPERTY LINE

FENCE LINE

SURFACE WATER

RAILROAD

BELOW SCREENING CRITERIA

● MAXIMUM QUOTIENTS LESS THAN 1.5

ABOVE SCREENING CRITERIA

● MAXIMUM QUOTIENTS BETWEEN 1.5 AND 10

● MAXIMUM QUOTIENTS GREATER THAN 10

figure 4.11

ECOLOGICAL SCREENING QUOTIENTS FOR METALS (CORRECTED) IN GROUNDWATER

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA043 FEB 7/2014

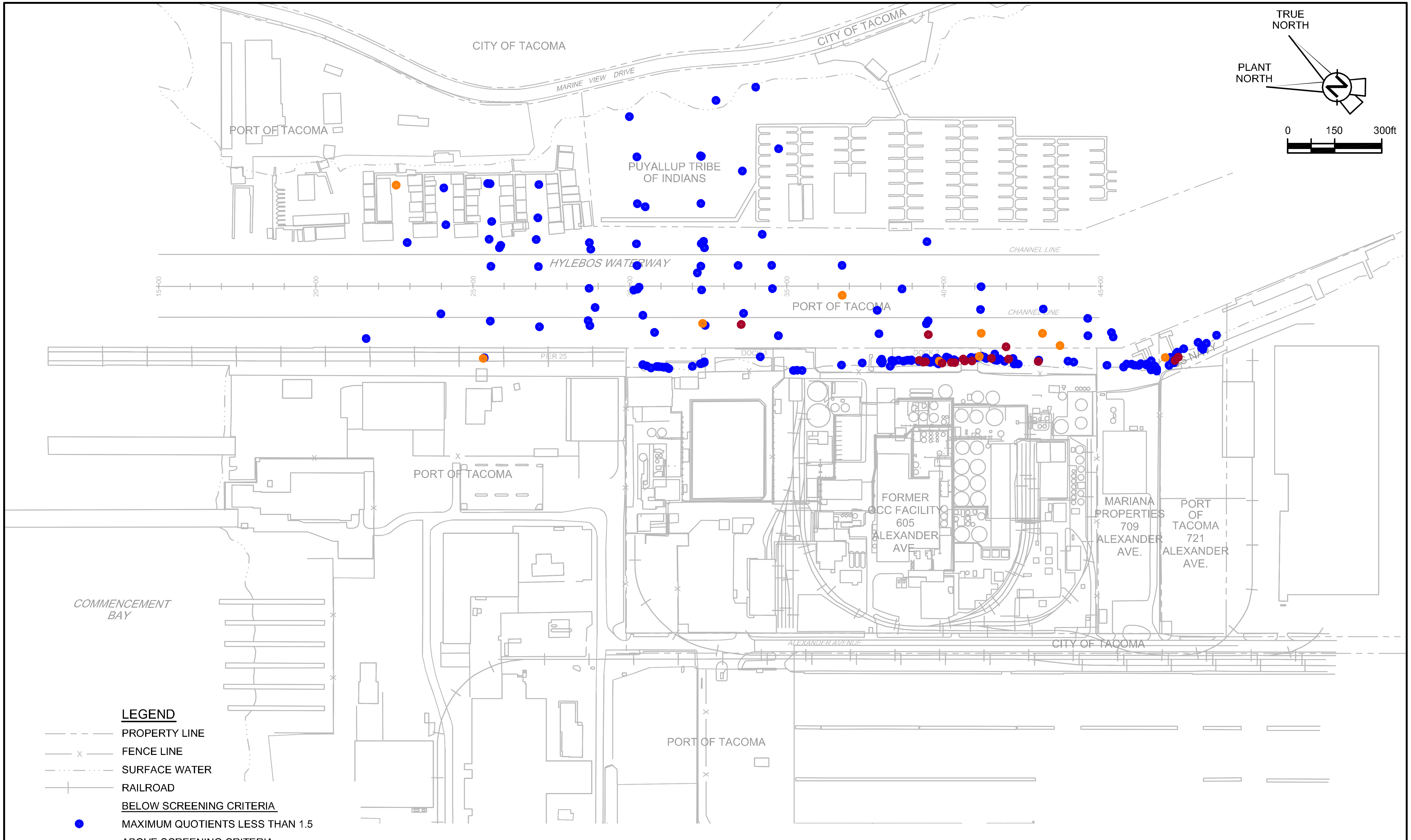
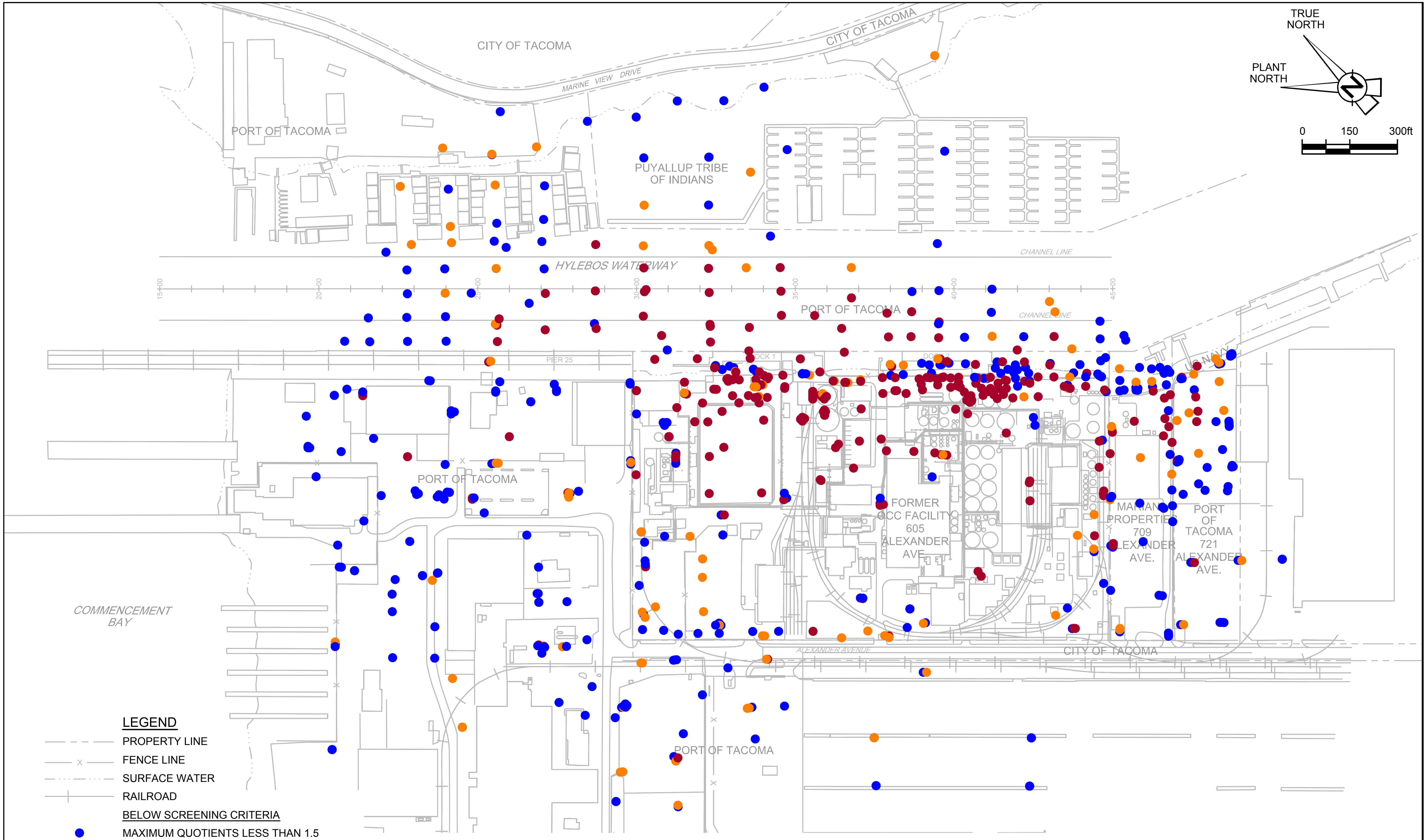


figure 4.12

ECOLOGICAL SCREENING QUOTIENTS FOR pH IN SEDIMENT/POREWATER/SEEPS/SEEPAGE METERS

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA044 FEB 6/2014



LEGEND

PROPERTY LINE
FENCE LINE
SURFACE WATER
RAILROAD

BELOW SCREENING CRITERIA

● MAXIMUM QUOTIENTS LESS THAN 1.5

ABOVE SCREENING CRITERIA

● MAXIMUM QUOTIENTS BETWEEN 1.5 AND 10
● MAXIMUM QUOTIENTS GREATER THAN 10

figure 4.13

ECOLOGICAL SCREENING QUOTIENTS FOR pH IN GROUNDWATER

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA045 FEB 7/2014

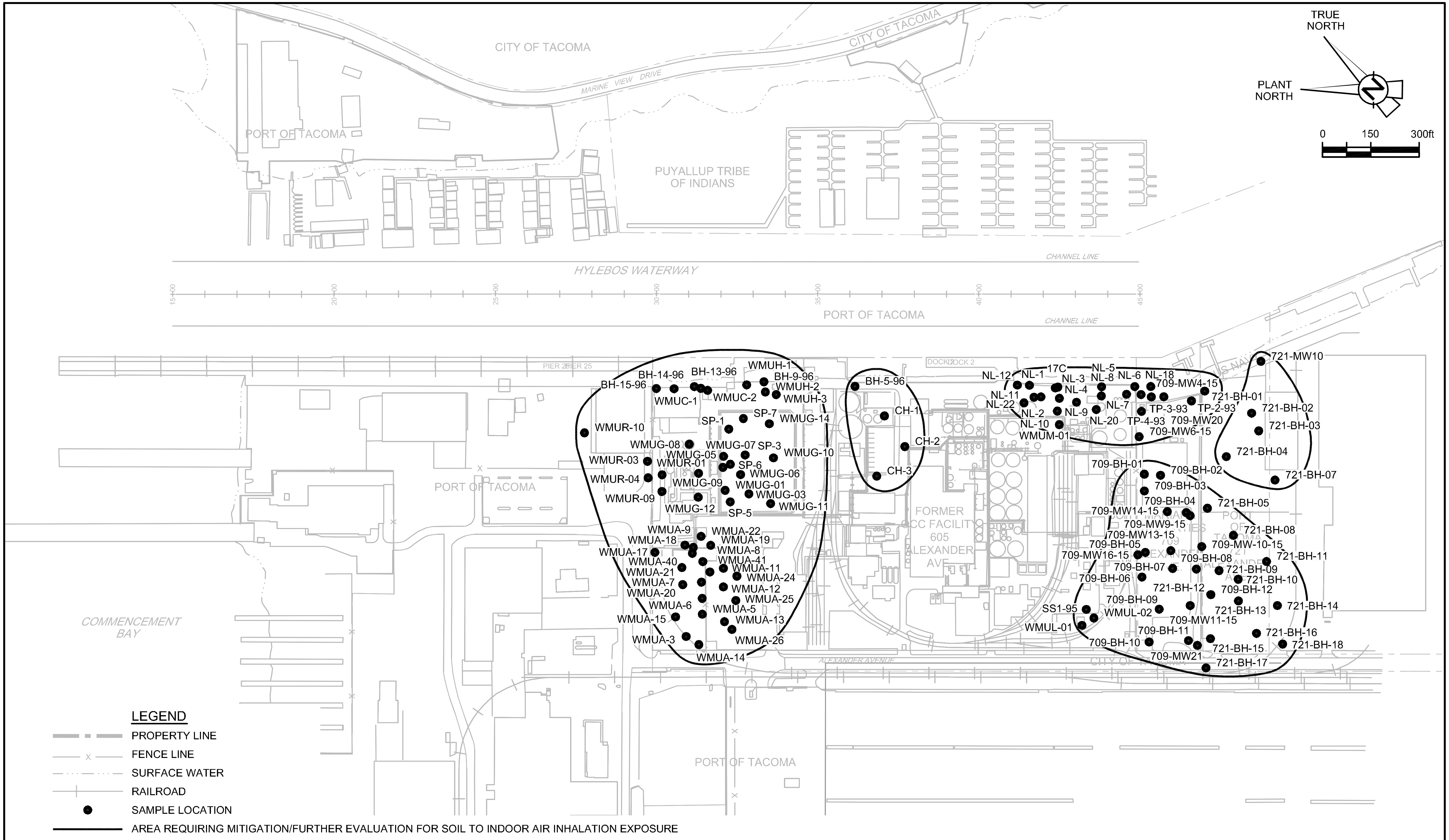


figure 6.1

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF SOIL TO INDOOR AIR INHALATION EXPOSURE
ON/OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

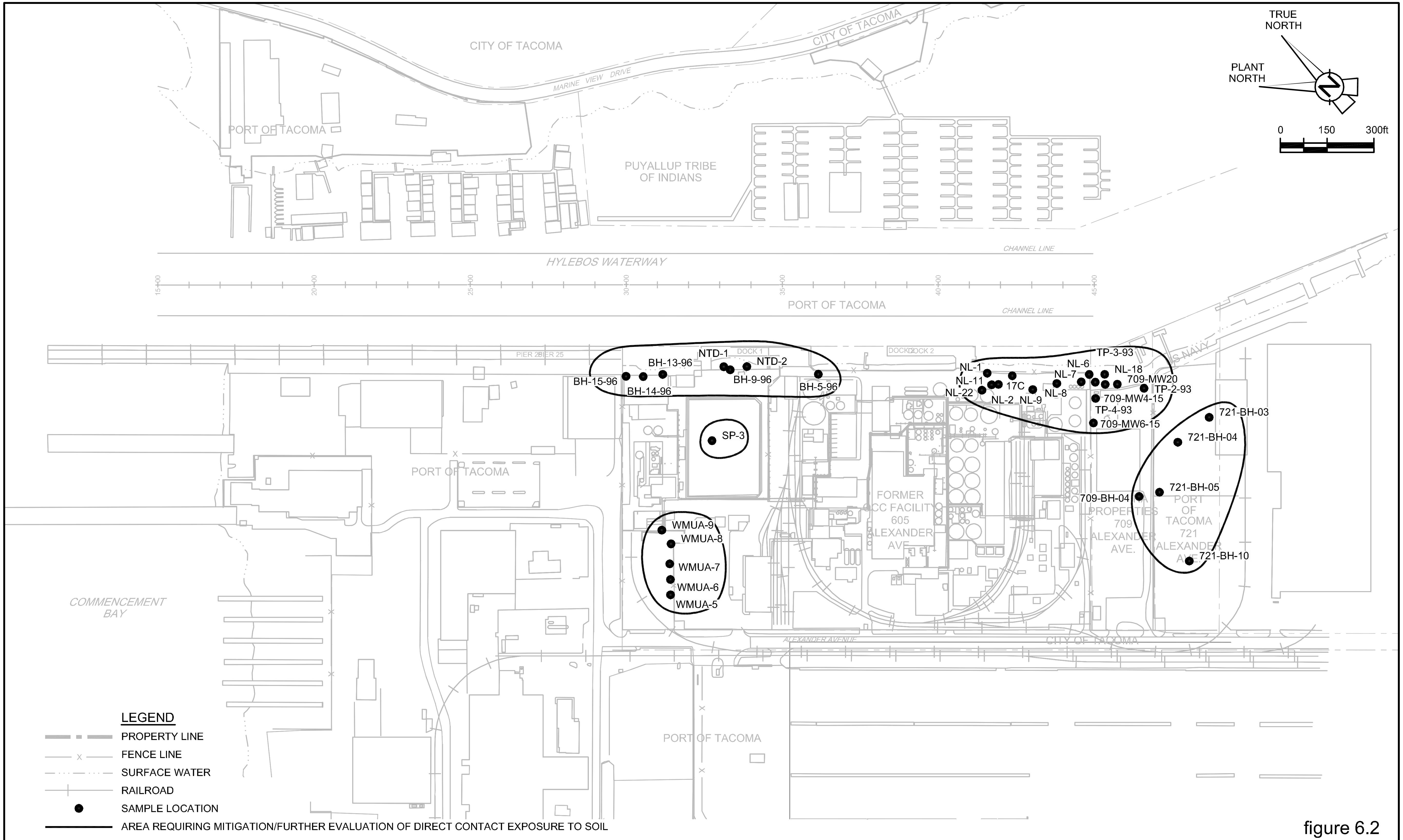
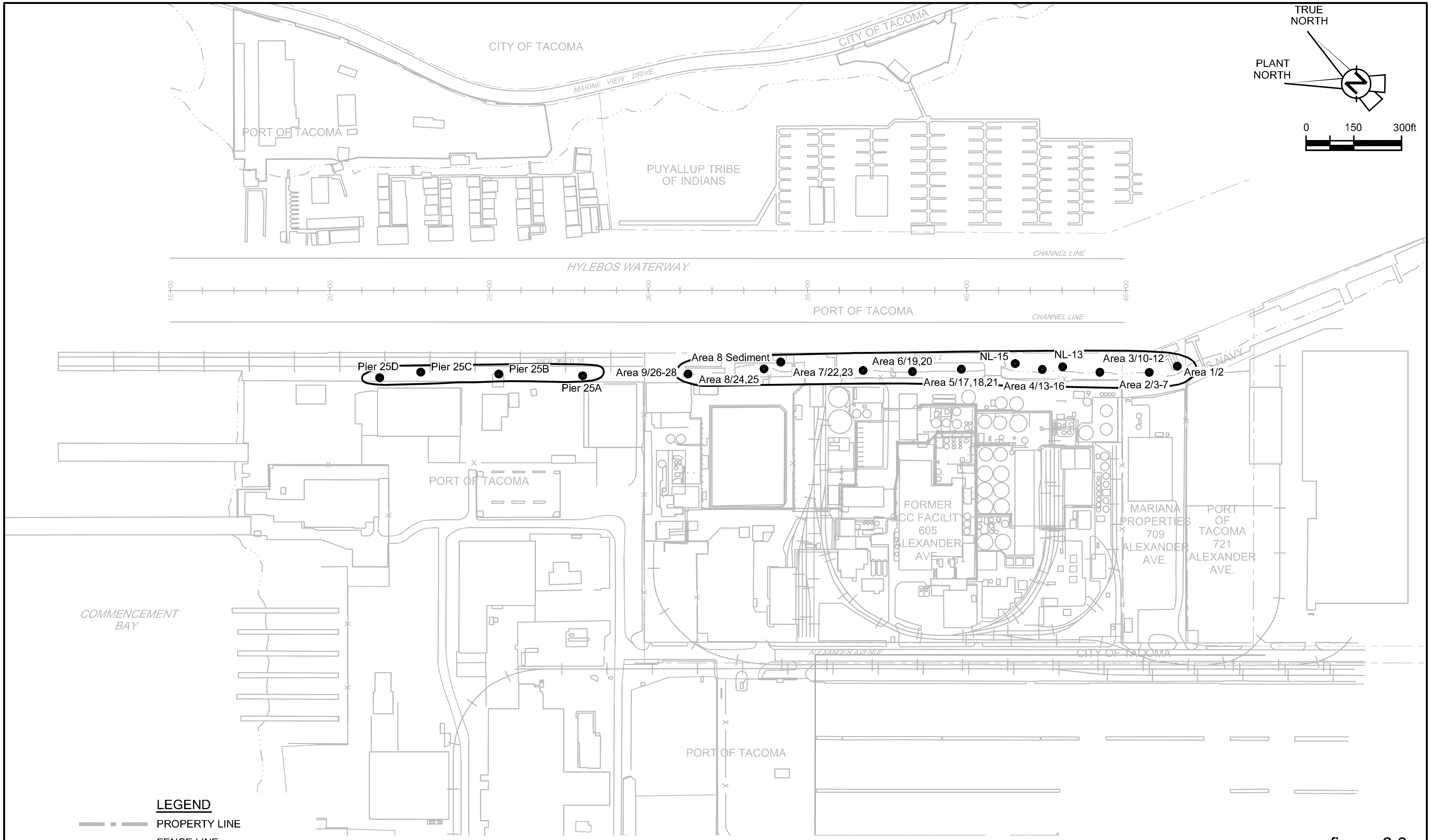


figure 6.2

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF DIRECT CONTACT EXPOSURE TO SOIL
ON/OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

CRA

07843-M2(126)GN-WA019 FEB 6/2014



LEGEND

▬ ▪ ▬	PROPERTY LINE
—x—	FENCE LINE
·· ··	SURFACE WATER
—┼—	RAILROAD
●	SAMPLE LOCATION
——	AREA REQUIRING MITIGATION/FURTHER EVALUATION OF DIRECT CONTACT EXPOSURE TO SEDIMENT

figure 6.3

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF DIRECT CONTACT EXPOSURE TO SEDIMENT
ON/OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

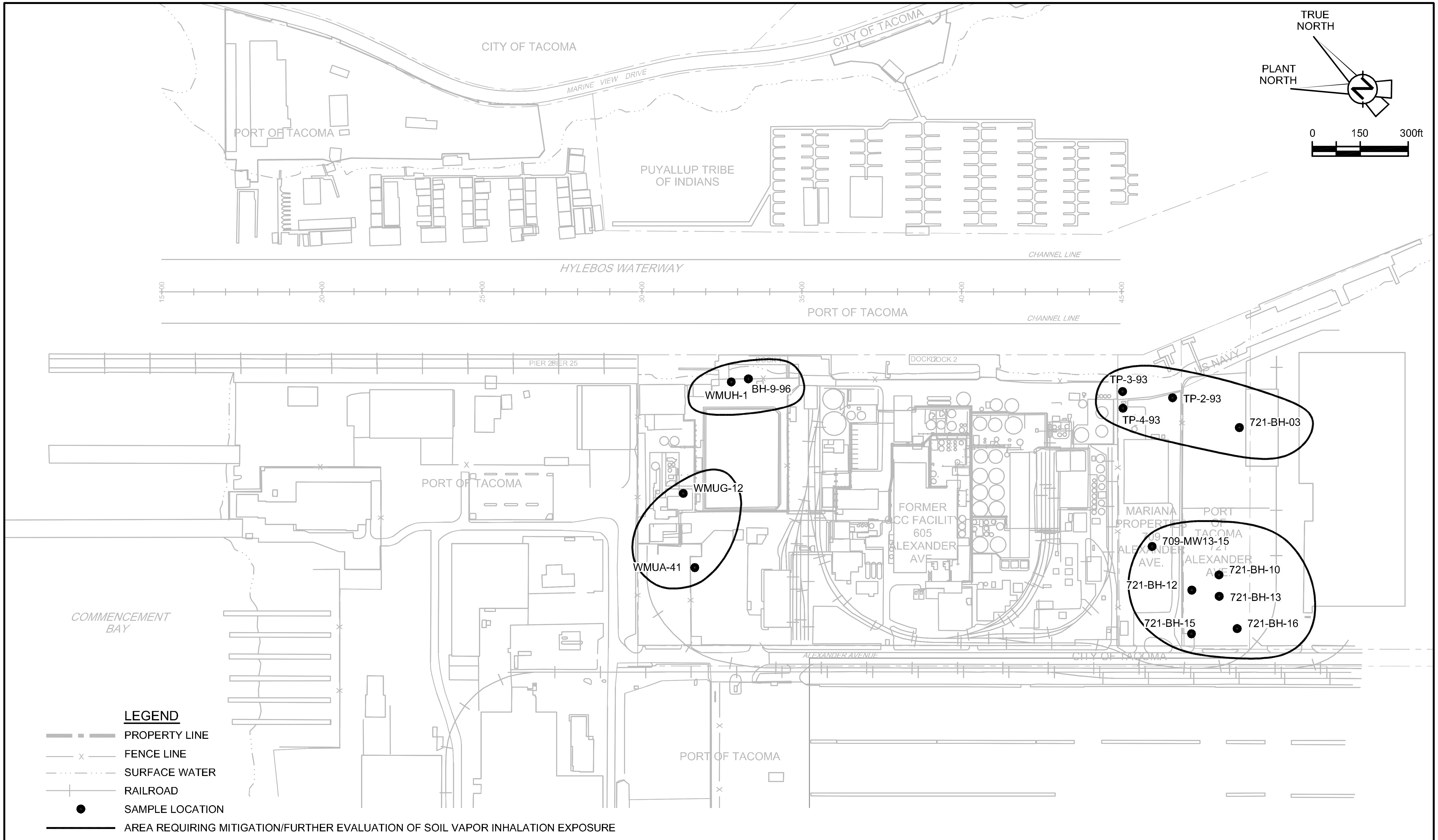


figure 6.4

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF SOIL VAPOR INHALATION EXPOSURE
ON/OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA021 FEB 6/2014

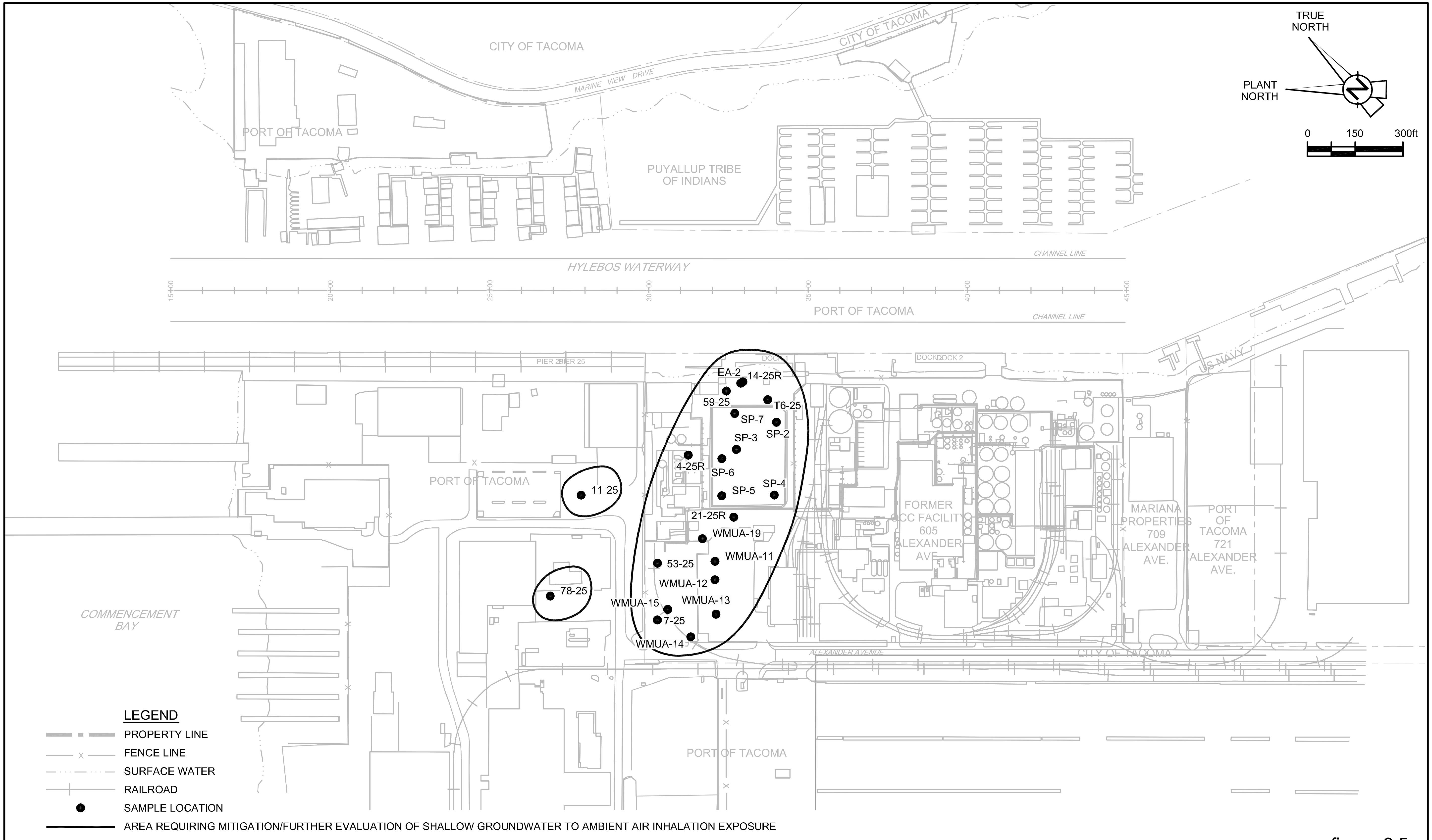


figure 6.5

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF SHALLOW GROUNDWATER TO AMBIENT AIR INHALATION EXPOSURE
ON/OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA022 FEB 6/2014

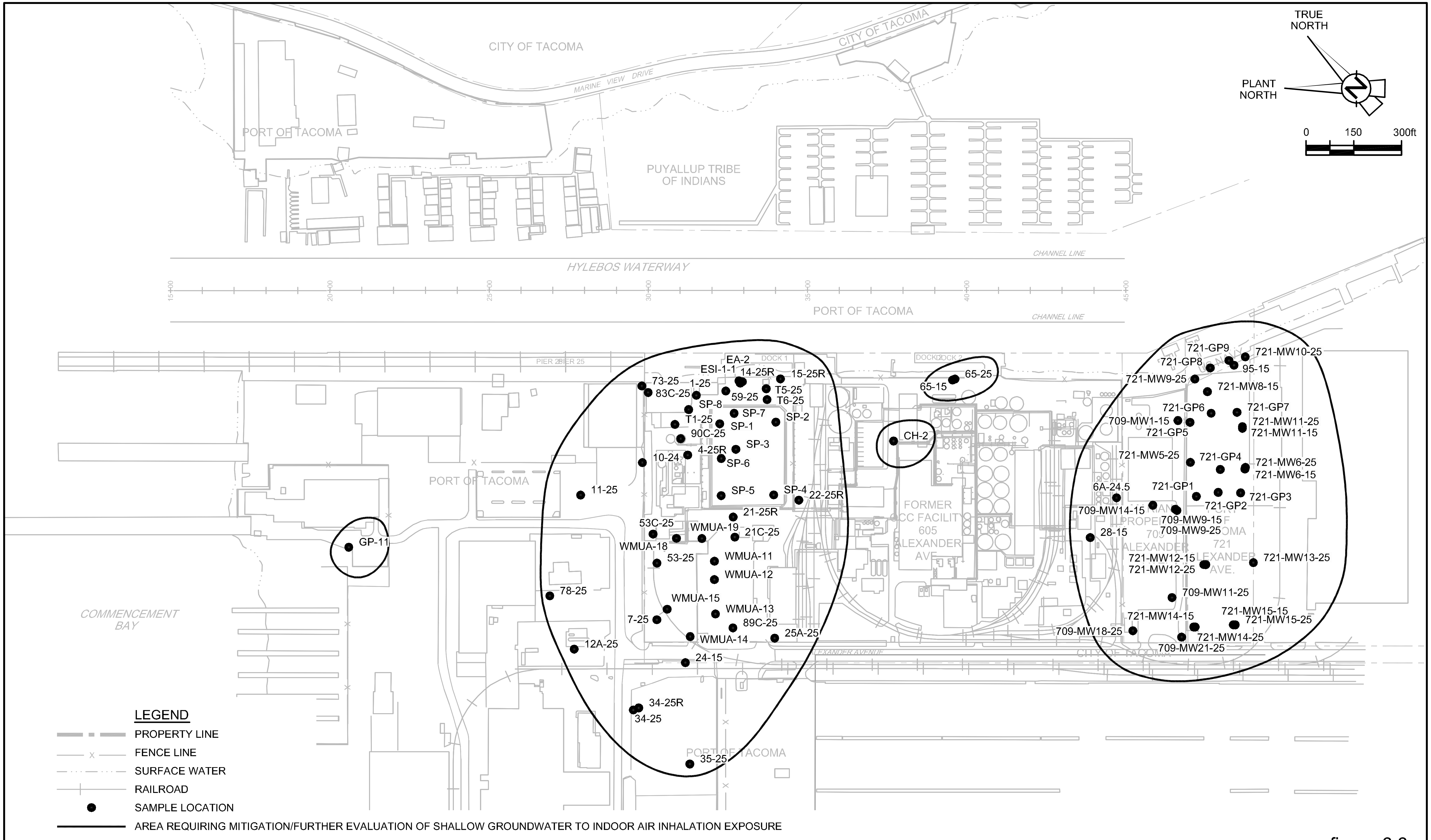


figure 6.6

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF SHALLOW GROUNDWATER TO INDOOR AIR INHALATION EXPOSURE
ON/OFF-OCC PROPERTY
Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA023 FEB 6/2014

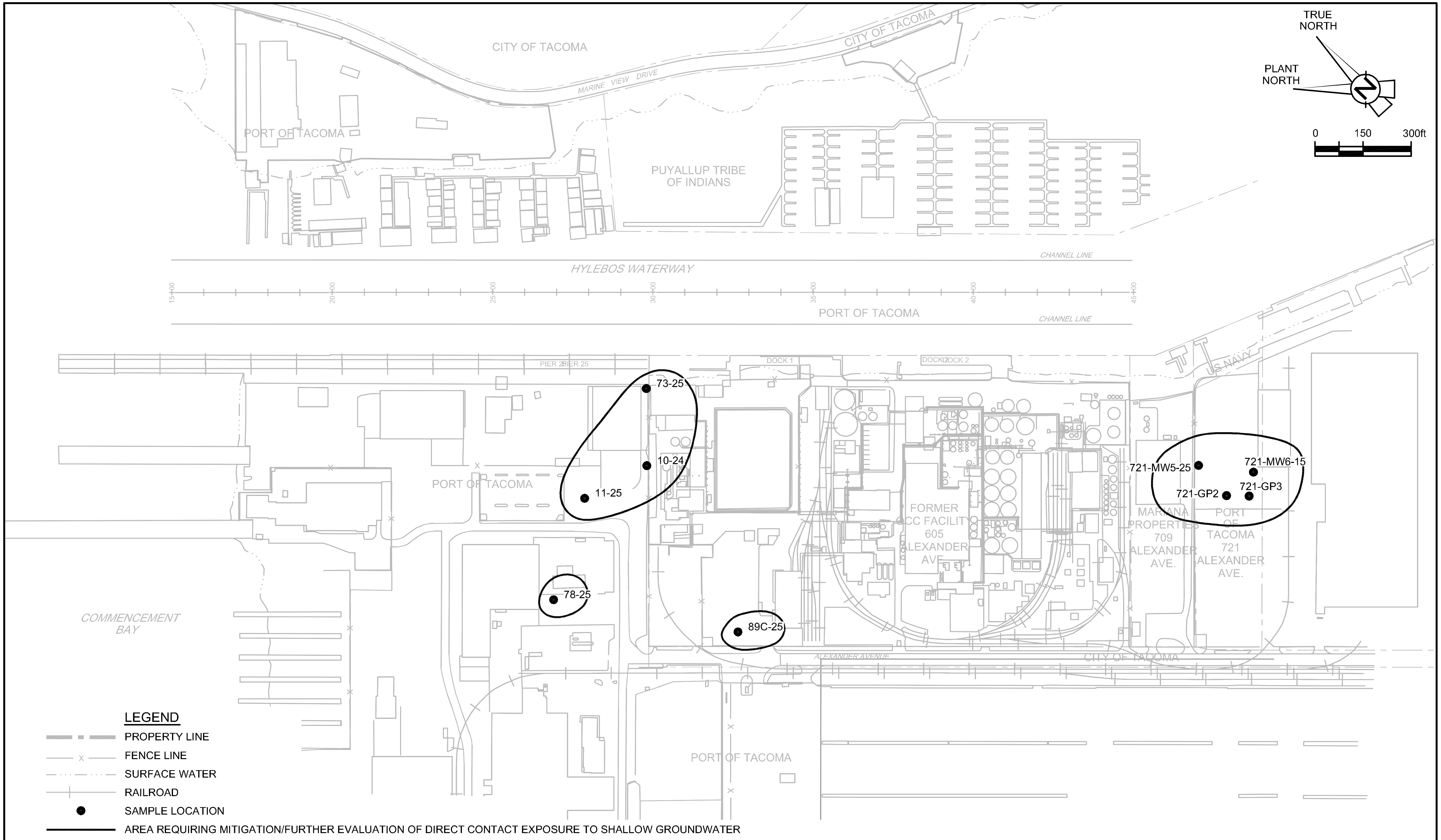


figure 6.7

AREAS REQUIRING MITIGATION/FURTHER EVALUATION OF DIRECT CONTACT EXPOSURE TO SHALLOW GROUNDWATER
ON/OFF-OCC PROPERTY

Occidental Chemical Corporation, Tacoma, Washington

07843-M2(126)GN-WA024 FEB 6/2014

PRIMARY RISK DRIVERS

	GROUNDWATER	SEDIMENT	SOIL
VOCs	X	--	BENZENE, CHLOROFORM, PCE, TCE
SVOCs	HCB	--	HCB, HCBD
METALS	(1)	As, Pb	As, Pb
PESTICIDES	---	--	---
PCBs	X	X	X
DIOXINS / FURANS	X	X	X
pH	X	--	---

HUMAN RECEPTORS

- Ⅰ TRESPASSER
- Ⅱ INDUSTRIAL/COMMERCIAL WORKER
- Ⅲ CONSTRUCTION/UTILITY WORKER
- Ⅳ FISHER

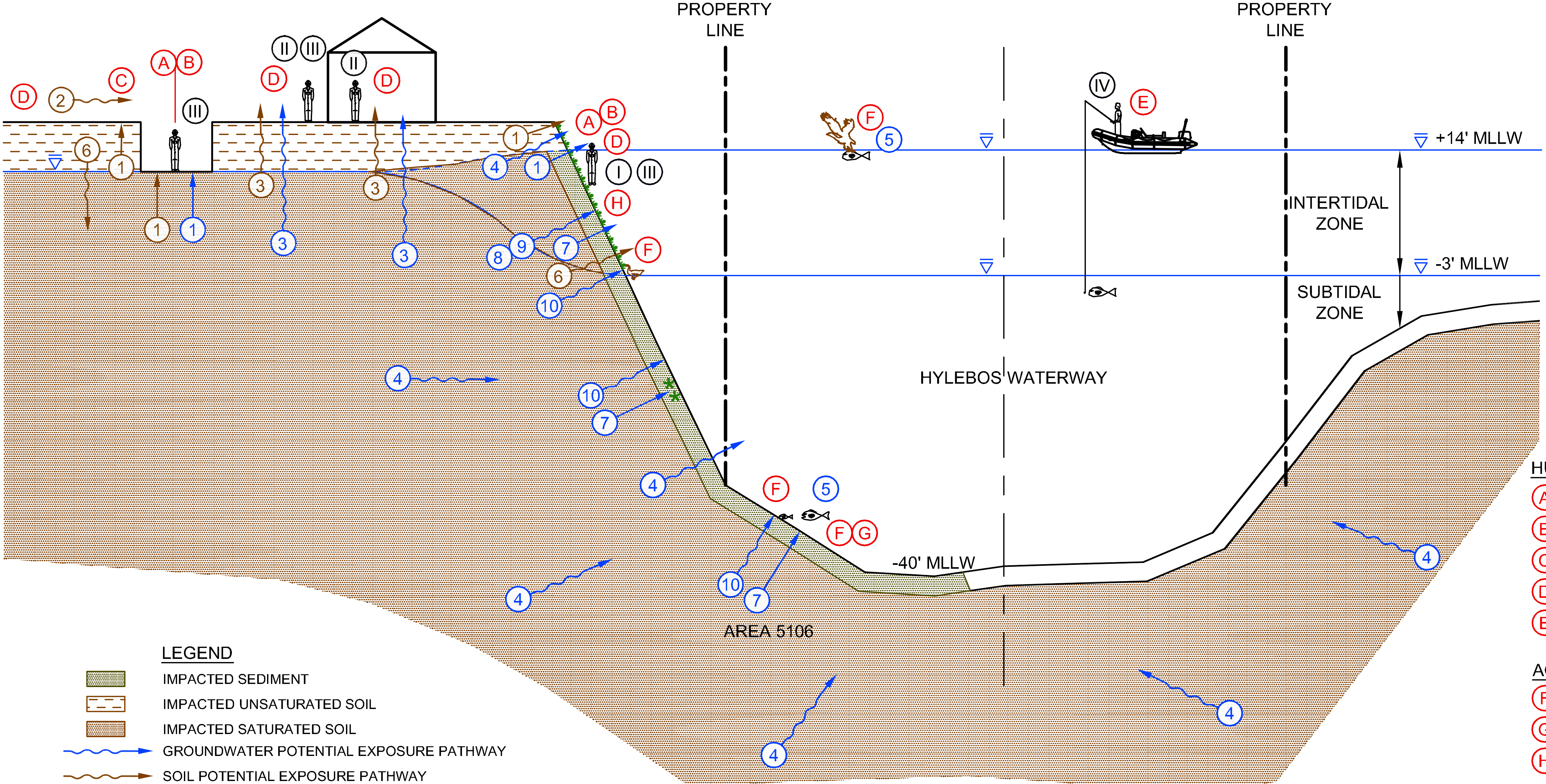
RELEASE MECHANISMS

HUMAN HEALTH

- ① ① DIRECT CONTACT
- ② WIND
- ③ ③ VOLATILIZATION
- ④ MIGRATION
- ⑤ BIO CONCENTRATION
- ⑥ LEACHING

AQUATIC

- ⑦ DIRECT CONTACT
- ⑧ INGESTION
- ⑨ UPTAKE
- ⑩ DIETARY UPTAKE



EXPOSURE ROUTE

HUMAN HEALTH

- Ⓐ INCIDENTAL INGESTION
- Ⓑ DERMAL CONTACT
- Ⓒ INHALATION OF PARTICULATES
- Ⓓ INHALATION OF VAPORS
- Ⓔ INGESTION

AQUATIC

- Ⓕ INGESTION
- Ⓖ DERMAL CONTACT
- Ⓗ UPTAKE

LEGEND

- ▨ IMPACTED SEDIMENT
- ▨ IMPACTED UNSATURATED SOIL
- ▨ IMPACTED SATURATED SOIL
- ⟶ GROUNDWATER POTENTIAL EXPOSURE PATHWAY
- ⟶ SOIL POTENTIAL EXPOSURE PATHWAY
- ① ① RELEASE MECHANISM (SOIL / GROUNDWATER)
- Ⓐ EXPOSURE ROUTE
- AQUATIC VEGETATION
- ** AQUATIC / BENTHIC INVERTEBRATE
- FISH
- BIRDS

NOTE:

(1) CONCENTRATIONS OF As, Cr, Cu, Pb, Ni, AND Zn PRESENT IN GROUNDWATER HAVE BEEN DETERMINED TO BE BIASED HIGH DUE TO INTERFERENCES ASSOCIATED WITH THE SITE'S GROUNDWATER MATRIX. THEY ARE NOT CONSIDERED TO BE REPRESENTATIVE OF SITE CONDITIONS.

figure 6.8

SCHEMATIC CONCEPTUAL SITE MODEL WITH RISK DRIVERS

Occidental Chemical Corporation, Tacoma, Washington

TABLE 2.1

UPLAND GROUNDWATER CONSTITUENTS OF CONCERN(1)
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Volatiles	
	1,1,2,2-Tetrachloroethane
	1,1,2-Trichloroethane
	1,1-Dichloroethene
	Benzene (2)
	Carbon Tetrachloride
	Chloroform (Trichloromethane)
	Methylene chloride
	Tetrachloroethene
	cis-1,2-Dichloroethene
	trans-1,2-Dichloroethene
	Trichloroethene
	Vinyl Chloride
General Chemistry	
	pH

Notes:

(1) From Table 3.1 of the Statement of Work (January 2005).

(2) 709/721 Alexander portion of Site only.

TABLE 2.2

EMBANKMENT AREA/ SUBTIDAL GROUNDWATER CONSTITUENTS OF CONCERN(1)
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Volatiles	
	1,1,2,2-Tetrachloroethane
	1,1,2-Trichloroethane
	1,1-Dichloroethene
	Benzene (2)
	Carbon tetrachloride
	Chloroform (Trichloromethane)
	Methylene chloride
	Tetrachloroethene
	cis-1,2-Dichloroethene
	trans-1,2-Dichloroethene
	Trichloroethene
	Vinyl chloride
Semi-Volatiles	
	Hexachlorobutadiene
	Hexachlorobenzene
	Pentachlorophenol
PCB	
	Total PCBs
Metals	
	Arsenic
	Chromium, total
	Copper
	Lead
	Mercury
	Nickel
	Thallium
	Zinc
General Chemistry	
	pH

Notes:

(1) From Table 3.2 of the Statement of Work (January 2005).

(2) 709/721 Alexander portion of Site only.

PCB Polychlorinated Biphenyl.

TABLE 2.3

SURFACE WATER CONSTITUENTS OF CONCERN(1)
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Volatiles	
	1,1,2,2-Tetrachloroethane
	1,1,2-Trichloroethane
	1,1-Dichloroethene
	Benzene (2)
	Carbon tetrachloride
	Chloroform (Trichloromethane)
	Methylene chloride
	Tetrachloroethene
	cis-1,2-Dichloroethene
	trans-1,2-Dichloroethene
	Trichloroethene
	Vinyl chloride
Semi-Volatiles	
	Hexachlorobenzene
	Pentachlorophenol
PCB	
	Total PCBs
Metals	
	Arsenic
	Chromium, total
	Copper
	Lead
	Mercury
	Nickel
	Thallium
	Zinc
General Chemistry	
	pH

Notes:

(1)	From Table 3.3 of the Statement of Work (January 2005).
(2)	709/721 Alexander portion of Site only.
PCB	Polychlorinated Biphenyl.

TABLE 2.4

SEDIMENT / POREWATER CONSTITUENTS OF CONCERN(1)
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Volatiles

1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethene
Benzene (2)
Carbon tetrachloride
Chloroform (Trichloromethane)
Ethylbenzene
Methylene chloride
Tetrachloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl chloride

Semi-Volatiles

1,2,4-Trichlorobenzene
bis(2-Ethylhexl) phthalate
Hexachlorobenzene
Hexachlorobutadiene
Pentachlorophenol

Pesticides, PCB(s)

4,4'-DDD
4,4'-DDE
4,4'-DDT
Total PCBs
Dioxin-Furan (2,3,7,8 tcdd)

Metals

Antimony
Arsenic
Cadmium
Chromium, total (3)
Copper
Lead
Mercury
Nickel
Silver
Thallium (3)
Zinc

General Chemistry

pH

Notes:

(1) From Table 3.4 of the Statement of Work (January 2005).
(2) 709/721 Alexander portion of Site only.
(3) Porewater COC only.
PCB Polychlorinated Biphenyl.

TABLE 2.5

SOIL CONSTITUENTS OF CONCERN
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Volatiles

1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethene
Benzene
Carbon tetrachloride
Chloroform (Trichloromethane)
cis-1,2-Dichloroethene
Ethylbenzene
Methylene chloride
Tetrachloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl chloride

Semi-Volatiles

1,2,4-Trichlorobenzene
bis(2-Ethylhexyl)phthalate
Hexachlorobenzene
Hexachlorobutadiene
Pentachlorophenol

Pesticides, PCB(s)

4,4'-DDD
4,4'-DDE
4,4'-DDT
Total PCBs

Metals

Antimony
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Silver
Thallium
Zinc

Note:

PCB Polychlorinated Biphenyl.

TABLE 3.1

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SOIL
ON-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Soil (0-10 ftbgs)
Exposure Medium: Soil

CAS Number	*Chemical*	*Minimum Concentration* (1,2)	*Minimum Qualifier*	*Maximum Concentration* (1,2)	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	0.62	J	290		µg/kg	WMUR-01; 9 ftbgs (06/15/12)	7/175	0.78 - 1400
79-00-5	1,1,2-Trichloroethane	ND		ND		µg/kg	--	0/177	0.28 - 1400
75-35-4	1,1-Dichloroethene	8		8		µg/kg	SP06; 0-2 ftbgs (06/05/06)	1/188	0.51 - 1400
71-43-2	Benzene	0.095	J	5300		µg/kg	709-MW-13-15; 5 ftbgs (07/27/95)	32/122	0.66 - 1400
56-23-5	Carbon tetrachloride	0.32	J	990		µg/kg	HC-TP-04-93; 4-4.5 ftbgs (12/08/93)	15/190	0.82 - 1400
67-66-3	Chloroform (Trichloromethane)	0.25	J	11000		µg/kg	HC-TP-04-93; 4-4.5 ftbgs (12/08/93)	57/190	1.5 - 1200
156-59-2	cis-1,2-Dichloroethene	0.24	J	45	J	µg/kg	NL-08; 1-4 ftbgs (05/31/05)	28/168	0.23 - 1400
100-41-4	Ethylbenzene	0.23	J	36000		µg/kg	709-MW-13-15; 5 ftbgs (07/27/95)	24/142	0.67 - 1400
75-09-2	Methylene chloride	1.7	J	5000		µg/kg	709-MW-10-15; 5 ftbgs (07/27/95)	58/201	3.53 - 1900
127-18-4	Tetrachloroethene	0.38	J	62000		µg/kg	WMUA-41; 9 ftbgs (06/12/12)	166/208	0.57 - 810
156-60-5	trans-1,2-Dichloroethene	2.4	J	3	J	µg/kg	SP06; 0-2 ftbgs (06/05/06)	2/168	0.35 - 1400
79-01-6	Trichloroethene	0.31	J	21000	J	µg/kg	WMUH-01; 0-4 ftbgs (06/08/04)	126/208	0.73 - 1200
75-01-4	Vinyl chloride	0.29	j	7.5		µg/kg	WMUA-08; 4-8 ftbgs (06/11/04)	8/176	1.7 - 1400
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	2.6	J	2300		µg/kg	HC-TP-03-93; 6-6.5 ftbgs (12/08/93)	8/47	0.54 - 220
117-81-7	bis(2-Ethylhexyl)phthalate	40		620		µg/kg	709-MW-04-15; 7-8.5 ftbgs (01/11/94)	14/64	18 - 1900
118-74-1	Hexachlorobenzene	0.14	J	1400		µg/kg	HC-TP-03-93; 6-6.5 ftbgs (12/08/93)	27/119	1.05 - 67000
87-68-3	Hexachlorobutadiene	1.43	J	28000		µg/kg	WMUA-06; 4-8 ftbgs (06/10/04)	48/110	0.85 - 67000
87-86-5	Pentachlorophenol	21.9	J	2500		µg/kg	WMUA-09; 0-4 ftbgs (06/11/04)	7/119	3.5 - 130000
	Pesticides								
72-54-8	4,4'-DDD	ND		ND		µg/kg	--	0/7	1.8 - 510
72-55-9	4,4'-DDE	3		7.3		µg/kg	BH-13-96; 0-2 ftbgs (04/01/96)	2/7	1.8 - 510
50-29-3	4,4'-DDT	3.3		5.9		µg/kg	BH-14-96; 0-4.9 ftbgs (04/01/96)	2/7	1.8 - 510
	PCBs								
1336-36-3	Total PCBs	40.9		15600	J	µg/kg	BH-09-96; 2-8 ftbgs (03/29/96)	19/87	5.3 - 190000
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	26.75	J	845.794	J	ng/kg	NTD01; 3-4 Ftbgs (11/29/06)	6/6	--
	Metals								
7440-36-0	Antimony	11	J	22100	J	µg/kg	017C; 5 ftbgs (07/13/12)	34/50	51 - 30000
7440-38-2	Arsenic	150	J	228000		µg/kg	NL-07; 1-3 ftbgs (05/31/05)	101/104	5000 - 30000
7440-43-9	Cadmium	16	J	39100		µg/kg	017C; 5 ftbgs (07/13/12)	38/50	19 - 1000
7440-47-3	Chromium	1900		1200000		µg/kg	BH-15-96; 0-7.5 ftbgs (04/01/96)	104/104	--
7440-50-8	Copper	5100		7070000		µg/kg	NL-07; 3-4 ftbgs (05/31/05)	104/104	--
7439-92-1	Lead	829		28000000		µg/kg	HC-TP-02-93; 4-4.5 ftbgs (12/08/93)	109/112	1900 - 2100
7439-97-6	Mercury	2	J	1200		µg/kg	BH-14-96; 0-4.9 ftbgs (04/01/96)	51/116	11.1 - 528
7440-02-0	Nickel	3200	J	962000		µg/kg	NL-09; 5-6 ftbgs (06/01/05)	104/104	--
7440-22-4	Silver	8	J	19500		µg/kg	017C; 5 ftbgs (07/13/12)	28/50	20 - 2000
7440-28-0	Thallium	21		210	J	µg/kg	NL-09; 5-6 ftbgs (06/01/05)	42/79	23 - 666
7440-66-6	Zinc	10100	J	10200000		µg/kg	017C; 5 ftbgs (07/13/12)	104/104	--

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from December 1993 through to October 2012.

TABLE 3.2

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SEDIMENT
ON-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

CAS Number	*Chemical*	*Minimum (1,2) Concentration*	*Minimum Qualifier*	*Maximum (1,2) Concentration*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	63.9		63.9		µg/kg	NL-13 (12/20/05)	1/2	3.35
75-35-4	1,1-Dichloroethene	9.32	J	9.32	J	µg/kg	NL-13 (12/20/05)	1/2	2.19
56-23-5	Carbon tetrachloride	29.2		211		µg/kg	NL-13 (12/20/05)	2/2	--
67-66-3	Chloroform	439		4820		µg/kg	NL-13 (12/20/05)	2/2	--
156-59-2	cis-1,2-Dichloroethene	4.03	J	217		µg/kg	NL-13 (12/20/05)	2/2	--
127-18-4	Tetrachloroethene	2		8110		µg/kg	NL-13 (12/20/05)	11/11	--
156-60-5	trans-1,2-Dichloroethene	11.2		11.2		µg/kg	NL-13 (12/20/05)	1/2	2.4
79-01-6	Trichloroethene	1.1		494		µg/kg	NL-13 (12/20/05)	7/11	1 - 1.11
75-01-4	Vinyl chloride	14.5		14.5		µg/kg	NL-13 (12/20/05)	1/2	2.7
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	60		86	J	µg/kg	Area 2/3-7 (04/03/96)	2/9	18 - 26
117-81-7	bis(2-Ethylhexyl)phthalate	65		1800		µg/kg	Area 8/24,25 (04/05/96)	9/9	--
118-74-1	Hexachlorobenzene	50		770	J	µg/kg	Area 2/3-7 (04/03/96)	10/11	11.2
87-68-3	Hexachlorobutadiene	37		2300	J	µg/kg	Area 2/3-7 (04/03/96)	11/11	--
87-86-5	Pentachlorophenol	120		290		µg/kg	Area 1/2 (04/03/96)	6/10	19.3 - 98
	Pesticides								
72-54-8	4,4'-DDD	140		2200		µg/kg	Area 4/13-16 (04/04/96)	6/11	0.243 - 510
72-55-9	4,4'-DDE	3.5		740		µg/kg	Area 4/13-16 (04/04/96)	2/11	0.238 - 560
50-29-3	4,4'-DDT	3.4		3.4		µg/kg	Area 9/26-28 (04/05/96)	1/11	0.28 - 560
	PCBs								
1336-36-3	Total PCBs	160		6250		µg/kg	Area 8/24, 25 (04/05/96)	8/15	4.43 - 50
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	--		--		ng/kg	--	--	--
	Metals								
7440-36-0	Antimony	9000		50000	J	µg/kg	Area 1/2 (04/03/96)	8/8	--
7440-38-2	Arsenic	9020	J	140000		µg/kg	Area 4/13-16 (04/04/96)	11/11	--
7440-43-9	Cadmium	400		3600		µg/kg	Area 8/24,25 (04/05/96)	5/9	300 - 1000
7440-47-3	Chromium	20500	J	160000		µg/kg	Area 8/24,25 (04/05/96)	11/11	--
7440-50-8	Copper	110000		2500000		µg/kg	Area 3/10-12 (04/04/96)	11/11	--
7439-92-1	Lead	520000	J	150000000	J	µg/kg	Area 4/13-16 (04/04/96)	11/11	--
7439-97-6	Mercury	43.1		1400		µg/kg	Area 9/26-28 (04/05/96)	11/11	--
7440-02-0	Nickel	30000		450000	J	µg/kg	Area 6/19,20 (04/05/96)	11/11	--
7440-22-4	Silver	400		2000		µg/kg	Area 4/13-16 (04/04/96)	9/9	--
7440-28-0	Thallium	41.5	J	41.5	J	µg/kg	NL-13 (12/20/05)	1/2	67.4
7440-66-6	Zinc	108000	J	1500000		µg/kg	Area 8/24,25 (04/05/96)	11/11	--

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from January 1994, April 1996, January/February 1998, and December 2005.

TABLE 3.3

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SHALLOW GROUNDWATER
ON-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Shallow Groundwater
Exposure Medium: Groundwater/ Ambient Air

CAS Number	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	0.77		5480		µg/L	SP-4 (06/20/06)	3/134	0.02 - 1300
79-00-5	1,1,2-Trichloroethane	0.1	J	166		µg/L	SP-4 (06/20/06)	6/134	0.082 - 1300
75-35-4	1,1-Dichloroethene	0.11	J	1000		µg/L	SP-5 (06/02/06)	43/134	0.086 - 1000
71-43-2	Benzene	0.07	J	2300		µg/L	721-MW15-15 (07/30/12)	41/76	0.5 - 1300
56-23-5	Carbon tetrachloride	0.3	J	200		µg/L	SP-5 (06/02/06)	2/134	0.082 - 1300
67-66-3	Chloroform (Trichloromethane)	0.08	J	79800		µg/L	SP-4 (06/20/06)	49/134	0.04 - 1300
156-59-2	cis-1,2-Dichloroethene	0.07	J	320000	J	µg/L	WMUA-14 (08/08/06)	100/134	0.16 - 620
100-41-4	Ethylbenzene	0.06	J	440		µg/L	709-MW9-15 (08/14/12)	34/76	0.5 - 1300
75-09-2	Methylene chloride	1.1	J	846		µg/L	SP-4 (06/20/06)	16/134	0.09 - 5000
127-18-4	Tetrachloroethene	0.097	J	170000		µg/L	WMUA-15 (08/07/06)	91/135	0.066 - 1300
156-60-5	trans-1,2-Dichloroethene	0.08	J	3100		µg/L	WMUA-14 (08/08/06)	65/134	0.091 - 1000
79-01-6	Trichloroethene	0.1	J	190000	J	µg/L	WMUA-14 (08/08/06)	95/135	0.16 - 50
75-01-4	Vinyl chloride	0.11	J	490000		µg/L	SP-2 (07/07/06)	73/134	0.14 - 1400
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	ND		ND		µg/L	--	0/3	0.2 - 1.9
117-81-7	bis(2-Ethylhexyl)phthalate	ND		ND		µg/L	--	0/3	0.97 - 9.5
118-74-1	Hexachlorobenzene	ND		ND		µg/L	--	0/34	0.00358 - 1.9
87-68-3	Hexachlorobutadiene	0.02		10.8		µg/L	SP-3 (06/14/06)	7/25	0.00245 - 1.9
87-86-5	Pentachlorophenol	0.917		3.1		µg/L	SP-6 (06/05/06)	5/33	0.0236 - 9.5
	Pesticides								
72-54-8	4,4'-DDD	ND		ND		µg/L	--	0/1	0.01
72-55-9	4,4'-DDE	ND		ND		µg/L	--	0/1	0.01
50-29-3	4,4'-DDT	ND		ND		µg/L	--	0/1	0.015
	PCBs								
1336-36-3	Total PCBs	ND		ND		µg/L	--	0/76	0.0098 - 1
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	0.002	J	14.948	J	pg/L	21-25R (01/17/07)	5/5	--
	Metals								
7440-36-0	Antimony	0.094	J	19		µg/L	5-25 (07/06/09)	47/66	0.01 - 0.5
7440-38-2	Arsenic	0.27	J	208		µg/L	3-25 (08/28/12)	93/105	0.334 - 43.2
7440-43-9	Cadmium	0.07	J	1.6		µg/L	80-25 (07/06/09)	23/65	0.2
7440-47-3	Chromium	0.31	J	672		µg/L	49-15 (08/11/12)	73/105	0.2 - 44.1
7440-50-8	Copper	0.24	J	286		µg/L	CH-5 (06/08/06)	89/105	1 - 93.9
7439-92-1	Lead	0.033	J	968		µg/L	CH-5 (06/08/06)	75/108	0.0167 - 28
7439-97-6	Mercury	0.02	J	0.54		µg/L	80-25 (07/06/09)	30/105	0.041 - 0.82
7440-02-0	Nickel	0.2	J	140		µg/L	66-15 (07/10/04)	84/105	0.8 - 40
7440-22-4	Silver	0.052	J	0.378		µg/L	48-15 (08/10/12)	14/66	0.04 - 0.3
7440-28-0	Thallium	0.009	J	12.2		µg/L	EA-3 (10/25/05)	18/103	0.0184 - 10
7440-66-6	Zinc	1.3	J	310		µg/L	5-25 (07/06/09)	55/103	0.302 - 575

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from July 2002 through to August 2012.

TABLE 3.4

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SOIL
OFF-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Soil (0-10 ftbgs)
Exposure Medium: Soil/ Indoor Air

CAS Number	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	3100		3100		µg/kg	721-BH-03; 7.5-8.5 ftbgs (05/31/12)	1/34	1.3 - 1400
79-00-5	1,1,2-Trichloroethane	ND		ND		µg/kg	--	0/34	0.28 - 1500
75-35-4	1,1-Dichloroethene	ND		ND		µg/kg	--	0/34	0.79 - 1500
71-43-2	Benzene	0.085	J	30000	J	µg/kg	721-BH-13; 6-7.25 ftbgs (05/21/12)	27/33	0.66 - 750
56-23-5	Carbon tetrachloride	ND		ND		µg/kg	--	0/34	0.84 - 1500
67-66-3	Chloroform (Trichloromethane)	ND		ND		µg/kg	--	0/34	1.5 - 1500
156-59-2	cis-1,2-Dichloroethene	ND		ND		µg/kg	--	0/34	0.23 - 1500
100-41-4	Ethylbenzene	0.33	J	72000	J	µg/kg	721-BH-13; 6-7.25 ftbgs (05/21/12)	18/33	0.67 - 360
75-09-2	Methylene chloride	2.2	J	1300	J	µg/kg	721-BH-03; 7.5-8.5 ftbgs (05/31/12)	6/34	4.8 - 3000
127-18-4	Tetrachloroethene	0.32	J	170	J	µg/kg	721-BH-13; 6-7.25 ftbgs (05/21/12)	18/34	0.67 - 1500
156-60-5	trans-1,2-Dichloroethene	ND		ND		µg/kg	--	0/34	0.36 - 1500
79-01-6	Trichloroethene	0.37	J	2.7	J	µg/kg	WMUA-29; 5-7 ftbgs (07/19/06)	5/34	0.88 - 1500
75-01-4	Vinyl chloride	ND		ND		µg/kg	--	0/34	1.8 - 1500
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	ND		ND		µg/kg	--	0/2	0.54
117-81-7	bis(2-Ethylhexyl)phthalate	ND		ND		µg/kg	--	0/2	64
118-74-1	Hexachlorobenzene	ND		ND		µg/kg	--	0/2	63
87-68-3	Hexachlorobutadiene	ND		ND		µg/kg	--	0/2	54
87-86-5	Pentachlorophenol	ND		ND		µg/kg	--	0/2	61
	Pesticides								
72-54-8	4,4'-DDD	--		--		µg/kg	--	--	--
72-55-9	4,4'-DDE	--		--		µg/kg	--	--	--
50-29-3	4,4'-DDT	--		--		µg/kg	--	--	--
	PCBs								
1336-36-3	Total PCBs	5.4		5.4		µg/kg	721-BH-13; 4-5 ftbgs (05/21/12)	1/10	6.3 - 98
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	--		--		ng/kg	--	--	--
	Metals								
7440-36-0	Antimony	10	J	2510	J	µg/kg	721-BH-05; 2.5-3.5 ftbgs (05/31/12)	30/33	44 - 61
7440-38-2	Arsenic	430	J	6380		µg/kg	721-BH-03; 0.5-1.5 ftbgs (05/31/12)	33/33	--
7440-43-9	Cadmium	11	J	706		µg/kg	721-BH-13; 4-5 ftbgs (05/21/12)	29/33	21 - 24
7440-47-3	Chromium	5410		16400		µg/kg	721-BH-03; 0.5-1.5 ftbgs (05/31/12)	33/33	--
7440-50-8	Copper	7590		283000		µg/kg	721-BH-05; 2.5-3.5 ftbgs (05/31/12)	33/33	--
7439-92-1	Lead	846		899000		µg/kg	721-BH-05; 2.5-3.5 ftbgs (05/31/12)	33/33	--
7439-97-6	Mercury	3	J	109		µg/kg	721-010; 2-3 ftbgs (06/05/12)	32/33	23
7440-02-0	Nickel	5040		25300		µg/kg	721-BH-07; 5-6 ftbgs (05/30/12)	33/33	--
7440-22-4	Silver	9	J	257	J	µg/kg	721-BH-10; 3-4 ftbgs (05/31/12)	30/33	21 - 24
7440-28-0	Thallium	20	J	59		µg/kg	721-BH-07; 5-6 ftbgs (05/30/12)	31/33	24 - 25
7440-66-6	Zinc	12100		438000	J	µg/kg	721-BH-05; 2.5-3.5 ftbgs (05/31/12)	31/33	12600 - 15400

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from July 2006 through to October 2012.

TABLE 3.5

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SEDIMENT
OFF-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

CAS Number	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	ND		ND		µg/kg	--	0/8	1.6 - 8.6
79-00-5	1,1,2-Trichloroethane	ND		ND		µg/kg	--	0/8	0.62 - 8.34
75-35-4	1,1-Dichloroethene	ND		ND		µg/kg	--	0/8	1 - 7.3
56-23-5	Carbon tetrachloride	ND		ND		µg/kg	--	0/8	1 - 4.3
67-66-3	Chloroform	ND		ND		µg/kg	--	0/8	1.89 - 3.7
156-59-2	cis-1,2-Dichloroethene	ND		ND		µg/kg	--	0/8	1.4 - 5.6
100-41-4	Ethylbenzene	--		--		µg/kg	--	--	--
75-09-2	Methylene chloride	ND		ND		µg/kg	--	0/8	2.92 - 5.9
127-18-4	Tetrachloroethene	2.12	J	2.12	J	µg/kg	Puyallup Tribe; 5106-23 (02/10/06)	1/8	0.7 - 6.1
156-60-5	trans-1,2-Dichloroethene	ND		ND		µg/kg	--	0/8	1.8 - 4.7
79-01-6	Trichloroethene	6.95	J	13		µg/kg	Puyallup Tribe; 5106-27 (04/10/06)	2/8	0.92 - 0.56
75-01-4	Vinyl chloride	ND		ND		µg/kg	--	0/8	2.2 - 6.9
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	--		--		µg/kg	--	--	--
117-81-7	bis(2-Ethylhexyl)phthalate	--		--		µg/kg	--	--	--
118-74-1	Hexachlorobenzene	--		--		µg/kg	--	--	--
87-68-3	Hexachlorobutadiene	--		--		µg/kg	--	--	--
87-86-5	Pentachlorophenol	--		--		µg/kg	--	--	--
	Pesticides								
72-54-8	4,4'-DDD	--		--		µg/kg	--	--	--
72-55-9	4,4'-DDE	--		--		µg/kg	--	--	--
50-29-3	4,4'-DDT	--		--		µg/kg	--	--	--
	PCBs								
1336-36-3	Total PCBs	148.73		25985.15		µg/kg	Pier25D (01/30/07)	10/10	--
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	1.305	J	57.389	J	ng/kg	Pier25A (01/30/07)	10/10	--
	Metals								
7440-36-0	Antimony	--		--		µg/kg	--	--	--
7440-38-2	Arsenic	--		--		µg/kg	--	--	--
7440-43-9	Cadmium	--		--		µg/kg	--	--	--
7440-47-3	Chromium	--		--		µg/kg	--	--	--
7440-50-8	Copper	--		--		µg/kg	--	--	--
7439-92-1	Lead	--		--		µg/kg	--	--	--
7439-97-6	Mercury	--		--		µg/kg	--	--	--
7440-02-0	Nickel	--		--		µg/kg	--	--	--
7440-22-4	Silver	--		--		µg/kg	--	--	--
7440-28-0	Thallium	--		--		µg/kg	--	--	--
7440-66-6	Zinc	--		--		µg/kg	--	--	--

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from February 2006, April 2006, and January 2007.

Note, although samples Pier 25B, Pier 25C and Pier 25D were included in the evaluation, these locations have been subsequently capped by the Port of Tacoma.

TABLE 3.6

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SHALLOW GROUNDWATER
OFF-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Shallow Groundwater
Exposure Medium: Groundwater/Ambient Air/Indoor Air

CAS Number	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	ND		ND		µg/L	--	0/83	0.081 - 2500
79-00-5	1,1,2-Trichloroethane	ND		ND		µg/L	--	0/83	0.082 - 2500
75-35-4	1,1-Dichloroethene	0.13	J	590	J	µg/L	078-025 (04/25/06)	8/83	0.086 - 2500
71-43-2	Benzene	0.07	J	2400		µg/L	721-006-015 (07/25/12)	29/52	0.16 - 2500
56-23-5	Carbon tetrachloride	ND		ND		µg/L	--	0/83	0.082 - 2500
67-66-3	Chloroform (Trichloromethane)	0.08	J	4400	J	µg/L	078-025 (04/25/06)	7/83	0.07 - 2500
156-59-2	cis-1,2-Dichloroethene	0.09	J	140000		µg/L	078-025 (04/25/06)	47/83	0.062 - 2500
100-41-4	Ethylbenzene	0.05	J	310		µg/L	721-GP002 (06/21/04)	22/52	0.23 - 2500
75-09-2	Methylene chloride	0.11	J	9500		µg/L	078-025 (04/25/06)	11/83	0.31 - 200
127-18-4	Tetrachloroethene	0.17	J	170000		µg/L	010-024 (08/21/12)	13/83	0.066 - 330
156-60-5	trans-1,2-Dichloroethene	0.12	J	7600		µg/L	078-025 (04/25/06)	21/83	0.091 - 2500
79-01-6	Trichloroethene	0.1	J	13000	J	µg/L	078-025 (04/25/06)	23/83	0.055 - 50
75-01-4	Vinyl chloride	0.1	J	20000		µg/L	078-025 (04/25/06)	30/83	0.14 - 2500
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	--		--		µg/L	--	--	--
117-81-7	bis(2-Ethylhexyl)phthalate	--		--		µg/L	--	--	--
118-74-1	Hexachlorobenzene	ND		ND		µg/L	--	0/4	1.33
87-68-3	Hexachlorobutadiene	--		--		µg/L	--	--	--
87-86-5	Pentachlorophenol	ND		ND		µg/L	--	0/4	1.87
	Pesticides								
72-54-8	4,4'-DDD	--		--		µg/L	--	--	--
72-55-9	4,4'-DDE	--		--		µg/L	--	--	--
50-29-3	4,4'-DDT	--		--		µg/L	--	--	--
	PCBs								
1336-36-3	Total PCBs	0.021		0.094		µg/L	721-010-025 (08/07/12)	2/16	0.01 - 5
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	0.015	J	0.063	J	pg/L	071-025 (07/27/12)	2/2	--
	Metals								
7440-36-0	Antimony	0.041	J	2.33	J	µg/L	721-007-015 (08/09/12)	19/33	0.5
7440-38-2	Arsenic	0.2	J	138		µg/L	Pier25-032 (04/04/06)	30/43	0.37 - 1
7440-43-9	Cadmium	0.07	J	0.65		µg/L	012-025 (08/24/12)	5/33	0.2
7440-47-3	Chromium	0.31	J	6350	J	µg/L	070-025 (08/26/12)	34/43	0.76 - 8.1
7440-50-8	Copper	0.25	J	117		µg/L	721-009-025 (07/22/12)	32/43	0.74 - 1
7439-92-1	Lead	0.036	J	9.04		µg/L	721-009-025 (07/22/12)	28/43	0.016 - 0.8
7439-97-6	Mercury	0.02	J	0.089	J	µg/L	Pier25-032 (04/04/06)	6/43	0.041 - 0.8
7440-02-0	Nickel	0.15	J	1160		µg/L	070-025 (08/26/12)	34/43	2
7440-22-4	Silver	0.145	J	0.145	J	µg/L	721-009-025 (07/22/12)	1/33	0.2
7440-28-0	Thallium	0.0046	J	0.77		µg/L	Pier25-032 (04/04/06)	7/43	0.019 - 0.8
7440-66-6	Zinc	0.84	J	118		µg/L	072-027 (07/12/04)	18/43	2.3 - 5

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from August 2002 through to August 2012.

TABLE 3.7

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN SHALLOW GROUNDWATER
ON/OFF-OCC PROPERTY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Surface Water

CAS Number	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*
	VOCs								
79-34-5	1,1,2,2-Tetrachloroethane	ND		5480		µg/L	SP-4 (06/20/06)	3/217	0.02 - 2500
79-00-5	1,1,2-Trichloroethane	ND		166		µg/L	SP-4 (06/20/06)	6/217	0.082 - 2500
75-35-4	1,1-Dichloroethene	0.11	J	1000		µg/L	SP-5 (06/02/06)	51/217	0.086 - 2500
71-43-2	Benzene	0.07	J	2400		µg/L	721-006-015 (07/25/12)	70/128	0.16 - 2500
56-23-5	Carbon tetrachloride	ND		200		µg/L	SP-5 (06/02/06)	2/217	0.082 - 2500
67-66-3	Chloroform (Trichloromethane)	0.08	J	79800		µg/L	SP-4 (06/20/06)	56/217	0.04 - 2500
156-59-2	cis-1,2-Dichloroethene	0.07	J	320000	J	µg/L	WMUA-14 (08/08/06)	147/217	0.062 - 2500
100-41-4	Ethylbenzene	0.05	J	440		µg/L	709-MW9-15 (08/14/12)	56/128	0.23 - 2500
75-09-2	Methylene chloride	0.11	J	9500		µg/L	078-025 (04/25/06)	27/217	0.09 - 5000
127-18-4	Tetrachloroethene	0.097	J	170000		µg/L	WMUA-15 (08/07/06)	104/218	0.066 - 1300
156-60-5	trans-1,2-Dichloroethene	0.08	J	7600		µg/L	078-025 (04/25/06)	86/217	0.091 - 2500
79-01-6	Trichloroethene	0.1	J	190000	J	µg/L	WMUA-14 (08/08/06)	118/218	0.055 - 50
75-01-4	Vinyl chloride	0.1	J	490000		µg/L	SP-2 (07/07/06)	103/217	0.14 - 2500
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	ND		ND		µg/L	--	0/3	0.2 - 1.9
117-81-7	bis(2-Ethylhexyl)phthalate	ND		ND		µg/L	--	0/3	0.97 - 9.5
118-74-1	Hexachlorobenzene	ND		ND		µg/L	--	0/38	0.00358 - 1.9
87-68-3	Hexachlorobutadiene	0.02		10.8		µg/L	SP-3 (06/14/06)	7/25	0.00245 - 1.9
87-86-5	Pentachlorophenol	ND		3.1		µg/L	SP-6 (06/05/06)	5/37	0.0236 - 9.5
	Pesticides								
72-54-8	4,4'-DDD	ND		ND		µg/L	--	0/1	0.01
72-55-9	4,4'-DDE	ND		ND		µg/L	--	0/1	0.01
50-29-3	4,4'-DDT	ND		ND		µg/L	--	0/1	0.015
	PCBs								
1336-36-3	Total PCBs	ND		0.094		µg/L	721-010-025 (08/07/12)	2/92	0.0098 - 5
	Dioxins/Furans								
1746-01-6	2,3,7,8-TCDD (TEQ)	0.002	J	14.948	J	pg/L	21-25R (01/17/07)	7/7	--
	Metals								
7440-36-0	Antimony	0.041	J	19		µg/L	5-25 (07/06/09)	66/99	0.01 - 0.5
7440-38-2	Arsenic	0.2	J	208		µg/L	3-25 (08/28/12)	123/148	0.334 - 43.2
7440-43-9	Cadmium	0.07	J	1.6		µg/L	80-25 (07/06/09)	28/98	0.2
7440-47-3	Chromium	0.31	J	6350	J	µg/L	070-025 (08/26/12)	107/148	0.2 - 44.1
7440-50-8	Copper	0.24	J	286		µg/L	CH-5 (06/08/06)	121/148	0.74 - 93.9
7439-92-1	Lead	0.033	J	968		µg/L	CH-5 (06/08/06)	103/151	0.016 - 28
7439-97-6	Mercury	0.02	J	0.54		µg/L	80-25 (07/06/09)	36/148	0.041 - 0.82
7440-02-0	Nickel	0.15	J	1160		µg/L	070-025 (08/26/12)	118/148	0.8 - 40
7440-22-4	Silver	0.052	J	0.378		µg/L	48-15 (08/10/12)	15/99	0.04 - 0.3
7440-28-0	Thallium	0.0046	J	12.2		µg/L	EA-3 (10/25/05)	25/146	0.0184 - 10
7440-66-6	Zinc	0.84	J	310		µg/L	5-25 (07/06/09)	73/146	0.302 - 575

Notes:

--	Not reported.
ND	Not detected.
J	Associated value is estimated.
TEQ	Toxic Equivalency
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from January 2002 through to August 2012.

TABLE 3.8

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR INDOOR AIR FROM SOIL AND GROUNDWATER - INDUSTRIAL/COMMERCIAL WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

			Industrial/Commercial Worker			
			Carcinogen	*Non-Carcinogen*	*Indoor Air*	
Constituents of Concern (COCs)	*URF inhalation 1/(mg/m^3)*	*RfC inhalation (mg/m^3)*	*TR Adult (mg/m^3)*	*THQ Adult (mg/m^3)*	*Risk-Based Concentration RBC$_{ia}$ (1) (mg/m^3)*	*(µg/m^3)*
VOCs						
1,1,2,2-Tetrachloroethane	5.80E-02	--	2.77E-04	NC	2.77E-04	2.77E-01
1,1,2-Trichloroethane	1.60E-02	--	1.00E-03	NC	1.00E-03	1.00E+00
1,1-Dichloroethene	--	2.00E-01	NC	8.57E-01	8.57E-01	8.57E+02
Benzene	7.80E-03	3.00E-02	2.06E-03	1.29E-01	2.06E-03	2.06E+00
Carbon Tetrachloride	6.00E-03	1.00E-01	2.68E-03	4.29E-01	2.68E-03	2.68E+00
Chloroform	2.30E-02	9.80E-02	6.99E-04	4.20E-01	6.99E-04	6.99E-01
cis-1,2-Dichloroethene	--	--	NC	NC	NV	NV
Ethylbenzene	--	1.00E+00	NC	4.29E+00	4.29E+00	4.29E+03
Methylene Chloride	1.00E-05	6.00E-01	1.61E+00	2.57E+00	1.61E+00	1.61E+03
Tetrachloroethene	2.60E-04	4.00E-02	6.18E-02	1.71E-01	6.18E-02	6.18E+01
trans-1,2-Dichloroethene	--	6.00E-02	NC	2.57E-01	2.57E-01	2.57E+02
Trichloroethene	4.10E-03	2.00E-03	3.92E-03	8.57E-03	3.92E-03	3.92E+00
Vinyl Chloride	4.40E-03	1.00E-01	3.65E-03	4.29E-01	3.65E-03	3.65E+00
SVOCs						
1,2,4-Trichlorobenzene	--	2.00E-03	NC	8.57E-03	8.57E-03	8.57E+00
Hexachlorobenzene	4.60E-01	--	3.49E-05	NC	3.49E-05	3.49E-02
Hexachlorobutadiene	2.20E-02	--	7.31E-04	NC	7.31E-04	7.31E-01
Pentachlorophenol	5.10E-03	--	3.15E-03	NC	3.15E-03	3.15E+00
Pesticides						
4,4'-DDE	9.70E-02	--	1.66E-04	NC	1.66E-04	1.66E-01
4,4'-DDT	9.70E-02	--	1.66E-04	NC	1.66E-04	1.66E-01
Metals						
Mercury	--	3.00E-04	NC	1.29E-03	1.29E-03	1.29E+00

Notes:

--	Not Available
NC	Not Calculated
NV	No Value
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	Assumed 8 hour work day.
(3)	Based on assumption of 5 days per week for 52 weeks over an exposure period of 365 days, as indicated in WAC (2007).

Industrial/Commercial Worker Assumptions

Risk-Based Concentration in Indoor Air (mg/m^3)	RBC$_{ia}$	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Unit Risk Factor (per mg/m^3)	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m^3)	RfC	chemical-specific	Refer to Table 3.33
Fraction Time Exposed (unitless)	FT	8/24	(2)
Exposure Frequency (unitless)	EF	0.7	WAC, 2007 (3)
Exposure Duration (years)	ED	20	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	20	WAC, 2007

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{ia} = \frac{TR \times ATc}{EF \times FT \times ED \times URF}$$

Non-Carcinogenic Endpoints:

$$RBC_{ia} = \frac{THQ \times ATnc}{EF \times FT \times ED \times (1/RfC)}$$

Reference:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

TABLE 3.9

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL FOR THE PROTECTION OF INDOOR AIR QUALITY FOR INDUSTRIAL/COMMERCIAL WORKER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

	Chemical Properties (1)							*Johnson & Ettinger*	*Risk-Based Concentrations for Soil, RBC_{soil}*				*Soil Maximum Concentration*	
Constituents of Concern (COCs)	*Henry's Law Constant, H_L (atm m^3/mol)*		*Water Diffusion Coefficient, D^{H2O} (cm^2/s)*		*Air Diffusion Coefficient, D^{air} (cm^2/s)*		*Organic Carbon Partitioning Coefficient, K_{oc} (mL/g)*	*Attenuation Factor a (2)*	*Risk-Based Indoor Air Concentration RBC_{ia} (3) (µg/m^3)*	*Soil Gas Concentration at Source C_{sg} (4) (µg/m^3)*	*Concentration Sorbed to Soil Particles C_{sp} (5) (mg/kg)*	*Soil Risk-Based Concentration RBC_{soil} (6) (mg/kg)*	*On-OCC Property (7) (mg/kg)*	*Off-OCC Property (8) (mg/kg)*
VOCs														
1,1,2,2-Tetrachloroethane	1.61E-04	(12.8°C)	7.90E-06	(25°C)	6.67E-02	(12.8°C)	9.33E+01	2.23E-03	2.77E-01	1.24E+02	1.03E-02	0.0109	0.29	3.1
1,1,2-Trichloroethane	4.58E-04	(12.8°C)	8.80E-06	(25°C)	7.33E-02	(12.8°C)	5.01E+01	2.24E-03	1.00E+00	4.48E+02	7.02E-03	0.0078913		
1,1-Dichloroethene	1.65E-02	(12.8°C)	1.04E-05	(25°C)	8.45E-02	(12.8°C)	5.89E+01	2.26E-03	8.57E+02	3.79E+05	1.94E-01	0.301	0.008	--
Benzene	3.09E-03	(12.8°C)	9.80E-06	(25°C)	8.27E-02	(12.8°C)	5.89E+01	2.26E-03	2.06E+00	9.13E+02	2.49E-03	0.0029	5.3	30
Carbon Tetrachloride	1.73E-02	(12.8°C)	8.80E-06	(25°C)	7.33E-02	(12.8°C)	1.74E+02	2.24E-03	2.68E+00	1.20E+03	1.73E-03	0.0021	0.99	--
Chloroform	2.13E-03	(12.8°C)	1.00E-05	(25°C)	9.77E-02	(12.8°C)	3.98E+01	2.28E-03	6.99E-01	3.07E+02	8.20E-04	0.001	11	--
cis-1,2-Dichloroethene	2.34E-03	(12.8°C)	1.13E-05	(25°C)	6.91E-02	(12.8°C)	3.55E+01	2.23E-03	NV	NV	NV	NV	0.045	--
Ethylbenzene	3.79E-03	(12.8°C)	7.80E-06	(25°C)	7.04E-02	(12.8°C)	3.63E+02	2.23E-03	4.29E+03	1.92E+06	2.63E+01	27.1	36	72
Methylene Chloride	1.32E-03	(12.8°C)	1.17E-05	(25°C)	9.49E-02	(12.8°C)	1.17E+01	2.28E-03	1.61E+03	7.06E+05	8.97E-01	1.48	5	1.3
Tetrachloroethene	9.24E-03	(12.8°C)	8.20E-06	(25°C)	6.76E-02	(12.8°C)	1.55E+02	2.23E-03	6.18E+01	2.77E+04	6.66E-02	0.075	62	0.17
trans-1,2-Dichloroethene	5.61E-03	(12.8°C)	1.19E-05	(25°C)	6.64E-02	(12.8°C)	5.25E+01	2.23E-03	2.57E+02	1.16E+05	1.55E-01	0.198	0.003	--
Trichloroethene	5.56E-03	(12.8°C)	9.10E-06	(25°C)	7.42E-02	(12.8°C)	1.66E+02	2.24E-03	3.92E+00	1.75E+03	7.47E-03	0.008	21	0.0027
Vinyl Chloride	1.88E-02	(12.8°C)	1.23E-05	(25°C)	9.96E-02	(12.8°C)	1.86E+01	2.28E-03	3.65E+00	1.60E+03	2.26E-04	0.0007	0.0075	--
SVOCs														
1,2,4-Trichlorobenzene	2.65E-03	(12.8°C)	7.92E-06	(25°C)	5.69E-02	(12.8°C)	1.35E+03	2.20E-03	8.57E+00	3.90E+03	2.84E-01	0.286	2.3	--
Hexachlorobenzene	3.12E-04	(12.8°C)	5.91E-06	(25°C)	5.09E-02	(12.8°C)	5.50E+04	2.18E-03	3.49E-02	1.60E+01	4.05E-01	0.405	1.4	--
Hexachlorobutadiene	3.26E-03	(12.8°C)	6.16E-06	(25°C)	5.27E-02	(12.8°C)	5.37E+04	2.18E-03	7.31E-01	3.34E+02	7.88E-01	0.788	28	--
Pentachlorophenol	4.80E-09	(12.8°C)	6.10E-06	(25°C)	5.26E-02	(12.8°C)	5.92E+02	2.28E-03	3.15E+00	1.38E+03	2.44E+04	24645	2.5	--
Pesticides														
4,4' DDE	4.27E-06	(12.8°C)	5.87E-06	(25°C)	1.35E-02	(12.8°C)	4.47E+06	1.73E-03	1.66E-01	9.55E+01	1.43E+04	14294	0.0073	--
4,4' DDT	4.27E-06	(12.8°C)	5.87E-06	(25°C)	1.35E-02	(12.8°C)	4.47E+06	1.73E-03	1.66E-01	9.55E+01	1.43E+04	14294	0.0059	--
Metals														
Mercury	3.56E-03	(12.8°C)	6.30E-06	(25°C)	2.88E-02	(12.8°C)	5.20E+01	2.03E-03	1.29E+00	6.32E+02	1.32E-03	0.0016	1.2	0.109

Notes:

(1) The applied chemical properties are obtained from the chemical properties database incorporated in USEPA (2004) and the Site specific information presented in Table 2.6 of the Site Characterization Report. The Henry's Law constants and air diffusion coefficients were corrected for an average vadose zone temperature of 12.8°C. The reference temperature for the water diffusion coefficient is 25°C and considering its low value, a correction to 12.8°C was considered negligible.

(2) The soil gas attenuation factor a is based on the solution for soil gas migration to building indoor air presented in Johnson and Ettinger [1991; Equation (21)] and the vadose zone and building properties listed below.
The calculation of the soil gas attenuation factor was conducted using the Excel spreadsheet "SL-ADV-Feb04.xls" developed by USEPA (2004) and the following vadose zone and building properties.

TABLE 3.9

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL FOR THE PROTECTION OF INDOOR AIR QUALITY FOR INDUSTRIAL/COMMERCIAL WORKER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Vadose Zone Soil Properties:

Vadose Zone Soil Type - Sand

Total Porosity, e_T (%)	43	Site-specific porosity value.
Moisture-Filled Porosity, e_m	0.054	Default moisture filled porosity for a sand soil in USEPA (2004)
Vapor-Filled Porosity, e_v	0.376	Vapour-filled porosity, e_v = q_m / 100 - e_m
Dry Bulk Soil Density, r_b (g/cm³)	1.61	Site-specific density value.
Depth Below Grade to Top of Contamination, L_t (cm)	23	Based on mid-point of screen interval of minimum depth to volatile soil impacts of 0 to 1.5 feet BGS (0 to 0.46 meters BGS).
Thickness of Soil Stratum A, h_B (cm)	23	Based on mid-point of screen interval of minimum depth to volatile soil impacts of 0 to 1.5 feet BGS (0 to 0.46 meters BGS).
Average Soil/Groundwater Temperature, T_S (ºC)	12.8	Average soil/groundwater temperature in Washington State, as indicated in WDEC (2009).
Fraction of Organic Carbon Content, f_{oc}	3.05E-03	Site-specific fraction of organic carbon content value.

Building Properties:

Enclosed Space Floor Length, L_B (cm)	1,000	Based on default building dimensions of 10 m x 10 m, as indicated in WDEC (2009).
Enclosed Space Floor Width, W_B (cm)	1,000	Based on default building dimensions of 10 m x 10 m, as indicated in WDEC (2009).
Enclosed Space Height, H_B (cm)	250	Based on a default ceiling height for a slab-on-grade building of 2.5 m, as indicated in WDEC (2009).
Indoor Air Exchange Rate, ER (1/hr)	0.50	Default industrial/commercial indoor air exchange rate, as indicated in WDEC (2009).
Crack-to-Total Area Ratio, h (%)	0.038	Default crack ratio for slab-on-grade structures, as indicated in WDEC (2009).
Soil-Building Pressure Differential, DP (g/cm-s^2)	40	Default soil-building pressure differential as indicated in USEPA (2002).
Enclosed Space Floor Thickness, L_{crack} (cm)	10	Based on default floor slab thickness, as indicated in WDEC (2009).
Depth Below Grade to Bottom of Enclosed Space Floor, L_F (cm)	10	Based on default floor slab thickness, as indicated in WDEC (2009).
Average Vapor Flow Rate Into Building, Q_{soil} (L/min)	5	Default average vapor flow rate into building, as indicated in WDEC (2009).

(3) Refer to Table 3.8 for target risk-based indoor air concentrations.

(4) The Site-specific soil gas criteria beneath the Site is calculated from $C_{sg}=RBC_{ia} / a$.

(5) Concentration sorbed to soil particles determined from the soil gas concentration assuming equilibrium conditions between the gas, aqueous, and sorbed phases using $C_{sp}=C_{sg}*CF*K_d/H$ where the Henry's Law Constant $H=H_L/(T*R)$, $K_d=K_{oc}*f_{oc}*PF$, where T is the vadose temperature in degrees Kelvin, the universal gas constant R is 8.21E-05 atm m^3/mol K (USEPA, 2002), CF is a units conversion factor of 10^{-6} cubic meters per milliliter (m^3/mL), and PF is a partitioning factor of 2, as indicated in Golder (2008).

(6) Soil risk-based concentration comprised of the gas, aqueous, and sorbed phases determined from C_{sp} using phase relationships as follows: $RBC_{soil}=C_{sp}/r_{db}*(e_m/K_d+He_v/K_d+r_{db})$ where e_m and e_v are the moisture and vapor filled porosities, respectively.

(7) For On-OCC Property soil maximum concentrations, refer to Table 3.1.

(8) For Off-OCC Property soil maximum concentrations, refer to Table 3.4.

☐ = Maximum Concentration exceeds RBC_{soil}.

TABLE 3.10

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR GROUNDWATER FOR THE PROTECTION OF INDOOR AIR QUALITY FOR INDUSTRIAL/COMMERCIAL WORKER

OCCIDENTAL CHEMICAL CORPORATION

TACOMA, WASHINGTON

	Chemical Properties (1)							*Risk-Based Concentrations for Groundwater, RBC_{gw}*			*Shallow Groundwater Maximum Concentration*	
Constituents of Concern (COCs)	***Henry's Law Constant, H_L (atm m³/mol)***		***Water Diffusion Coefficient, D^{H2O} (cm²/s)***		***Air Diffusion Coefficient, D^{air} (cm²/s)***		***Johnson & Ettinger Attenuation Factor, a (2)***	***Risk-Based Indoor Air Concentration RBC_{ia} (3) (µg/m³)***	***Soil Gas Criteria C_{sg} (4) (µg/m³)***	***Theoretical Groundwater Concentration RBC_{gw} (5) (µg/L)***	***On-OCC Property (6) (µg/L)***	***Off-OCC Property (7) (µg/L)***
VOCs												
1,1,2,2-Tetrachloroethane	1.61E-04	(12.8°C)	7.90E-06	(25°C)	6.67E-02	(12.8°C)	5.67E-04	2.77E-01	4.88E+02	71.0	5,480	--
1,1,2-Trichloroethane	6.50E-04	(12.8°C)	8.80E-06	(25°C)	7.33E-02	(12.8°C)	6.02E-04	1.00E+00	1.67E+03	60.2	166	--
1,1-Dichloroethene	1.65E-02	(12.8°C)	1.04E-05	(25°C)	8.45E-02	(12.8°C)	6.66E-04	8.57E+02	1.29E+06	1,834	1,000	590
Benzene	3.09E-03	(12.8°C)	9.80E-06	(25°C)	8.27E-02	(12.8°C)	6.56E-04	2.06E+00	3.14E+03	23.8	2,300	2,400
Carbon tetrachloride	1.73E-02	(12.8°C)	8.80E-06	(25°C)	7.33E-02	(12.8°C)	6.00E-04	2.68E+00	4.47E+03	6.04	200	
Chloroform	2.13E-03	(12.8°C)	1.00E-05	(25°C)	9.77E-02	(12.8°C)	7.39E-04	6.99E-01	9.46E+02	10.4	79,800	4,400
cis-1,2-Dichloroethene	2.34E-03	(12.8°C)	1.13E-05	(25°C)	6.91E-02	(12.8°C)	5.75E-04	NV	NV	NV	320,000	140,000
Ethylbenzene	3.80E-03	(12.8°C)	7.80E-06	(25°C)	7.04E-02	(12.8°C)	5.83E-04	4.29E+03	7.36E+06	45,401	440	310
Methylene Chloride	1.32E-03	(12.8°C)	1.17E-05	(25°C)	9.49E-02	(12.8°C)	7.25E-04	1.61E+03	2.22E+06	39,330	846	9,500
Tetrachloroethene	9.24E-03	(12.8°C)	8.20E-06	(25°C)	6.76E-02	(12.8°C)	5.65E-04	6.18E+01	1.09E+05	278	170,000	170,000
trans-1,2-Dichloroethene	5.61E-03	(12.8°C)	1.19E-05	(25°C)	6.64E-02	(12.8°C)	5.57E-04	2.57E+02	4.62E+05	1,931	3,100	7,600
Trichloroethene	5.56E-03	(12.8°C)	9.10E-06	(25°C)	7.42E-02	(12.8°C)	6.06E-04	3.92E+00	6.47E+03	27.3	190,000	13,000
Vinyl Chloride	1.88E-02	(12.8°C)	1.23E-05	(25°C)	9.96E-02	(12.8°C)	7.48E-04	3.65E+00	4.88E+03	6.08	490,000	20,000
SVOCs												
Hexachlorobutadiene	3.27E-03	(12.8°C)	6.16E-06	(25°C)	5.27E-02	(12.8°C)	4.64E-04	7.31E-01	1.57E+03	11.3	10.8	--
Pentachlorophenol	4.80E-09	(12.8°C)	6.10E-06	(25°C)	5.26E-02	(12.8°C)	1.01E-03	3.15E+00	3.11E+03	15,210,257	3.10	--
Metals												
Mercury	3.56E-03	(12.8°C)	6.30E-06	(25°C)	2.88E-02	(12.8°C)	2.79E-04	1.29E+00	4.61E+03	30.4	0.54	0.09

Notes:

(1) The applied chemical properties are obtained from the chemical properties database incorporated in USEPA (2004) and the Site-specific information presented in Table 2.6 of the Site Characterization Report. air
The Henry's Law constants and diffusion coefficients were corrected for an average vadose zone temperature of 12.8°C. The reference temperature for the water diffusion coefficient is 25°C and considering its low value, a correction to 12.8°C was considered negligible.

(2) The soil gas attenuation factor a is based on the solution for soil gas migration to building indoor air presented in Johnson and Ettinger [1991; Equation (21)] and the vadose zone and building properties listed below. The calculation of the soil gas attenuation factor was conducted using the Excel spreadsheet "GW-ADV-Feb04.xls" developed by USEPA (2004) and the following vadose zone and building properties.

TABLE 3.10

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR GROUNDWATER FOR THE PROTECTION OF INDOOR AIR QUALITY FOR INDUSTRIAL/COMMERCIAL WORKER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Vadose Zone Soil Properties:		
Vadose Zone Soil Type - Sand		
Total Porosity, e_T (%)	43	Site-specific porosity value.
Moisture-Filled Porosity, e_m	0.054	Default moisture filled porosity for a sand soil in USEPA (2004)
Vapor-Filled Porosity, e_v	0.376	Vapour-filled porosity, $e_v = q_m / 100 - e_m$
Dry Bulk Soil Density, r_{db} (g/cm³)	1.61	Default dry bulk density for a sand soil, as indicated in MTCA Cleanup Regulation, Version 3.1.
Average Soil/Groundwater Temperature, T_S (ºC)	12.8	Average soil/groundwater temperature in Washington State, as indicated in WDEC (2009).
Depth Below Grade to Water Table, L_{WT} (cm)	366	Based on the median depth to groundwater of 12 feet (3.66 meters).
Thickness of Soil Stratum A, h_B (cm)	366	Based on the median depth to groundwater of 12 feet (3.66 meters).
Building Properties:		
Enclosed Space Floor Length, L_B (cm)	1,000	Based on default building dimensions of 10 m x 10 m, as indicated in WDEC (2009).
Enclosed Space Floor Width, W_B (cm)	1,000	Based on default building dimensions of 10 m x 10 m, as indicated in WDEC (2009).
Enclosed Space Height, H_B (cm)	250	Based on a default ceiling height for a slab-on-grade building of 2.5 m, as indicated in WDEC (2009).
Indoor Air Exchange Rate, ER (1/hr)	0.50	Default industrial/commercial indoor air exchange rate, as indicated in WDEC (2009).
Crack-to-Total Area Ratio, h (%)	0.038	Default crack ratio for slab-on-grade structures, as indicated in WDEC (2009).
Soil-Building Pressure Differential, DP (g/cm-s^2)	40	Default soil-building pressure differential as indicated in USEPA (2002).
Enclosed Space Floor Thickness, L_{crack} (cm)	10	Based on default floor slab thickness, as indicated in WDEC (2009).
Depth Below Grade to Bottom of Enclosed Space Floor, L_F (cm)	10	Based on default floor slab thickness, as indicated in WDEC (2009).
Average Vapor Flow Rate Into Building, Q_{soil} (L/min)	5	Default average vapor flow rate into building, as indicated in USEPA (2002).

(3) Refer to Table 3.8 for risk-based indoor air concentrations.

(4) The Site-specific soil gas criteria beneath the existing Site building is calculated from C_{sg}=RBC $_{ia}$ / a.

(5) The theoretical groundwater concentration determined from the soil gas concentration assuming equilibrium conditions and Henry's Law; $RBC_{gw}=C_{sg}*[(T*R)/H_t/CF]$ where T is the vadose temperature in degrees Kelvin, the universal gas constant R is 8.206E-05 atm m^3/mol K, and CF is a conversion factor of 1,000 L/m^3.

(6) For On-OCC Property shallow groundwater maximum concentrations, refer to Table 3.3.

(7) For Off-OCC Property shallow groundwater maximum concentrations, refer to Table 3.6.

☐ = Maximum concentration exceeds RBC_{gw}.

TABLE 3.11

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR AMBIENT AIR FROM GROUNDWATER - TRESPASSER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

			Trespasser			
			Carcinogen	*Non-Carcinogen*	*Ambient Air*	
Constituents of Concern (COCs)	*URF inhalation 1/(mg/m^3)*	*RfC inhalation (mg/m^3)*	*TR Adolescent (mg/m^3)*	*THQ Adolescent (mg/m^3)*	*Risk-Based Concentration RBC $_{aa}$ (1) (mg/m^3)*	*(µg/m^3)*
VOCs						
1,1,2,2-Tetrachloroethane	5.80E-02	--	6.52E-03	NC	6.52E-03	6.52E+00
1,1,2-Trichloroethane	1.60E-02	--	2.36E-02	NC	2.36E-02	2.36E+01
1,1-Dichloroethene	--	2.00E-01	NC	1.01E+01	1.01E+01	1.01E+04
Benzene	7.80E-03	3.00E-02	4.85E-02	1.51E+00	4.85E-02	4.85E+01
Carbon Tetrachloride	6.00E-03	1.00E-01	6.30E-02	5.04E+00	6.30E-02	6.30E+01
Chloroform	2.30E-02	9.80E-02	1.64E-02	4.94E+00	1.64E-02	1.64E+01
cis-1,2-Dichloroethene	--	--	NC	NC	NV	NV
Ethylbenzene	--	1.00E+00	NC	5.04E+01	5.04E+01	5.04E+04
Methylene Chloride	1.00E-05	6.00E-01	3.78E+01	3.03E+01	3.03E+01	3.03E+04
Tetrachloroethene	2.60E-04	4.00E-02	1.45E+00	2.02E+00	1.45E+00	1.45E+03
trans-1,2-Dichloroethene	--	6.00E-02	NC	3.03E+00	3.03E+00	3.03E+03
Trichloroethene	4.10E-03	2.00E-03	9.22E-02	1.01E-01	9.22E-02	9.22E+01
Vinyl Chloride	4.40E-03	1.00E-01	8.59E-02	5.04E+00	8.59E-02	8.59E+01
SVOCs						
Hexachlorobutadiene	2.20E-02	--	1.72E-02	NC	1.72E-02	1.72E+01
Pentachlorophenol	5.10E-03	--	7.41E-02	NC	7.41E-02	7.41E+01
Metals						
Mercury	--	3.00E-04	NC	1.51E-02	1.51E-02	1.51E+01

Notes:

--	Not Available
NC	Not Calculated
NV	No Value
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	The basis for the FT is the 50th percentile from Table 16-1, Recommended Values for Activity Factors - Time Outdoors (total). The time spent outdoors for 6-11 years old of 100 min/day equates to 1.7 hrs (CT) [100/60]. The RME is double the CT value for 3.4 hrs.
(3)	The basis for the EF is the 50th percentile from Table 16-1, Recommended Values for Activity Factors - Time Outdoors (total). The time spent outdoors for 6-11 years old of 100 min/day from out of a possible 365 days equates to 25.3 days (CT) [(100 min/d /1440 total min/d)*365]. The RME is double the CT value for 50.6 days.

Trespasser Assumptions

Risk-Based Concentration in Ambient Air (mg/m^3)	RBC$_{aa}$	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Unit Risk Factor (per mg/m^3)	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m^3)	RfC	chemical-specific	Refer to Table 3.33
Fraction Time Exposed (unitless)	FT	3.4/24	USEPA, 2008a (2)
Exposure Frequency (unitless)	EF	0.14	USEPA, 2008a (3)
Exposure Duration (years)	ED	10	USEPA, 2008b
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	10	USEPA, 2008b

Exposure Equations

Carcinogenic Endpoints:
$$RBC_{aa} = \frac{TR \times ATc}{EF \times FT \times ED \times URF}$$

Non-Carcinogenic Endpoints:
$$RBC_{aa} = \frac{THQ \times ATnc}{EF \times FT \times ED \times (1/RfC)}$$

References:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC,
Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

USEPA, 2008a: Child Specific Exposure Factors Handbook, September 2008.

USEPA, 2008b: Human Health Risk Assessment Bulletins - Supplement to RAGS, Region 4: Superfund, September 30, 2008.

TABLE 3.12

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR AMBIENT AIR FROM GROUNDWATER -
INDUSTRIAL/COMMERCIAL WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

			Industrial/Commercial Worker			
			Carcinogen	*Non-Carcinogen*	*Ambient Air*	
Constituents of Concern	*URF inhalation*	*RfC inhalation*	*TR Adult*	*THQ Adult*	*Risk-Based Concentration RBC_{aa} (1)*	
(COCs)	*1/(mg/m³)*	*(mg/m³)*	*(mg/m³)*	*(mg/m³)*	*(mg/m³)*	*(μg/m³)*
VOCs						
1,1,2,2-Tetrachloroethane	5.80E-02	--	2.77E-04	NC	2.77E-04	2.77E-01
1,1,2-Trichloroethane	1.60E-02	--	1.00E-03	NC	1.00E-03	1.00E+00
1,1-Dichloroethene	--	2.00E-01	NC	8.57E-01	8.57E-01	8.57E+02
Benzene	7.80E-03	3.00E-02	2.06E-03	1.29E-01	2.06E-03	2.06E+00
Carbon Tetrachloride	6.00E-03	1.00E-01	2.68E-03	4.29E-01	2.68E-03	2.68E+00
Chloroform	2.30E-02	9.80E-02	6.99E-04	4.20E-01	6.99E-04	6.99E-01
cis-1,2-Dichloroethene	--	--	NC	NC	NV	NV
Ethylbenzene	--	1.00E+00	NC	4.29E+00	4.29E+00	4.29E+03
Methylene Chloride	1.00E-05	6.00E-01	1.61E+00	2.57E+00	1.61E+00	1.61E+03
Tetrachloroethene	2.60E-04	4.00E-02	6.18E-02	1.71E-01	6.18E-02	6.18E+01
trans-1,2-Dichloroethene	--	6.00E-02	NC	2.57E-01	2.57E-01	2.57E+02
Trichloroethene	4.10E-03	2.00E-03	3.92E-03	8.57E-03	3.92E-03	3.92E+00
Vinyl Chloride	4.40E-03	1.00E-01	3.65E-03	4.29E-01	3.65E-03	3.65E+00
SVOCs						
Hexachlorobutadiene	2.20E-02	--	7.31E-04	NC	7.31E-04	7.31E-01
Pentachlorophenol	5.10E-03	--	3.15E-03	NC	3.15E-03	3.15E+00
Metals						
Mercury	--	3.00E-04	NC	1.29E-03	1.29E-03	1.29E+00

Notes:

--	Not Available
NC	Not Calculated
NV	No Value
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	Assumed 8 hour work day.
(3)	Based on assumption of 5 days per week for 52 weeks over an exposure period of 365 days, as indicated in WAC (2007).

Industrial/Commercial Worker Assumptions

Risk-Based Concentration in Ambient Air (mg/m³)	RBC_{aa}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Unit Risk Factor (per mg/m³)	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m³)	RfC	chemical-specific	Refer to Table 3.33
Fraction Time Exposed (unitless)	FT	8/24	(2)
Exposure Frequency (unitless)	EF	0.7	WAC, 2007 (3)
Exposure Duration (years)	ED	20	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	20	WAC, 2007

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{aa} = \frac{TR \times ATc}{EF \times FT \times ED \times URF}$$

Non-Carcinogenic Endpoints:

$$RBC_{aa} = \frac{THQ \times ATnc}{EF \times FT \times ED \times (1/RfC)}$$

Reference:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

TABLE 3.13

ESTIMATED GROUNDWATER CONCENTRATIONS PROTECTIVE OF AMBIENT AIR
TRESPASSER SCENARIO
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Ambient Air RBCs (µg/m^3) (1)*	*Groundwater Protective of Ambient Air Concentration (µg/L) (2)*	*Shallow Groundwater Concentration*	
			On-OCC Property (3) (µg/L)	*Off-OCC Property (4) (µg/L)*
VOCs				
1,1,2,2-Tetrachloroethane	6.52E+00	228,348	5.48E+03	ND
1,1,2-Trichloroethane	2.36E+01	459,332	1.66E+02	ND
1,1-Dichloroethene	1.01E+04	13,779,061	1.00E+03	5.90E+02
Benzene	4.85E+01	303,869	2.30E+03	2.40E+03
Carbon Tetrachloride	6.30E+01	94,555	2.00E+02	ND
Chloroform	1.64E+01	120,635	7.98E+04	4.40E+03
cis-1,2-Dichloroethene	NV	NV	3.20E+05	1.40E+05
Ethylbenzene	5.04E+04	316,410,846	4.40E+02	3.10E+02
Methylene Chloride	3.03E+04	302,405,812	8.46E+02	9.50E+03
Tetrachloroethene	1.45E+03	4,267,216	1.70E+05	1.70E+05
trans-1,2-Dichloroethene	3.03E+03	13,404,082	3.10E+03	7.60E+03
Trichloroethene	9.22E+01	389,618	1.90E+05	1.30E+04
Vinyl Chloride	8.59E+01	87,159	$\boxed{4.90E+05}$	2.00E+04
SVOCs				
Hexachlorobutadiene	1.72E+01	161,956	1.08E+01	NV
Pentachlorphonol	7.41E+01	6,027,522,978	3.10E+00	ND
Metals				
Mercury	1.51E+01	201,259	5.40E-01	8.90E-02

Notes:

NV	No Value
ND	No Detected
☐	Maximum concentration exceeds groundwater concentration protective of ambient air.
(1)	Refer to Table 3.11 for risk-based ambient air concentrations.
(2)	Groundwater concentration protective of risk-based ambient air concentrations obtained by dividing the risk-based ambient air concentrations by the chemical-specific Volatilization Factors (VFwamb) calculated in Table 3.14.
(3)	Maximum On-OCC Property shallow groundwater concentrations obtained from Table 3.3.
(4)	Maximum Off-OCC Property shallow groundwater concentrations obtained from Table 3.6.

TABLE 3.14

CALCULATION OF GROUNDWATER TO AMBIENT AIR VOLATILIZATION FACTORS (VF_{wamb})

OCCIDENTAL CHEMICAL CORPORATION

TACOMA, WASHINGTON

	Chemical Properties (1)										
Constituents of Concern (COCs)	***Henry's Law Constant, H_L (atm m³/mol) (1)***		***Water Diffusion Coefficient, D_{H2O} (cm²/s) (1)***		***Air Diffusion Coefficient, D_{air} (cm²/s) (1)***		***Henry's Law Constant, H' (unitless) (2)***	***D_{cap}^{eff} (cm^2/sec) (4)***	***D_s^{eff} (cm^2/sec) (5)***	***D_{ws}^{eff} (cm^2/sec) (6)***	***VF_{wamb} (L/m^3) (7)***
<u>VOCs</u>											
1,1,2,2-Tetrachloroethane	1.61E-04	(12.8°C)	7.90E-06	(25°C)	6.67E-02	(12.8°C)	6.90E-03	7.73E-05	1.39E-02	1.49E-03	2.86E-05
1,1,2-Trichloroethane	6.50E-04	(12.8°C)	8.80E-06	(25°C)	7.33E-02	(12.8°C)	2.78E-02	3.24E-05	1.53E-02	6.67E-04	5.15E-05
1,1-Dichloroethene	1.65E-02	(12.8°C)	1.04E-05	(25°C)	8.45E-02	(12.8°C)	7.03E-01	1.78E-05	1.76E-02	3.75E-04	7.32E-04
Benzene	3.09E-03	(12.8°C)	9.80E-06	(25°C)	8.27E-02	(12.8°C)	1.32E-01	2.08E-05	1.72E-02	4.35E-04	1.60E-04
Carbon Tetrachloride	1.73E-02	(12.8°C)	8.80E-06	(25°C)	7.33E-02	(12.8°C)	7.42E-01	1.54E-05	1.53E-02	3.24E-04	6.67E-04
Chloroform	2.13E-03	(12.8°C)	1.00E-05	(25°C)	9.77E-02	(12.8°C)	9.10E-02	2.58E-05	2.03E-02	5.39E-04	1.36E-04
cis-1,2-Dichloroethene	2.34E-03	(12.8°C)	1.13E-05	(25°C)	6.91E-02	(12.8°C)	9.99E-02	2.02E-05	1.44E-02	4.22E-04	1.17E-04
Ethylbenzene	3.80E-03	(12.8°C)	7.80E-06	(25°C)	7.04E-02	(12.8°C)	1.62E-01	1.68E-05	1.47E-02	3.53E-04	1.59E-04
Methylene Chloride	1.32E-03	(12.8°C)	1.17E-05	(25°C)	9.49E-02	(12.8°C)	5.66E-02	3.06E-05	1.97E-02	6.37E-04	1.00E-04
Tetrachloroethene	9.26E-03	(12.8°C)	8.20E-06	(25°C)	6.76E-02	(12.8°C)	3.96E-01	1.47E-05	1.41E-02	3.10E-04	3.41E-04
trans-1,2-Dichloroethene	5.63E-03	(12.8°C)	1.19E-05	(25°C)	6.64E-02	(12.8°C)	2.41E-01	1.61E-05	1.38E-02	3.38E-04	2.26E-04
Trichloroethene	5.57E-03	(12.8°C)	9.10E-06	(25°C)	7.42E-02	(12.8°C)	2.38E-01	1.70E-05	1.54E-02	3.58E-04	2.37E-04
Vinyl Chloride	1.89E-02	(12.8°C)	1.23E-05	(25°C)	9.96E-02	(12.8°C)	8.09E-01	2.09E-05	2.07E-02	4.39E-04	9.86E-04
<u>SVOCs</u>											
Hexachlorobutadiene	3.27E-03	(12.8°C)	6.16E-06	(25°C)	5.27E-02	(12.8°C)	1.40E-01	1.31E-05	1.10E-02	2.74E-04	1.06E-04
Pentachlorophenol	4.80E-09	(12.8°C)	6.10E-06	(25°C)	5.26E-02	(12.8°C)	2.05E-07	1.66E+00	2.06E-02	2.16E-02	1.23E-08
<u>Metals</u>											
Mercury	3.81E-03	(12.8°C)	6.30E-06	(25°C)	2.88E-02	(12.8°C)	1.63E-01	7.96E-06	6.00E-03	1.66E-04	7.52E-05

Notes:

(1) The applied chemical properties were obtained from the chemical properties database incorporated in USEPA (2004) and the Site-specific information presented in Table 2.6 of the Site Characterization Report. The Henry's Law constant and air diffusion coefficient were corrected for an average vadose zone temperature of 12.8°C. The reference temperature for the water diffusion coefficient is 25°C and, considering its low value, a correction to 12.8°C was considered negligible.

(2) The Henry's Law Constant $H'=H_L/(T*R)$, where T is the vadose zone temperature in degrees Kelvin and the universal gas constant R is 8.21E-05 atm m^3/mol K.

(3) The calculation of the volatilization factor (VF_{wamb}) was conducted following the procedure in ASTM, 1998 and the following vadose zone and capillary fringe properties.

Vadose Zone and Capillary Fringe Properties:		
Total Porosity, e_T (%)	43	Site-specific porosity value.
Vadose Zone Moisture-Filled Porosity, e_m	0.054	Default moisture filled porosity for a sand soil in USEPA (2004)
Vadose Zone Vapor-Filled Porosity, e_v	0.376	Vapour-filled porosity, $e_v = q_m / 100 - e_m$
Dry Bulk Soil Density, r_{db} (g/cm³)	1.61	Site-specific dry bulk density value.
Vadose Zone Temperature (°C)	12.8	Average soil/groundwater temperature in Washington State, as indicated in WDEC (2009).
Thickness of Capillary Fringe (h_{cap}) (cm)	17	Approximated using the Excel spreadsheet "GW-ADV-Feb04.xls" developed by USEPA (2004) based on the Johnson and Ettinger Model (Johnson & Ettinger, 1991).
Thickness of Vadose Zone (h_v) (cm)	349	Depth of water table less the thickness of capillary fringe
Depth to Water Table (L_{GW}) (cm)	366	Based on the median depth to groundwater of 12 feet (3.66 meters).
Capillary Fringe Moisture-Filled Porosity, e_{mcf}	0.253	Approximated using the Excel spreadsheet "GW-ADV-Feb04.xls" developed by USEPA (2004) based on the Johnson and Ettinger Model (Johnson & Ettinger, 1991).
Capillary Fringe Vapor-Filled Porosity, e_{vcf}	0.047	Vapor-filled porosity, $e_{vcf} = e_T / 100 - e_{mcf}$
Wind Speed, U_a (cm/s)	225	Default wind speed above ground surface in ambient mixing zone (ASTM, 1998).
Ambient Air Mixing Zone Height, d_{air}(cm)	200	Default height of ambient air mixing zone (ASTM, 1998).
Width of Source Area, W (cm)	45720	Approximated based on the maximum width of OCC Property at it's widest point (1500 ft wide, north to south).

(4) The Effective Diffusion Coefficient through the capillary fringe is calculated from $D_{cap}^{eff} = (D_{air} * e_{vcf}^{3.33} / e_T^2) + (D_{H2O} / H' * e_{mcf}^{3.33} / e_T^2)$.

(5) The Effective Diffusion Coefficient in soil is calculated from $D_s^{eff} = (D_{air} * e_v^{3.33} / e_T^2) + (D_{H2O} / H' * e_m^{3.33} / e_T^2)$.

(6) The Effective Diffusion Coefficient between groundwater and the soil surface is calculated from $D_{ws}^{eff} = (h_{cap} + h_v) / (h_{cap} / D_{cap}^{eff} + h_v / D_s^{eff})$.

(7) The groundwater-to-ambient air Volatilization Factor is calculated from $VF_{wamb} = H' * 1000 / (1 + (U_a * d_{air} * L_{GW} / (W * D_w^{eff})))$.

TABLE 3.15

ESTIMATED GROUNDWATER CONCENTRATIONS PROTECTIVE OF AMBIENT AIR
INDUSTRIAL/COMMERCIAL WORKER SCENARIO
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Ambient Air RBCs (µg/m^3) (1)*	*Groundwater Protective of Ambient Air Concentration (µg/L) (2)*	*Shallow Groundwater Concentration*	
			On-OCC Property (3) (µg/L)	*Off-OCC Property (4) (µg/L)*
VOCs				
1,1,2,2-Tetrachloroethane	2.77E-01	9,705	5.48E+03	ND
1,1,2-Trichloroethane	1.00E+00	19,522	1.66E+02	ND
1,1-Dichloroethene	8.57E+02	1,171,220	1.00E+03	5.90E+02
Benzene	2.06E+00	12,914	2.30E+03	2.40E+03
Carbon Tetrachloride	2.68E+00	4,019	2.00E+02	ND
Chloroform	6.99E-01	5,127	7.98E+04	4.40E+03
cis-1,2-Dichloroethene	NV	NV	3.20E+05	1.40E+05
Ethylbenzene	4.29E+03	26,894,922	4.40E+02	3.10E+02
Methylene Chloride	1.61E+03	16,065,309	8.46E+02	9.50E+03
Tetrachloroethene	6.18E+01	181,357	1.70E+05	1.70E+05
trans-1,2-Dichloroethene	2.57E+02	1,139,347	3.10E+03	7.60E+03
Trichloroethene	3.92E+00	16,559	1.90E+05	1.30E+04
Vinyl Chloride	3.65E+00	3,704	4.90E+05	2.00E+04
SVOCs				
Hexachlorobutadiene	7.31E-01	6,883	1.08E+01	NV
Pentachlorophenol	3.15E+00	256,169,727	3.10E+00	ND
Metals				
Mercury	1.29E+00	17,107	5.40E-01	8.90E-02

Notes:

NV	No Value
ND	Not Detected
☐	Maximum concentration exceeds groundwater concentration protective of ambient air.
(1)	Refer to Table 3.12 for risk-based ambient air concentrations.
(2)	Groundwater concentration protective of risk-based ambient air concentrations obtained by dividing the risk-based ambient air concentrations by the chemical-specific Volatilization Factors (VFwamb) calculated in Table 3.14.
(3)	Maximum On-OCC Property shallow groundwater concentrations obtained from Table 3.3.
(4)	Maximum Off-OCC Property shallow groundwater concentrations obtained from Table 3.6.

TABLE 3.16

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - TRESPASSER ORAL, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*CSF*		*URF*	*RfD*		*RfC*	*Relative Absorption Factor*		*PEF or VF*	*Trespasser*		*Soil Risk-Based Concentration*	*Soil Maximum Concentration*	
										Carcinogen	*Non-Carcinogen*			
	oral 1/(mg/kg-d)	*dermal 1/(mg/kg-d)*	*inhalation 1/(mg/m^3)*	*oral (mg/kg-d)*	*dermal (mg/kg-d)*	*inhalation (mg/m^3)*	*Oral (%/100)*	*Dermal (%/100)*	*(m^3/kg)*	*TR Adolescent (mg/kg)*	*THQ Adolescent (mg/kg)*	*RBC_{soil} (1) (mg/kg)*	*On-OCC Property (2) (mg/kg)*	*Off-OCC Property (3) (mg/kg)*
VOCs														
1,1,2,2-Tetrachloroethane	2.00E-01	2.50E-01	5.80E-02	2.00E-02	1.60E-02	--	1.0E+00	3.0E-02	2.8E+03	1.51E+01	4.97E+04	15.1	0.29	3.1
1,1,2-Trichloroethane	5.70E-02	7.13E-02	1.60E-02	4.00E-03	3.20E-03	--	1.0E+00	3.0E-02	1.3E+03	2.80E+01	9.95E+03	28.0	ND	ND
1,1-Dichloroethene	--	--	--	5.00E-02	4.00E-02	2.00E-01	1.0E+00	5.0E-04	2.9E+02	NV	2.88E+03	2,879	0.008	ND
Benzene	5.50E-02	6.88E-02	7.80E-03	4.00E-03	3.20E-03	3.00E-02	1.0E+00	5.0E-04	5.4E+02	2.48E+01	7.71E+02	24.8	5.3	$\boxed{30}$
Carbon Tetrachloride	7.00E-02	8.75E-02	6.00E-03	4.00E-03	3.20E-03	1.00E-01	1.0E+00	5.0E-04	4.0E+02	2.32E+01	1.73E+03	23.2	0.99	ND
Chloroform	3.10E-02	3.88E-02	2.30E-02	1.00E-02	8.00E-03	9.80E-02	1.0E+00	5.0E-04	5.6E+02	9.03E+00	2.53E+03	9.03	$\boxed{11}$	ND
cis-1,2-Dichloroethene	--	--	--	2.00E-03	1.60E-03	--	1.0E+00	5.0E-04	5.5E+02	NV	6.40E+03	6,397	0.045	ND
Ethylbenzene	--	--	--	1.00E-01	8.00E-02	1.00E+00	1.0E+00	3.0E-02	8.8E+02	NV	3.75E+04	37,540	36	72
Methylene Chloride	2.00E-03	2.50E-03	1.00E-05	6.00E-03	4.80E-03	6.00E-01	1.0E+00	5.0E-04	4.3E+02	6.89E+03	7.73E+03	6,885	5	1.3
Tetrachloroethene	2.10E-03	2.63E-03	2.60E-04	6.00E-03	4.80E-03	4.00E-02	1.0E+00	3.0E-02	6.7E+02	8.73E+02	1.23E+03	873	62	0.17
trans-1,2-Dichloroethene	--	--	--	2.00E-02	1.60E-02	6.00E-02	1.0E+00	5.0E-04	4.0E+02	NV	1.20E+03	1,200	0.003	ND
Trichloroethene	4.60E-02	5.75E-02	4.10E-03	5.00E-04	4.00E-04	2.00E-03	1.0E+00	3.0E-02	5.2E+02	4.28E+01	5.03E+01	42.8	21	0.0027
Vinyl Chloride	7.20E-01	9.00E-01	4.40E-03	3.00E-03	2.40E-03	1.00E-01	1.0E+00	5.0E-04	2.1E+02	1.17E+01	9.52E+02	11.7	0.0075	ND
SVOCs														
1,2,4-Trichlorobenzene	--	--	--	1.00E-02	5.00E-03	2.00E-03	1.0E+00	1.0E-01	9.9E+03	NV	9.25E+02	925	2.3	ND
bis(2-Ethylhexyl)phthalate	1.40E-02	2.80E-02	2.40E-03	2.00E-02	1.00E-02	--	1.0E+00	1.0E-01	6.0E+08	6.73E+02	2.51E+04	673	0.62	ND
Hexachlorobenzene	1.60E+00	3.20E+00	4.60E-01	8.00E-04	4.00E-04	--	1.0E+00	1.0E-01	6.8E+04	5.32E+00	1.00E+03	5.32	1.4	ND
Hexachlorobutadiene	7.80E-02	1.56E-01	2.20E-02	1.00E-03	5.00E-04	--	1.0E+00	1.0E-01	1.7E+04	8.51E+01	1.26E+03	85.1	28	ND
Pentachlorophenol	4.10E-01	8.20E-01	5.10E-03	5.00E-03	2.50E-03	--	1.0E+00	1.0E-01	6.0E+08	2.30E+01	6.28E+03	23.0	2.5	ND
Pesticides														
4,4'-DDD	2.40E-01	4.80E-01	6.90E-02	--	--	--	1.0E+00	1.0E-01	6.0E+08	3.92E+01	NV	39.2	ND	--
4,4'-DDE	3.40E-01	6.80E-01	9.70E-02	--	--	--	1.0E+00	1.0E-01	1.2E+06	2.75E+01	NV	27.5	0.0073	--
4,4'-DDT	3.40E-01	6.80E-01	9.70E-02	5.00E-04	2.50E-04	--	1.0E+00	1.0E-01	6.0E+08	2.77E+01	6.28E+02	27.7	0.0059	--
PCBs														
Total PCBs	2.00E+00	4.00E+00	5.70E-01	--	--	--	1.0E+00	1.0E-01	6.0E+08	4.71E+00	NV	4.71	$\boxed{15.6}$	0.0054
Dioxins/Furans														
2,3,7,8-TCDD (TEQ)	1.30E+05	2.60E+05	3.80E-02	7.00E-10	3.50E-10	4.00E-08	1.0E+00	1.0E-01	6.0E+08	7.24E-05	8.79E-04	0.0000724	$\boxed{0.000845794}$	--
Metals														
Antimony	--	--	--	4.00E-04	8.00E-05	--	1.0E+00	1.0E-02	6.0E+08	NV	9.25E+02	925	22.1	2.51
Arsenic	1.50E+00	7.50E+00	4.30E+00	3.00E-04	6.00E-05	1.50E-05	1.0E+00	1.0E-02	6.0E+08	1.16E+01	6.93E+02	11.6	$\boxed{228}$	6.38
Cadmium	--	--	1.80E+00	5.00E-04	1.00E-04	2.00E-05	1.0E+00	1.0E-02	6.0E+08	1.26E+05	1.15E+03	1,154	39.1	0.706
Chromium	--	--	--	1.50E+00	3.00E-01	--	1.0E+00	1.0E-02	6.0E+08	NV	3.47E+06	3,468,654	1,200	16.4
Copper	--	--	--	4.00E-02	8.00E-03	--	1.0E+00	1.0E-02	6.0E+08	NV	9.25E+04	92,497	7,070	283
Lead	--	--	--	--	--	--	1.0E+00	1.0E-02	6.0E+08	NV	NV	NV	28,000	899
Mercury	--	--	--	3.00E-04	6.00E-05	3.00E-04	1.0E+00	1.0E-02	1.2E+04	NV	1.43E+02	143	1.2	0.109
Nickel	--	--	--	2.00E-02	4.00E-03	9.00E-05	1.0E+00	1.0E-02	6.0E+08	NV	4.55E+04	45,476	962	25.3
Silver	--	--	--	5.00E-03	1.00E-03	--	1.0E+00	1.0E-02	6.0E+08	NV	1.16E+04	11,562	19.5	0.257
Thallium	--	--	--	--	--	--	1.0E+00	1.0E-02	6.0E+08	NV	NV	NV	0.21	0.059
Zinc	--	--	--	3.00E-01	6.00E-02	--	1.0E+00	1.0E-02	6.0E+08	NV	6.94E+05	693,731	10,200	438

Notes:

--	Not Available
NA	Not Applicable
ND	Not Detected
NV	No Value
TEQ	Toxic Equivalency
☐	Maximum concentration exceeds RBC_{soil}.
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	For On-OCC Property soil maximum concentrations, refer to Table 3.1.
(3)	For Off-OCC Property soil maximum concentrations, refer to Table 3.4.
(4)	The basis for SA is the 50th percentile value from Table 7-1, Recommended Values for Total Body Surface Area, Males and Females Combined. The total body surface area was multiplied by 0.25 (25 percent) to account for exposed skin.
(5)	The basis for the FT is the 50th percentile from Table 16-1, Recommended Values for Activity Factors - Time Outdoors (total). The time spent outdoors for 6-11 years old of 100 min/day equates to 1.7 hrs (CT) [100/60]. The RME is double the CT value for 3.4 hrs.
(6)	The basis for the EF is the 50th percentile from Table 16-1, Recommended Values for Activity Factors - Time Outdoors (total). The time spent outdoors for 6-11 years old of 100 min/day from out of a possible 365 days equates to 25.3 days (CT) [(100 min/d /1440 total min/d)*365]. The RME is double the CT value for 50.6 days.

TABLE 3.16

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - TRESPASSER ORAL, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Trespasser Assumptions

Risk-Based Concentration in Soil (mg/kg)	RBC_{soil}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Cancer Slope Factor (per mg/kg-day)	CSF	chemical-specific	Refer to Table 3.34
Reference Dose Factor (mg/kg-day)	RfD	chemical-specific	Refer to Table 3.32
Unit Risk Factor (per mg/m^3)	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m^3)	RfC	chemical-specific	Refer to Table 3.33
Soil Ingestion Rate (mg/day)	SIR	100	USEPA, 2002
Absorption Factor - Oral (%/100)	ABSo	1	WAC, 2007
Surface Area Exposed (cm^2)	SA	3,900	USEPA, 2008a (4)
Adherence Factor (mg/cm^2-event)	AF	0.2	WAC, 2007
Absorption Factor - Dermal (%/100)	ABSd	chemical-specific	WAC, 2007
Event Frequency (event/day)	EV	1	USEPA, 2002
Fraction Time Exposed (unitless)	FT	3.4/24	USEPA, 2008a (5)
Exposure Frequency (unitless)	EF	0.14	USEPA, 2008a (6)
Exposure Duration (years)	ED	10	USEPA, 2008b
Average Body Weight (kg)	ABW	45	USEPA, 2008b
Conversion Factor (kg/mg)	CF	1.0E-06	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	10	USEPA, 2008b
Particulate Emission Factor (m^3/kg)	PEF	site-specific	Refer to Table 3.17
Volatilization Factor (m^3/kg)	VF	chemical-specific	Refer to Table 3.18

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{soil} = \frac{TR \times ATc}{EF \times ED \times [(CSF \times SIR \times CF \times ABSo)/ABW + (CSF \times SA \times EV \times AF \times CF \times ABSd)/ABW + (URF \times FT \times (1/VF \text{ or } PEF))]}$$

Non-Carcinogenic Endpoints:

$$RBC_{soil} = \frac{THQ \times ATnc}{EF \times ED \times [((1/RfD) \times SIR \times CF \times ABSo)/ABW + ((1/RfD) \times SA \times EV \times AF \times CF \times ABSd)/ABW + ((1/RfC) \times FT \times (1/VF \text{ or } PEF))]}$$

References:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

USEPA, 2008a: Child Specific Exposure Factors Handbook, September 2008.

USEPA, 2008b: Human Health Risk Assessment Bulletins - Supplement to RAGS, Region 4: Superfund, September 30, 2008.

TABLE 3.17

DERIVATION OF PARTICULATE EMISSION FACTOR (PEF) FOR SOIL - TRESPASSER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Parameters (1)	***Reference***	
"A"	Exhibit D-2, USEPA, 2002	14.2253
Area	Site-Specific (2), acres	35.62
"B"	Exhibit D-2, USEPA, 2002	18.8366
"C"	Exhibit D-2, USEPA, 2002	218.1845

Q/C_{wind}	Exhibit D-2, USEPA, 2002	41.38

PEF	Equation 4-5, USEPA, 2002	6.00E+08

Notes:

(1) The A, B, and C based on Zone 1 - Seattle, Washington

(2) OCC Property is approximately 35.62 acres (1551604.74 ft^2) in area.

Reference:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response.OSWER 9355.4-24, December 2002.

TABLE 3.18

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR SOIL - TRESPASSER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

VF: Soil-to-Air Volatilization Factor

$$\boxed{VF = Q/C \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4} (m^2 / cm^2)}$$

						Constituents of Concern										
				Reference	***Units***	***1,1,2,2-Tetrachloroethane***	***1,1,2-Trichloroethane***	***1,1-Dichloroethene***	***Benzene***	***Carbon Tetrachloride***	***Chloroform***	***cis-1,2-Dichloroethene***	***Ethylbenzene***	***Methylene Chloride***	***Tetrachloroethene***	***trans-1,2-Dichloroethene***
Where:	**VF**	**=**	**soil-to-air volatilization factor**	Equation 4-8, USEPA, 2002	m³/kg	**2.76E+03**	**1.29E+03**	**2.91E+02**	**5.43E+02**	**3.96E+02**	**5.56E+02**	**5.51E+02**	**8.77E+02**	**4.27E+02**	**6.65E+02**	**4.04E+02**
	Q/C_{vol}	=	inverse of mean conc - centre of square source	Equation D-3, USEPA, 2002	(g/m²-sec)/(kg/m³)	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38
	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	2.15E-04	9.77E-04	1.93E-02	5.55E-03	1.04E-02	5.30E-03	5.39E-03	2.13E-03	8.95E-03	3.69E-03	1.00E-02
	T	=	exposure interval	USEPA, 2002	s	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61

Q/C_{vol}: Inverse of Mean Conc - Centre of Square Source

$$\boxed{Q / C_{vol} = A \times \exp \frac{(\ln Area - B)^2}{C}}$$

Where:	"A"	=	constant	USEPA, 2002 (1)		14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253
	Area	=	areal extent of the site or contamination	Site-Specific (2)	acres	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62
	"B"	=	constant	USEPA, 2002 (1)		18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366
	"C"	=	constant	USEPA, 2002 (1)		218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845

D_A: Apparent Diffusivity

$$\boxed{D_A = \frac{\left[\left(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w\right) / n^2\right]}{\rho_b K_b + \Theta_w + \Theta_a H'}}$$

					Units											
Where:	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	2.15E-04	9.77E-04	1.93E-02	5.55E-03	1.04E-02	5.30E-03	5.39E-03	2.13E-03	8.95E-03	3.69E-03	1.00E-02
	Q_a	=	air-filled porosity	Refer to Table 3.9	unitless	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376
	Q_w	=	water-filled porosity	Refer to Table 3.9	unitless	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
	n	=	total soil porosity	Refer to Table 3.9	unitless	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	H'	=	dimensionless Henry's Law Constant	USEPA, 2004 (3)	unitless	6.90E-03	2.78E-02	7.03E-01	1.32E-01	7.42E-01	9.10E-02	9.99E-02	1.62E-01	5.66E-02	3.96E-01	2.41E-01
	D_i	=	diffusivity of chemical x in air	USEPA, 2004 (3)	cm²/s	6.67E-02	7.33E-02	8.45E-02	8.27E-02	7.33E-02	9.77E-02	6.91E-02	7.04E-02	9.49E-02	6.76E-02	6.64E-02
	D_w	=	diffusivity of chemical x in water	USEPA, 2004	cm²/s	7.90E-06	8.80E-06	1.04E-05	9.80E-06	8.80E-06	1.00E-05	1.13E-05	7.80E-06	1.17E-05	8.20E-06	1.19E-05
	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.41E-01	2.29E-01	1.98E-01	1.89E-01	4.64E-01	1.62E-01	1.08E-01	6.22E-01	3.05E-02	8.08E-01	1.16E-01

Kd: Soil-Water Partition Coefficient

$$\boxed{K_d = K_{oc} \times f_{oc}}$$

					Units											
Where:	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.41E-01	2.29E-01	1.98E-01	1.89E-01	4.64E-01	1.62E-01	1.08E-01	6.22E-01	3.05E-02	8.08E-01	1.16E-01
	K_{oc}	=	soil organic carbon-water partition coefficient	USEPA, 2004	cm³/g	7.90E+01	7.50E+01	6.50E+01	6.20E+01	1.52E+02	5.30E+01	3.55E+01	2.04E+02	1.00E+01	2.65E+02	3.80E+01
	f_{oc}	=	organic content of soil	Refer to Table 3.9	g/g	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305

TABLE 3.18

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR SOIL - TRESPASSER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

VF: Soil-to-Air Volatilization Factor

$$VF = Q/C \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4} (m^2/cm^2)$$

						Constituents of Concern						
				Reference	***Units***	***Trichloroethene***	***Vinyl Chloride***	***1,2,4-Trichlorobenzene***	***Hexachlorobenzene***	***Hexachlorobutadiene***	***4,4'-DDE***	***Mercury***
Where:	**VF**	=	**soil-to-air volatilization factor**	Equation 4-8, USEPA, 2002	m³/kg	**5.19E+02**	**2.10E+02**	**9.90E+03**	**6.75E+04**	**1.68E+04**	**1.16E+06**	**1.19E+04**
	Q/C_{vol}	=	inverse of mean conc - centre of square source	Equation D-3, USEPA, 2002	(g/m²-sec)/(kg/m³)	41.38	41.38	41.38	41.38	41.38	41.38	41.38
	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	6.06E-03	3.72E-02	1.67E-05	3.59E-07	5.79E-06	1.21E-09	1.16E-05
	T	=	exposure interval	USEPA, 2002	s	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08	3.15E+08
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61

Q/C_{vol}: Inverse of Mean Conc - Centre of Square Source

$$Q / C_{vol} = A \times \exp \frac{(\ln Area - B)^2}{C}$$

Where:	"A"	=	constant	USEPA, 2002 (1)		14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253
	Area	=	areal extent of the site or contamination	Site-Specific (2)	acres	35.62	35.62	35.62	35.62	35.62	35.62	35.62
	"B"	=	constant	USEPA, 2002 (1)		18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366
	"C"	=	constant	USEPA, 2002 (1)		218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845

D_A: Apparent Diffusivity

$$D_A = \frac{\left[\left(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w\right) / n^2\right]}{\rho_b K_b + \Theta_w + \Theta_a H'}$$

					Units							
Where:	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	6.06E-03	3.72E-02	1.67E-05	3.59E-07	5.79E-06	1.21E-09	1.16E-05
	Q_a	=	air-filled porosity	Refer to Table 3.9	unitless	0.376	0.376	0.376	0.376	0.376	0.376	0.376
	Q_w	=	water-filled porosity	Refer to Table 3.9	unitless	0.054	0.054	0.054	0.054	0.054	0.054	0.054
	n	=	total soil porosity	Refer to Table 3.9	unitless	0.430	0.430	0.430	0.430	0.430	0.430	0.430
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	H'	=	dimensionless Henry's Law Constant	USEPA, 2004 (3)	unitless	2.38E-01	8.09E-01	2.34E-02	1.33E-02	1.40E-01	1.83E-04	1.63E-01
	D_i	=	diffusivity of chemical x in air	USEPA, 2004 (3)	cm²/s	7.42E-02	9.96E-02	2.82E-02	5.09E-02	5.27E-02	1.35E-02	2.88E-02
	D_w	=	diffusivity of chemical x in water	USEPA, 2004	cm²/s	9.10E-06	1.23E-05	8.23E-06	5.91E-06	6.16E-06	5.87E-06	6.30E-06
	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.87E-01	5.67E-02	5.06E+00	2.44E+02	1.64E+02	2.64E+02	5.20E+01

Kd: Soil-Water Partition Coefficient

$$K_d = K_{oc} \times f_{oc}$$

					Units							
Where:	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.87E-01	5.67E-02	5.06E+00	2.44E+02	1.64E+02	2.64E+02	5.20E+01
	K_{oc}	=	soil organic carbon-water partition coefficient	USEPA, 2004	cm³/g	9.40E+01	1.86E+01	1.66E+03	8.00E+04	5.37E+04	8.64E+04	--
	f_{oc}	=	organic content of soil	Refer to Table 3.9	g/g	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305

Notes:
(1) The A, B, and C based on Zone 1 - Seattle, Washington
(2) OCC property is approximately 35.62 acres (1551604.74 ft^2) in area.
(3) Site-specific parameter adjusted for a temperature of 12.8°C.

References:
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.
USEPA, 2004. User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings, Office of Emergency and Remedial Response, Washington, DC, February 22.

TABLE 3.19

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - INDUSTRIAL/COMMERCIAL WORKER ORAL, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents	*CSF*		*URF*	*RfD*		*RfC*	*Relative Absorption Factor*		*PEF or*	*Industrial/Commercial Worker Carcinogen TR*	*Industrial/Commercial Worker Non-Carcinogen THQ*	*Soil Risk-Based Concentration*	*Soil Maximum Concentration*	
of Concern	*oral*	*dermal*	*inhalation*	*oral*	*dermal*	*inhalation*	*Oral*	*Dermal*	*VF*	*Adult*	*Adult*	*RBC_{soil} (1)*	*On-OCC Property (2)*	*Off-OCC Property (3)*
(COCs)	*1/(mg/kg-d)*	*1/(mg/kg-d)*	*1/(mg/m³)*	*(mg/kg-d)*	*(mg/kg-d)*	*(mg/m³)*	*(%/100)*	*(%/100)*	*(m³/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
VOCs														
1,1,2,2-Tetrachloroethane	2.00E-01	2.50E-01	5.80E-02	4.00E-03	3.20E-03	--	1.0E+00	3.0E-02	3.9E+03	1.04E+00	5.82E+03	1.04	0.11	ND
1,1,2-Trichloroethane	5.70E-02	7.13E-02	1.60E-02	4.00E-03	3.20E-03	--	1.0E+00	3.0E-02	1.8E+03	1.80E+00	5.82E+03	1.80	ND	ND
1,1-Dichloroethene	--	--	--	5.00E-02	4.00E-02	2.00E-01	1.0E+00	5.0E-04	4.1E+02	NV	3.51E+02	351	0.008	ND
Benzene	5.50E-02	6.88E-02	7.80E-03	4.00E-03	3.20E-03	3.00E-02	1.0E+00	5.0E-04	7.7E+02	1.56E+00	9.75E+01	1.56	5.3	ND
Carbon Tetrachloride	7.00E-02	8.75E-02	6.00E-03	4.00E-03	3.20E-03	1.00E-01	1.0E+00	5.0E-04	5.6E+02	1.48E+00	2.33E+02	1.48	0.99	ND
Chloroform	3.10E-02	3.88E-02	2.30E-02	1.00E-02	8.00E-03	9.80E-02	1.0E+00	5.0E-04	7.9E+02	5.48E-01	3.25E+02	0.548	11	ND
cis-1,2-Dichloroethene	--	--	--	1.00E-02	8.00E-03	--	1.0E+00	5.0E-04	7.8E+02	NV	1.99E+04	19,876	0.045	ND
Ethylbenzene	--	--	--	1.00E-01	8.00E-02	1.00E+00	1.0E+00	3.0E-02	1.2E+03	NV	5.13E+03	5,128	36	ND
Methylene Chloride	7.50E-03	9.38E-03	4.70E-04	6.00E-02	4.80E-02	1.00E+00	1.0E+00	5.0E-04	6.0E+02	2.02E+01	2.54E+03	20.2	5	ND
Tetrachloroethene	5.40E-01	6.75E-01	5.90E-03	1.00E-02	8.00E-03	2.70E-01	1.0E+00	3.0E-02	9.4E+02	2.04E+00	1.01E+03	2.04	45	0.0094
trans-1,2-Dichloroethene	--	--	--	2.00E-02	1.60E-02	6.00E-02	1.0E+00	5.0E-04	5.7E+02	NV	1.46E+02	146	0.003	ND
Trichloroethene	5.90E-03	7.38E-03	2.00E-03	--	--	--	1.0E+00	3.0E-02	7.3E+02	5.87E+00	NV	5.87	21	0.0027
Vinyl Chloride	7.20E-01	9.00E-01	4.40E-03	3.00E-03	2.40E-03	1.00E-01	1.0E+00	5.0E-04	3.0E+02	9.81E-01	1.24E+02	0.981	0.0075	ND
SVOCs														
1,2,4-Trichlorobenzene	--	--	--	1.00E-02	5.00E-03	2.00E-03	1.0E+00	1.0E-01	1.4E+04	NV	1.18E+02	118	2.3	ND
bis(2-Ethylhexyl)phthalate	1.40E-02	2.80E-02	2.40E-03	2.00E-02	1.00E-02	--	1.0E+00	1.0E-01	6.0E+08	1.79E+02	1.33E+04	179	0.62	ND
Hexachlorobenzene	1.60E+00	3.20E+00	4.60E-01	8.00E-04	4.00E-04	--	1.0E+00	1.0E-01	9.5E+04	1.06E+00	5.33E+02	1.06	1.4	ND
Hexachlorobutadiene	7.80E-02	1.56E-01	2.20E-02	1.00E-03	5.00E-04	--	1.0E+00	1.0E-01	2.4E+04	1.13E+01	6.67E+02	11.3	28	ND
Pentachlorophenol	1.20E-01	2.40E-01	5.10E-03	3.00E-02	1.50E-02	--	1.0E+00	1.0E-01	6.0E+08	2.08E+01	2.00E+04	20.8	2.5	ND
Pesticides														
4,4'-DDD	2.40E-01	4.80E-01	6.90E-02	--	--	--	1.0E+00	1.0E-01	6.0E+08	1.04E+01	NV	10.4	ND	--
4,4'-DDE	3.40E-01	6.80E-01	9.70E-02	--	--	--	1.0E+00	1.0E-01	1.6E+06	7.16E+00	NV	7.16	0.0073	--
4,4'-DDT	3.40E-01	6.80E-01	9.70E-02	5.00E-04	2.50E-04	--	1.0E+00	1.0E-01	6.0E+08	7.35E+00	3.33E+02	7.35	0.0059	--
PCBs														
Total PCBs	2.00E+00	4.00E+00	5.70E-01	--	--	--	1.0E+00	1.0E-01	6.0E+08	1.25E+00	NV	1.25	15.6	--
Dioxins/Furans														
2,3,7,8-TCDD (TEQ)	1.30E+05	2.60E+05	3.80E-02	1.00E-09	5.00E-10	4.00E-08	1.0E+00	1.0E-01	6.0E+08	1.92E-05	6.67E-04	0.0000192	0.000846	--
Metals														
Antimony	--	--	--	4.00E-04	8.00E-05	--	1.0E+00	1.0E-02	6.0E+08	NV	5.33E+02	533	12	--
Arsenic	1.50E+00	7.50E+00	4.30E+00	3.00E-04	6.00E-05	1.50E-05	1.0E+00	1.0E-02	6.0E+08	3.33E+00	3.96E+02	3.33	228	--
Cadmium	--	--	1.80E+00	5.00E-04	1.00E-04	1.00E-05	1.0E+00	1.0E-02	6.0E+08	5.36E+03	6.50E+02	650	9	--
Chromium	--	--	--	1.50E+00	3.00E-01	--	1.0E+00	1.0E-02	6.0E+08	NV	2.00E+06	2,000,000	1,200	--
Copper	--	--	--	4.00E-02	8.00E-03	--	1.0E+00	1.0E-02	6.0E+08	NV	5.33E+04	53,333	7,070	--
Lead	--	--	--	--	--	--	1.0E+00	1.0E-02	6.0E+08	NV	NV	NV	28,000	--
Mercury	--	--	--	1.60E-04	3.20E-05	3.00E-04	1.0E+00	1.0E-02	1.7E+04	NV	1.96E+01	19.6	1.2	--
Nickel	--	--	--	2.00E-02	4.00E-03	9.00E-05	1.0E+00	1.0E-02	6.0E+08	NV	2.39E+04	23,911	962	--
Silver	--	--	--	5.00E-03	1.00E-03	--	1.0E+00	1.0E-02	6.0E+08	NV	6.67E+03	6,667	10	--
Thallium	--	--	--	--	--	--	1.0E+00	1.0E-02	6.0E+08	NV	NV	NV	0.21	--
Zinc	--	--	--	3.00E-01	6.00E-02	--	1.0E+00	1.0E-02	6.0E+08	NV	4.00E+05	400,000	2,540	--

Notes:

--	Not Available
NA	Not Applicable
ND	Not Detected
NV	No Value
TEQ	Toxic Equivalency
☐	Maximum concentration exceeds RBC_{soil}.
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	For On-OCC Property soil maximum concentrations, refer to Table 3.1.
(3)	For Off-OCC Property soil maximum concentrations, refer to Table 3.4.
(4)	Assumed 8 hour work day.
(5)	Based on assumption of 5 days per week for 52 weeks over an exposure period of 365 days, as indicated in WAC (2007).

TABLE 3.19

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - INDUSTRIAL/COMMERCIAL WORKER ORAL, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Industrial/Commercial Worker Assumptions

Risk-Based Concentration in Soil (mg/kg)	RBC_{soil}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Cancer Slope Factor (per mg/kg-day)	CSF	chemical-specific	Refer to Table 3.34
Reference Dose Factor (mg/kg-day)	RfD	chemical-specific	Refer to Table 3.32
Unit Risk Factor (per mg/m^3)	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m^3)	RfC	chemical-specific	Refer to Table 3.33
Soil Ingestion Rate (mg/day)	SIR	50	WAC, 2007
Absorption Factor - Oral (%/100)	ABSo	1	WAC, 2007
Surface Area Exposed (cm^2/day)	SA	2,500	WAC, 2007
Adherence Factor (mg/cm^2)	AF	0.2	WAC, 2007
Absorption Factor - Dermal (%/100)	ABSd	chemical-specific	WAC, 2007
Fraction Time Exposed (unitless)	FT	8/24	(4)
Exposure Frequency (unitless)	EF	0.7	WAC, 2007 (5)
Exposure Duration (years)	ED	20	WAC, 2007
Average Body Weight (kg)	ABW	70	WAC, 2007
Conversion Factor (kg/mg)	CF	1.0E-06	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	20	WAC, 2007
Particulate Emission Factor (m^3/kg)	PEF	site-specific	Refer to Table 3.20
Volatilization Factor (m^3/kg)	VF	chemical-specific	Refer to Table 3.21

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{soil} = \frac{\text{TR x ATc}}{\text{EF x ED x [(CSF x SIR x CF x ABSo)/ABW + (CSF x SA x AF x CF x ABSd)/ABW + (URF x FT x (1/VF or PEF))]}}$$

Non-Carcinogenic Endpoints:

$$RBC_{soil} = \frac{\text{THQ x ATnc}}{\text{EF x ED x [((1/RfD) x SIR x CF x ABSo)/ABW + ((1/RfD) x SA x AF x CF x ABSd)/ABW + ((1/RfC) x FT x (1/VF or PEF))]}}$$

Reference:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

TABLE 3.20

DERIVATION OF PARTICULATE EMISSION FACTOR (PEF) FOR SOIL - INDUSTRIAL/COMMERCIAL WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Parameters (1)	***Reference***	
"A"	Exhibit D-2, USEPA, 2002	14.2253
Area	Site-Specific (2), acres	35.62
"B"	Exhibit D-2, USEPA, 2002	18.8366
"C"	Exhibit D-2, USEPA, 2002	218.1845

Q/C_{wind}	Exhibit D-2, USEPA, 2002	41.38

PEF	Equation 4-5, USEPA, 2002	6.00E+08

Notes:

(1) The A, B, and C based on Zone 1 - Seattle, Washington

(2) OCC Property is approximately 35.62 acres (1551604.74 ft^2) in area.

Reference:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response.OSWER 9355.4-24, December 2002.

TABLE 3.21

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR SOIL - INDUSTRIAL/COMMERCIAL WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

VF: Soil-to-Air Volatilization Factor

$$\boxed{VF = Q/C \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4} (m^2/cm^2)}$$

						Constituents of Concern										
				Reference	*Units*	*1,1,2,2-Tetrachloroethane*	*1,1,2-Trichloroethane*	*1,1-Dichloroethene*	*Benzene*	*Carbon Tetrachloride*	*Chloroform*	*cis-1,2-Dichloroethene*	*Ethylbenzene*	*Methylene Chloride*	*Tetrachloroethene*	*trans-1,2-Dichloroethene*
Where:	**VF**	**=**	**soil-to-air volatilization factor**	Equation 4-8, USEPA, 2002	m³/kg	**3.90E+03**	**1.83E+03**	**4.11E+02**	**7.67E+02**	**5.60E+02**	**7.86E+02**	**7.79E+02**	**1.24E+03**	**6.05E+02**	**9.41E+02**	**5.71E+02**
	Q/C_{vol}	=	inverse of mean conc - centre of square source	Equation D-3, USEPA, 2002	(g/m²-sec)/(kg/m³)	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38	41.38
	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	2.15E-04	9.77E-04	1.93E-02	5.55E-03	1.04E-02	5.30E-03	5.39E-03	2.13E-03	8.95E-03	3.69E-03	1.00E-02
	T	=	exposure interval	USEPA, 2002	s	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61

Q/C_{vol}: Inverse of Mean Conc - Centre of Square Source

$$\boxed{Q/C_{vol} = A \times \exp \frac{(\ln Area - B)^2}{C}}$$

Where:	"A"	=	constant	USEPA, 2002 (1)		14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253
	Area	=	areal extent of the site or contamination	Site-Specific (2)	acres	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62	35.62
	"B"	=	constant	USEPA, 2002 (1)		18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366
	"C"	=	constant	USEPA, 2002 (1)		218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845

D_A: Apparent Diffusivity

$$\boxed{D_A = \frac{\left[\left(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w\right)/n^2\right]}{\rho_b K_b + \Theta_w + \Theta_a H'}}$$

					Units											
Where:	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	2.15E-04	9.77E-04	1.93E-02	5.55E-03	1.04E-02	5.30E-03	5.39E-03	2.13E-03	8.95E-03	3.69E-03	1.00E-02
	Q_a	=	air-filled porosity	Refer to Table 3.9	unitless	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376
	Q_w	=	water-filled porosity	Refer to Table 3.9	unitless	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
	n	=	total soil porosity	Refer to Table 3.9	unitless	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430	0.430
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	H'	=	dimensionless Henry's Law Constant	USEPA, 2004 (3)	unitless	6.90E-03	2.78E-02	7.03E-01	1.32E-01	7.42E-01	9.10E-02	9.99E-02	1.62E-01	5.66E-02	3.96E-01	2.41E-01
	D_i	=	diffusivity of chemical x in air	USEPA, 2004 (3)	cm²/s	6.67E-02	7.33E-02	8.45E-02	8.27E-02	7.33E-02	9.77E-02	6.91E-02	7.04E-02	9.49E-02	6.76E-02	6.64E-02
	D_w	=	diffusivity of chemical x in water	USEPA, 2004	cm²/s	7.90E-06	8.80E-06	1.04E-05	9.80E-06	8.80E-06	1.00E-05	1.13E-05	7.80E-06	1.17E-05	8.20E-06	1.19E-05
	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.41E-01	2.29E-01	1.98E-01	1.89E-01	4.64E-01	1.62E-01	1.08E-01	6.22E-01	3.05E-02	8.08E-01	1.16E-01

Kd: Soil-Water Partition Coefficient

$$\boxed{K_d = K_{oc} \times f_{oc}}$$

					Units											
Where:	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.41E-01	2.29E-01	1.98E-01	1.89E-01	4.64E-01	1.62E-01	1.08E-01	6.22E-01	3.05E-02	8.08E-01	1.16E-01
	K_{oc}	=	soil organic carbon-water partition coefficient	USEPA, 2004	cm³/g	7.90E+01	7.50E+01	6.50E+01	6.20E+01	1.52E+02	5.30E+01	3.55E+01	2.04E+02	1.00E+01	2.65E+02	3.80E+01
	f_{oc}	=	organic content of soil	Refer to Table 3.9	g/g	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305

TABLE 3.21

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR SOIL - INDUSTRIAL/COMMERCIAL WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

VF: Soil-to-Air Volatilization Factor

$$VF = Q/C \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4} (m^2 / cm^2)$$

						Constituents of Concern						
				Reference	***Units***	***Trichloroethene***	***Vinyl Chloride***	***1,2,4-Trichlorobenzene***	***Hexachlorobenzene***	***Hexachlorobutadiene***	***4,4'-DDE***	***Mercury***
Where:	**VF**	**=**	**soil-to-air volatilization factor**	Equation 4-8, USEPA, 2002	m³/kg	**7.35E+02**	**2.97E+02**	**1.40E+04**	**9.55E+04**	**2.38E+04**	**1.64E+06**	**1.68E+04**
	Q/C_{vol}	=	inverse of mean conc - centre of square source	Equation D-3, USEPA, 2002	(g/m²-sec)/(kg/m³)	41.38	41.38	41.38	41.38	41.38	41.38	41.38
	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	6.06E-03	3.72E-02	1.67E-05	3.59E-07	5.79E-06	1.21E-09	1.16E-05
	T	=	exposure interval	USEPA, 2002	s	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08	6.31E+08
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61

Q/C_{vol}: Inverse of Mean Conc - Centre of Square Source

$$Q / C_{vol} = A \times \exp \frac{(\ln Area - B)^2}{C}$$

Where:	"A"	=	constant	USEPA, 2002 (1)		14.2253	14.2253	14.2253	14.2253	14.2253	14.2253	14.2253
	Area	=	areal extent of the site or contamination	Site-Specific (2)	acres	35.62	35.62	35.62	35.62	35.62	35.62	35.62
	"B"	=	constant	USEPA, 2002 (1)		18.8366	18.8366	18.8366	18.8366	18.8366	18.8366	18.8366
	"C"	=	constant	USEPA, 2002 (1)		218.1845	218.1845	218.1845	218.1845	218.1845	218.1845	218.1845

D_A: Apparent Diffusivity

$$D_A = \frac{\left[\left(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w\right) / n^2\right]}{\rho_b K_b + \Theta_w + \Theta_a H'}$$

					Units							
Where:	D_A	=	apparent diffusivity	Equation 4-8, USEPA, 2002	cm²/s	6.06E-03	3.72E-02	1.67E-05	3.59E-07	5.79E-06	1.21E-09	1.16E-05
	Q_a	=	air-filled porosity	Refer to Table 3.9	unitless	0.376	0.376	0.376	0.376	0.376	0.376	0.376
	Q_w	=	water-filled porosity	Refer to Table 3.9	unitless	0.054	0.054	0.054	0.054	0.054	0.054	0.054
	n	=	total soil porosity	Refer to Table 3.9	unitless	0.430	0.430	0.430	0.430	0.430	0.430	0.430
	r_b	=	soil dry bulk density	Refer to Table 3.9	g/cm³	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	H'	=	dimensionless Henry's Law Constant	USEPA, 2004 (3)	unitless	2.38E-01	8.09E-01	2.34E-02	1.33E-02	1.40E-01	1.83E-04	1.63E-01
	D_i	=	diffusivity of chemical x in air	USEPA, 2004 (3)	cm²/s	7.42E-02	9.96E-02	2.82E-02	5.09E-02	5.27E-02	1.35E-02	2.88E-02
	D_w	=	diffusivity of chemical x in water	USEPA, 2004	cm²/s	9.10E-06	1.23E-05	8.23E-06	5.91E-06	6.16E-06	5.87E-06	6.30E-06
	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.87E-01	5.67E-02	5.06E+00	2.44E+02	1.64E+02	2.64E+02	5.20E+01

Kd: Soil-Water Partition Coefficient

$$K_d = K_{oc} \times f_{oc}$$

					Units							
Where:	K_d	=	soil-water partition coefficient	USEPA, 2002	cm³/g	2.87E-01	5.67E-02	5.06E+00	2.44E+02	1.64E+02	2.64E+02	5.20E+01
	K_{oc}	=	soil organic carbon-water partition coefficient	USEPA, 2004	cm³/g	9.40E+01	1.86E+01	1.66E+03	8.00E+04	5.37E+04	8.64E+04	--
	f_{oc}	=	organic content of soil	Refer to Table 3.9	g/g	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305	0.00305

Notes:

(1) The A, B, and C based on Zone 1 - Seattle, Washington

(2) OCC property is approximately 35.62 acres (1551604.74 ft^2) in area.

(3) Site-specific parameter adjusted for a temperature of 12.8°C.

References:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.
USEPA, 2004. User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings, Office of Emergency and Remedial Response, Washington, DC, February 22.

TABLE 3.22

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - CONSTRUCTION/UTILITY WORKER ORAL, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

							Relative			Construction/ Utility Worker		Soil	
							Absorption			Carcinogen	Non-Carcinogen	Risk-Based	Soil Maximum
Constituents	CSF		URF	RfD		RfC	Factor		PEF or	TR	THQ	Concentration	Concentration
of Concern	oral	dermal	inhalation	oral	dermal	inhalation	Oral	Dermal	VF	Adult	Adult	RBC $_{soil}$ (1)	Off-OCC Property (2)
(COCs)	1/(mg/kg-d)	1/(mg/kg-d)	1/(mg/m ^{3})	(mg/kg-d)	(mg/kg-d)	(mg/m ^{3})	(%/100)	(%/100)	(m ^{3} /kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
VOCs													
1,1,2,2-Tetrachloroethane	2.00E-01	2.50E-01	5.80E-02	2.00E-02	1.60E-02	--	1.0E+00	3.0E-02	5.2E+03	6.34E+01	1.53E+04	63	3.1
1,1,2-Trichloroethane	5.70E-02	7.13E-02	1.60E-02	4.00E-03	3.20E-03	--	1.0E+00	3.0E-02	2.3E+03	1.16E+02	3.05E+03	116	ND
1,1-Dichloroethene	--	--	--	5.00E-02	4.00E-02	2.00E-01	1.0E+00	5.0E-04	3.2E+02	NV	7.45E+02	745	ND
Benzene	5.50E-02	6.88E-02	7.80E-03	4.00E-03	3.20E-03	3.00E-02	1.0E+00	5.0E-04	1.0E+03	1.05E+02	3.24E+02	105	30
Carbon Tetrachloride	7.00E-02	8.75E-02	6.00E-03	4.00E-03	3.20E-03	1.00E-01	1.0E+00	5.0E-04	7.9E+02	1.05E+02	7.42E+02	105	ND
Chloroform	3.10E-02	3.88E-02	2.30E-02	1.00E-02	8.00E-03	9.80E-02	1.0E+00	5.0E-04	9.4E+02	3.63E+01	9.82E+02	36	ND
cis-1,2-Dichloroethene	--	--	--	2.00E-03	1.60E-03	--	1.0E+00	5.0E-04	1.0E+03	NV	1.69E+03	1,694	ND
Ethylbenzene	--	--	--	1.00E-01	8.00E-02	1.00E+00	1.0E+00	3.0E-02	2.1E+03	NV	1.88E+04	18,843	72
Methylene Chloride	2.00E-03	2.50E-03	1.00E-05	6.00E-03	4.80E-03	6.00E-01	1.0E+00	5.0E-04	7.8E+02	2.19E+04	2.67E+03	2,673	1.3
Tetrachloroethene	2.10E-03	2.63E-03	2.60E-04	6.00E-03	4.80E-03	4.00E-02	1.0E+00	3.0E-02	1.1E+03	3.44E+03	4.88E+02	488	0.17
trans-1,2-Dichloroethene	--	--	--	2.00E-02	1.60E-02	6.00E-02	1.0E+00	5.0E-04	6.7E+02	NV	4.72E+02	472	ND
Trichloroethene	4.60E-02	5.75E-02	4.10E-03	5.00E-04	4.00E-04	2.00E-03	1.0E+00	3.0E-02	8.9E+02	1.69E+02	2.02E+01	20	0.0027
Vinyl Chloride	7.20E-01	9.00E-01	4.40E-03	3.00E-03	2.40E-03	1.00E-01	1.0E+00	5.0E-04	3.8E+02	4.11E+01	3.83E+02	41	ND
SVOCs													
1,2,4-Trichlorobenzene	--	--	--	1.00E-02	5.00E-03	2.00E-03	1.0E+00	1.0E-01	1.7E+04	NV	3.76E+02	376	ND
bis(2-Ethylhexyl)phthalate	1.40E-02	2.80E-02	2.40E-03	2.00E-02	1.00E-02	--	1.0E+00	1.0E-01	4.5E+06	2.84E+03	1.06E+04	2,836	ND
Hexachlorobenzene	1.60E+00	3.20E+00	4.60E-01	8.00E-04	4.00E-04	--	1.0E+00	1.0E-01	7.2E+04	2.11E+01	4.24E+02	21	ND
Hexachlorobutadiene	7.80E-02	1.56E-01	2.20E-02	1.00E-03	5.00E-04	--	1.0E+00	1.0E-01	2.8E+04	3.54E+02	5.30E+02	354	ND
Pentachlorophenol	4.10E-01	8.20E-01	5.10E-03	5.00E-03	2.50E-03	--	1.0E+00	1.0E-01	4.5E+06	9.70E+01	2.65E+03	97	ND
PCBs													
Total PCBs	2.00E+00	4.00E+00	5.70E-01	--	--	--	1.0E+00	1.0E-01	4.5E+06	1.98E+01	NV	20	0.0054
Metals													
Antimony	--	--	--	4.00E-04	8.00E-05	--	1.0E+00	1.0E-02	4.5E+06	NV	2.95E+02	295	2.51
Arsenic	1.50E+00	7.50E+00	4.30E+00	3.00E-04	6.00E-05	1.50E-05	1.0E+00	1.0E-02	4.5E+06	3.55E+01	1.74E+02	36	6.38
Cadmium	--	--	1.80E+00	5.00E-04	1.00E-04	2.00E-05	1.0E+00	1.0E-02	4.5E+06	2.26E+03	2.75E+02	275	0.706
Chromium	--	--	--	1.50E+00	3.00E-01	--	1.0E+00	1.0E-02	4.5E+06	NV	1.11E+06	1,106,719	16.4
Copper	--	--	--	4.00E-02	8.00E-03	--	1.0E+00	1.0E-02	4.5E+06	NV	2.95E+04	29,513	283
Lead	--	--	--	--	--	--	1.0E+00	1.0E-02	4.5E+06	NV	NV	NV	899
Mercury	--	--	--	3.00E-04	6.00E-05	3.00E-04	1.0E+00	1.0E-02	1.3E+04	NV	3.86E+01	39	0.109
Nickel	--	--	--	2.00E-02	4.00E-03	9.00E-05	1.0E+00	1.0E-02	4.5E+06	NV	3.67E+03	3,669	25.3
Silver	--	--	--	5.00E-03	1.00E-03	--	1.0E+00	1.0E-02	4.5E+06	NV	3.69E+03	3,689	0.257
Thallium	--	--	--	--	--	--	1.0E+00	1.0E-02	4.5E+06	NV	NV	NV	0.059
Zinc	--	--	--	3.00E-01	6.00E-02	--	1.0E+00	1.0E-02	4.5E+06	NV	2.21E+05	221,344	438

Notes:

--	= Not Available
NA	= Not Applicable
NV	= No Value
☐	= Maximum concentration exceeds RBC $_{soil}$.
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	For Off-OCC Property soil maximum concentrations, refer to Table 3.4.
(3)	Assumed 8 hour work day.
(4)	Based on assumption of 5 days per week for 18 weeks over an exposure period of 365 days.
(5)	Assumes construction campaign occurs within a one year time period.

TABLE 3.22

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - CONSTRUCTION/UTILITY WORKER ORAL, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Construction/ Utility Worker Assumptions

Risk-Based Concentration in Soil (mg/kg)	RBC_{soil}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Cancer Slope Factor (per mg/kg-day)	CSF	chemical-specific	Refer to Table 3.34
Reference Dose Factor (mg/kg-day)	RfD	chemical-specific	Refer to Table 3.32
Unit Risk Factor (per mg/m^3)	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m^3)	RfC	chemical-specific	Refer to Table 3.33
Soil Ingestion Rate (mg/day)	SIR	330	USEPA, 2002
Absorption Factor - Oral (%/100)	ABSo	1	WAC, 2007
Surface Area Exposed (cm^2/day)	SA	3,300	USEPA, 2002
Adherence Factor (mg/cm^2-event)	AF	0.3	USEPA, 2002
Absorption Factor - Dermal (%/100)	ABSd	chemical-specific	WAC, 2007
Event Frequency (event/day)	EV	1	USEPA, 2002
Fraction Time Exposed (unitless)	FT	8/24	(3)
Exposure Frequency (unitless)	EF	0.25	(4)
Exposure Duration (years)	ED	1	(5)
Average Body Weight (kg)	ABW	70	WAC, 2007
Conversion Factor (kg/mg)	CF	1.0E-06	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	1	WAC, 2007
Particulate Emission Factor (m^3/kg)	PEF	site-specific	Refer to Table 3.23
Volatilization Factor (m^3/kg)	VF	chemical-specific	Refer to Table 3.24

Exposure Equations

Carcinogenic Endpoints: $$RBC_{soil} = \frac{TR \times ATc}{EF \times ED \times [(CSF \times SIR \times CF \times ABSo)/ABW + (CSF \times SA \times EV \times AF \times CF \times ABSd)/ABW + (URF \times FT \times (1/VF \text{ or } PEF))]}$$

Non-Carcinogenic Endpoints: $$RBC_{soil} = \frac{THQ \times ATnc}{EF \times ED \times [((1/RfD) \times SIR \times CF \times ABSo)/ABW + ((1/RfD) \times SA \times EV \times AF \times CF \times ABSd)/ABW + ((1/RfC) \times FT \times (1/VF \text{ or } PEF))]}$$

Reference:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

TABLE 3.23

DERIVATION OF PARTICULATE EMISSION FACTOR (PEF) FOR SOIL -
CONSTRUCTION/UTILITY WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

$PEF_{SC} =$ $Q/C_{sr} \times 1/F_D \times [\ (T \times A_R) / (556 \times ((W/3)^{0.4} \times ((365\ d/y - p) / 365\ d/y) \times VKT)]$

$Q/C_{sr} =$ $A \times EXP\ [\ (\ln A_s - B)^2 / C]$

INPUT PARAMETERS		*REFERENCE*
PEF_{sc}/ subchronic road particulate emission factor (m^3/kg) =	**4.52E+06**	Equation 5-5, USEPA, 2002
Q/C_{sr}/ inverse of ratio of the 1-h geometric mean air concentration =	41.38	Equation 5-6, USEPA, 2002
A/ constant (unitless) =	14.2253	USEPA, 2002 (1)
B/ constant (unitless) =	18.8366	USEPA, 2002 (1)
C/ constant (unitless) =	218.1845	USEPA, 2002 (1)
A_s/ areal extent of site surface soil contamination (acres) =	35.62	Site-Specific (2)
F_D/ dispersion correction factor (unitless) =	0.185	USEPA, 2002
T/ total time over which construction occurs (s) =	3.15E+07	USEPA, 2002 (site-specific, within a 1 year construction campaign)
A_R/ surface area of contaminated road segment (m^2) =	274	USEPA, 2002 (A_R = LR*WR*0.092903 m^2/ft^2)
LR - length of road segment (ft) =	148	USEPA, 2002
WR - width of road segment (ft) =	20	USEPA, 2002
W/ mean vehicle weight (tons) =	8	USEPA, 2002, Assumes 20 two-ton cars and 10 twenty-ton trucks (W = (20*2+10*20)/30)
p/ number of days with at least 0.01 inches of precipitation (days/yr) =	180	USEPA, 2002
VKT/ sum of fleet vehicle kilometers traveled during the exposure duration (km) =	1,026	Assuming that the area is configured as a square with the unpaved construction access road segment dividing the square evenly, the road length would be equal to the square root of 144148.8 m^2, also equal to 380 m or 0.38 km. Assuming that each vehicle travels the length of the road once per day, 5 days per week for a total of 90 days, (30*0.38*90).

Notes:

(1) The A, B, and C based on Zone 1 - Seattle, Washington

(2) OCC Property is approximately 35.62 acres (1551604.74 ft^2) in area.

Reference:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.

TABLE 3.24

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR SOIL - CONSTRUCTION/UTILITY WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

$$VF = (Q/C) \times 1/F_D \times ((3.14 \times D_a \times T)^{1/2}) \times 10^{-4} / (2 \times db \times D_a)$$

$$Da = ((Pa^{10/3 \times} Di \times H + Pw^{10/3 \times} Dw) / n^2)/(db \times Kd + Pw + Pa \times H)$$

$$Q/C_{sa} = A \times EXP\ [\ (\ln A_s - B)^2 / C]$$

$$F_D = 0.1852+(5.3537/t_c)+(-9.6318/t_c^2)$$

		Constituents of Concern			
Input Parameters	*Reference*	*1,1,2,2-TCA*	*Benzene*	*Ethylbenzene*	*Methylene Chloride*
VF/ volatilization factor (m^3/kg) =	Equation 5-14, USEPA, 2002	**5.25E+03**	**9.97E+02**	**2.09E+03**	**7.83E+02**
Da/ apparent diffusivity (cm^2/s) =	Equation 5-14, USEPA, 2002	1.63E-04	4.53E-03	1.03E-03	7.33E-03
Q/C/ inverse of the mean conc. at center of square source (g/m^2-s per kg/m^3) =	Equation 5-15, USEPA, 2002	41.38	41.38	41.38	41.38
A/ constant (unitless) =	USEPA, 2002 (1)	14.2253	14.2253	14.2253	14.2253
B/ constant (unitless) =	USEPA, 2002 (1)	18.8366	18.8366	18.8366	18.8366
C/ constant (unitless) =	USEPA, 2002 (1)	218.1845	218.1845	218.1845	218.1845
A_s/ areal extent of site surface soil contamination (acres) =	Site-Specific (2)	35.62	35.62	35.62	35.62
F_D/ dispersion correction factor (unitless) =	Equation E-16, USEPA, 2002	0.185	0.185	0.185	0.185
Pa/ air-filled soil porosity (L_{air}/L_{soil}) =	Refer to Table 3.9	0.321	0.32	0.32	0.32
Di/ diffusivity in air (cm^2/s) =	USEPA, 2004 (3)	7.10E-02	8.80E-02	7.50E-02	1.01E-01
H/ dimensionless Henry's law constant =	USEPA, 2004 (3)	1.41E-02	2.28E-01	3.23E-01	8.98E-02
Pw/ water-filled soil porosity (L_{water}/L_{soil}) =	Refer to Table 3.9	0.054	0.054	0.054	0.054
Dw/ diffusivity in water (cm^2/s) =	USEPA, 2004	7.90E-06	9.80E-06	7.80E-06	1.17E-05
n/ total soil porosity (L_{pore}/L_{soil}) =	Refer to Table 3.9	0.375	0.375	0.375	0.375
db/ dry soil bulk density (g/cm^3) =	Refer to Table 3.9	1.66	1.66	1.66	1.66
Kd/ soil-water partition coefficient (cm^3/g) =	USEPA, 2002 (Kd = Koc x foc)	5.60E-01	3.53E-01	2.18E+00	7.02E-02
Koc/ soil organic carbon-water partition coefficient (cm^3/g) =	USEPA, 2004	9.33E+01	5.89E+01	3.63E+02	1.17E+01
foc/ organic carbon content of soil (g/g) =	Refer to Table 3.9	0.006	0.006	0.006	0.006
t_c/ exposure interval (hrs) =	Site-Specific	8.76E+03	8.76E+03	8.76E+03	8.76E+03
T/ exposure interval (s) =	Site-Specific	3.15E+07	3.15E+07	3.15E+07	3.15E+07
Conversion Factor/ 10^{-4} (m^2/cm^2) =	USEPA, 2002	1.00E-04	1.00E-04	1.00E-04	1.00E-04

Notes:

(1) The A, B, and C based on Zone 1 - Seattle, Washington

(2) OCC Property is approximately 35.62 acres (1551604.74 ft^2) in area.

(3) Site-specific parameter adjusted for a temperature of 12.8°C

References:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.

USEPA, 2004. User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings, Office of Emergency and Remedial Response, Washington, DC, February 22.

TABLE 3.24

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR SOIL - CONSTRUCTION/UTILITY WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

$VF = (Q/C) \times 1/F_D \times ((3.14 \times D_a \times T)^{1/2}) \times 10^{-4} / (2 \times db \times D_a)$

$Da = ((Pa^{10/3\ x}\ Di \times H + Pw^{10/3\ x}\ Dw) / n^2)/(db \times Kd + Pw + Pa \times H)$

$Q/C_{sa} = A \times EXP\ [\ (\ln A_s - B)^2 / C]$

$F_D = 0.1852+(5.3537/t_c)+(-9.6318/t_c^2)$

		Constituents of Concern		
		PCE	***TCE***	***Mercury***
Input Parameters	***Reference***			
VF/ volatilization factor (m^3/kg) =	Equation 5-14, USEPA, 2002	**1.14E+03**	**8.88E+02**	**1.30E+04**
Da/ apparent diffusivity (cm^2/s) =	Equation 5-14, USEPA, 2002	3.69E-03	6.06E-03	2.67E-05
Q/C/ inverse of the mean conc. at center of square source (g/m^2-s per kg/m^3) =	Equation 5-15, USEPA, 2002	41.38	41.38	41.38
A/ constant (unitless) =	USEPA, 2002 (1)	14.2253	14.2253	14.2253
B/ constant (unitless) =	USEPA, 2002 (1)	18.8366	18.8366	18.8366
C/ constant (unitless) =	USEPA, 2002 (1)	218.1845	218.1845	218.1845
A_s/ areal extent of site surface soil contamination (acres) =	Site-Specific (2)	35.62	35.62	35.62
F_D/ dispersion correction factor (unitless) =	Equation E-16, USEPA, 2002	0.185	0.185	0.185
Pa/ air-filled soil porosity (L_{air}/L_{soil}) =	Refer to Table 3.9	0.376	0.376	0.32
Di/ diffusivity in air (cm^2/s) =	USEPA, 2004 (3)	6.76E-02	7.42E-02	3.07E-02
H/ dimensionless Henry's law constant =	USEPA, 2004 (3)	3.96E-01	2.38E-01	4.67E-01
Pw/ water-filled soil porosity (L_{water}/L_{soil}) =	Refer to Table 3.9	0.054	0.054	0.054
Dw/ diffusivity in water (cm^2/s) =	USEPA, 2004	8.20E-06	9.10E-06	6.30E-06
n/ total soil porosity (L_{pore}/L_{soil}) =	Refer to Table 3.9	0.430	0.430	0.375
db/ dry soil bulk density (g/cm^3) =	Refer to Table 3.9	1.61	1.61	1.66
Kd/ soil-water partition coefficient (cm^3/g) =	USEPA, 2002 (Kd = Koc x foc)	8.08E-01	2.87E-01	5.20E+01
Koc/ soil organic carbon-water partition coefficient (cm^3/g) =	USEPA, 2004	2.65E+02	9.40E+01	--
foc/ organic carbon content of soil (g/g) =	Refer to Table 3.9	0.00305	0.00305	0.006
t_c/ exposure interval (hrs) =	Site-Specific	8.76E+03	8.76E+03	8.76E+03
T/ exposure interval (s) =	Site-Specific	3.15E+07	3.15E+07	3.15E+07
Conversion Factor/ 10^{-4} (m^2/cm^2) =	USEPA, 2002	1.00E-04	1.00E-04	1.00E-04

Notes:

(1) The A, B, and C based on Zone 1 - Seattle, Washington

(2) OCC Property is approximately 35.62 acres (1551604.74 ft^2) in area.

(3) Site-specific parameter adjusted for a temperature of 12.8°C

References:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.

USEPA, 2004. User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings, Office of Emergency and Remedial Response, Washington, DC, February 22.

TABLE 3.25

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR GROUNDWATER - CONSTRUCTION/UTILITY WORKER INGESTION, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*CSF*		*URF*	*RfD*		*RfC*			*Construction/ Utility Worker*		*Risk-Based Concentrations (1)*		*Shallow Groundwater Maximum Concentration*
	ingestion	*dermal*	*inhalation*	*ingestion*	*dermal*	*inhalation*	*DAevent*	*VF*	*TR Adult*	*THQ Adult*	*RBC $_{gw}$*		*Off-OCC Property (2)*
	1/(mg/kg-d)	*1/(mg/kg-d)*	*1/(mg/m ^{3})*	*(mg/kg-d)*	*(mg/kg-d)*	*(mg/m ^{3})*	*(cm/event)*	*(L/m ^{3})*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(µg/L)*	*(µg/L)*
VOCs													
1,1-Dichloroethene	--	--	--	5.00E-02	4.00E-02	2.00E-01	5.5E-02	2.1E-01	NV	9.42E+00	9.42	9,420	590
Benzene	5.50E-02	6.88E-02	7.80E-03	4.00E-03	3.20E-03	3.00E-02	6.6E-02	2.3E-01	3.59E-01	1.10E+00	0.36	359	2,400
Chloroform	3.10E-02	3.88E-02	2.30E-02	1.00E-02	8.00E-03	9.80E-02	3.3E-02	1.9E-01	1.99E-01	4.64E+00	0.20	199	4,400
cis-1,2-Dichloroethene	--	--	--	2.00E-03	1.60E-03	--	3.6E-02	2.1E-01	NV	3.36E+00	3.36	3,356	140,000
Ethylbenzene	--	--	--	1.00E-01	8.00E-02	1.00E+00	2.1E-01	2.0E-01	NV	2.05E+01	20.53	20,534	310
Methylene Chloride	2.00E-03	2.50E-03	1.00E-05	6.00E-03	4.80E-03	6.00E-01	1.6E-02	2.2E-01	9.40E+01	1.23E+01	12.25	12,254	9,500
Tetrachloroethene	2.10E-03	2.63E-03	2.60E-04	6.00E-03	4.80E-03	4.00E-02	1.8E-01	1.6E-01	8.08E+00	1.26E+00	1.26	1,257	170,000
trans-1,2-Dichloroethene	--	--	--	2.00E-02	1.60E-02	6.00E-02	3.6E-02	2.1E-01	NV	3.10E+00	3.10	3,097	7,600
Trichloroethene	4.60E-02	5.75E-02	4.10E-03	5.00E-04	4.00E-04	2.00E-03	6.0E-02	1.8E-01	7.08E-01	1.06E-01	0.11	106	13,000
Vinyl Chloride	7.20E-01	9.00E-01	4.40E-03	3.00E-03	2.40E-03	1.00E-01	2.5E-02	2.6E-01	1.83E-01	2.74E+00	0.18	183	20,000
PCBs													
Total PCBs	2.00E+00	4.00E+00	5.70E-01	--	--	--	6.1E+00	NA	2.60E-04	NV	0.00026	0.26	0.094
Dioxins/Furans													
2,3,7,8-TCDD (TEQ)	1.30E+05	2.60E+05	3.80E-02	7.00E-10	3.50E-10	4.00E-08	5.8E+00	NA	4.23E-09	5.13E-09	4.23E-09	4.23E-06	6.30E-08
Metals													
Antimony	--	--	--	4.00E-04	8.00E-05	--	4.0E-03	NA	NV	1.30E+00	1.30	1,302	2.33
Arsenic	1.50E+00	7.50E+00	4.30E+00	3.00E-04	6.00E-05	1.50E-05	4.0E-03	NA	1.63E-01	9.77E-01	0.16	163	138
Cadmium	--	--	1.80E+00	5.00E-04	1.00E-04	2.00E-05	4.0E-03	NA	NV	1.63E+00	1.63	1,628	0.65
Chromium	--	--	--	1.50E+00	3.00E-01	--	4.0E-03	NA	NV	4.88E+03	4,884	4,883,721	6,350
Copper	--	--	--	4.00E-02	8.00E-03	--	4.0E-03	NA	NV	1.30E+02	130	130,233	117
Lead	--	--	--	--	--	--	4.0E-04	NA	NV	NV	NV	NV	9.04
Mercury	--	--	--	3.00E-04	6.00E-05	3.00E-04	4.0E-03	1.5E-01	NV	2.41E-02	0.02	24.1	0.089
Nickel	--	--	--	2.00E-02	4.00E-03	9.00E-05	8.0E-04	NA	NV	1.69E+02	169	168,675	1,160
Silver	--	--	--	5.00E-03	1.00E-03	--	2.4E-03	NA	NV	2.35E+01	23.49	23,490	0.145
Thallium	--	--	--	--	--	--	4.0E-03	NA	NV	NV	NV	NV	0.77
Zinc	--	--	--	3.00E-01	6.00E-02	--	2.4E-03	NA	NV	1.41E+03	1,409	1,409,396	118

Notes :

-- = Not Available
NA = Not Applicable
NV = No Value
☐ = Maximum concentration exceeds RBC$_{gw}$.
(1) The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2) For Off-OCC Property shallow groundwater maximum concentrations, refer to Table 3.6.
(3) Professional Judgment; assumes 5 days/wk for 18 weeks or 90 days per 365 days.
(4) Professional Judgment; assumes construction campaign occurs within a one year time period.
(5) Professional Judgment, assumes half of a worker's 8 hour work day spent in direct contact with Site groundwater.
(6) Professional Judgment, assumes 8 hour work day.

TABLE 3.25

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR GROUNDWATER - CONSTRUCTION/UTILITY WORKER INGESTION, DERMAL, AND INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Construction/ Utility Worker Exposure Assumptions

Risk-Based Concentration in Groundwater (mg/L)	RBC_{gw}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Cancer Slope Factor (per mg/kg-day)	CSF	chemical-specific	Refer to Table 3.34
Reference Dose Factor (mg/kg-day)	RfD	chemical-specific	Refer to Table 3.32
Unit Risk Factor (1/(mg/m^3))	URF	chemical-specific	Refer to Table 3.35
Reference Concentration (mg/m^3)	RfC	chemical-specific	Refer to Table 3.33
Water Ingestion Rate (L/day)	WIR	0.02	Virginia DEQ, 2002
Event Frequency (event/day)	EV	1	USEPA, 2004
Exposure Frequency (unitless)	EF	0.25	Professional Judgment (3)
Exposure Duration (years)	ED	1	Professional Judgment (4)
Exposure Time (hrs/day)	ET	4	Professional Judgment (5)
Fraction Time Exposed (unitless)	FT	8/24	Professional Judgment (6)
Average Body Weight (kg)	ABW	70	WAC, 2007
Surface Area Exposed (cm^2)	SA	3,300	USEPA, 2002
Conversion Factor (L/cm^3)	CF	0.001	
Dermal Absorbed per Event (cm/event)	DAevent	chemical-specific	Refer to Table 3.26
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	1	WAC, 2007
Volatilization Factor (L/m^3)	VF	chemical-specific	Refer to Table 3.27

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{gw} = \frac{TR \times ATc}{EF \times ED \times ((CSF \times WIR)/ABW + (CSF \times SA \times DAevent \times EV \times CF)/ABW + (URF \times FT \times VF))}$$

Non-Carcinogenic Endpoints:

$$RBC_{gw} = \frac{THQ \times ATnc}{EF \times ED \times (((1/RfD) \times IR)/ABW + ((1/RfD) \times SA \times DAevent \times EV \times CF)/ABW + ((1/RfC) \times FT \times VF))}$$

References:

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.

USEPA, 2004: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), EPA/540/R/99/005, July 2004.

Virginia DEQ, 2002: Virginia DEQ Waste Management, Voluntary Remediation Program Assessment Guidance, Values Use for Chronic Daily Intakes, July 1, 2002 and updates (http://www.deq.virginia.gov/vrprisk/raguide.html).

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

TABLE 3.26

DERIVATION OF DAevent FOR GROUNDWATER - CONSTRUCTION/ UTILITY WORKER DERMAL EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

DAevent (cm/event) - Inorganics= PC x CF x ET

DAevent (cm/event) - Organics= ET <= t* =

2 x FA x PC x SQRT(6 x t_{event} x ET / PI)

ET > t* =

FA x PC x (ET/(1+B)+2 x t_{event} x $((1+3B+3B^{2})/(1+B)^{2})$

t* =2.4 x t_{event}

Constituents of Concern (COCs)	***PC cm/hr***	***Ref***	***FA unitless***	***Ref***	***MW g/mole***	***t_{event} hr/event***	***D_{sc} cm^{2}/hr***	***b unitless***	***c unitless***	***t* hr***	***ET (1) hr/event***	***B dimensionless***	***DA event (2) cm/event***
<u>VOCs</u>													
1,1-Dichloroethene	1.20E-02	USEPA, 2004	1.0E+00	USEPA, 2004	9.69E+01	3.66E-01	4.54E-07	3.32E-01	3.64E-01	8.79E-01	4.0E+00	4.54E-02	5.51E-02
Benzene	1.50E-02	USEPA, 2004	1.0E+00	USEPA, 2004	7.81E+01	2.87E-01	5.79E-07	3.35E-01	3.68E-01	6.90E-01	4.0E+00	5.10E-02	6.62E-02
Chloroform	6.80E-03	USEPA, 2004	1.0E+00	USEPA, 2004	1.19E+02	4.90E-01	3.40E-07	3.21E-01	3.53E-01	1.18E+00	4.0E+00	2.86E-02	3.33E-02
cis-1,2-Dichloroethene	7.67E-03	USEPA, 2004	1.0E+00	USEPA, 2004	9.69E+01	3.66E-01	4.54E-07	3.21E-01	3.53E-01	8.79E-01	4.0E+00	2.91E-02	3.56E-02
Ethylbenzene	4.90E-02	USEPA, 2004	1.0E+00	USEPA, 2004	1.06E+02	4.13E-01	4.03E-07	4.35E-01	4.73E-01	9.91E-01	4.0E+00	1.94E-01	2.12E-01
Methylene Chloride	3.50E-03	USEPA, 2004	1.0E+00	USEPA, 2004	8.49E+01	3.14E-01	5.30E-07	3.11E-01	3.42E-01	7.53E-01	4.0E+00	1.24E-02	1.61E-02
Tetrachloroethene	3.30E-02	USEPA, 2004	1.0E+00	USEPA, 2004	1.66E+02	8.91E-01	1.87E-07	4.12E-01	4.50E-01	2.14E+00	4.0E+00	1.63E-01	1.82E-01
trans-1,2-Dichloroethene	7.70E-03	USEPA, 2004	1.0E+00	USEPA, 2004	9.69E+01	3.66E-01	4.54E-07	3.21E-01	3.53E-01	8.79E-01	4.0E+00	2.92E-02	3.57E-02
Trichloroethene	1.20E-02	USEPA, 2004	1.0E+00	USEPA, 2004	1.31E+02	5.72E-01	2.91E-07	3.36E-01	3.69E-01	1.37E+00	4.0E+00	5.29E-02	6.00E-02
Vinyl Chloride	5.60E-03	USEPA, 2004	1.0E+00	USEPA, 2004	6.25E+01	2.35E-01	7.08E-07	3.14E-01	3.45E-01	5.64E-01	4.0E+00	1.70E-02	2.47E-02
<u>PCBs</u>													
Total PCBs	5.20E-01	USEPA, 2004	1.0E+00	USEPA, 2004	2.92E+02	4.53E+00	3.67E-08	8.94E+00	3.49E+00	1.94E+01	4.0E+00	3.42E+00	6.12E+00
<u>Dioxins/Furans</u>													
2,3,7,8-TCDD (TEQ)	8.10E-01	USEPA, 2004	5.0E-01	USEPA, 2004	3.22E+02	6.67E+00	2.49E-08	2.20E+01	5.64E+00	2.95E+01	4.0E+00	5.59E+00	5.78E+00

TABLE 3.26

DERIVATION OF DAevent FOR GROUNDWATER - CONSTRUCTION/ UTILITY WORKER DERMAL EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

DAevent (cm/event) - Inorganics= PC x CF x ET

DAevent (cm/event) - Organics= ET <= t* =

$2 \times FA \times PC \times SQRT(6 \times t_{event} \times ET / PI)$

ET > t* =

$FA \times PC \times (ET/(1+B)+2 \times t_{event} \times ((1+3B+3B^2)/(1+B)^2)$

$t^* = 2.4 \times t_{event}$

Constituents of Concern (COCs)	*PC cm/hr*	*Ref*	*FA unitless*	*Ref*	*MW g/mole*	*t_{event} hr/event*	*D_{sc} cm^2/hr*	*b unitless*	*c unitless*	*t* hr*	*ET (1) hr/event*	*B dimensionless*	*DA event (2) cm/event*
Metals													
Antimony	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Arsenic	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Cadmium	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Chromium	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Copper	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Lead	1.00E-04	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-04
Mercury	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Nickel	2.00E-04	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	8.00E-04
Silver	6.00E-04	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	2.40E-03
Thallium	1.00E-03	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	4.00E-03
Zinc	6.00E-04	USEPA, 2004	--	--	--	--	--	--	--	--	4.0E+00	--	2.40E-03

Notes:

(1) Professional Judgment; as dewatering would occur when groundwater is exposed, it is assumed that the construction/utility worker would have direct dermal contact with groundwater for 4 hours/day out of an 8 hour work day.

(2) Calculated using equations presented above and in USEPA (2004).

References:

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.27

DERIVATION OF VOLATILIZATION FACTOR (VF) FOR GROUNDWATER - CONSTRUCTION/UTILITY WORKER INHALATION EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Molecular Weight (g/mol)*	*Henry's Law Constant (1) (atm-m ^{3} /mol)*	*Liquid Phase Coefficient (2) (cm/s)*	*Gas Phase Coefficient (3) (cm/s)*	*Overall Mass Transfer Coefficient (4) (cm/s)*	*Volatilization Factor (5) (L/m ^{3})*
VOCs						
1,1-Dichloroethene	9.69E+01	1.65E-02	1.10E-03	4.55E-01	1.10E-03	2.12E-01
Benzene	7.81E+01	3.09E-03	1.23E-03	4.89E-01	1.21E-03	2.33E-01
Chloroform	1.19E+02	2.13E-03	9.94E-04	4.24E-01	9.69E-04	1.87E-01
cis-1,2-Dichloroethene	9.69E+01	2.34E-03	1.10E-03	4.55E-01	1.08E-03	2.08E-01
Ethylbenzene	1.06E+02	3.80E-03	1.05E-03	4.41E-01	1.04E-03	2.01E-01
Methylene Chloride	8.49E+01	1.32E-03	1.18E-03	4.75E-01	1.13E-03	2.18E-01
Tetrachloroethene	1.66E+02	9.26E-03	8.43E-04	3.80E-01	8.38E-04	1.62E-01
trans-1,2-Dichloroethene	9.69E+01	5.63E-03	1.10E-03	4.55E-01	1.09E-03	2.11E-01
Trichloroethene	1.31E+02	5.57E-03	9.47E-04	4.11E-01	9.38E-04	1.81E-01
Vinyl Chloride	6.25E+01	1.89E-02	1.37E-03	5.27E-01	1.37E-03	2.65E-01
Metals						
Mercury	2.01E+02	3.27E-03	7.66E-04	3.56E-01	7.54E-04	1.46E-01

Temperature, T (K):	285.95
Ideal Gas Constant, R (atm-m^3/mole-K):	0.000082
Width of the trench, W, (m):	2
Length of the trench, L, (m):	10
Area of Trench, A (m^2):	20
Volume of Trench, A (m^3):	46
Depth of the trench, D, (m):	2.30
Wind speed 10 m above the water surface (m/s):	0.45
Air changes per hour (hr^{-1}):	162
Mixing factor (deviation from complete mixing in real conditions [unitless]):	0.5
Fraction of trench floor through which contaminant can enter (unitless):	1

Notes:

(1) Henry's Law constants were corrected for an average groundwater temperature of 12.8°C.
(2) Calculated using Equation (3) of Appendix B.
(3) Calculated using Equation (4) of Appendix B.
(4) Calculated using Equation (2) of Appendix B.
(5) Calculated using Equation (1) of Appendix B.

TABLE 3.28

RISK-BASED CONCENTRATIONS (RBCs) FOR LEAD IN SOIL AND GROUNDWATER BASED ON THE ADULT LEAD MODEL
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Model Parameters	*Symbol*	*Units*	*Adolescent Trespasser*	*Ref*	*Adult Industrial Worker*	*Ref*	*Adult Construction Worker*	*Ref*
Target Blood Lead (PbB) concentration in the fetus (95th percentile)	$PbB_{95fetal}$	µg/dL	10	(1)	10	(1)	10	(1)
Baseline blood lead value	$PbB_{adult,0}$	µg/dL	1	(2)	1	(2)	1	(2)
R (Mean ratio of fetal to maternal PbB)	$R_{fetal/maternal}$	unitless	0.9	(1)	0.9	(1)	0.9	(1)
Individual geometric standard deviation	GSD_i	unitless	1.8	(2)	1.8	(2)	1.8	(2)
Biokinetic slope factor	BKSF	µg/dL per µg/day	0.4	(1)	0.4	(1)	0.4	(1)
Soil Ingestion Rate	IR_S	g/day	0.1	(3)	0.05	(4)	0.33	(3)
Soil Exposure Frequency	EF_S	days/yr	50.6	Refer to Table 3.17	260	Refer to Table 3.20	90	Refer to Table 3.23
Absolute Absorption Fraction of Lead in Soil	AF_S	unitless	0.12	(1)	0.12	(1)	0.12	(1)
Groundwater Ingestion Rate	IR_{GW}	g/day	--	--	--	--	0.02	Refer to Table 3.25
Groundwater Exposure Frequency	EF_{GW}	days/yr	--	--	--	--	90	Refer to Table 3.25
Absolute Absorption Fraction of Lead in Groundwater	AF_{GW}	unitless	--	--	--	--	0.2	(1)
Averaging Time	AT	days/yr	365	(1)	365	(1)	126	(5)

Risk-Based Concentration (RBC) - Soil (mg/kg) (6)	**4.85E+03**	**1.89E+03**	**2.85E+02**
Soil Maximum Lead Concentration - On-OCC Property (mg/kg) (7)	**$\boxed{2.80E+04}$**	**$\boxed{2.80E+04}$**	--
Soil Maximum Lead Concentration - Off-OCC Property (mg/kg) (8)	**8.99E+02**	**8.99E+02**	**8.99E+02**
Risk-Based Concentration (RBC) - Groundwater (µg/L) (6)	**--**	**--**	**2.82E+03**
Shallow Groundwater Maximum Lead Concentration - Off-OCC Property (µg/L) (9)	**--**	**--**	**9.04E+00**

Notes:

☐ Maximum concentration exceeds lead RBC.

(1) USEPA, 2003:Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January 2003.

(2) USEPA, 2009 Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters.
OSWER 9200.2-82. July 2009. http://www.epa.gov/superfund/lead/products/almupdate.pdf

(3) USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

(4) WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

(5) Based on a 90 day exposure frequency, the average time is based on 7 days for 18 weeks.

(6) The RBC was calculated using the following formula:

$$RBC = \frac{((PbB_{95fetal}/(GSD_i^{1.645} \times R_{fetal/maternal}) - PbB_{adult,0})) \times AT}{(BKSF \times IR \times AF \times EF)}$$

(7) For maximum On-OCC Property lead concentration, refer to Table 3.1.

(8) For maximum Off-OCC Property lead concentration, refer to Table 3.4.

(9) For maximum Off-OCC Property lead concentration, refer to Table 3.6.

TABLE 3.29

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SEDIMENT - TRESPASSER ORAL AND DERMAL EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	CSF		RfD		Relative Absorption Factor		Trespasser		Sediment Risk-Based Concentration RBC $_{sed}$ (1) (mg/kg)	Sediment Maximum Concentration	
	oral 1/(mg/kg-d)	dermal 1/(mg/kg-d)	oral (mg/kg-d)	dermal (mg/kg-d)	Oral (%/100)	Dermal (%/100)	Carcinogen TR Adolescent (mg/kg)	Non-Carcinogen THQ Adolescent (mg/kg)		On-OCC Property (2) (mg/kg)	Off-OCC Property (3) (mg/kg)
VOCs											
1,1,2,2-Tetrachloroethane	2.00E-01	2.50E-01	4.00E-03	3.20E-03	1.0E+00	3.0E-02	9.33E+01	9.95E+03	93.3	0.0639	ND
1,1-Dichloroethene	--	--	5.00E-02	4.00E-02	1.0E+00	5.0E-04	NV	1.60E+05	159,935	0.00932	ND
Carbon Tetrachloride	7.00E-02	8.75E-02	4.00E-03	3.20E-03	1.0E+00	5.0E-04	3.43E+02	1.28E+04	343	0.211	ND
Chloroform	3.10E-02	3.88E-02	1.00E-02	8.00E-03	1.0E+00	5.0E-04	7.74E+02	3.20E+04	774	4.82	ND
cis-1,2-Dichloroethene	--	--	1.00E-02	8.00E-03	1.0E+00	5.0E-04	NV	3.20E+04	31,987	0.217	ND
Tetrachloroethene	5.40E-01	6.75E-01	1.00E-02	8.00E-03	1.0E+00	3.0E-02	3.45E+01	2.49E+04	34.5	8.11	0.00212
trans-1,2-Dichloroethene	--	--	2.00E-02	1.60E-02	1.0E+00	5.0E-04	NV	6.40E+04	63,974	0.0112	ND
Trichloroethene	5.90E-03	7.38E-03	--	--	1.0E+00	3.0E-02	3.16E+03	NV	3,161	0.494	0.013
Vinyl chloride	7.20E-01	9.00E-01	3.00E-03	2.40E-03	1.0E+00	5.0E-04	3.33E+01	9.60E+03	33.3	0.0145	ND
SVOCs											
1,2,4-Trichlorobenzene	--	--	1.00E-02	5.00E-03	1.0E+00	1.0E-01	NV	1.26E+04	12,556	0.086	--
bis(2-Ethylhexyl)phthalate (DEHP)	1.40E-02	2.80E-02	2.00E-02	1.00E-02	1.0E+00	1.0E-01	6.73E+02	2.51E+04	673	1.8	--
Hexachlorobenzene	1.60E+00	3.20E+00	8.00E-04	4.00E-04	1.0E+00	1.0E-01	5.89E+00	1.00E+03	5.89	0.77	--
Hexachlorobutadiene	7.80E-02	1.56E-01	1.00E-03	5.00E-04	1.0E+00	1.0E-01	1.21E+02	1.26E+03	121	2.3	--
Pentachlorophenol	1.20E-01	2.40E-01	3.00E-02	1.50E-02	1.0E+00	1.0E-01	7.85E+01	3.77E+04	78.5	0.29	--
Pesticides											
4,4'-DDD	2.40E-01	4.80E-01	--	--	1.0E+00	1.0E-01	3.92E+01	NV	39.2	2.2	--
4,4'-DDE	3.40E-01	6.80E-01	--	--	1.0E+00	1.0E-01	2.77E+01	NV	27.7	0.74	--
4,4'-DDT	3.40E-01	6.80E-01	5.00E-04	2.50E-04	1.0E+00	1.0E-01	2.77E+01	6.28E+02	27.7	0.0034	--
PCBs											
Total PCBs	2.00E+00	4.00E+00	--	--	1.0E+00	1.0E-01	4.71E+00	NV	4.71	6.25	25.99
Dioxins/Furans											
2,3,7,8-TCDD (TEQ)	1.30E+05	2.60E+05	1.00E-09	5.00E-10	1.0E+00	1.0E-01	7.24E-05	1.26E-03	0.0000724	--	0.000057
Metals											
Antimony	--	--	4.00E-04	8.00E-05	1.0E+00	1.0E-02	NV	9.25E+02	925	50	--
Arsenic	1.50E+00	7.50E+00	3.00E-04	6.00E-05	1.0E+00	1.0E-02	1.16E+01	6.94E+02	11.6	140	--
Cadmium	--	--	5.00E-04	1.00E-04	1.0E+00	1.0E-02	NV	1.16E+03	1,156	3.6	--
Chromium	--	--	1.50E+00	3.00E-01	1.0E+00	1.0E-02	NV	3.47E+06	3,468,654	160	--
Copper	--	--	4.00E-02	8.00E-03	1.0E+00	1.0E-02	NV	9.25E+04	92,497	2,500	--
Lead	--	--	--	--	1.0E+00	1.0E-02	NV	NV	NV	150,000	--
Mercury	--	--	1.60E-04	3.20E-05	1.0E+00	1.0E-02	NV	3.70E+02	370	1.4	--
Nickel	--	--	2.00E-02	4.00E-03	1.0E+00	1.0E-02	NV	4.62E+04	46,249	450	--
Silver	--	--	5.00E-03	1.00E-03	1.0E+00	1.0E-02	NV	1.16E+04	11,562	2	--
Thallium	--	--	--	--	1.0E+00	1.0E-02	NV	NV	NV	0.0415	--
Zinc	--	--	3.00E-01	6.00E-02	1.0E+00	1.0E-02	NV	6.94E+05	693,731	1,500	--

Notes:

--	= Not Available
NA	= Not Applicable
NV	= No Value
TEQ	= Toxic Equivalency
☐	= Maximum concentration exceeds RBC$_{sed}$.
(1)	The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2)	For On-OCC Property sediment maximum concentrations, refer to Table 3.2.
(3)	For Off-OCC Property sediment maximum concentrations, refer to Table 3.5.
(4)	The basis for SA is the 50th percentile value from Table 7-1, Recommended Values for Total Body Surface Area, Males and Females Combined. The total body surface area was multiplied by 0.25 (25 percent) to account for exposed skin.
(5)	The basis for the EF is the 50th percentile from Table 16-1, Recommended Values for Activity Factors - Time Outdoors (total). The time spent outdoors for 6-11 years old of 100 min/day from out of a possible 365 days equates to 25.3 days (CT) [(100 min/d /1440 total min/d)*365]. The RME is double the CT value for 50.6 days.

TABLE 3.29

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SEDIMENT - TRESPASSER ORAL AND DERMAL EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Trespasser Assumptions

Risk-Based Concentration in Sediment (mg/kg)	RBC_{sed}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Cancer Slope Factor (per mg/kg-day)	CSF	chemical-specific	Refer to Table 3.34
Reference Dose Factor (mg/kg-day)	RfD	chemical-specific	Refer to Table 3.32
Sediment Ingestion Rate (mg/day)	SIR	100	USEPA, 2002
Absorption Factor - Oral (%/100)	ABSo	1	WAC, 2007
Surface Area Exposed (cm^2/day)	SA	3,900	USEPA, 2008a (4)
Adherence Factor (mg/cm^2-event)	AF	0.2	WAC, 2007
Absorption Factor - Dermal (%/100)	ABSd	chemical-specific	WAC, 2007
Event Frequency (event/day)	EV	1	USEPA, 2002
Exposure Frequency (unitless)	EF	0.14	USEPA, 2008a (5)
Exposure Duration (years)	ED	10	USEPA, 2008b
Average Body Weight (kg)	ABW	45	USEPA, 2008b
Conversion Factor (kg/mg)	CF	1.0E-06	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	10	USEPA, 2008b

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{sed} = \frac{\text{TR x ATc}}{\text{EF x ED x [(CSF x SIR x CF x ABSo)/ABW + (CSF x SA x EV x AF x CF x ABSd)/ABW]}}$$

Non-Carcinogenic Endpoints:

$$RBC_{sed} = \frac{\text{THQ x ATnc}}{\text{EF x ED x [((1/RfD) x SIR x CF x ABSo)/ABW + ((1/RfD) x SA x EV x AF x CF x ABSd)/ABW]}}$$

References:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06,
Washington State Department of Ecology, October 12, 2007.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2008a: Child Specific Exposure Factors Handbook, September 2008.
USEPA, 2008b: Human Health Risk Assessment Bulletins - Supplement to RAGS, Region 4: Superfund, September 30, 2008.

TABLE 3.30

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SEDIMENT - INDUSTRIAL/COMMERCIAL WORKER ORAL AND DERMAL EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*CSF*		*RfD*		*Relative Absorption Factor*		*Industrial/Commercial Worker*		*Sediment*	*Sediment Maximum Concentration*	
	oral 1/(mg/kg-d)	*dermal 1/(mg/kg-d)*	*oral (mg/kg-d)*	*dermal (mg/kg-d)*	*Oral (%/100)*	*Dermal (%/100)*	*Carcinogen TR Adult (mg/kg)*	*Non-Carcinogen THQ Adult (mg/kg)*	*Risk-Based Concentration RBC_{sed} (1) (mg/kg)*	*On-OCC Property (2) (mg/kg)*	*Off-OCC Property (3) (mg/kg)*
VOCs											
1,1,2,2-Tetrachloroethane	2.00E-01	2.50E-01	4.00E-03	3.20E-03	1.0E+00	3.0E-02	2.73E+01	5.82E+03	27.3	0.0639	ND
1,1-Dichloroethene	--	--	5.00E-02	4.00E-02	1.0E+00	5.0E-04	NV	9.94E+04	99,379	0.00932	ND
Carbon Tetrachloride	7.00E-02	8.75E-02	4.00E-03	3.20E-03	1.0E+00	5.0E-04	1.06E+02	7.95E+03	106	0.211	ND
Chloroform	3.10E-02	3.88E-02	1.00E-02	8.00E-03	1.0E+00	5.0E-04	2.40E+02	1.99E+04	240	4.82	ND
cis-1,2-Dichloroethene	--	--	1.00E-02	8.00E-03	1.0E+00	5.0E-04	NV	1.99E+04	19,876	0.217	ND
Tetrachloroethene	5.40E-01	6.75E-01	1.00E-02	8.00E-03	1.0E+00	3.0E-02	1.01E+01	1.45E+04	10.1	8.11	0.00212
trans-1,2-Dichloroethene	--	--	2.00E-02	1.60E-02	1.0E+00	5.0E-04	NV	3.98E+04	39,752	0.0112	ND
Trichloroethene	5.90E-03	7.38E-03	--	--	1.0E+00	3.0E-02	9.24E+02	NV	924	0.494	0.013
Vinyl chloride	7.20E-01	9.00E-01	3.00E-03	2.40E-03	1.0E+00	5.0E-04	1.04E+01	5.96E+03	10.4	0.0145	ND
SVOCs											
1,2,4-Trichlorobenzene	--	--	1.00E-02	5.00E-03	1.0E+00	1.0E-01	NV	6.67E+03	6,667	0.086	--
bis(2-Ethylhexyl)phthalate (DEHP)	1.40E-02	2.80E-02	2.00E-02	1.00E-02	1.0E+00	1.0E-01	1.79E+02	1.33E+04	179	1.8	--
Hexachlorobenzene	1.60E+00	3.20E+00	8.00E-04	4.00E-04	1.0E+00	1.0E-01	1.56E+00	5.33E+02	1.56	0.77	--
Hexachlorobutadiene	7.80E-02	1.56E-01	1.00E-03	5.00E-04	1.0E+00	1.0E-01	3.21E+01	6.67E+02	32.1	2.3	--
Pentachlorophenol	1.20E-01	2.40E-01	3.00E-02	1.50E-02	1.0E+00	1.0E-01	2.08E+01	2.00E+04	20.8	0.29	--
Pesticides											
4,4'-DDD	2.40E-01	4.80E-01	--	--	1.0E+00	1.0E-01	1.04E+01	NV	10.4	2.2	--
4,4'-DDE	3.40E-01	6.80E-01	--	--	1.0E+00	1.0E-01	7.35E+00	NV	7.35	0.74	--
4,4'-DDT	3.40E-01	6.80E-01	5.00E-04	2.50E-04	1.0E+00	1.0E-01	7.35E+00	3.33E+02	7.35	0.0034	--
PCBs											
Total PCBs	2.00E+00	4.00E+00	--	--	1.0E+00	1.0E-01	1.25E+00	NV	1.25	$\boxed{6.25}$	$\boxed{25.99}$
Dioxins/Furans											
2,3,7,8-TCDD (TEQ)	1.30E+05	2.60E+05	1.00E-09	5.00E-10	1.0E+00	1.0E-01	1.92E-05	6.67E-04	0.0000192	--	$\boxed{0.000057}$
Metals											
Antimony	--	--	4.00E-04	8.00E-05	1.0E+00	1.0E-02	NV	5.33E+02	533	50	--
Arsenic	1.50E+00	7.50E+00	3.00E-04	6.00E-05	1.0E+00	1.0E-02	3.33E+00	4.00E+02	3.33	$\boxed{140}$	--
Cadmium	--	--	5.00E-04	1.00E-04	1.0E+00	1.0E-02	NV	6.67E+02	667	3.6	--
Chromium	--	--	1.50E+00	3.00E-01	1.0E+00	1.0E-02	NV	2.00E+06	2,000,000	160	--
Copper	--	--	4.00E-02	8.00E-03	1.0E+00	1.0E-02	NV	5.33E+04	53,333	2,500	--
Lead	--	--	--	--	1.0E+00	1.0E-02	NV	NV	NV	150,000	--
Mercury	--	--	1.60E-04	3.20E-05	1.0E+00	1.0E-02	NV	2.13E+02	213	1.4	--
Nickel	--	--	2.00E-02	4.00E-03	1.0E+00	1.0E-02	NV	2.67E+04	26,667	450	--
Silver	--	--	5.00E-03	1.00E-03	1.0E+00	1.0E-02	NV	6.67E+03	6,667	2	--
Thallium	--	--	--	--	1.0E+00	1.0E-02	NV	NV	NV	0.0415	--
Zinc	--	--	3.00E-01	6.00E-02	1.0E+00	1.0E-02	NV	4.00E+05	400,000	1,500	--

Notes:

-- = Not Available
NA = Not Applicable
NV = No Value
TEQ = Toxic Equivalency
☐ = Maximum concentration exceeds RBC_{sed}.
(1) The selected RBC is the lower of the carcinogenic-based concentration and the non-carcinogenic-based concentration.
(2) For On-OCC Property sediment maximum concentrations, refer to Table 3.2.
(3) For Off-OCC Property sediment maximum concentrations, refer to Table 3.5.
(4) Based on assumption of 5 days per week for 52 weeks over an exposure period of 365 days, as indicated in WAC (2007).

TABLE 3.30

DERIVATION OF RISK-BASED CONCENTRATIONS (RBCs) FOR SEDIMENT - INDUSTRIAL/COMMERCIAL WORKER ORAL AND DERMAL EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Industrial/Commercial Worker Assumptions

Risk-Based Concentration in Sediment (mg/kg)	RBC_{sed}	calculated	
Target Cancer Risk (unitless)	TR	1.0E-06	
Target Hazard Quotient (unitless)	THQ	1.0	
Cancer Slope Factor (per mg/kg-day)	CSF	chemical-specific	Refer to Table 3.34
Reference Dose Factor (mg/kg-day)	RfD	chemical-specific	Refer to Table 3.32
Sediment Ingestion Rate (mg/day)	SIR	50	WAC, 2007
Absorption Factor - Oral (%/100)	ABSo	1	WAC, 2007
Surface Area Exposed (cm^2/day)	SA	2,500	WAC, 2007
Adherence Factor (mg/cm^2-event)	AF	0.2	WAC, 2007
Absorption Factor - Dermal (%/100)	ABSd	chemical-specific	WAC, 2007
Event Frequency (event/day)	EV	1	USEPA, 2002
Exposure Frequency (unitless)	EF	0.7	WAC, 2007 (4)
Exposure Duration (years)	ED	20	WAC, 2007
Average Body Weight (kg)	ABW	70	WAC, 2007
Conversion Factor (kg/mg)	CF	1.0E-06	WAC, 2007
Averaging Time (years) - carcinogenic	ATc	75	WAC, 2007
Averaging Time (years) - non-carcinogenic	ATnc	20	WAC, 2007

Exposure Equations

Carcinogenic Endpoints:

$$RBC_{sed} = \frac{TR \times ATc}{EF \times ED \times [(CSF \times SIR \times CF \times ABSo)/ABW + (CSF \times SA \times EV \times AF \times CF \times ABSd)/ABW]}$$

Non-Carcinogenic Endpoints:

$$RBC_{sed} = \frac{THQ \times ATnc}{EF \times ED \times [((1/RfD) \times SIR \times CF \times ABSo)/ABW + ((1/RfD) \times SA \times EV \times AF \times CF \times ABSd)/ABW]}$$

References:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

TABLE 3.31

SUMMARY OF MTCA CLEANUP LEVELS FOR SURFACE WATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Surface Water MTCA Cleanup Level (1) (µg/L)*	*Shallow Groundwater Maximum Concentration (2) (µg/L)*
VOCs		
1,1,2,2-Tetrachloroethane	4	5,480
1,1,2-Trichloroethane	16	166
1,1-Dichloroethene	3.2	1,000
Benzene	51	2,400
Carbon Tetrachloride	1.6	200
Chloroform	470	79,800
cis-1,2-Dichloroethene	NV	320,000
Ethylbenzene	2,100	440
Methylene Chloride	590	9,500
Tetrachloroethene	3.3	170,000
trans-1,2-Dichloroethene	10,000	7,600
Trichloroethene	30	190,000
Vinyl Chloride	2.4	490,000
SVOCs		
1,2,4-Trichlorobenzene	70	ND
bis(2-Ethylhexyl)phthalate	2.2	ND
Hexachlorobenzene	0.01	ND
Hexachlorobutadiene	18	10.8
Pentachlorophenol	3	ND
Pesticides		
4,4'-DDD	0.01	ND
4,4'-DDE	0.01	ND
4,4'-DDT	0.01	ND
PCBs		
Total PCBs	0.2	0.094

TABLE 3.31

SUMMARY OF MTCA CLEANUP LEVELS FOR SURFACE WATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Surface Water MTCA Cleanup Level (1) (µg/L)*	*Shallow Groundwater Maximum Concentration (2) (µg/L)*
Dioxins/Furans		
2,3,7,8-TCDD (TEQ)	0.00001	$\boxed{0.000015}$
Metals		
Antimony	640	$\boxed{19}$
Arsenic	1	$\boxed{208}$
Cadmium	8.8	1.6
Chromium	50	$\boxed{6,350}$
Copper	2.4	$\boxed{286}$
Lead	8.1	$\boxed{968}$
Mercury	0.2	$\boxed{0.54}$
Nickel	8.2	$\boxed{1,160}$
Silver	25,926	0.378
Thallium	1	$\boxed{12}$
Zinc	81	$\boxed{310}$

Notes :

NV	No Value
TEQ	Toxic Equivalency
☐	Maximum concentration exceeds MTCA Cleanup Level
(1)	MTCA Cleanup Level taken from Table 2.5 of Site Characterization Report.
(2)	For shallow groundwater maximum concentrations, refer to Table 3.7.

TABLE 3.32

NON-CANCER TOXICITY DATA - ORAL/DERMAL ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Chronic/ Subchronic*	*Oral RfD Value*	*Oral RfD Units*	*Oral to Dermal Adjustment Factor (ABS_{GI}) (1)*	*Absorbed Dermal RfD (2)*	*Units*	*Primary Target Organ*	*Combined Uncertainty/Modifying Factors*	*Sources of RfD (3)*	*Source Date (MM-YY)*
VOCs										
1,1,2,2-Tetrachloroethane	chronic	2.00E-02	mg/kg-d	0.8	1.60E-02	mg/kg-d	liver	1000	IRIS	Sep-10
1,1,2-Trichloroethane	chronic	4.00E-03	mg/kg-d	0.8	3.20E-03	mg/kg-d	clinical serum chemistry	1000	IRIS	Feb-95
1,1-Dichloroethene	chronic	5.00E-02	mg/kg-d	0.8	4.00E-02	mg/kg-d	liver	100	IRIS	Aug-02
Benzene	chronic	4.00E-03	mg/kg-d	0.8	3.20E-03	mg/kg-d	blood system	300	WAC	Jan-06
Carbon Tetrachloride	chronic	4.00E-03	mg/kg-d	0.8	3.20E-03	mg/kg-d	blood system	1000	IRIS	Mar-10
Chloroform	chronic	1.00E-02	mg/kg-d	0.8	8.00E-03	mg/kg-d	liver	100	IRIS	Oct-01
cis-1,2-Dichloroethene	chronic	2.00E-03	mg/kg-d	0.8	1.60E-03	mg/kg-d	kidney	3000	IRIS	Sep-10
Ethylbenzene	chronic	1.00E-01	mg/kg-d	0.8	8.00E-02	mg/kg-d	liver	1000	IRIS	Jun-91
Methylene Chloride	chronic	6.00E-03	mg/kg-d	0.8	4.80E-03	mg/kg-d	liver	30	IRIS	Nov-11
Tetrachloroethene	chronic	6.00E-03	mg/kg-d	0.8	4.80E-03	mg/kg-d	central nervous system	1000	IRIS	Feb-12
trans-1,2-Dichloroethene	chronic	2.00E-02	mg/kg-d	0.8	1.60E-02	mg/kg-d	blood system	3000	IRIS	Sep-10
Trichloroethene	chronic	5.00E-04	mg/kg-d	0.8	4.00E-04	mg/kg-d	developmental effects	3000	IRIS	Sep-11
Vinyl Chloride	chronic	3.00E-03	mg/kg-d	0.8	2.40E-03	mg/kg-d	liver	30	IRIS	Aug-00
SVOCs										
1,2,4-Trichlorobenzene	chronic	1.00E-02	mg/kg-d	0.5	5.00E-03	mg/kg-d	adrenal weights	1000	IRIS	Nov-96
Benzo(a)pyrene	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	chronic	2.00E-02	mg/kg-d	0.5	1.00E-02	mg/kg-d	liver	1000	IRIS	May-91
Hexachlorobenzene	chronic	8.00E-04	mg/kg-d	0.5	4.00E-04	mg/kg-d	liver	100	IRIS	Apr-91
Hexachlorobutadiene	chronic	1.00E-03	mg/kg-d	0.5	5.00E-04	mg/kg-d	kidney	100	PPRTV	Jul-07
Pentachlorophenol	chronic	5.00E-03	mg/kg-d	0.5	2.50E-03	mg/kg-d	liver	300	IRIS	Sep-10
PCBs										
Total PCBs	--	--	--	--	--	--	--	--	--	--
Pesticides										
4,4'-DDD	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	chronic	5.00E-04	mg/kg-d	0.5	2.50E-04	mg/kg-d	liver	100	IRIS	Feb-96
Aldrin	chronic	3.00E-05	mg/kg-d	0.5	1.50E-05	mg/kg-d	liver	1000	IRIS	Mar-88
Dieldrin	chronic	5.00E-05	mg/kg-d	0.5	2.50E-05	mg/kg-d	liver	100	IRIS	Sep-90

TABLE 3.32

NON-CANCER TOXICITY DATA - ORAL/DERMAL ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Chronic/ Subchronic*	*Oral RfD Value*	*Oral RfD Units*	*Oral to Dermal Adjustment Factor (ABS_{GI}) (1)*	*Absorbed Dermal RfD (2)*	*Units*	*Primary Target Organ*	*Combined Uncertainty/Modifying Factors*	*Sources of RfD (3)*	*Source Date (MM-YY)*
Dioxins/Furans										
2,3,7,8-TCDD	chronic	7.00E-10	mg/kg-d	0.5	3.50E-10	mg/kg-d	reproductive effects	30	IRIS	Feb-12
Metals										
Antimony	chronic	4.00E-04	mg/kg-d	0.2	8.00E-05	mg/kg-d	clinical serum chemistry	1000	IRIS	Feb-91
Arsenic	chronic	3.00E-04	mg/kg-d	0.2	6.00E-05	mg/kg-d	skin discoloration	3	IRIS	Feb-93
Cadmium	chronic	5.00E-04	mg/kg-d	0.2	1.00E-04	mg/kg-d	proteinuria	10	IRIS	Feb-94
Chromium	chronic	1.50E+00	mg/kg-d	0.2	3.00E-01	mg/kg-d	no effects	1000	IRIS	Sep-98
Copper	chronic	4.00E-02	mg/kg-d	0.2	8.00E-03	mg/kg-d	gastrointestinal system	--	HEAST	Jul-97
Lead	--	--	--	--	--	--	--	--	--	--
Mercury	chronic	3.00E-04	mg/kg-d	0.2	6.00E-05	mg/kg-d	autoimmune system	1000	IRIS (4)	May-95
Nickel	chronic	2.00E-02	mg/kg-d	0.2	4.00E-03	mg/kg-d	body weight	300	IRIS	Dec-96
Silver	chronic	5.00E-03	mg/kg-d	0.2	1.00E-03	mg/kg-d	argyria	3	IRIS	Dec-96
Thallium	--	--	--	--	--	--	--	--	--	--
Zinc	chronic	3.00E-01	mg/kg-d	0.2	6.00E-02	mg/kg-d	clinical serum chemistry	3	IRIS	Aug-05

Notes:

-- Not Available

(1) Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

(2) Absorbed Dermal RfD = Oral RfD x ABS_{GI}, consistent with WAC, 2007.

(3) IRIS: Integrated Risk Information System Database, CRA accessed IRIS database on February 26, 2013.

Note: dates of RfD provided is the last revision date of the IRIS toxicity data provided (http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList).

PPRTV: Provisional Peer Reviewed Toxicity Values for trans-1,2-Dichloroethylene, Superfund Health Risk Technical Support Center, NCEA, January 2013.

Note: dates of RfD provided is the last revision date of the PPRTV toxicity data provided (http://hhpprtv.ornl.gov/).

HEAST: Health Effects Assessment Summary Table, Office of Research and Development, OERR, EPA 540/R-97-036, PB97-921199, July 1997.

WAC: Updated Reference Doses for Total Petroleum Hydrocarbons (TPH) Fractions and Individual Hazardous Substances Related to TPH, Washington Department of Ecology, Toxics Cleanup Program, Revised January 2006.

(4) Toxicity data for mercuric chloride substituted for elemental mercury.

TABLE 3.33

NON-CANCER TOXICITY DATA - INHALATION ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Chronic/ Subchronic*	*Value Inhalation RfC*	*Units*	*Primary Target Organ*	*Combined Uncertainty/Modifying Factors*	*Source of RfC (1)*	*Source Date (MM-YY)*
VOCs							
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	--
1,1,2-Trichloroethane	--	--	--	--	--	--	--
1,1-Dichloroethene	chronic	2.00E-01	mg/m^3	liver	30	IRIS	Aug-02
Benzene	chronic	3.00E-02	mg/m^3	blood system	300	WAC	Jan-06
Carbon Tetrachloride	chronic	1.00E-01	mg/m^3	blood system	100	IRIS	Mar-10
Chloroform	chronic	9.80E-02	mg/m^3	liver	100	ATSDR	Sep-97
cis-1,2-Dichloroethene	--	--	--	--	--	--	--
Ethylbenzene	chronic	1.00E+00	mg/m^3	liver	300	WAC	Jan-06
Methylene Chloride	chronic	6.00E-01	mg/m^3	liver	30	IRIS	Nov-11
Tetrachloroethene	chronic	4.00E-02	mg/m^3	central nervous system	1000	IRIS	Feb-12
trans-1,2-Dichloroethene	chronic	6.00E-02	mg/m^3	liver	3000	PPRTV	Mar-06
Trichloroethene	chronic	2.00E-03	mg/m^3	immune system	100	IRIS	Sep-11
Vinyl Chloride	chronic	1.00E-01	mg/m^3	liver	30	IRIS	Aug-00
SVOCs							
1,2,4-Trichlorobenzene	chronic	2.00E-03	mg/m^3	liver	3000	PPRTV	Jun-09
Benzo(a)pyrene	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	--	--	--	--	--	--	--
Hexachlorobenzene	--	--	--	--	--	--	--
Hexachlorobutadiene	--	--	--	--	--	--	--
Pentachlorophenol	--	--	--	--	--	--	--
PCBs							
Total PCBs	--	--	--	--	--	--	--
Pesticides							
4,4'-DDD	--	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--	--
Aldrin	--	--	--	--	--	--	--
Dieldrin	--	--	--	--	--	--	--

TABLE 3.33

NON-CANCER TOXICITY DATA - INHALATION ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Chronic/ Subchronic*	*Value Inhalation RfC*	*Units*	*Primary Target Organ*	*Combined Uncertainty/Modifying Factors*	*Source of RfC (1)*	*Source Date (MM-YY)*
Dioxins/Furans							
2,3,7,8-TCDD	chronic	4.00E-08	mg/m^3	liver	100	OEHHA	Dec-00
Metals							
Antimony	--	--	--	--	--	--	--
Arsenic	chronic	1.50E-05	mg/m^3	developmental effects	1000	OEHHA	Dec-08
Cadmium	chronic	2.00E-05	mg/m^3	kidney	30	OEHHA	Dec-00
Chromium	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--
Mercury	chronic	3.00E-04	mg/m^3	autoimmune system	30	IRIS	Jun-95
Nickel	chronic	9.00E-05	mg/m^3	respiratory system	30	ATSDR	Sep-05
Silver	--	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--

Notes:

--Not Available

(1) WAC: Updated Reference Doses for Total Petroleum Hydrocarbons (TPH) Fractions and Individual Hazardous Substances Related to TPH, Washington Department of Ecology, Toxics Cleanup Program, Revised January 2006.

IRIS: Integrated Risk Information System Database, CRA accessed IRIS database on February 26, 2013.

Note: dates of RfC provided is the last revision date of the IRIS toxicity data provided (http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList).

ATSDR: Agency for Toxic Substances and Disease Registry, Minimal Risk Levels for Hazardous Substances, March 2013.

Note: dates of RfC provided is the last revision date of the ATSDR toxicity data provided (http://www.atsdr.cdc.gov/mrls/index.asp).

PPRTV: Provisional Peer Reviewed Toxicity Values for trans-1,2-Dichloroethylene, Superfund Health Risk Technical Support Center, NCEA, January 2013.

Note: dates of RfC provided is the last revision date of the PPRTV toxicity data provided (http://hhpprtv.ornl.gov/).

OEHHA: Determination of Noncancer Chronic Reference Exposure Levels, Office of Environmental Health Hazard Assessment, CalEPA, February 12, 2002.

Note: dates of RfC provided is the last revision date of the OEHHA toxicity data provided (http://www.oehha.ca.gov/air/allrels.html)

TABLE 3.34

CANCER TOXICITY DATA - ORAL/DERMAL ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Carcinogenic Potency Factor*	*Oral to Dermal Adjustment Factor (ABS$_{GI}$) (1)*	*Absorbed Dermal Carcinogenic Potency Factor (2)*	*Units*	*Weight of Evidence/ Cancer Guideline Description*	*Source of CSF (3)*	*Source Date (MM-YY)*
VOCs							
1,1,2,2-Tetrachloroethane	2.00E-01	0.8	2.50E-01	(mg/kg-day)$^{-1}$	B2	IRIS	Sep-10
1,1,2-Trichloroethane	5.70E-02	0.8	7.13E-02	(mg/kg-day)$^{-1}$	C	IRIS	Feb-94
1,1-Dichloroethene	--	--	--	--	C	--	--
Benzene	5.50E-02	0.8	6.88E-02	(mg/kg-day)$^{-1}$	A	IRIS	Jan-00
Carbon Tetrachloride	7.00E-02	0.8	8.75E-02	(mg/kg-day)$^{-1}$	B2	IRIS	Mar-10
Chloroform	3.10E-02	0.8	3.88E-02	(mg/kg-day)$^{-1}$	B2	OEHHA	2009
cis-1,2-Dichloroethene	--	--	--	--	D	--	--
Ethylbenzene	--	--	--	--	D	--	--
Methylene Chloride	2.00E-03	0.8	2.50E-03	(mg/kg-day)$^{-1}$	B2	IRIS	Nov-11
Tetrachloroethene	2.10E-03	0.8	2.63E-03	(mg/kg-day)$^{-1}$	A	IRIS	Feb-12
trans-1,2-Dichloroethene	--	--	--	--	D	--	--
Trichloroethene	4.60E-02	0.8	5.75E-02	(mg/kg-day)$^{-1}$	A	IRIS	Sep-11
Vinyl Chloride (adulthood)	7.20E-01	0.8	9.00E-01	(mg/kg-day)$^{-1}$	A	IRIS	Aug-00
SVOCs							
1,2,4-Trichlorobenzene	--	--	--	--	D	--	--
Benzo(a)pyrene	7.30E+00	0.5	1.46E+01	(mg/kg-day)$^{-1}$	B2	IRIS	Nov-94
bis(2-Ethylhexyl)phthalate	1.40E-02	0.5	2.80E-02	(mg/kg-day)$^{-1}$	B2	IRIS	Feb-93
Hexachlorobenzene	1.60E+00	0.5	3.20E+00	(mg/kg-day)$^{-1}$	B2	IRIS	Nov-96
Hexachlorobutadiene	7.80E-02	0.5	1.56E-01	(mg/kg-day)$^{-1}$	C	IRIS	Apr-91
Pentachlorophenol	4.10E-01	0.5	8.20E-01	(mg/kg-day)$^{-1}$	B2	IRIS	Sep-10
PCBs							
Total PCBs	2.00E+00	0.5	4.00E+00	(mg/kg-day)$^{-1}$	B2	IRIS	Jun-97
Pesticides							
4,4'-DDD	2.40E-01	0.5	4.80E-01	(mg/kg-day)$^{-1}$	B2	IRIS	Aug-88
4,4'-DDE	3.40E-01	0.5	6.80E-01	(mg/kg-day)$^{-1}$	B2	IRIS	Aug-88
4,4'-DDT	3.40E-01	0.5	6.80E-01	(mg/kg-day)$^{-1}$	B2	IRIS	May-91
Aldrin	1.70E+01	0.5	3.40E+01	(mg/kg-day)$^{-1}$	B2	IRIS	Jul-93
Dieldrin	1.60E+01	0.5	3.20E+01	(mg/kg-day)$^{-1}$	B2	IRIS	Jul-93

TABLE 3.34

CANCER TOXICITY DATA - ORAL/DERMAL ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Carcinogenic Potency Factor*	*Oral to Dermal Adjustment Factor (ABS_{GI}) (1)*	*Absorbed Dermal Carcinogenic Potency Factor (2)*	*Units*	*Weight of Evidence/ Cancer Guideline Description*	*Source of CSF (3)*	*Source Date (MM-YY)*
Dioxins/Furans							
2,3,7,8-TCDD	1.30E+05	0.5	2.60E+05	$(mg/kg-day)^{-1}$	B2	OEHHA	2009
Metals							
Antimony	--	--	--	--	--	--	--
Arsenic	1.50E+00	0.2	7.50E+00	$(mg/kg-day)^{-1}$	A	IRIS	Apr-98
Cadmium	--	--	--	--	B1	--	--
Chromium	--	--	--	--	D	--	--
Copper	--	--	--	--	D	--	--
Lead	--	--	--	--	B2	--	--
Mercury	--	--	--	--	D	--	--
Nickel	--	--	--	--	--	--	--
Silver	--	--	--	--	D	--	--
Thallium	--	--	--	--	--	--	--
Zinc	--	--	--	--	D	--	--

Notes:

--Not Available

(1) Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

(2) Absorbed Dermal CSF = Oral CSF / ABS_{GI}, consistent with WAC, 2007.

(3) IRIS: Integrated Risk Information System Database, CRA accessed IRIS database on February 26, 2013.
Note: dates of CSF provided is the last revision date of the IRIS toxicity data provided
(http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList).
OEHHA: Toxicity Criteria Database, Office of Environmental Health Hazard Assessment, CalEPA, February 2013.
Note: dates of CSF provided is the last technical support document (http://oehha.ca.gov/tcdb/index.asp).

EPA Weight of Evidence Classification :

A - Known Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 3.35

CANCER TOXICITY DATA - INHALATION ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Unit Risk*	*Units*	*Weight of Evidence/ Cancer Guideline Description*	*Source of URF (1)*	*Source Date (MM-YY)*
VOCs					
1,1,2,2-Tetrachloroethane	5.80E-02	$(mg/m^3)^{-1}$	B2	OEHHA	2009
1,1,2-Trichloroethane	1.60E-02	$(mg/m^3)^{-1}$	C	IRIS	Feb-94
1,1-Dichloroethene	--	--	C	--	--
Benzene	7.80E-03	$(mg/m^3)^{-1}$	A	IRIS	Jan-00
Carbon Tetrachloride	6.00E-03	$(mg/m^3)^{-1}$	B2	IRIS	Mar-10
Chloroform	2.30E-02	$(mg/m^3)^{-1}$	B2	IRIS	Oct-01
cis-1,2-Dichloroethene	--	--	D	--	--
Ethylbenzene	--	--	D	--	--
Methylene Chloride	1.00E-05	$(mg/m^3)^{-1}$	B2	IRIS	Nov-11
Tetrachloroethene	2.60E-04	$(mg/m^3)^{-1}$	A	IRIS	Feb-12
trans-1,2-Dichloroethene	--	--	D	--	--
Trichloroethene	4.10E-03	$(mg/m^3)^{-1}$	A	IRIS	Sep-11
Vinyl Chloride (lifetime)	8.80E-03	$(mg/m^3)^{-1}$	A	IRIS	Aug-00
Vinyl Chloride (adulthood)	4.40E-03	$(mg/m^3)^{-1}$	A	IRIS	Aug-00
SVOCs					
1,2,4-Trichlorobenzene	--	--	D	--	--
Benzo(a)pyrene	--	--	B2	--	--
bis(2-Ethylhexyl)phthalate	2.40E-03	$(mg/m^3)^{-1}$	B2	OEHHA	2009
Hexachlorobenzene	4.60E-01	$(mg/m^3)^{-1}$	B2	IRIS	Nov-96
Hexachlorobutadiene	2.20E-02	$(mg/m^3)^{-1}$	C	IRIS	Apr-91
Pentachlorophenol	5.10E-03	$(mg/m^3)^{-1}$	B2	OEHHA	2009
PCBs					
Total PCBs	5.70E-01	$(mg/m^3)^{-1}$	B2	IRIS	Jun-97

TABLE 3.35

CANCER TOXICITY DATA - INHALATION ROUTE OF EXPOSURE
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern (COCs)	*Unit Risk*	*Units*	*Weight of Evidence/ Cancer Guideline Description*	*Source of URF (1)*	*Source Date (MM-YY)*
Pesticides					
4,4'-DDD	6.90E-02	$(mg/m^3)^{-1}$	B2	OEHHA	2009
4,4'-DDE	9.70E-02	$(mg/m^3)^{-1}$	B2	OEHHA	2009
4,4'-DDT	9.70E-02	$(mg/m^3)^{-1}$	B2	IRIS	May-91
Aldrin	4.90E+00	$(mg/m^3)^{-1}$	B2	IRIS	Jul-93
Dieldrin	4.60E+00	$(mg/m^3)^{-1}$	B2	IRIS	Jul-93
Dioxins/Furans					
2,3,7,8-TCDD	3.80E-02	$(mg/m^3)^{-1}$	B2	OEHHA	2009
Metals					
Antimony	--	--	--	--	--
Arsenic	4.30E+00	$(mg/m^3)^{-1}$	A	IRIS	Apr-98
Cadmium	1.80E+00	$(mg/m^3)^{-1}$	B1	IRIS	Jun-92
Chromium	--	--	D	--	--
Copper	--	--	D	--	--
Lead	--	--	B2	--	--
Mercury	--	--	D	--	--
Nickel	--	--	--	--	--
Silver	--	--	D	--	--
Thallium	--	--	--	--	--
Zinc	--	--	D	--	--

Notes:

--Not Available

(1) IRIS: Integrated Risk Information System Database, CRA accessed IRIS database on February 26, 2013.
Note: dates of CSF provided is the last revision date of the IRIS toxicity data provided
(http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList).
OEHHA: Toxicity Criteria Database, Office of Environmental Health Hazard Assessment, CalEPA, February 2013.
Note: dates of URF provided is the last technical support document (http://oehha.ca.gov/tcdb/index.asp).

EPA Weight of Evidence Classification :

A - Known Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 3.36

OCCURRENCE AND DISTRIBUTION OF CONSTITUENTS OF CONCERN (COCs) IN INDOOR AIR RELATIVE TO WISHA AND OSHA PELs

OCCIDENTAL CHEMICAL CORPORATION

TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Indoor Air
Exposure Medium: Indoor Air

CAS Number	*Chemical*	*Minimum (1,2) Concentration*	*Minimum Qualifier*	*Maximum (1,2) Concentration*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*	*WISHA PEL (3,4)*	*WISHA PEL (units)*	*OSHA PEL (5,6)*	*OSHA PEL (units)*
	VOCs												
79-34-5	1,1,2,2-Tetrachloroethane	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	1	ppm	5	ppm
79-00-5	1,1,2-Trichloroethane	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	10	ppm	10	ppm
75-35-4	1,1-Dichloroethene	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	1	ppm	--	--
71-43-2	Benzene	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	1	ppm	10	ppm
56-23-5	Carbon tetrachloride	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	2	ppm	10	ppm
67-66-3	Chloroform (Trichloromethane)	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	2	ppm	50	ppm
156-59-2	cis-1,2-Dichloroethene	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	200(7)	--	200(9)	ppm
100-41-4	Ethylbenzene	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	100	ppm	100	ppm
75-09-2	Methylene chloride	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	25	ppm	25	ppm
127-18-4	Tetrachloroethene	0.0057	--	0.011	--	ppm	Control Room (08/19/10)	2/7	0.005 - 0.01	25	ppm	100	ppm
156-60-5	trans-1,2-Dichloroethene	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	200(7)	ppm	200(9)	ppm
79-01-6	Trichloroethene	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	50	ppm	100	ppm
75-01-4	Vinyl chloride	ND	--	ND	--	ppm	--	0/7	0.005 - 0.01	1	ppm	1	ppm
	SVOCs												
117-81-7	bis(2-Ethylhexyl)phthalate	ND	--	ND	--	mg/m^3	--	0/14	0.047 - 0.063	5	mg/m^3	5	mg/m^3
87-86-5	Pentachlorophenol	0.001	--	0.001	--	mg/m^3	Control Room (08/19/10)	1/7	0.001	0.5	mg/m^3	0.5	mg/m^3
	Metals												
7439-97-6	Mercury	ND	--	ND	--	mg/m^3	--	0/7	0.00068 - 0.00077	0.05(8)	mg/m^3	0.1(8)	mg/m^3

Notes:

ND Not detected.
(1) Minimum/maximum detected concentration.
(2) Based on data collected from August 2010.
(3) Washington Industrial Safety and Health Act (WISHA). Permissible Exposure Limits. WAC 296-841-20025. http://apps.leg.wa.gov/WAC/default.aspx?cite=296-841-20025.
(4) 8-hour time-weighted average (TWA) Permissible Exposure Limits (PELs).
(5) Occupational Safety and Health Administration (OSHA), Permissible Exposure Limits (PEL), Part 1910, Subpart Z, Table Z-1 (February 2006), Table Z-2 (June 2006), and standards 1910.1017 (vinyl chloride) and 1910.1052 (methylene chloride).
(6) 8-hour TWA PELs except for chloroform and mercury (vapor), which are ceiling levels.
(7) 8-hour TWA PEL for 1,2-dichloroethylene (CASRN 540-59-0), which is a mixture of cis- and trans- isomers.
(8) PEL for mercury vapor.
(9) 8-hour TWA PEL for 1,2-dichloroethylene (CASRN 540-59-0), or for cis- or trans- isomers.

TABLE 3.37

SUMMARY OF INDOOR AIR SCREENING TO RISK-BASED CONCENTRATIONS (RBCs)
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Scenario Timeframe: Current/Future
Medium: Indoor Air
Exposure Medium: Indoor Air

CAS Number	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency (2)*	*Range of Detection Limits (2)*	*RBCs (3)*
	VOCs									
79-34-5	1,1,2,2-Tetrachloroethane	ND		ND		mg/m^3	--	0/7	0.034 - 0.069	0.0003
79-00-5	1,1,2-Trichloroethane	ND		ND		mg/m^3	--	0/7	0.027 - 0.054	0.0010
75-35-4	1,1-Dichloroethene	ND		ND		mg/m^3	--	0/7	0.02 - 0.04	0.86
71-43-2	Benzene	ND		ND		mg/m^3	--	0/7	0.016 - 0.032	0.002
56-23-5	Carbon tetrachloride	ND		ND		mg/m^3	--	0/7	0.031 - 0.063	0.0027
67-66-3	Chloroform (Trichloromethane)	ND		ND		mg/m^3	--	0/7	0.024 - 0.049	0.0007
156-59-2	cis-1,2-Dichloroethene	ND		ND		mg/m^3	--	0/7	0.02 - 0.04	--
100-41-4	Ethylbenzene	ND		ND		mg/m^3	--	0/7	0.022 - 0.043	4.29
75-09-2	Methylene chloride	ND		ND		mg/m^3	--	0/7	0.017 - 0.035	1.61
127-18-4	Tetrachloroethene	0.039		**0.071**		mg/m^3	Control Room (08/19/10)	2/7	0.034 - 0.068	0.062
156-60-5	trans-1,2-Dichloroethene	ND		ND		mg/m^3	--	0/7	0.02 - 0.04	0.26
79-01-6	Trichloroethene	ND		ND		mg/m^3	--	0/7	0.027 - 0.054	0.0039
75-01-4	Vinyl chloride	ND		ND		mg/m^3	--	0/7	0.013 - 0.026	0.0036
	SVOCs									
117-81-7	bis(2-Ethylhexyl)phthalate	ND		ND		mg/m^3	--	0/14	0.047 - 0.063	--
87-86-5	Pentachlorophenol	**0.011**		**0.011**		mg/m^3	Control Room (08/19/10)	1/7	0.01	0.0032
	Metals									
7439-97-6	Mercury	ND		ND		mg/m^3	--	0/7	0.00068 - 0.00077	0.0013

Notes:

ND	Not detected.
BOLD	Maximum concentration exceeds RBC.
(1)	Minimum/maximum detected concentration.
(2)	Based on data collected from August 2010.
(3)	Refer to Table 3.8 for derivation of RBC.

TABLE 4.1

WATER ESVs FOR METALS AND pH
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

	Water Media, µg/l			***Sediments, µg/kg***	
	Washington	***USEPA***	***ESV***	***ESV***	***Source***
Antimony	NV	NV	640*	150000	CB SQG***
Arsenic	36	36	36	57000	CB SQG***
Cadmium	9.3	8.8	8.8	5100	CB SQG***
Chromium, total	50	50	50	260000	CB SQG***
Copper	2.4	3.1	2.4	390000	CB SQG***
Lead	8.1	8.1	8.1	450000	CB SQG***
Mercury	NV	0.94	0.94	590	CB SQG***
Nickel	8.2	8.2	8.2	140000	CB SQG***
Silver	NV	1.9**	1.9**	6100	CB SQG***
Thallium	NV	NV	40*	2600	Dutch*
Zinc	81	81	81	410000	CB SQG***
pH	7 - 8.5 su	NV	7 – 8.5	7 – 8.5	Water ESV

Notes

* See Section 4.3.1.1 for source of ESV

** this is acute silver criterion since no chronic criterion exists

*** CB SQG are Commencement Bay Sediment Quality Objectives

TABLE 4.2

ESVs FOR ORGANIC CHEMICALS IN POREWATER (µg/L) AND SEDIMENTS (µg/kg)
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Chemical	***Porewater ESV µg/L***	***Source***	***Sediment ESV µg/kg***	***Source***
Organics Contributing to Total Narcosis*				
1,1,2,2-Tetrachloroethane	3,662	EPA 2008	6,975	EPA 2008
1,1,2-Trichloroethane	6,099	EPA 2008	11,337	EPA 2008
1,1-Dichloroethene	3,802	EPA 2008	6,632	EPA 2008
Benzene	5,300	EPA 2008	9,062	EPA 2008
Carbon tetrachloride	1,601	EPA 2008	4,389	EPA 2008
Chloroform (Trichloromethane)	6,142	EPA 2008	9,869	EPA 2008
Cis-1,2-dichloroethene	5,349	EPA 2008	7,523	EPA 2008
Ethylbenzene	790	EPA 2008	2,635	EPA 2008
Methylene chloride	38,144	EPA 2008	42,511	EPA 2008
Tetrachloroethene	1,967	EPA 2008	7,937	EPA 2008
Trans-1,2-dichloroethene	4,880	EPA 2008	7,003	EPA 2008
Trichloroethene	1,429	EPA 2008	2,967	EPA 2008
Vinyl chloride	11,755	EPA 2008	14,258	EPA 2008
1,2,4-Trichlorobenzene	120	EPA 2008	2280	EPA 2008
Hexachlorobenzene	11	EPA 2008	10,076	EPA 2008
Hexachlorobutadiene	6.5	See text	721	See text
Bis(2-ethylhexyl) phthalate	340	See text	432,600	See text
Pentachlorophenol	7.9	Wat. Quality Crit.	360	CB SQO***
Sum of Quotients of the Above	<1.5	See text	<1.5	See text
Organics Not Contributing to Total Narcosis**				
DDT	0.01	MTCA CL****	16	CB SQO***
DDE	0.01	MTCA CL****	9	CB SQO***
DDD	0.01	MTCA CL****	34	CB SQO***
PCB	0.2	MTCA CL****	300	CB SQO***
Dioxin TEQ	0.00001	MTCA CL****	0.06	See text

Notes

* These chemicals assumed to have additive toxicity. Each chemical's concentration divided by ESV and quotients summed. See Section 4.3.1.1.

** These organics assumed to have different modes of toxicity. Risk based on each chemical concentration divided by its ESV. See Section 4.3.1.1.

*** CB SQG are Commencement Bay Sediment Quality Objectives

**** MTCA CL are MTCA cleanup levels.

TABLE 4.3

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SURFACE SEDIMENTS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
PT-007	S-072403-VSP-PT7-003	2 to 3 ft bml	Subtidal	**33.88**	**24.57**	**58.45**
PT-009	S-072303-VSP-PT9-001	0 to 1 ft bml	Subtidal	**20.65**	0.07	**20.72**
PT-008	S-072303-VSP-PT8-002	1 to 2 ft bml	Subtidal	**8.01**	0.00	**8.02**
5106-002	SE-013006-5106-2-001	0 to 2 ft bml	Subtidal	0.25	**7.76**	**8.01**
PT-007	S-072403-VSP-PT7-011	1 to 2 ft bml	Subtidal	**5.11**	**1.94**	**7.05**
PT-006	S-072503-VSP-PT6-001	0 to 1 ft bml	Subtidal	**4.94**	0.19	**5.14**
NL-13	SE-122005-NL-13-001	0 to 1.5 ft bml	Subtidal	**2.08**	**1.60**	**3.68**
PT-007	S-072403-VSP-PT7-001	0 to 1 ft bml	Subtidal	**2.43**	1.19	**3.62**
Area 02/3-7	Area 2 Sediment	0 ft bml	Intertidal	**3.27**	0.05	**3.32**
NL-16	SE-051806-NL-16-BI-001	0 to 2 ft bml	Subtidal	**2.61**	0.10	**2.71**
PT-007	S-072403-VSP-PT7-002	1 to 2 ft bml	Subtidal	0.21	**2.37**	**2.58**
PT-006	S-072503-VSP-PT6-003	2 to 3 ft bml	Subtidal	**1.94**	0.19	**2.13**
PT-004	S-072203-VSP-PT4-010	10 to 11 ft bml	Subtidal	**1.68**	0.15	**1.83**
Area 04/13-16	Area 4 Sediment	0 ft bml	Intertidal	**1.78**	0.00	**1.78**
5208	Intertidal-5208--(HWCC Sample)	0 ft bml	Subtidal	**1.63**	0.02	**1.65**
5206	Intertidal-5206--(HWCC Sample)	0 ft bml	Subtidal	1.49	0.00	1.50
5207	Intertidal-5207--(HWCC Sample)	0 ft bml	Subtidal	1.42	0.01	1.42
Area 01/2	Area 1 Sediment	0 ft bml	Intertidal	1.22	0.03	1.25
5205	Intertidal-5205--(HWCC Sample)	0 ft bml	Subtidal	1.14	0.03	1.17
PT-009	S-072303-VSP-PT9-003	2 to 3 ft bml	Subtidal	0.78	0.38	1.15
PT-009	S-072303-VSP-PT9-002	1 to 2 ft bml	Subtidal	0.87	0.26	1.13
Area 07/22,23	Area 7 Sediment	0 ft bml	Intertidal	1.07	0.00	1.07
PT-006	S-072503-VSP-PT6-011	1 to 2 ft bml	Subtidal	0.78	0.06	0.84
NL-24	SE-011207-BS-NL-24-001	0 to 3 ft bml	Subtidal	0.81	0.01	0.82
NL-15	SE-121605-NL-15-001	0 to 1.5 ft bml	Subtidal	0.69	0.09	0.78
NL-14	SE-121405-NL-14-001	0 to 2 ft bml	Subtidal	0.00	0.77	0.77
Area 06/19,20	Area 6 Sediment	0 ft bml	Intertidal	0.75	0.00	0.75
Area 05/17,18,21	Area 5 Sediment	0 ft bml	Intertidal	0.72	0.00	0.72
Area 09/26-28	Area 9 Sediment	0 ft bml	Intertidal	0.66	0.02	0.68
PT-006	S-072503-VSP-PT6-002	1 to 2 ft bml	Subtidal	0.63	0.04	0.67
5211	Intertidal-5211--(HWCC Sample)	0 ft bml	Subtidal	0.54	0.01	0.56
PT-008	S-072303-VSP-PT8-003	2 to 3 ft bml	Subtidal	0.32	0.11	0.43
NL-29	SE-011807-BS-NL-29-001	0 to 3 ft bml	Subtidal	0.37	0.00	0.37
PT-005	S-072503-VSP-PT5-001	2 to 3 ft bml	Subtidal	0.24	0.00	0.24
5106-014	SE-120105-5106-14-002	2 to 4 ft bml	Subtidal	0.00	0.17	0.17
Area 03 Sediment	Area 3 Sediment	0 ft bml	Intertidal	0.10	0.00	0.10
PT-008	S-072303-VSP-PT8-001	0 to 1 ft bml	Subtidal	0.07	0.02	0.09
Pier25-013	SE-020206-PIER25-13-001	0 to 2 ft bml	Subtidal	0.08	0.00	0.08
Area 08 Sediment	Area 8 Sediment	0 ft bml	Intertidal	0.06	0.00	0.06
NL-26	SE-011707-BS-NL-26-001	0 to 3 ft bml	Subtidal	0.05	0.00	0.05
5106-014	SE-120105-5106-14-001	2 to 4 ft bml	Subtidal	0.00	0.04	0.04
NL-30	SE-011907-BS-NL-30-001	0 to 3 ft bml	Subtidal	0.03	0.00	0.03
NL-25	SE-011807-ILM-NL-25-001	0 to 3 ft bml	Subtidal	0.01	0.00	0.01
5106-021	SE-010606-5106-21-001	0.5 to 2.5 ft bml	Subtidal	0.00	0.00	0.00
5106-019	SE-011306-5106-19-001	0.5 to 2.5 ft bml	Subtidal	0.00	0.00	0.00
Pier25-018	SE-120805-PIER25-18-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-010	SE-110205-5106-10-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-009	SE-103105-5106-9-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
Pier25-006	SE-020306-PIER25-6-001	0.5 to 2.5 ft bml	Subtidal	0.00	0.00	0.00
Pier25-001	SE-063005-PIER25-1-001	0.5 to 3 ft bml	Subtidal	0.00	0.00	0.00
5106-023	SE-021006-5106-23-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
Pier25-016	SE-121205-PIER25-16-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-022	SE-012506-5106-22-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
5106-025	SE-042706-5106-25-010	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
5106-026	SE-021406-5106-26-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
5106-027	SE-041006-5106-27-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
5106-031	SE-042806-5106-31-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
Pier25-012	SE-020106-PIER25-12-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
Pier25-025	SE-012006-PIER25-25-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00

TABLE 4.3

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SURFACE SEDIMENTS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Pier25-028	SE-012406-PIER25-28-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
Pier25-029	SE-020606-PIER25-29-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
Pier25-030	SE-012606-PIER25-30-001	0 to 2 ft bml	Subtidal	0.00	0.00	0.00
5106-030	SE-042506-5106-30-001	0.5 to 2 ft bml	Subtidal	0.00	0.00	0.00
5106-020	SE-010406-5106-20-001	0.5 to 2.5 ft bml	Subtidal	0.00	0.00	0.00
Pier25-021	SE-010306-PIER25-21-001	0.5 to 2.5 ft bml	Subtidal	0.00	0.00	0.00
Pier25-022	SE-011706-PIER25-22-001	0.5 to 2.5 ft bml	Subtidal	0.00	0.00	0.00
Pier25-026	SE-012306-PIER25-26-001	1.5 to 3.5 ft bml	Subtidal	0.00	0.00	0.00
5106-011	SE-101305-5106-11-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-022	SE-012506-5106-22-002	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-022	SE-012506-5106-22-003	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-024	SE-020806-5106-24-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-029	SE-042106-5106-29-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
Pier25-029	SE-020606-PIER25-29-002	2 to 4 ft bml	Subtidal	0.00	0.00	0.00
5106-013	SE-112805-5106-13-001	2 to 4 ft bml	Subtidal	0.00	0.00	0.00

Notes:

(1) Screening Quotient (SQ)
Bold SQ > 1.5

TABLE 4.4

SUMMARY OF SCREENING OF METALS IN SURFACE SEDIMENTS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth ft BML*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic chemicals*
Area 4/13-16	Area 4 Sediment	0	Intertidal	**333.33**	**33.87**	2	Lead
Area 1/2	Area 1 Sediment	0	Intertidal	**288.89**	**29.34**	1	Lead
Area 2/3-7	Area 2 Sediment	0	Intertidal	**266.67**	**27.12**	1	Lead
Area 3 Sediment	Area 3 Sediment	0	Intertidal	**120.00**	**13.02**	2	Lead
Area 7/22,23	Area 7 Sediment	0	Intertidal	**100.00**	**10.51**	1	Lead
5208	Intertidal-5208--(HWCC Sample)	0	Subtidal	**77.11**	**8.02**	1	Lead
NL-13	SE-122005-NL-13-001	0 to 1.5	Subtidal	**42.00**	**5.44**	1	Lead
Area 6/19,20	Area 6 Sediment	0	Intertidal	**31.11**	**4.13**	2	Lead
Area 8 Sediment	Area 8 Sediment	0	Intertidal	**3.66**	1.46	4	Zinc
Area 5/17,18,21	Area 5 Sediment	0	Intertidal	**10.00**	1.28	1	Lead
5206	Intertidal-5206--(HWCC Sample)	0	Subtidal	**3.56**	0.86	1	Mercury
NL-29	SE-011807-BS-NL-29-001	0 to 3	Subtidal	**4.73**	0.75	1	Lead
NL-26	SE-011707-BS-NL-26-001	0 to 3	Subtidal	**3.36**	0.74	1	Copper
Area 9/26-28	Area 9 Sediment	0	Intertidal	**2.37**	0.57	1	Mercury
5207	Intertidal-5207--(HWCC Sample)	0	Subtidal	**2.56**	0.51	1	Lead
5205	Intertidal-5205--(HWCC Sample)	0	Subtidal	**1.68**	0.41	1	Mercury
NL-15	SE-121605-NL-15-001	0 to 1.5	Subtidal	**1.60**	0.41	1	Lead
5211	Intertidal-5211--(HWCC Sample)	0	Subtidal	1.19	0.28	0	Zinc
NL-24	SE-011207-BS-NL-24-001	0 to 3	Subtidal	0.41	0.19	0	Lead
Pier25-13	SE-020206-PIER25-13-001	0 to 2	Subtidal	0.27	0.13	0	Chromium Total
NL-30	SE-011907-BS-NL-30-001	0 to 3	Subtidal	0.19	0.11	0	Mercury
NL-25	SE-011807-ILM-NL-25-001	0 to 3	Subtidal	0.30	0.11	0	Lead
Pier25-1	SE-063005-PIER25-1-001	0.5 to 3	Subtidal	0.12	0.04	0	Zinc
5106-2	SE-013006-5106-2-001	0 to 2	Subtidal	0.06	0.03	0	Zinc

Notes:

(1) Maximum screening quotient (SQ)
(2) Average screening quotient (SQ)
Bold SQ > 1.5

TABLE 4.5

SUMMARY OF SCREENING OF PCBs IN SURFACE SEDIMENTS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*SQ (1) for PCBs*	*Notes*
PT-17A	SE-020107-ILM-17A-001	0.5 to 2.5	Subtidal	**113.44**	
5209	Intertidal-5209--(HWCC Sample)	0	Subtidal	**103.33**	Aroclor
Pier 25D	SE-013107-BI-PIER25D-001	0 to 0.33	Intertidal	**86.62**	Aroclor
Pier 25A	SE-013007-BI-PIER25A-002	0 to 3	Intertidal	**21.95**	Aroclor
Area 8 Sediment	Area 8 Sediment	0	Intertidal	**20.83**	
Pier 25A	SE-013007-BI-PIER25A-001	0 to 0.33	Intertidal	**19.24**	Aroclor
5206	Intertidal-5206--(HWCC Sample)	0	Subtidal	**10.33**	Aroclor
Pier 25C	SE-013107-BI-PIER25C-003	2 to 3.5	Intertidal	**8.19**	Aroclor
Pier 25B	SE-013007-BI-PIER25B-001	0 to 0.33	Intertidal	**8.13**	Aroclor
Area 8 Sediment	Area 8 Sediment	0	Intertidal	**6.00**	Aroclor
Pier 25C	SE-013107-BI-PIER25C-001	0 to 0.33	Intertidal	**4.30**	Aroclor
Pier 25D	SE-013107-BI-PIER25D-002	0.5 to 2	Intertidal	**3.49**	Aroclor
Area 5203 Sediment	Area 5203 Sediment	0	Intertidal	**3.20**	Aroclor
5207	Intertidal-5207--(HWCC Sample)	0	Subtidal	**2.87**	Aroclor
HW-1	SE-012407-BS-HW-1-001	0 to 0.33	Subtidal	**2.48**	Aroclor
Pier 25C	SE-013107-BI-PIER25C-002	0 to 2	Intertidal	**1.92**	Aroclor
Area 5209 Sediment	Area 5209 Sediment	0	Intertidal	**1.57**	Aroclor
Area 3 Sediment	Area 3 Sediment	0	Intertidal	1.47	Aroclor
Area 9/26-28	Area 9 Sediment	0	Intertidal	1.43	Aroclor
5205	Intertidal-5205--(HWCC Sample)	0	Subtidal	1.17	Aroclor
NL-27	SE-011907-BS-NL-27-001	0 to 2	Subtidal	1.12	Aroclor
Area 3 Sediment	Area 3 Sediment	0	Intertidal	0.93	Aroclor
HW-4	SE-012307-BS-HW-4-001	0 to 0.33	Subtidal	0.92	Aroclor
NL-29	SE-011807-BS-NL-29-001	0 to 3	Subtidal	0.82	Aroclor
Area 7/22,23	Area 7 Sediment	0	Intertidal	0.53	Aroclor
Pier 25D	SE-013107-BI-PIER25D-003	2 to 3.5	Intertidal	0.52	Aroclor
Pier 25B	SE-013007-BI-PIER25B-002	2 to 3.5	Intertidal	0.50	Aroclor
NL-25	SE-011807-ILM-NL-25-001	0 to 3	Subtidal	0.45	Aroclor
NL-26	SE-011707-BS-NL-26-001	0 to 3	Subtidal	0.43	Aroclor
HW-4	SE-012307-BS-HW-4-002	0 to 2	Subtidal	0.41	Aroclor
NL-24	SE-011207-BS-NL-24-001	0 to 3	Subtidal	0.34	Aroclor
HW-2	SE-012507-BS-HW-2-002	0.5 to 2.5	Subtidal	0.31	Aroclor
HW-3	SE-012207-BS-HW3-001	0 to 0.33	Subtidal	0.14	Aroclor
HW-3	SE-012207-BS-HW3-002	0 to 2	Subtidal	0.12	Aroclor
Pier25-1	SE-063005-PIER25-1-001	0.5 to 3	Subtidal	0.12	Aroclor
HW-1	SE-012407-BS-HW-1-002	0.5 to 2.5	Subtidal	0.12	Aroclor
HW-2	SE-012507-BS-HW-2-001	0 to 0.33	Subtidal	0.08	Aroclor
NL-30	SE-011907-BS-NL-30-001	0 to 3	Subtidal	0.05	
HW-2	SE-012507-BS-HW-2-003	2.5 to 4.5	Subtidal	0.03	Aroclor
Area 1/2	Area 1 Sediment	0	Intertidal	0.00	Aroclor
Area 2/3-7	Area 2 Sediment	0	Intertidal	0.00	Aroclor
Area 4/13-16	Area 4 Sediment	0	Intertidal	0.00	Aroclor
Area 5/17,18,21	Area 5 Sediment	0	Intertidal	0.00	Aroclor
Area 6/19,20	Area 6 Sediment	0	Intertidal	0.00	Aroclor
NL-13	SE-122005-NL-13-001	0 to 1.5	Subtidal	0.00	Aroclor
NL-15	SE-121605-NL-15-001	0 to 1.5	Subtidal	0.00	
5208	Intertidal-5208--(HWCC Sample)	0	Subtidal	0.00	Congeners
5211	Intertidal-5211--(HWCC Sample)	0	Subtidal	0.00	Congeners
5106-2	SE-013006-5106-2-001	0 to 2	Subtidal	0.00	Congeners
Pier25-13	SE-020206-PIER25-13-001	0 to 2	Subtidal	0.00	Congeners

Notes:

(1) Screening Quotient (SQ)
Bold SQ > 1.5

TABLE 4.6

SUMMARY OF SCREENING OF DDT AND METABOLITES IN SURFACE SEDIMENT
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth ft BML*	*Tidal Zone*	*Maximum SQ* (1)	*Average SQ* (1)
Area 04/13-16	Area 4 Sediment	0	Intertidal	**137.50**	**73.24**
Area 05/17,18,21	Area 5 Sediment	0	Intertidal	**38.75**	**12.92**
Area 01/2	Area 1 Sediment	0	Intertidal	**35.63**	**11.88**
Area 02/3-7	Area 2 Sediment	0	Intertidal	**28.13**	**9.38**
Area 03 Sediment	Area 3 Sediment	0	Intertidal	**12.50**	**4.17**
Area 06/19,20	Area 6 Sediment	0	Intertidal	**8.75**	**2.92**
Area 09/26-28	Area 9 Sediment	0	Intertidal	0.39	0.16
5205.00	Intertidal-5205--(HWCC Sample)	0	Subtidal	0.00	0.00
5206.00	Intertidal-5206--(HWCC Sample)	0	Subtidal	0.00	0.00
5207.00	Intertidal-5207--(HWCC Sample)	0	Subtidal	0.00	0.00
5208.00	Intertidal-5208--(HWCC Sample)	0	Subtidal	0.00	0.00
5209.00	Intertidal-5209--(HWCC Sample)	0	Subtidal	0.00	0.00
5211.00	Intertidal-5211--(HWCC Sample)	0	Subtidal	0.00	0.00
Area 07/22,23	Area 7 Sediment	0	Intertidal	0.00	0.00
Area 08 Sediment	Area 8 Sediment	0	Intertidal	0.00	0.00
NL-13	SE-122005-NL-13-001	0 to 1.5	Subtidal	0.00	0.00
NL-15	SE-121605-NL-15-001	0 to 1.5	Subtidal	0.00	0.00
NL-16	SE-051806-NL-16-BI-001	0 to 2	Subtidal	0.00	0.00
NL-24	SE-011207-BS-NL-24-001	0 to 3	Subtidal	0.00	0.00
NL-25	SE-011807-ILM-NL-25-001	0 to 3	Subtidal	0.00	0.00
NL-26	SE-011707-BS-NL-26-001	0 to 3	Subtidal	0.00	0.00
NL-29	SE-011807-BS-NL-29-001	0 to 3	Subtidal	0.00	0.00
NL-30	SE-011907-BS-NL-30-001	0 to 3	Subtidal	0.00	0.00

Note:

(1) Screening Quotient (SQ)
Bold SQ > 1.5

TABLE 4.7

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
SM2	GW-061006-SM-2-JL-001	0.00	Subtidal	0.00	0.04	0.04
SM5	GW-061206-SM-5-GH-001	0.00	Subtidal	0.00	0.04	0.04
SM15	GW-061606-SM-15-JPL-001	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-010	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-009	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-008	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-007	0.00	Subtidal	0.00	0.02	0.02
SM3	GW-061106-SM-3-JL-001	0.00	Subtidal	0.00	0.02	0.02
SM14	GW-062306-SM-14-GH-001	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-001	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-002	0.00	Subtidal	0.00	0.02	0.02
SM1	GW-061206-SM-1-GH-006	0.00	Subtidal	0.00	0.01	0.01
SM1	GW-061206-SM-1-GH-005	0.00	Subtidal	0.00	0.01	0.01
SM5	GW-061206-SM-5-GH-008	0.00	Subtidal	0.00	0.01	0.01
SM1	GW-061206-SM-1-GH-004	0.00	Subtidal	0.00	0.01	0.01
SM1	GW-061206-SM-1-GH-003	0.00	Subtidal	0.00	0.01	0.01
SM2	GW-061006-SM-2-JL-002	0.00	Subtidal	0.00	0.01	0.01
SM5	GW-061206-SM-5-GH-009	0.00	Subtidal	0.00	0.01	0.01
SM15	GW-061606-SM-15-JPL-002	0.00	Subtidal	0.00	0.01	0.01
SM2	GW-061006-SM-2-JL-003	0.00	Subtidal	0.00	0.01	0.01
SM26	GW-062906-SM-26-GH-001	0.00	Intertidal	0.00	0.01	0.01
SM16	GW-062806-SM-16-GH-001	0.00	Subtidal	0.00	0.01	0.01
SM2	GW-061006-SM-2-JL-004	0.00	Subtidal	0.00	0.01	0.01
SM14	GW-062306-SM-14-GH-002	0.00	Subtidal	0.00	0.01	0.01
SM6	GW-061506-SM-6-JPL-001	0.00	Subtidal	0.00	0.01	0.01
SM3	GW-061106-SM-3-JL-002	0.00	Subtidal	0.00	0.01	0.01
SM5	GW-061206-SM-5-GH-010	0.00	Subtidal	0.00	0.01	0.01
SM2	GW-061006-SM-2-JL-005	0.00	Subtidal	0.00	0.01	0.01
SM3	GW-061106-SM-3-JL-003	0.00	Subtidal	0.00	0.00	0.00
SM2	GW-061006-SM-2-JL-006	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-003	0.00	Subtidal	0.00	0.00	0.00
SM2	GW-061006-SM-2-JL-007	0.00	Subtidal	0.00	0.00	0.00
SM14	GW-062306-SM-14-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM2	GW-061006-SM-2-JL-009	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-005	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-004	0.00	Subtidal	0.00	0.00	0.00
SM2	GW-061006-SM-2-JL-010	0.00	Subtidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-003	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-007	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-006	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-005	0.00	Subtidal	0.00	0.00	0.00
SM2	GW-061006-SM-2-JL-008	0.00	Subtidal	0.00	0.00	0.00
SM14	GW-062306-SM-14-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-009	0.00	Subtidal	0.00	0.00	0.00

TABLE 4.7

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
SM3	GW-061106-SM-3-JL-006	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-007	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-010	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-002	0.00	Subtidal	0.00	0.00	0.00
SM14	GW-062306-SM-14-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM14	GW-062306-SM-14-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM15	GW-061606-SM-15-JPL-008	0.00	Subtidal	0.00	0.00	0.00
SM14	GW-062306-SM-14-GH-009	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-008	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-009	0.00	Subtidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-005	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-003	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-010	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-010	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM7	GW-062606-SM-7-GH-005	0.00	Subtidal	0.00	0.00	0.00
SM14	GW-062306-SM-14-GH-010	0.00	Subtidal	0.00	0.00	0.00
SM7	GW-062606-SM-7-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM7	GW-062606-SM-7-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-004	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-009	0.00	Subtidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-002	0.00	Intertidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-007	0.00	Subtidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-006	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-010	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-005	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-006	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-009	0.00	Subtidal	0.00	0.00	0.00
SM8	GW-061506-SM-8-JPL-008	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-007	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062406-SM-23-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-008	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-005	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM19	GW-062206-SM-19-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062406-SM-23-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-005	0.00	Subtidal	0.00	0.00	0.00

TABLE 4.7

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ* (1) *SVOC*	*Summed SQ* (1) *VOC*	*Summed SQ* (1) *All Organics*
SM9	GW-061306-SM-9-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM20	GW-062306-SM-20-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM19	GW-062206-SM-19-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-009	0.00	Intertidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-010	0.00	Subtidal	0.00	0.00	0.00
SM19	GW-062206-SM-19-GH-005	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062406-SM-23-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062406-SM-23-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-009	0.00	Subtidal	0.00	0.00	0.00
SM9	GW-061306-SM-9-GH-010	0.00	Subtidal	0.00	0.00	0.00
SM19	GW-062206-SM-19-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-010	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-008	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-007	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-006	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-005	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-004-005	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-004	0.00	Intertidal	0.00	0.00	0.00
SM26	GW-062906-SM-26-GH-003	0.00	Intertidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-011	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-009	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-007-009	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-005	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-003-006	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM25	GW-062706-SM-25-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-009	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-005	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM23	GW-062706-SM-23-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM7	GW-062606-SM-7-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM7	GW-062606-SM-7-GH-001	0.00	Subtidal	0.00	0.00	0.00

TABLE 4.7

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
SM21	GW-062606-SM-21-GH-010	0.00	Subtidal	0.00	0.00	0.00
SM21	GW-062606-SM-21-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM21	GW-062606-SM-21-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM19	GW-062206-SM-19-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM19	GW-062206-SM-19-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-009	0.00	Subtidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM18	GW-062206-SM-18-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM6	GW-061506-SM-6-JPL-001-008	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-008	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-007	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-006	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-005	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-004	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-003	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-002	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-001-008	0.00	Subtidal	0.00	0.00	0.00
SM11	GW-061406-SM-11-GH-001	0.00	Subtidal	0.00	0.00	0.00
SM3	GW-061106-SM-3-JL-001-010	0.00	Subtidal	0.00	0.00	0.00
SM2	GW-061006-SM-2-JL-001-010	0.00	Subtidal	0.00	0.00	0.00

Notes:

(1) Screening Quotient (SQ)

TABLE 4.8

SUMMARY OF SCREENING OF METALS IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
SM2	GW-061006-SM-2-JL-001-010	0	Subtidal	**3.22**	0.82	2.00	Lead
SM3	GW-061106-SM-3-JL-001-010	0	Subtidal	**2.72**	0.41	1.00	Lead
SM14	GW-062306-SM-14-GH-01-05/08-10	0	Subtidal	**2.61**	0.44	1.00	Lead
SM25	GW-062706-SM-25-GH-001-002	0	Subtidal	**1.75**	0.40	1.00	Lead
SM26	GW-062906-SM-26-GH-001-002	0	Intertidal	1.03	0.33	0.00	
SM6	GW-061506-SM-6-JPL-001-008	0	Subtidal	0.83	0.31	0.00	
SM9	GW-061306-SM-9-GH-001-010	0	Subtidal	0.82	0.21	0.00	
SM19	GW-062206-SM-19-GH-001-006/008	0	Subtidal	0.66	0.22	0.00	
SM23	GW-062406-SM-23-GH-001-004	0	Subtidal	0.64	0.21	0.00	
SM20	GW-062306-SM-20-GH-01-03/05-10	0	Subtidal	0.52	0.16	0.00	
SM1	GW-061206-SM-1-GH-001-010	0	Subtidal	0.45	0.11	0.00	
SM25	GW-062706-SM-25-GH-003-004	0	Subtidal	0.44	0.12	0.00	
SM23	GW-062706-SM-23-GH-001-009	0	Subtidal	0.43	0.12	0.00	
SM11	GW-061406-SM-11-GH-001-008	0	Subtidal	0.42	0.10	0.00	
SM25	GW-062706-SM-25-GH-007-008	0	Subtidal	0.28	0.08	0.00	
SM26	GW-062906-SM-26-GH-003-004	0	Intertidal	0.26	0.08	0.00	
SM25	GW-062706-SM-25-GH-009	0	Subtidal	0.23	0.07	0.00	
SM26	GW-062906-SM-26-GH-005	0	Intertidal	0.21	0.07	0.00	
SM25	GW-062706-SM-25-GH-005-006	0	Subtidal	0.20	0.06	0.00	
SM26	GW-062906-SM-26-GH-006-007	0	Intertidal	0.18	0.06	0.00	
SM26	GW-062906-SM-26-GH-008-009	0	Intertidal	0.17	0.04	0.00	

Notes:

(1) Maximum screening quotient (SQ)

(2) Average screening quotient (SQ)

Bold SQ > 1.5

TABLE 4.9

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
PT-7	G-072403-VSP-PT7-002	2 to 4	Subtidal	0.00	**62.59**	**62.59**
PT-5	G-072503-VSP-PT5-002	2 to 4	Subtidal	0.00	**51.99**	**51.99**
PT-5	G-072503-VSP-PT5-004	2 to 4	Subtidal	0.00	**47.66**	**47.66**
PT-5	G-072503-VSP-PT5-001	0 to 2	Subtidal	0.00	**34.99**	**34.99**
PT-7	G-072403-VSP-PT7-001	2 to 4	Subtidal	0.00	**15.71**	**15.71**
5106-2	GW-013006-5106-2-001	0 to 3	Subtidal	0.00	**7.66**	**7.66**
Milky-Seep 1	PW-022798-STI-004	0.00	Intertidal	0.13	0.18	0.31
PT-6	G-072503-VSP-PT6-001	2 to 4	Subtidal	0.00	0.25	0.25
PT-4	G-072203-VSP-PT4-002	2 to 4	Subtidal	0.00	0.25	0.25
NL-24	GW-011207-BS-NL-24-001	1.5 to 4.5	Subtidal	0.20	0.00	0.20
PZ-SHI-1-33	GW-042706-TR-PZ-SHI-1-4	2.25 to 3.25	Subtidal	0.00	0.08	0.08
5106-14	GW-120105-5106-14-002	2 to 5	Subtidal	0.00	0.06	0.06
5106-14	GW-120105-5106-14-001	2 to 5	Subtidal	0.00	0.06	0.06
PT-3	G-072503-VSP-PT3-003	2 to 4	Subtidal	0.00	0.05	0.05
PT-3	G-072503-VSP-PT3-001	2 to 4	Subtidal	0.00	0.05	0.05
Milky-Seep 2	PW-030298-STI-011	0.00	Intertidal	0.03	0.02	0.04
NL-24	GW-011207-BS-NL-24-001	1.5 to 4.5	Subtidal	0.00	0.04	0.04
NL-17	GW-033006-RB-NL-17-002	3 to 6	Subtidal	0.00	0.03	0.03
5106-10	GW-110205-5106-10-001	2 to 5	Subtidal	0.00	0.03	0.03
NL-15	GW-121605-NL-15-002	3 to 6	Subtidal	0.00	0.03	0.03
NL-17	GW-033006-RB-NL-17-001	0 to 3	Subtidal	0.00	0.03	0.03
NL-13	GW-122005-NL-13-001	0 to 3	Subtidal	0.00	0.03	0.03
Pier25-13	GW-020206-PIER25-13-001	0 to 3	Subtidal	0.00	0.02	0.02
NL-13	GW-122005-NL-13-002	3 to 6	Subtidal	0.00	0.02	0.02
NL-14	GW-121405-NL-14-001	1 to 4	Subtidal	0.02	0.00	0.02
5106-21	GW-010606-5106-21-001	0.5 to 3.5	Subtidal	0.00	0.01	0.01
HYD-6	GW-093005-HYD-6-001	2.3 to 5.3	Subtidal	0.00	0.01	0.01
5106-12	GW-101005-5106-12-001	2 to 5	Subtidal	0.01	0.00	0.01
Pier25-27	GW-011906-PIER25-27-001	0.5 to 3.5	Subtidal	0.00	0.01	0.01
HYD-6	GW-093005-HYD-6-001	2.3 to 5.3	Subtidal	0.01	0.00	0.01
Dock2-3	GW-072205-DOCK2-3-001	3 to 6	Subtidal	0.01	0.00	0.01
NL-15	GW-121605-NL-15-002	3 to 6	Subtidal	0.01	0.00	0.01
NL-13	GW-122005-NL-13-001	0 to 3	Subtidal	0.01	0.00	0.01
Pier25-1	GW-063005-PIER25-1-001	3 to 5	Subtidal	0.01	0.00	0.01
PT-4	G-072203-VSP-PT4-001	0 to 2	Subtidal	0.00	0.00	0.00
Dock2-5	GW-080105-DOCK2-5-002	2 to 5	Subtidal	0.00	0.00	0.00
5106-23	GW-021006-5106-23-001	0 to 3	Subtidal	0.00	0.00	0.00
NL-28	GW-011607-BS-NL-28-001	1.5 to 3.5	Subtidal	0.00	0.00	0.00
721-PZ-1	PZ1-0604-OUT	1 to 2	Intertidal	0.00	0.00	0.00
721-PZ-2	PZ2-0604-OUT	1 to 2	Intertidal	0.00	0.00	0.00
NL-14	GW-121405-NL-14-001	1 to 4	Subtidal	0.00	0.00	0.00
Dock2-10	GW-091205-DOCK2-10-002	2.6 to 5.6	Subtidal	0.00	0.00	0.00
Dock2-10	GW-091205-DOCK2-10-001	2.6 to 5.6	Subtidal	0.00	0.00	0.00
Dock2-10	GW-091205-DOCK2-10-002	2.6 to 5.6	Subtidal	0.00	0.00	0.00
Pier25-25	GW-012006-PIER25-25-001	0 to 3	Subtidal	0.00	0.00	0.00
5106-24	GW-020806-5106-24-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-5	GW-080105-DOCK2-5-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-5	GW-080105-DOCK2-5-002	2 to 5	Subtidal	0.00	0.00	0.00
5106-9	GW-110105-5106-9-001	2 to 5	Subtidal	0.00	0.00	0.00
HYD-9	GW-091405-HYD-9-001	2 to 5	Subtidal	0.00	0.00	0.00
NL-15	GW-121605-NL-15-001	0 to 3	Subtidal	0.00	0.00	0.00
Pier25-12	GW-020106-Pier25-12-001	0 to 3	Subtidal	0.00	0.00	0.00
721-PZ-3	FD1-060404	1 to 2	Intertidal	0.00	0.00	0.00
Pier25-6	GW-020306-PIER25-6-001	0.5 to 3.5	Subtidal	0.00	0.00	0.00
NL-23	GW-081106-LH-NL23-001	0 to 3	Subtidal	0.00	0.00	0.00
5106-19	GW-011306-5106-19-001	0.5 to 3.5	Subtidal	0.00	0.00	0.00
721-PZ-3	PZ3-0604-OUT	1 to 2	Intertidal	0.00	0.00	0.00
NL-29	GW-011807-BS-NL-29-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00
NL-16	GW-051806-NL-16-BI-001	1 to 4	Subtidal	0.00	0.00	0.00
5106-13	GW-112805-5106-13-001	2 to 5	Subtidal	0.00	0.00	0.00

TABLE 4.9

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Dock2-6	GW-090605-DOCK2-6-001	0.7 to 3.7	Subtidal	0.00	0.00	0.00
Dock2-3	GW-072205-DOCK2-3-001	3 to 6	Subtidal	0.00	0.00	0.00
Pier25-18	GW-120805-PIER25-18-001	2 to 5	Subtidal	0.00	0.00	0.00
5106-26	GW-021406-5106-26-001	0 to 3	Subtidal	0.00	0.00	0.00
NL-13	GW-122005-NL-13-002	3 to 6	Subtidal	0.00	0.00	0.00
Pier25-26	GW-012306-PIER25-26-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00
NL-28	GW-011607-BS-NL-28-001	1.5 to 3.5	Subtidal	0.00	0.00	0.00
Pier25-19	GW-120705-PIER25-19-001	2.6 to 5.6	Subtidal	0.00	0.00	0.00
5106-22	GW-012506-5106-22-001	0 to 3	Subtidal	0.00	0.00	0.00
5106-22	GW-012506-5106-22-002	0 to 3	Subtidal	0.00	0.00	0.00
Pier25-16	GW-121205-PIER25-16-001	2 to 5	Subtidal	0.00	0.00	0.00
5106-11	GW-101305-5106-11-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-7	GW-090705-Dock2-7-001	3 to 6	Subtidal	0.00	0.00	0.00
HYD-9	GW-091405-HYD-9-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-3	GW-072205-DOCK2-3-002	3 to 6	Subtidal	0.00	0.00	0.00
Pier25-1	GW-063005-PIER25-1-001	3 to 5	Subtidal	0.00	0.00	0.00
5106-32	GW-050306-5106-32-BS-001	1 to 5	Subtidal	0.00	0.00	0.00
PZ-SHI-1-33	GW-042706-TR-PZ-SHI-1-4	2.25 to 3.25	Subtidal	0.00	0.00	0.00
HYD-8	GW-091305-HYD-8-002	2 to 5	Subtidal	0.00	0.00	0.00
5106-20	GW-010406-5106-20-001	0.5 to 3.5	Subtidal	0.00	0.00	0.00
5106-12	GW-101005-5106-12-001	2 to 5	Subtidal	0.00	0.00	0.00
Pier25-28	GW-012406-PIER25-28-001	0 to 3	Subtidal	0.00	0.00	0.00
5106-25	GW-042706-5106-25-009	1 to 5	Subtidal	0.00	0.00	0.00
5106-27	GW-041006-5106-27-001	0 to 4	Subtidal	0.00	0.00	0.00
5106-29	GW-042106-5106-29-001	0 to 4	Subtidal	0.00	0.00	0.00
5106-30	GW-042606-5106-30-009	1 to 5	Subtidal	0.00	0.00	0.00
5106-31	GW-042806-5106-31-001	1 to 5	Subtidal	0.00	0.00	0.00
Dock2-11	GW-101905-DOCK2-11-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-12	GW-110805-DOCK2-12-001	2 to 5	Subtidal	0.00	0.00	0.00
NL-25	GW-011807-ILM-NL-25-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00
NL-30	GW-011907-BS-NL-30-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00
Pier25-20	GW-120605-PIER25-20-001	2 to 5	Subtidal	0.00	0.00	0.00
Pier25-21	GW-010306-PIER25-21-001	0.5 to 3.5	Subtidal	0.00	0.00	0.00
Pier25-22	GW-011706-PIER25-22-001	0.5 to 3.5	Subtidal	0.00	0.00	0.00
Pier25-23	GW-011106-PIER25-23-001	2 to 5	Subtidal	0.00	0.00	0.00
Pier25-24	GW-011206-PIER25-24-001	0.5 to 3.5	Subtidal	0.00	0.00	0.00
Pier25-29	GW-020606-PIER25-29-001	0 to 3	Subtidal	0.00	0.00	0.00
Pier25-29	GW-020606-PIER25-29-002	2 to 5	Subtidal	0.00	0.00	0.00
Pier25-30	GW-012606-PIER25-30-001	0 to 3	Subtidal	0.00	0.00	0.00
5106-2	GW-013006-5106-2-001	0 to 3	Subtidal	0.00	0.00	0.00
5106-10	GW-110205-5106-10-001	2 to 5	Subtidal	0.00	0.00	0.00
5106-16	GW-111405-5106-16-001	1 to 4	Subtidal	0.00	0.00	0.00
Dock2-3	GW-072205-DOCK2-3-002	3 to 6	Subtidal	0.00	0.00	0.00
Dock2-5	GW-080105-DOCK2-5-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-6	GW-090605-DOCK2-6-001	0.7 to 3.7	Subtidal	0.00	0.00	0.00
Dock2-7	GW-090705-DOCK2-7-001	3 to 6	Subtidal	0.00	0.00	0.00
Dock2-10	GW-091205-DOCK2-10-001	2.6 to 5.6	Subtidal	0.00	0.00	0.00
Dock2-11	GW-101905-DOCK2-11-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-12	GW-110805-DOCK2-12-001	2 to 5	Subtidal	0.00	0.00	0.00
Dock2-14	GW-102805-DOCK2-14-001	2 to 5	Subtidal	0.00	0.00	0.00
HYD-8	GW-091305-HYD-8-002	2 to 5	Subtidal	0.00	0.00	0.00
NL-15	GW-121605-NL-15-001	0 to 3	Subtidal	0.00	0.00	0.00
NL-23	GW-081106-LH-NL23-001	0 to 3	Subtidal	0.00	0.00	0.00
NL-30	GW-011907-BS-NL-30-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00
Pier25-13	GW-020206-PIER25-13-001	0 to 3	Subtidal	0.00	0.00	0.00
NL-25	GW-011807-ILM-NL-25-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00
NL-29	GW-011807-BS-NL-29-001	1.5 to 4.5	Subtidal	0.00	0.00	0.00

Notes:

(1) Screening Quotient (SQ)
Bold SQ > 1.5

TABLE 4.10

SUMMARY OF SCREENING OF HEAVY METALS IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
5106-12	GW-101005-5106-12-001	2 to 5	Subtidal	**341.58**	**57.16**	**6.00**	Silver
Pier25-1	GW-063005-PIER25-1-001	3 to 5	Subtidal	**5.78**	0.75	1.00	Zinc
HW-1	GW-012407-BS-HW-1-001	0.5 to 2.5	Subtidal	**3.62**	0.56	1.00	Mercury
NL-24	GW-011207-BS-NL-24-001	1.5 to 4.5	Subtidal	**2.23**	0.44	1.00	Mercury
Milky-Seep 1	PW-022798-STI-004	0.00	Intertidal	**2.47**	0.38	1.00	Lead
NL-16	GW-051806-NL-16-BI-001	1 to 4	Subtidal	1.01	0.17	0.00	
NL-25	GW-011807-ILM-NL-25-001	1.5 to 4.5	Subtidal	0.69	0.16	0.00	
Dock2-12	GW-110805-DOCK2-12-001	2 to 5	Subtidal	0.69	0.16	0.00	
5106-15	GW-111505-5106-15-002	2 to 5	Subtidal	0.64	0.13	0.00	
Milky-Seep 2	PW-051298-STI-001	0.00	Intertidal	0.37	0.13	0.00	
NL-30	GW-011907-BS-NL-30-001	1.5 to 4.5	Subtidal	0.64	0.12	0.00	
NL-23	GW-081106-LH-NL23-001	0 to 3	Subtidal	0.52	0.10	0.00	
5106-15	GW-111505-5106-15-001	2 to 5	Subtidal	0.34	0.09	0.00	
Dock2-11	GW-101905-DOCK2-11-001	2 to 5	Subtidal	0.34	0.08	0.00	
Pier25-29	GW-020606-PIER25-29-002	2 to 5	Subtidal	0.60	0.08	0.00	
5106-16	GW-111405-5106-16-001	1 to 4	Subtidal	0.34	0.08	0.00	
Pier25-21	GW-010306-PIER25-21-001	0.5 to 3.5	Subtidal	0.19	0.08	0.00	
5106-13	GW-112805-5106-13-001	2 to 5	Subtidal	0.34	0.08	0.00	
5106-22	GW-012506-5106-22-002	0 to 3	Subtidal	0.25	0.07	0.00	
NL-28	GW-011607-BS-NL-28-001	1.5 to 3.5	Subtidal	0.23	0.07	0.00	
HW-2	GW-012507-BS-HW-2-001	2.5 to 4.5	Subtidal	0.23	0.07	0.00	
5106-10	GW-110205-5106-10-001	2 to 5	Subtidal	0.22	0.07	0.00	
5106-11	GW-101305-5106-11-001	2 to 5	Subtidal	0.23	0.06	0.00	
5106-19	GW-011306-5106-19-001	0.5 to 3.5	Subtidal	0.26	0.06	0.00	
NL-13	GW-122005-NL-13-002	3 to 6	Subtidal	0.21	0.05	0.00	
NL-29	GW-011807-BS-NL-29-001	1.5 to 4.5	Subtidal	0.22	0.05	0.00	
Pier25-13	GW-020206-PIER25-13-001	0 to 3	Subtidal	0.14	0.05	0.00	
Pier25-26	GW-012306-PIER25-26-001	1.5 to 4.5	Subtidal	0.14	0.05	0.00	
Pier25-20	GW-120605-PIER25-20-001	2 to 5	Subtidal	0.22	0.05	0.00	
5106-9	GW-110105-5106-9-001	2 to 5	Subtidal	0.14	0.05	0.00	
Pier25-22	GW-011706-PIER25-22-001	0.5 to 3.5	Subtidal	0.14	0.05	0.00	
5106-26	GW-021406-5106-26-001	0 to 3	Subtidal	0.14	0.05	0.00	
Dock2-14	GW-102805-DOCK2-14-001	2 to 5	Subtidal	0.14	0.05	0.00	
5106-14	GW-120105-5106-14-001	2 to 5	Subtidal	0.22	0.05	0.00	
Pier25-18	GW-120805-PIER25-18-001	2 to 5	Subtidal	0.20	0.05	0.00	
5106-2	GW-013006-5106-2-001	0 to 3	Subtidal	0.14	0.05	0.00	
5106-22	GW-012506-5106-22-001	0 to 3	Subtidal	0.14	0.04	0.00	
5106-24	GW-020806-5106-24-001	2 to 5	Subtidal	0.25	0.04	0.00	
Pier25-6	GW-020306-PIER25-6-001	0.5 to 3.5	Subtidal	0.30	0.04	0.00	
Pier25-23	GW-011106-PIER25-23-001	2 to 5	Subtidal	0.14	0.04	0.00	
Pier25-24	GW-011206-PIER25-24-001	0.5 to 3.5	Subtidal	0.14	0.04	0.00	
PZ-SHI-1-33	GW-042706-TR-PZ-SHI-1-4	2.25 to 3.25	Subtidal	0.27	0.04	0.00	
NL-13	GW-122005-NL-13-001	0 to 3	Subtidal	0.15	0.04	0.00	
Dock2-3	GW-072205-DOCK2-3-002	3 to 6	Subtidal	0.20	0.03	0.00	
Dock2-3	GW-072205-DOCK2-3-001	3 to 6	Subtidal	0.19	0.03	0.00	
Dock2-5	GW-080105-DOCK2-5-002	2 to 5	Subtidal	0.19	0.03	0.00	
Pier25-29	GW-020606-PIER25-29-001	0 to 3	Subtidal	0.14	0.03	0.00	
Dock2-5	GW-080105-DOCK2-5-001	2 to 5	Subtidal	0.18	0.03	0.00	
5106-32	GW-050306-5106-32-BS-001	1 to 5	Subtidal	0.20	0.03	0.00	
5106-21	GW-010606-5106-21-001	0.5 to 3.5	Subtidal	0.19	0.03	0.00	
NL-14	GW-121405-NL-14-001	1 to 4	Subtidal	0.16	0.03	0.00	
Pier25-30	GW-012606-PIER25-30-001	0 to 3	Subtidal	0.18	0.03	0.00	
Pier25-25	GW-012006-PIER25-25-001	0 to 3	Subtidal	0.17	0.03	0.00	
5106-25	GW-042706-5106-25-009	1 to 5	Subtidal	0.15	0.02	0.00	
Pier25-16	GW-121205-PIER25-16-001	2 to 5	Subtidal	0.15	0.02	0.00	
Pier25-19	GW-120705-PIER25-19-001	2.6 to 5.6	Subtidal	0.15	0.02	0.00	

TABLE 4.10

SUMMARY OF SCREENING OF HEAVY METALS IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
NL-15	GW-121605-NL-15-002	3 to 6	Subtidal	0.14	0.02	0.00	
NL-15	GW-121605-NL-15-001	0 to 3	Subtidal	0.14	0.02	0.00	
HYD-9	GW-091405-HYD-9-001	2 to 5	Subtidal	0.15	0.02	0.00	
Pier25-28	GW-012406-PIER25-28-001	0 to 3	Subtidal	0.13	0.02	0.00	
HYD-8	GW-091305-HYD-8-002	2 to 5	Subtidal	0.14	0.02	0.00	
5106-14	GW-120105-5106-14-002	2 to 5	Subtidal	0.12	0.02	0.00	
5106-23	GW-021006-5106-23-001	0 to 3	Subtidal	0.13	0.02	0.00	
Pier25-12	GW-020106-PIER25-12-001	0 to 3	Subtidal	0.12	0.02	0.00	
Dock2-7	GW-090705-DOCK2-7-001	3 to 6	Subtidal	0.12	0.02	0.00	
Dock2-10	GW-091205-DOCK2-10-001	2.6 to 5.6	Subtidal	0.06	0.01	0.00	
Dock2-10	GW-091205-DOCK2-10-002	2.6 to 5.6	Subtidal	0.06	0.01	0.00	
5106-30	GW-042606-5106-30-009	1 to 5	Subtidal	0.06	0.01	0.00	
5106-20	GW-010406-5106-20-001	0.5 to 3.5	Subtidal	0.07	0.01	0.00	
5106-29	GW-042106-5106-29-001	0 to 4	Subtidal	0.06	0.01	0.00	
Dock2-6	GW-090605-DOCK2-6-001	0.7 to 3.7	Subtidal	0.05	0.01	0.00	
5106-27	GW-041006-5106-27-001	0 to 4	Subtidal	0.03	0.01	0.00	
5106-31	GW-042806-5106-31-001	1 to 5	Subtidal	0.03	0.01	0.00	
Pier25-27	GW-011906-PIER25-27-001	0.5 to 3.5	Subtidal	0.02	0.01	0.00	

Notes:

(1) Maximum screening quotient (SQ)

(2) Average screening quotient (SQ)

Bold SQ > 1.5

TABLE 4.11

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEEPS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Sample Type*	*Filtered (Y/N)*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Seep-94	SEEP-94	Surface	N	0.00	0.22	0.22
ECOLOGY2	Ecology-2	Surface	N	0.00	0.21	0.21
Seep No.001	Seep No.1	Surface	N	0.00	0.17	0.17
ECOLOGY1	Ecology-1	Surface	N	0.00	0.07	0.07
ECOLOGY3	Ecology-3	Surface	N	0.00	0.04	0.04
ESI-E-10-02	SP-07842-110802-JSV-071	Surface	N	0.00	0.04	0.04
Seep No.002	Seep No.2	Surface	N	0.00	0.03	0.03
DC-20	P063004-DC20	Surface	N	0.00	0.01	0.01
DC-14	P063004-DC14	Surface	N	0.00	0.01	0.01
ESI-G-22-98	P-011198-MPT-018	Surface	N	0.00	0.01	0.01
ESI-C-19-98	P-011098-MPT-011	Surface	N	0.00	0.01	0.01
ESI-G-15-98	P-011198-MPT-016	Surface	N	0.00	0.00	0.00
Seep No.002	Seep No.2	Surface	N	0.00	0.00	0.00
ESI-C-21-98	P-011298-MPT-020	Surface	N	0.00	0.00	0.00
Seep No.002	Seep No.2	Surface	N	0.00	0.00	0.00
NAVY-3-04	P-012004-BDM-003	Surface	N	0.00	0.00	0.00
ESI-E-7-98	P-010998-MPT-006	Surface	N	0.00	0.00	0.00
ESI-E-8-98	P-011498-MPT-011	Surface	N	0.00	0.00	0.00
Seep No.001	Seep No.1	Surface	N	0.00	0.00	0.00
Seep No.003	Seep No.3	Surface	N	0.00	0.00	0.00
DC-28	P070104-DC28	Surface	N	0.00	0.00	0.00
ESI-G-12-98	P-011198-MPT-014	Surface	N	0.00	0.00	0.00
ESI-A-15-98	P-011298-MPT-023	Surface	N	0.00	0.00	0.00
ESI-G-16-98	P-011198-MPT-017	Surface	N	0.00	0.00	0.00
DC-08	P063004-DC08	Surface	N	0.00	0.00	0.00
ESI-A-16-98	P-011298-MPT-021	Surface	N	0.00	0.00	0.00
DC-30	P070204-DC30	Surface	N	0.00	0.00	0.00
DC-29	P070104-DC29	Surface	N	0.00	0.00	0.00
DC-22	P070104-DC22	Surface	N	0.00	0.00	0.00
ESI-D-2-02	SP-07842-110702-JSV-059	Surface	N	0.00	0.00	0.00
ESI-D-1-02	SP-07842-110602-JSV-038	Surface	N	0.00	0.00	0.00
NAVY-2-04	P-012004-BDM-002	Surface	N	0.00	0.00	0.00
NAVY-1-04	P-012004-JEC-001	Surface	N	0.00	0.00	0.00
DC-04	P063004-DC04	Surface	N	0.00	0.00	0.00
DC-07	P063004-DC07	Surface	N	0.00	0.00	0.00
DC-05	P063004-DC05	Surface	N	0.00	0.00	0.00
DC-03	P063004-DC03	Surface	N	0.00	0.00	0.00
DC-16	P063004-DC16	Surface	N	0.00	0.00	0.00
DC-02	P063004-DC02	Surface	N	0.00	0.00	0.00
DC-06	P063004-DC06	Surface	N	0.00	0.00	0.00
DC-17	P063004-DC17	Surface	N	0.00	0.00	0.00
DC-11	P063004-DC11	Surface	N	0.00	0.00	0.00
DC-13	P063004-DC13	Surface	N	0.00	0.00	0.00
DC-15	P063004-DC15	Surface	N	0.00	0.00	0.00
DC-09	P063004-DC09	Surface	N	0.00	0.00	0.00
DC-19	P063004-DC19	Surface	N	0.00	0.00	0.00
DC-01	P063004-DC01	Surface	N	0.00	0.00	0.00
DC-12	P063004-DC12	Surface	N	0.00	0.00	0.00
DC-10	P063004-DC10	Surface	N	0.00	0.00	0.00
DC-18	P063004-DC18	Surface	N	0.00	0.00	0.00
DC-17	P063004-FD01	Surface	N	0.00	0.00	0.00
DC-21	P063004-DC21	Surface	N	0.00	0.00	0.00
DC-23	P070104-DC23	Surface	N	0.00	0.00	0.00
DC-24	P070104-DC24	Surface	N	0.00	0.00	0.00
DC-25	P070104-DC25	Surface	N	0.00	0.00	0.00

TABLE 4.11

SUMMARY OF SCREENING OF TOTAL ORGANICS IN SEEPS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Sample Type*	*Filtered (Y/N)*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
DC-26	P070104-DC26	Surface	N	0.00	0.00	0.00
DC-27	P070104-DC27	Surface	N	0.00	0.00	0.00
DC-27	P070104-FD02	Surface	N	0.00	0.00	0.00
ESI-D-3-02	SP-07842-110602-JJW-035	Surface	N	0.00	0.00	0.00
ESI-D-3-02	SP-07842-110602-JJW-036	Surface	N	0.00	0.00	0.00
Seep No.003	Seep No.3	Surface	N	0.00	0.00	0.00
ESI-A-18-98	P-011298-MPT-022	Surface	N	0.00	0.00	0.00
ESI-B-25-98	P-011398-MPT-026	Surface	N	0.00	0.00	0.00
ESI-B-26-98	P-011398-MPT-027	Surface	N	0.00	0.00	0.00
ESI-F-11-98	P-011098-MPT-009	Surface	N	0.00	0.00	0.00
ESI-F-13-98	P-011398-MPT-024	Surface	N	0.00	0.00	0.00
ESI-F-13-98	P-011398-MPT-025	Surface	N	0.00	0.00	0.00
ESI-C-19-98	P-011298-MPT-011	Surface	N	0.00	0.00	0.00
ESI-E-7-98	P-011098-MPT-006	Surface	N	0.00	0.00	0.00
ESI-B-31-98	P-011498-MPT-028	Surface	N	0.00	0.00	0.00

Note:

(1) Screening Quotient (SQ)

TABLE 4.12

SUMMARY OF SCREENING OF METALS IN SEEPS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample***	***Sample Type***	***Filtered (Y/N)***	***Max SQ Metal (1)***	***Average SQ Metal (2)***	***# Metals With SQ > 1***	***Most Problematic Chemicals***
DC-28	P070104-DC28	Surface	N	**306.17**	**38.46**	1.00	Lead
DC-23	P070104-DC23	Surface	N	**153.09**	**19.16**	1.00	Lead
DC-03	P063004-DC03	Surface	N	**56.17**	**7.11**	1.00	Lead
DC-21	P063004-DC21	Surface	N	**43.21**	**5.42**	1.00	Lead
DC-04	P063004-DC04	Surface	N	**34.94**	**4.54**	1.00	Lead
DC-12	P063004-DC12	Surface	N	**31.11**	**3.92**	1.00	Lead
G-014/G-024	PZ-JW-004	Piezometer	Y	**27.04**	**5.44**	1.00	Lead
DC-30	P070204-DC30	Surface	N	**26.91**	**3.38**	1.00	Lead
DC-01	P063004-DC01	Surface	N	**26.30**	**3.31**	1.00	Lead
B-012/B-024	PZ-JW-001	Piezometer	Y	**24.07**	**4.86**	1.00	Lead
B-012/B-024	PZ-JW-002	Piezometer	Y	**23.95**	**4.84**	1.00	Lead
DC-22	P070104-DC22	Surface	N	**20.62**	**2.59**	1.00	Lead
DC-24	P070104-DC24	Surface	N	**13.33**	**1.68**	1.00	Lead
DC-17	P063004-DC17	Surface	N	**12.59**	**1.60**	1.00	Lead
DC-11	P063004-DC11	Surface	N	**12.30**	**1.57**	1.00	Lead
DC-05	P063004-DC05	Surface	N	**11.81**	1.49	1.00	Lead
DC-29	P070104-DC29	Surface	N	**10.42**	1.32	1.00	Lead
DC-17	P063004-FD01	Surface	N	**10.12**	1.29	1.00	Lead
DC-15	P063004-DC15	Surface	N	**9.68**	1.35	1.00	Lead
DC-18	P063004-DC18	Surface	N	**8.88**	1.13	1.00	Lead
ESI-G-22-98	P-011198-MPT-018	Surface	N	**7.68**	0.84	1.00	Lead
ESI-G-12-98	P-011198-MPT-014	Surface	N	**7.67**	0.84	1.00	Lead
DC-27	P070104-DC27	Surface	N	**7.62**	0.97	1.00	Lead
ESI-G-15-98	P-011198-MPT-016	Surface	N	**6.93**	0.76	1.00	Lead
DC-20	P063004-DC20	Surface	N	**6.09**	0.78	1.00	Lead
DC-09	P063004-DC09	Surface	N	**5.36**	0.69	1.00	Lead
DC-27	P070104-FD02	Surface	N	**5.11**	0.66	1.00	Lead
DC-07	P063004-DC07	Surface	N	**5.00**	0.64	1.00	Lead
DC-08	P063004-DC08	Surface	N	**4.44**	0.57	1.00	Lead
DC-14	P063004-DC14	Surface	N	**4.20**	0.54	1.00	Lead
DC-19	P063004-DC19	Surface	N	**4.06**	0.52	1.00	Lead
ESI-A-15-98	P-011298-MPT-023	Surface	N	**3.63**	0.49	1.00	Lead
DC-13	P063004-DC13	Surface	N	**2.81**	0.37	1.00	Lead
ESI-A-16-98	P-011298-MPT-021	Surface	N	**2.44**	0.32	1.00	Lead
DC-10	P063004-DC10	Surface	N	**2.35**	0.31	1.00	Lead
ESI-G-16-98	P-011198-MPT-017	Surface	N	**2.31**	0.37	1.00	Lead
DC-25	P070104-DC25	Surface	N	**2.05**	0.27	1.00	Lead
A-011/A-022	SP-7842-JW-002	Surface	Y	**1.98**	0.43	1.00	Lead
DC-26	P070104-DC26	Surface	N	**1.93**	0.26	1.00	Lead
A-011/A-022	SP-7842-JW-003	Surface	Y	**1.85**	0.40	1.00	Lead
ESI-B-25-98	P-011398-MPT-026	Surface	N	**1.74**	0.24	1.00	Lead
DC-02	P063004-DC02	Surface	N	1.48	0.20	0.00	
DC-06	P063004-DC06	Surface	N	1.47	0.20	0.00	
ESI-A-18-98	P-011298-MPT-022	Surface	N	1.37	0.21	0.00	
ESI-F-13-98	P-011398-MPT-024	Surface	N	1.32	0.20	0.00	
DC-16	P063004-DC16	Surface	N	1.32	0.18	0.00	
ESI-F-11-98	P-011098-MPT-009	Surface	N	1.01	0.17	0.00	
ESI-B-26-98	P-011398-MPT-027	Surface	N	0.95	0.18	0.00	
ESI-C-19-98	P-011298-MPT-011	Surface	N	0.89	0.18	0.00	
ESI-F-13-98	P-011398-MPT-025	Surface	N	0.89	0.16	0.00	
ESI-B-21-98	PZ-JW-006	Piezometer	Y	0.71	0.25	0.00	
ESI-C-21-98	P-011298-MPT-020	Surface	N	0.31	0.10	0.00	
ESI-E-7-98	P-010998-MPT-006	Surface	N	0.31	0.10	0.00	
ESI-E-8-98	P-011498-MPT-011	Surface	N	0.31	0.10	0.00	
B-012/B-024	SP-7842-JW-004	Piezometer	Y	0.31	0.09	0.00	
ESI-B-21-98	SP-7842-JW-005	Piezometer	Y	0.31	0.09	0.00	
Seep-94	SEEP-94	Surface	N	0.19	0.04	0.00	
ESI-C-23-98	PZ-JW-003	Piezometer	Y	0.19	0.06	0.00	
Seep-94	SEEP-94	Surface	N	0.01	0.00	0.00	

Notes:

(1) Maximum screening quotient (SQ)
(2) Average screening quotient (SQ)
Bold SQ > 1.5

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-2	1/30/06	24 to 27 ft bml	Subtidal	**2.3**	**1994.8**	**1997.1**
SP-3	6/14/06	23 to 26 ft bgs	Upland	0.2	**288.6**	**288.8**
5106-1	9/27/05	30 to 33 ft bml	Subtidal	0.1	**186.7**	**186.8**
MW-H-01	6/25/2013	162 to 164 ft BGS	Upland	0.0	**171.0**	**171.0**
WMUA-12	8/2/06	17.5 to 19.5 ft bgs	Upland	0.0	**169.0**	**169.0**
5106-1	9/27/05	25 to 28 ft bml	Subtidal	0.0	**164.8**	**164.8**
WMUA-14	8/8/06	21.5 to 22.5 ft bgs	Upland	0.0	**164.3**	**164.3**
WMUA-15	8/7/06	23.5 to 24.5 ft bgs	Upland	0.0	**158.5**	**158.5**
D-5	5/11/03	116.55 ft bgs	Upland	0.0	**156.8**	**156.8**
MW-EXT-9-SHALLOW	9/27/2013	123 ft BGS	Upland	0.0	**155.9**	**155.9**
D-5	2/9/03	116.55 ft bgs	Upland	0.0	**148.6**	**148.6**
WMUA-15	8/7/06	14.5 to 15.5 ft bgs	Upland	0.0	**148.5**	**148.5**
MW-EXT-9-DEEP	7/12/2013	112 to 114 ft BGS	Upland	0.0	**140.5**	**140.5**
SP-6	6/6/06	48 to 51 ft bgs	Upland	0.0	**139.8**	**139.8**
4-83R	1/28/02	83 ft bgs	Upland	0.0	**137.6**	**137.6**
WMUA-18	8/7/06	26.5 to 27.5 ft bgs	Upland	0.0	**135.5**	**135.5**
5106-1	9/28/05	50 to 53 ft bml	Subtidal	0.1	**133.9**	**134.1**
D-5	8/2/02	116.55 ft bgs	Upland	0.0	**133.0**	**133.0**
4-83R	2/9/04	83 ft bgs	Upland	0.0	**132.6**	**132.6**
11-100	2/12/04	100 ft bgs	Upland	0.0	**131.2**	**131.2**
SP-5	6/2/06	23 to 26 ft bgs	Upland	0.2	**131.1**	**131.3**
11-100	1/27/02	100 ft bgs	Upland	0.0	**130.4**	**130.4**
D-5	5/14/05	116.55 ft bgs	Upland	0.0	**129.5**	**129.5**
WMUA-14	8/8/06	18.5 to 19.5 ft bgs	Upland	0.0	**127.6**	**127.6**
D-5	2/1/02	116.55 ft bgs	Upland	0.0	**125.9**	**125.9**
11-100	8/18/03	100 ft bgs	Upland	0.0	**125.3**	**125.3**
11-100	11/9/02	100 ft bgs	Upland	0.0	**123.6**	**123.6**
4-83R	11/9/02	83 ft bgs	Upland	0.0	**123.1**	**123.1**
11-100	4/24/06	100 ft bgs	Upland	0.0	**122.9**	**122.9**
4-83R	2/4/03	83 ft bgs	Upland	0.0	**122.7**	**122.7**
11-100	2/11/03	100 ft bgs	Upland	0.0	**121.8**	**121.8**
5106-2	1/30/06	34 to 37 ft bml	Subtidal	0.0	**120.3**	**120.3**
77C-160	7/16/12	160 ft bgs	Upland	0.0	**120.2**	**120.2**
SP-5	6/12/06	58 to 61 ft bgs	Upland	0.7	**118.8**	**119.5**
4-83R	8/20/03	83 ft bgs	Upland	0.0	**116.3**	**116.3**
11-100	8/7/02	100 ft bgs	Upland	0.0	**116.1**	**116.1**
4-83R	4/4/06	83 ft bgs	Upland	0.0	**111.1**	**111.1**
4-83R	8/4/02	83 ft bgs	Upland	0.0	**108.1**	**108.1**
SP-4	6/20/06	18 to 21 ft bgs	Upland	0.9	**106.5**	**107.4**
5106-2	1/30/06	44 to 47 ft bml	Subtidal	7.8	**106.0**	**113.9**
PT-13	6/9/04	20 to 20.5 ft bml	Subtidal	0.0	**102.6**	**102.6**
SP-5	6/12/06	68 to 71 ft bgs	Upland	0.1	**100.1**	**100.3**
5106-9	11/1/05	52 to 55 ft bml	Subtidal	0.0	**91.8**	**91.8**
10-24	8/21/12	24 ft bgs	Upland	0.0	**90.4**	**90.4**
D-4	2/5/04	104.9 ft bgs	Upland	0.0	**88.4**	**88.4**
Pier25-13	2/2/06	60 to 63 ft bml	Subtidal	0.0	**86.9**	**86.9**
5106-13	11/28/05	22 to 25 ft bml	Subtidal	0.0	**86.1**	**86.1**
Pier25-12	2/1/06	60 to 63 ft bml	Subtidal	0.0	**83.8**	**83.8**
SP-6	6/7/06	58 to 61 ft bgs	Upland	1.6	**82.1**	**83.7**
Pier25-12	2/1/06	80 to 83 ft bml	Subtidal	0.0	**80.3**	**80.3**
D-4	8/8/02	104.9 ft bgs	Upland	0.0	**79.2**	**79.2**
SP-6	6/6/06	33 to 36 ft bgs	Upland	0.2	**78.3**	**78.5**
21-25R	4/19/06	25 ft bgs	Upland	0.0	**78.1**	**78.1**
MW-H-01	6/25/2013	152 to 154 ft BGS	Upland	0.0	**77.3**	**77.3**
D-4	8/11/04	104.9 ft bgs	Upland	0.0	**76.5**	**76.5**
5106-13	11/28/05	27 to 30 ft bml	Subtidal	0.0	**76.0**	**76.0**
Pier25-13	2/2/06	50 to 53 ft bml	Subtidal	0.0	**75.7**	**75.7**
SP-3	6/15/06	33 to 36 ft bgs	Upland	2.7	**74.7**	**77.4**
SP-5	6/5/06	33 to 36 ft bgs	Upland	0.1	**74.1**	**74.2**
SP-5	6/2/06	18 to 21 ft bgs	Upland	0.2	**72.9**	**73.1**

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Pier25-18	12/9/05	62 to 65 ft bml	Subtidal	0.0	**71.6**	**71.6**
WMUA-18	8/4/06	38.5 to 39.5 ft bgs	Upland	0.0	**70.8**	**70.8**
SP-5	6/13/06	98 to 101 ft bgs	Upland	1.8	**70.6**	**72.4**
5106-13	11/28/05	32 to 35 ft bml	Subtidal	0.0	**70.2**	**70.2**
5106-1	9/28/05	55 to 58 ft bml	Subtidal	0.1	**69.7**	**69.8**
5106-1	9/27/05	40 to 43 ft bml	Subtidal	0.0	**68.3**	**68.3**
HYD-3	8/15/05	81 to 84 ft bml	Subtidal	0.0	**67.6**	**67.6**
D-4	5/16/05	104.9 ft bgs	Upland	0.0	**66.8**	**66.8**
D-4	5/11/03	104.9 ft bgs	Upland	0.0	**66.6**	**66.6**
5106-13	11/28/05	17 to 20 ft bml	Subtidal	0.0	**66.6**	**66.6**
MW-EXT-9-DEEP	7/15/2013	142 to 144 ft BGS	Upland	0.0	**65.6**	**65.6**
MW-EXT-9-DEEP	7/15/2013	122 to 124 ft BGS	Upland	0.0	**64.1**	**64.1**
PT-12A	10/24/05	78.9 to 81.9 ft bml	Subtidal	0.0	**64.0**	**64.0**
D-4	8/14/03	104.9 ft bgs	Upland	0.0	**63.9**	**63.9**
D-4	2/9/03	104.9 ft bgs	Upland	0.0	**63.4**	**63.4**
HYD-3	8/15/05	91 to 94 ft bml	Subtidal	0.0	**62.9**	**62.9**
SB-B-DEEP	8/8/2013	152 to 154 ft BGS	Upland	0.0	**61.6**	**61.6**
Pier25-25	1/20/06	30 to 33 ft bml	Subtidal	0.0	**61.3**	**61.3**
HYD-1	9/1/05	44 to 47 ft bml	Subtidal	0.0	**59.9**	**59.9**
11-100	8/7/12	100 ft bgs	Upland	0.0	**59.9**	**59.9**
HYD-2	8/30/05	78 to 81 ft bml	Subtidal	0.0	**59.4**	**59.4**
HYD-2	8/30/05	88 to 91 ft bml	Subtidal	0.0	**59.0**	**59.0**
Pier25-12	2/1/06	30 to 33 ft bml	Subtidal	0.0	**55.4**	**55.4**
HYD-1	9/1/05	84 to 87 ft bml	Subtidal	0.0	**54.2**	**54.2**
HYD-4	9/22/05	6 to 9 ft bml	Subtidal	0.0	**53.9**	**53.9**
WMUA-13	8/3/06	19 to 20 ft bgs	Upland	0.0	**53.9**	**53.9**
5106-9	11/1/05	17 to 20 ft bml	Subtidal	0.0	**52.7**	**52.7**
5106-1	9/27/05	15 to 18 ft bml	Subtidal	0.0	**51.8**	**51.8**
Pier25-13	2/3/06	70 to 73 ft bml	Subtidal	0.0	**51.7**	**51.7**
Pier25-12	2/1/06	40 to 43 ft bml	Subtidal	0.0	**51.4**	**51.4**
PT-12A	10/24/05	68.9 to 71.9 ft bml	Subtidal	0.0	**50.0**	**50.0**
MW-EXT-9-DEEP	7/15/2013	132 to 134 ft BGS	Upland	0.0	**49.1**	**49.1**
SP-3	6/14/06	18 to 21 ft bgs	Upland	0.2	**48.3**	**48.4**
MW-EXT-9-DEEP	7/16/2013	152 to 154 ft BGS	Upland	0.0	**47.9**	**47.9**
MW-EXT-9-DEEP	7/16/2013	162 to 164 ft BGS	Upland	0.0	**46.6**	**46.6**
5106-9	11/1/05	22 to 25 ft bml	Subtidal	0.0	**46.4**	**46.4**
5106-9	11/1/05	37 to 40 ft bml	Subtidal	0.0	**46.1**	**46.1**
5106-2	1/30/06	4 to 7 ft bml	Subtidal	0.0	**45.7**	**45.7**
5106-1	9/27/05	35 to 38 ft bml	Subtidal	0.0	**45.6**	**45.6**
SP-5	6/12/06	78 to 81 ft bgs	Upland	0.7	**44.3**	**45.0**
EA-1	9/28/05	91.5 to 94.5 ft bgs	Upland	0.3	**43.9**	**44.2**
Pier25-18	12/9/05	72 to 75 ft bml	Subtidal	0.0	**42.9**	**42.9**
HYD-1	9/1/05	74 to 77 ft bml	Subtidal	0.0	**42.7**	**42.7**
5106-1	9/27/05	6 to 9 ft bml	Subtidal	0.0	**42.7**	**42.7**
5106-1	9/27/05	10 to 13 ft bml	Subtidal	0.0	**42.1**	**42.2**
SP-2	7/7/06	8 to 11 ft bgs	Upland	0.0	**41.7**	**41.7**
D-5	5/23/06	116.55 ft bgs	Upland	0.0	**41.1**	**41.1**
PT-13	6/9/04	42.5 to 43 ft bml	Subtidal	0.0	**40.4**	**40.4**
SB-B-DEEP	8/7/2013	102 to 104 ft BGS	Upland	0.0	**40.3**	**40.3**
5106-13	11/28/05	37 to 40 ft bml	Subtidal	0.0	**40.1**	**40.1**
5106-1	9/27/05	45 to 48 ft bml	Subtidal	0.0	**40.0**	**40.0**
SP-8	7/17/06	58 to 61 ft bgs	Upland	0.2	**39.9**	**40.1**
78-25	4/25/06	25 ft bgs	Upland	0.0	**39.6**	**39.6**
SP-3	6/15/06	43 to 46 ft bgs	Upland	1.5	**39.3**	**40.8**
SP-8	7/19/06	108 to 111 ft bgs	Upland	1.8	**38.8**	**40.5**
74-130	8/23/06	130 ft bgs	Upland	0.0	**38.5**	**38.5**
53C-50	7/24/12	50 ft bgs	Upland	0.0	**38.4**	**38.4**
21-25R	2/5/04	25 ft bgs	Upland	0.0	**38.4**	**38.4**
Pier25-18	12/9/05	42 to 45 ft bml	Subtidal	0.0	**38.2**	**38.2**

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
PT-6	7/25/03	8 to 10 ft bml	Subtidal	0.0	**37.4**	**37.4**
SP-6	6/7/06	78 to 81 ft bgs	Upland	0.2	**37.0**	**37.2**
Pier25-17	11/17/05	33.7 to 36.7 ft bml	Subtidal	0.0	**36.4**	**36.4**
SP-6	6/6/06	43 to 46 ft bgs	Upland	0.0	**35.8**	**35.8**
Pier25-18	12/9/05	32 to 35 ft bml	Subtidal	0.0	**35.7**	**35.7**
D-3	5/11/03	68.5 ft bgs	Upland	0.0	**35.2**	**35.2**
83C-100	7/25/12	100 ft bgs	Upland	0.0	**34.8**	**34.8**
5106-9	11/1/05	42 to 45 ft bml	Subtidal	0.0	**34.4**	**34.4**
SP-6	6/8/06	98 to 101 ft bgs	Upland	0.0	**34.3**	**34.3**
Pier25-12	2/1/06	70 to 73 ft bml	Subtidal	0.0	**34.2**	**34.2**
WMUA-19	8/3/06	18.5 to 19.5 ft bgs	Upland	0.0	**32.9**	**32.9**
5106-9	11/1/05	47 to 50 ft bml	Subtidal	0.0	**32.9**	**32.9**
Pier25-13	2/2/06	20 to 23 ft bml	Subtidal	0.0	**32.6**	**32.6**
PT-13A	11/9/05	61.9 to 64.9 ft bml	Subtidal	0.0	**32.5**	**32.5**
1-100R	8/16/03	100 ft bgs	Upland	0.0	**32.5**	**32.5**
MW-EXT-9-INT	9/27/2013	155 ft BGS	Upland	0.0	**32.2**	**32.2**
SB-B-DEEP	8/7/2013	112 to 114 ft BGS	Upland	0.0	**31.1**	**31.1**
1-100R	2/12/03	100 ft bgs	Upland	0.0	**31.0**	**31.0**
74-100	8/22/06	100 ft bgs	Upland	0.0	**30.1**	**30.1**
D-3	5/16/05	68.5 ft bgs	Upland	0.0	**29.9**	**29.9**
1-100R	1/26/02	100 ft bgs	Upland	0.0	**29.6**	**29.6**
HYD-2	8/30/05	68 to 71 ft bml	Subtidal	0.0	**29.5**	**29.5**
SB-B-DEEP	8/8/2013	132 to 134 ft BGS	Upland	0.0	**29.3**	**29.3**
WW-A1R	8/22/12	45 to 45 ft bml	Subtidal	0.0	**29.3**	**29.3**
SP-6	6/6/06	23 to 26 ft bgs	Upland	0.0	**29.3**	**29.3**
Pier25-19	12/7/05	42.6 to 45.6 ft bml	Subtidal	0.0	**29.3**	**29.3**
PT-5	7/25/03	6 to 8 ft bml	Subtidal	0.0	**29.2**	**29.2**
EA-2	10/10/05	15 to 18 ft bgs	Upland	0.0	**29.1**	**29.1**
A-2A	2/5/04	132.75 ft bgs	Upland	0.0	**28.9**	**28.9**
PZ-SHI-1-126	4/27/06	96 to 101 ft bml	Subtidal	0.0	**28.9**	**28.9**
Pier25-12	2/1/06	50 to 53 ft bml	Subtidal	0.0	**28.8**	**28.8**
Pier25-17	11/17/05	53.7 to 56.7 ft bml	Subtidal	0.0	**28.6**	**28.6**
94C-100	7/24/12	100 ft bgs	Upland	0.0	**28.4**	**28.4**
MW-H-01	6/24/2013	142 to 144 ft BGS	Upland	0.0	**28.3**	**28.3**
40-100R	5/5/02	100 ft bgs	Upland	0.0	**27.9**	**27.9**
5106-1	9/27/05	20 to 23 ft bml	Subtidal	0.0	**27.9**	**27.9**
1-100R	8/4/02	100 ft bgs	Upland	0.0	**27.6**	**27.6**
1-100R	2/10/04	100 ft bgs	Upland	0.0	**27.6**	**27.6**
HYD-4	9/22/05	16 to 19 ft bml	Subtidal	0.1	**27.5**	**27.6**
4-45R	1/28/02	45 ft bgs	Upland	0.0	**27.5**	**27.5**
HYD-3	8/15/05	71 to 74 ft bml	Subtidal	0.0	**27.5**	**27.5**
4-25R	1/28/02	25 ft bgs	Upland	0.0	**27.5**	**27.5**
Pier25-18	12/8/05	22 to 25 ft bml	Subtidal	0.0	**27.4**	**27.4**
1-100R	11/7/02	100 ft bgs	Upland	0.0	**27.4**	**27.4**
A-2A	8/10/04	132.75 ft bgs	Upland	0.0	**27.4**	**27.4**
WMUA-11	8/2/06	17.5 to 18.5 ft bgs	Upland	0.0	**27.3**	**27.3**
4-25R	2/9/04	25 ft bgs	Upland	0.0	**27.2**	**27.2**
1-100R	4/18/06	100 ft bgs	Upland	0.0	**27.0**	**27.0**
5106-20	1/5/06	43.5 to 46.5 ft bml	Subtidal	0.0	**26.6**	**26.6**
7-25	8/8/12	25 ft bgs	Upland	0.0	**26.3**	**26.3**
SP-3	6/15/06	68 to 71 ft bgs	Upland	1.1	**26.2**	**27.3**
A-2A	8/14/03	132.75 ft bgs	Upland	0.0	**26.0**	**26.0**
4-45R	2/9/04	45 ft bgs	Upland	0.0	**25.9**	**25.9**
5106-9	11/1/05	27 to 30 ft bml	Subtidal	0.0	**25.9**	**25.9**
40-100R	8/8/02	100 ft bgs	Upland	0.0	**25.6**	**25.6**
A-2A	2/9/03	132.75 ft bgs	Upland	0.0	**25.3**	**25.3**
40-100R	2/6/03	100 ft bgs	Upland	0.0	**25.2**	**25.2**
5106-26	2/15/06	42 to 45 ft bml	Intertidal	0.0	**25.1**	**25.1**
SB-B-DEEP	8/8/2013	142 to 144 ft BGS	Upland	0.0	**25.0**	**25.0**

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
WW-A1R	8/23/12	75 to 75 ft bml	Subtidal	0.0	**24.6**	**24.6**
PZ-SHI-2-25	4/28/06	3.75 to 4.75 ft bml	Intertidal	0.2	**24.4**	**24.6**
61C-160	7/17/12	160 ft bgs	Upland	0.0	**24.4**	**24.4**
4-25R	8/4/02	25 ft bgs	Upland	0.0	**24.4**	**24.4**
5106-3	9/19/05	4 to 7 ft bml	Subtidal	0.0	**24.0**	**24.0**
WW-A1R	8/22/12	55 to 55 ft bml	Subtidal	0.0	**24.0**	**24.0**
A-2A	5/11/03	132.75 ft bgs	Upland	0.0	**23.9**	**23.9**
40-100R	5/7/03	100 ft bgs	Upland	0.0	**23.6**	**23.6**
40-100R	11/11/02	100 ft bgs	Upland	0.0	**23.6**	**23.6**
HYD-3	8/16/05	101 to 104 ft bml	Subtidal	0.0	**23.5**	**23.5**
5106-13	11/29/05	52 to 55 ft bml	Subtidal	0.0	**23.4**	**23.4**
40-100R	8/18/03	100 ft bgs	Upland	0.0	**23.3**	**23.3**
4-45R	11/11/02	45 ft bgs	Upland	0.0	**23.2**	**23.2**
4-45R	8/20/03	45 ft bgs	Upland	0.0	**23.2**	**23.2**
WW-A1R	8/23/12	65 to 65 ft bml	Subtidal	0.0	**23.2**	**23.2**
SP-1	6/26/06	58 to 61 ft bgs	Upland	0.5	**23.0**	**23.6**
Pier25-10	10/27/05	56 to 59 ft bml	Subtidal	0.0	**23.0**	**23.0**
MW-H-01	6/21/2013	132 to 134 ft BGS	Upland	0.0	**22.8**	**22.8**
4-25R	2/4/03	25 ft bgs	Upland	0.0	**22.6**	**22.6**
5106-21	1/9/06	30.5 to 33.5 ft bml	Subtidal	0.0	**22.5**	**22.5**
4-25R	11/11/02	25 ft bgs	Upland	0.0	**22.2**	**22.2**
40-100R	1/27/02	100 ft bgs	Upland	0.0	**22.0**	**22.0**
SP-4	6/21/06	68 to 71 ft bgs	Upland	0.0	**21.9**	**22.0**
94C-100	9/24/2013	100 ft BGS	Upland	0.0	**21.4**	**21.4**
BH-72	8/9/06	98 to 101 ft bgs	Upland	0.0	**21.4**	**21.4**
5106-9	11/1/05	12 to 15 ft bml	Subtidal	0.0	**21.3**	**21.3**
5106-9	11/1/05	57 to 60 ft bml	Subtidal	0.0	**21.3**	**21.3**
5106-21	1/9/06	20.5 to 23.5 ft bml	Subtidal	0.0	**21.2**	**21.2**
4-45R	8/4/02	45 ft bgs	Upland	0.0	**20.9**	**20.9**
PZ-SHI-2-75	8/25/12	75 ft bgs	Intertidal	0.0	**20.8**	**20.8**
61C-130	7/17/12	130 ft bgs	Upland	0.0	**20.7**	**20.7**
5106-5	9/9/05	14 to 17 ft bml	Subtidal	0.0	**20.7**	**20.7**
5106-13	11/29/05	47 to 50 ft bml	Subtidal	0.0	**20.5**	**20.5**
5106-13	11/29/05	42 to 45 ft bml	Subtidal	0.0	**20.3**	**20.3**
EA-1	9/23/05	46.5 to 49.5 ft bgs	Upland	0.0	**19.5**	**19.5**
Pier25-19	12/7/05	62.6 to 65.6 ft bml	Subtidal	0.0	**19.5**	**19.5**
5106-2	1/31/06	64 to 67 ft bml	Subtidal	0.3	**19.5**	**19.8**
Pier25-6	8/18/05	55.9 to 58.9 ft bml	Subtidal	0.0	**19.4**	**19.4**
A-2A	8/2/02	132.75 ft bgs	Upland	0.0	**19.3**	**19.3**
5106-21	1/9/06	25.5 to 28.5 ft bml	Subtidal	0.0	**19.3**	**19.3**
5106-26	2/14/06	37 to 40 ft bml	Intertidal	0.0	**19.1**	**19.1**
5106-2	1/30/06	14 to 17 ft bml	Subtidal	0.0	**19.0**	**19.0**
HYD-1	9/1/05	64 to 67 ft bml	Subtidal	0.0	**19.0**	**19.0**
5106-20	1/5/06	33.5 to 36.5 ft bml	Subtidal	0.0	**18.9**	**18.9**
SP-7	6/28/06	18 to 21 ft bgs	Upland	0.0	**18.9**	**18.9**
40-100R	11/17/03	100 ft bgs	Upland	0.0	**18.8**	**18.8**
40-100R	5/13/04	100 ft bgs	Upland	0.0	**18.1**	**18.1**
5106-3	9/19/05	9 to 12 ft bml	Subtidal	0.1	**18.0**	**18.1**
D-4	1/31/02	104.9 ft bgs	Upland	0.0	**17.7**	**17.7**
C-2	5/24/06	68.5 ft bgs	Upland	0.0	**17.5**	**17.5**
PT-13A	11/9/05	11.8 to 14.8 ft bml	Subtidal	0.0	**17.4**	**17.5**
5106-24	2/9/06	52 to 55 ft bml	Intertidal	0.0	**17.4**	**17.4**
SB-B-DEEP	8/8/2013	122 to 124 ft BGS	Upland	0.0	**17.4**	**17.4**
59-25	4/12/06	25 ft bgs	Upland	0.0	**17.4**	**17.4**
4-45R	2/4/03	45 ft bgs	Upland	0.0	**17.2**	**17.2**
SP-1	6/26/06	68 to 71 ft bgs	Upland	0.2	**17.2**	**17.4**
Pier25-25	1/20/06	20 to 23 ft bml	Subtidal	0.0	**17.1**	**17.1**
A-2A	5/14/05	132.75 ft bgs	Upland	0.0	**16.8**	**16.8**
SP-7	6/29/06	43 to 46 ft bgs	Upland	0.8	**16.7**	**17.5**

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS IN GROUNDWATER OCCIDENTAL CHEMICAL CORPORATION TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ* $^{(1)}$ *SVOC*	*Summed SQ* $^{(1)}$ *VOC*	*Summed SQ* $^{(1)}$ *All Organics*
40-100R	2/16/04	100 ft bgs	Upland	0.0	**16.7**	**16.7**
5106-24	2/9/06	42 to 45 ft bml	Intertidal	0.0	**16.6**	**16.6**
T1-100	4/12/06	100 ft bgs	Upland	0.0	**16.5**	**16.5**
SP-5	6/9/06	43 to 46 ft bgs	Upland	0.0	**16.4**	**16.4**
5106-20	1/5/06	38.5 to 41.5 ft bml	Subtidal	0.0	**16.3**	**16.3**
MW-H-01	6/21/2013	122 to 124 ft BGS	Upland	0.0	**16.2**	**16.2**
5106-10	11/3/05	27 to 30 ft bml	Subtidal	0.0	**16.0**	**16.0**
MW-G-DEEP	7/26/2013	142 to 144 ft BGS	Upland	0.0	**16.0**	**16.0**
Pier25-25	1/20/06	60 to 63 ft bml	Subtidal	0.0	**16.0**	**16.0**
A-4	5/11/03	68.5 ft bgs	Upland	0.0	**16.0**	**16.0**
4-25R	8/20/03	25 ft bgs	Upland	0.0	**15.9**	**15.9**
40-100R	8/18/04	100 ft bgs	Upland	0.0	**15.7**	**15.7**
D-4	5/26/06	104.9 ft bgs	Upland	0.0	**15.6**	**15.6**
Pier25-18	12/9/05	52 to 55 ft bml	Subtidal	0.0	**15.5**	**15.5**
D-3	5/24/06	68.5 ft bgs	Upland	0.0	**15.3**	**15.3**
PT-12A	10/24/05	88.9 to 91.9 ft bml	Subtidal	0.0	**15.2**	**15.2**
SP-6	6/5/06	18 to 21 ft bgs	Upland	0.0	**15.2**	**15.2**
Pier25-13	2/2/06	30 to 33 ft bml	Subtidal	0.0	**15.1**	**15.1**
5106-20	1/5/06	48.5 to 51.5 ft bml	Subtidal	0.0	**15.0**	**15.0**
59-50	8/19/03	50 ft bgs	Upland	0.0	**14.8**	**14.8**
Pier25-25	1/20/06	50 to 52 ft bml	Subtidal	0.0	**14.8**	**14.8**
MW-EXT-9-DEEP	7/12/2013	102 to 104 ft BGS	Upland	0.0	**14.3**	**14.3**
SP-6	6/7/06	68 to 71 ft bgs	Upland	1.3	**14.1**	**15.4**
5106-26	2/14/06	32 to 35 ft bml	Intertidal	0.0	**14.1**	**14.1**
PT-15	6/29/04	18 to 19 ft bml	Subtidal	0.0	**14.1**	**14.1**
5106-1	9/28/05	60 to 63 ft bml	Subtidal	0.0	**14.0**	**14.0**
D-4	2/14/05	104.9 ft bgs	Upland	0.0	**13.9**	**13.9**
Pier25-6	8/18/05	65.9 to 68.9 ft bml	Subtidal	0.0	**13.7**	**13.7**
5106-13	11/29/05	57 to 60 ft bml	Subtidal	0.0	**13.4**	**13.4**
40-100R	11/15/04	100 ft bgs	Upland	0.0	**13.2**	**13.2**
Pier25-17	12/12/05	25.5 to 28.5 ft bml	Subtidal	0.0	**13.2**	**13.2**
53-25	2/12/04	25 ft bgs	Upland	0.0	**13.1**	**13.1**
SP-1	6/26/06	43 to 46 ft bgs	Upland	0.0	**13.0**	**13.0**
Pier25-24	1/13/06	54.1 to 57.1 ft bml	Subtidal	0.0	**12.9**	**12.9**
Pier25-17	11/17/05	43.7 to 46.7 ft bml	Subtidal	0.0	**12.8**	**12.8**
5106-26	2/14/06	27 to 30 ft bml	Intertidal	0.0	**12.7**	**12.7**
Pier25-10	10/27/05	46 to 49 ft bml	Subtidal	0.0	**12.7**	**12.7**
Pier25-2	7/18/05	76 to 79 ft bml	Subtidal	0.0	**12.7**	**12.7**
A-2A	2/14/05	132.75 ft bgs	Upland	0.0	**12.6**	**12.6**
5106-2	1/31/06	54 to 57 ft bml	Subtidal	0.0	**12.6**	**12.6**
59-50	5/6/03	50 ft bgs	Upland	0.0	**12.5**	**12.5**
MW-G-SHALLOW	9/25/2013	145 ft BGS	Upland	0.0	**12.4**	**12.4**
C-2	5/16/05	68.5 ft bgs	Upland	0.0	**12.3**	**12.3**
53-25	1/27/02	25 ft bgs	Upland	0.0	**12.3**	**12.3**
SP-4	6/20/06	23 to 26 ft bgs	Upland	0.7	**12.1**	**12.8**
53-25	2/5/03	25 ft bgs	Upland	0.0	**12.1**	**12.1**
C-1	5/11/03	68.5 ft bgs	Upland	0.0	**12.1**	**12.1**
A-2A	1/31/02	132.75 ft bgs	Upland	0.0	**11.8**	**11.8**
Pier25-20	12/6/05	40 to 43 ft bml	Subtidal	0.0	**11.8**	**11.8**
59-50	4/12/06	50 ft bgs	Upland	0.0	**11.8**	**11.8**
Pier25-17	11/17/05	73.7 to 76.7 ft bml	Subtidal	0.0	**11.7**	**11.7**
Pier25-15	11/30/05	29 to 32 ft bml	Subtidal	0.0	**11.6**	**11.6**
4-25R	4/19/06	25 ft bgs	Upland	0.0	**11.5**	**11.5**
SP-1	6/26/06	48 to 51 ft bgs	Upland	0.0	**11.5**	**11.5**
SP-1	6/23/06	23 to 26 ft bgs	Upland	0.2	**11.5**	**11.7**
SP-8	7/14/06	43 to 46 ft bgs	Upland	0.0	**11.4**	**11.4**
5106-20	1/5/06	28.5 to 31.5 ft bml	Subtidal	0.0	**11.3**	**11.3**
WMUA-18	8/4/06	72.5 to 73.5 ft bgs	Upland	0.0	**11.0**	**11.0**
32-50R	1/26/02	50 ft bgs	Upland	0.0	**11.0**	**11.0**

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-3	9/19/05	14 to 17 ft bml	Subtidal	0.3	**10.9**	**11.2**
22-50	8/16/03	50 ft bgs	Upland	0.0	**10.8**	**10.8**
24-50	8/15/12	50 ft bgs	Upland	0.0	**10.8**	**10.8**
HYD-3	8/17/05	111 to 114 ft bml	Subtidal	0.0	**10.6**	**10.6**
40-100R	2/15/05	100 ft bgs	Upland	0.0	**10.6**	**10.6**
C-1	5/16/05	68.5 ft bgs	Upland	0.0	**10.4**	**10.4**
53C-75	7/24/12	75 ft bgs	Upland	0.0	**10.4**	**10.4**
53-25	8/7/02	25 ft bgs	Upland	0.0	**10.3**	**10.3**
Pier25-23	1/11/06	53 to 56 ft bml	Subtidal	0.0	**10.1**	**10.1**
5106-24	2/9/06	47 to 50 ft bml	Intertidal	0.0	**10.1**	**10.1**
SP-5	6/12/06	48 to 51 ft bgs	Upland	0.0	**10.0**	**10.0**
Pier25-13	2/3/06	80 to 83 ft bml	Subtidal	0.0	**10.0**	**10.0**
59-25	5/6/03	25 ft bgs	Upland	0.0	**10.0**	**10.0**
53-50	4/27/06	50 ft bgs	Upland	0.0	**9.9**	**9.9**
5106-13	11/28/05	12 to 15 ft bml	Subtidal	0.0	**9.9**	**9.9**
40-100R	5/18/05	100 ft bgs	Upland	0.0	**9.8**	**9.8**
5106-20	1/5/06	53.5 to 56.5 ft bml	Subtidal	0.0	**9.8**	**9.8**
HYD-3	8/17/05	121 to 124 ft bml	Subtidal	0.0	**9.6**	**9.6**
EA-1	9/22/05	24.5 to 27.5 ft bgs	Upland	0.0	**9.5**	**9.6**
34-25	4/10/06	25 ft bgs	Upland	0.0	**9.5**	**9.5**
53-25	8/19/03	25 ft bgs	Upland	0.0	**9.4**	**9.4**
5106-24	2/9/06	57 to 60 ft bml	Intertidal	0.0	**9.3**	**9.3**
5106-14	12/1/05	17 to 20 ft bml	Subtidal	0.0	**9.3**	**9.3**
C-1	5/24/06	68.5 ft bgs	Upland	0.0	**9.1**	**9.1**
32-50R	8/6/02	50 ft bgs	Upland	0.0	**9.0**	**9.0**
94C-130	7/24/12	130 ft bgs	Upland	0.0	**9.0**	**9.0**
22-50	2/11/03	50 ft bgs	Upland	0.0	**9.0**	**9.0**
EA-1	9/28/05	106.5 to 109.5 ft bgs	Upland	0.0	**9.0**	**9.0**
SP-3	6/15/06	48 to 51 ft bgs	Upland	0.8	**8.9**	**9.7**
SP-8	7/17/06	68 to 71 ft bgs	Upland	0.2	**8.8**	**9.0**
59-25	8/19/03	25 ft bgs	Upland	0.0	**8.8**	**8.8**
21-25R	8/14/03	25 ft bgs	Upland	0.0	**8.7**	**8.7**
5106-27	4/11/06	39 to 43 ft bml	Intertidal	0.0	**8.6**	**8.6**
WMUA-12	8/3/06	21.5 to 22.5 ft bgs	Upland	0.0	**8.6**	**8.6**
22-50	1/28/02	50 ft bgs	Upland	0.0	**8.5**	**8.5**
22-50	11/7/02	50 ft bgs	Upland	0.0	**8.4**	**8.4**
22-50	2/17/04	50 ft bgs	Upland	0.0	**8.4**	**8.4**
PZ-SHI-1-100	4/27/06	66 to 71 ft bml	Subtidal	0.0	**8.2**	**8.2**
5106-20	1/4/06	13.5 to 16.5 ft bml	Subtidal	0.0	**8.1**	**8.1**
Pier25-10	10/27/05	66 to 69 ft bml	Subtidal	0.0	**8.0**	**8.0**
5106-21	1/6/06	5.5 to 8.5 ft bml	Subtidal	0.0	**8.0**	**8.0**
5106-14	12/1/05	22 to 25 ft bml	Subtidal	0.0	**7.9**	**7.9**
53C-100	7/24/12	100 ft bgs	Upland	0.0	**7.8**	**7.8**
Pier25-24	1/12/06	44.1 to 47.1 ft bml	Subtidal	0.0	**7.8**	**7.8**
5106-25	4/17/06	39 to 43 ft bml	Intertidal	0.0	**7.8**	**7.8**
32-50R	11/9/02	50 ft bgs	Upland	0.0	**7.7**	**7.7**
C-3	8/11/04	68.5 ft bgs	Upland	0.0	**7.6**	**7.6**
Pier25-25	1/20/06	40 to 43 ft bml	Subtidal	0.0	**7.6**	**7.6**
A-4	5/14/05	68.5 ft bgs	Upland	0.0	**7.6**	**7.6**
5106-21	1/9/06	15.5 to 18.5 ft bml	Subtidal	0.0	**7.5**	**7.5**
5106-21	1/10/06	35.5 to 38.5 ft bml	Subtidal	0.0	**7.4**	**7.4**
SP-1	6/23/06	18 to 21 ft bgs	Upland	0.0	**7.4**	**7.4**
5106-24	2/9/06	67 to 70 ft bml	Intertidal	0.0	**7.2**	**7.2**
5106-21	1/10/06	40.5 to 43.5 ft bml	Subtidal	0.0	**7.0**	**7.0**
EA-1	9/23/05	41.5 to 44.5 ft bgs	Upland	0.0	**6.9**	**6.9**
40-100R	4/7/06	100 ft bgs	Upland	0.0	**6.9**	**6.9**
Pier25-24	1/13/06	64.1 to 67.1 ft bml	Subtidal	0.0	**6.7**	**6.7**
T1-50	1/28/02	50 ft bgs	Upland	0.0	**6.6**	**6.6**
SP-4	6/21/06	48 to 51 ft bgs	Upland	0.0	**6.6**	**6.6**

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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
C-3	2/14/05	68.5 ft bgs	Upland	0.0	**6.6**	**6.6**
5106-26	2/15/06	47 to 50 ft bml	Intertidal	0.0	**6.5**	**6.5**
Pier25-11	10/6/05	35 to 38 ft bml	Subtidal	0.0	**6.5**	**6.5**
21-25R	2/9/03	25 ft bgs	Upland	0.0	**6.4**	**6.4**
5106-24	2/9/06	72 to 75 ft bml	Intertidal	0.0	**6.4**	**6.4**
SB-B-DEEP	8/9/2013	162 to 164 ft BGS	Upland	0.0	**6.3**	**6.3**
EA-1	9/23/05	51.5 to 54.5 ft bgs	Upland	0.0	**6.2**	**6.2**
32-50R	2/12/03	50 ft bgs	Upland	0.0	**6.1**	**6.1**
5106-20	1/5/06	23.5 to 26.5 ft bml	Subtidal	0.0	**6.0**	**6.0**
5106-26	2/14/06	22 to 25 ft bml	Intertidal	0.0	**6.0**	**6.0**
BH-71	8/10/06	98 to 101 ft bgs	Upland	0.0	**6.0**	**6.0**
MW-G-DEEP	7/29/2013	152 to 154 ft BGS	Upland	0.0	**5.9**	**5.9**
T1-100	8/6/02	100 ft bgs	Upland	0.0	**5.9**	**5.9**
SP-4	6/22/06	88 to 91 ft bgs	Upland	2.8	**5.9**	**8.7**
5106-27	4/11/06	30 to 34 ft bml	Intertidal	0.0	**5.8**	**5.8**
Pier25-17	11/17/05	63.7 to 66.7 ft bml	Subtidal	0.0	**5.8**	**5.8**
EA-2	10/10/05	25 to 28 ft bgs	Upland	0.0	**5.7**	**5.7**
21-25R	7/31/02	25 ft bgs	Upland	0.0	**5.7**	**5.7**
5106-9	11/1/05	7 to 10 ft bml	Subtidal	0.0	**5.7**	**5.7**
C-3	2/4/04	68.5 ft bgs	Upland	0.0	**5.7**	**5.7**
83C-130	7/25/12	130 ft bgs	Upland	0.0	**5.7**	**5.7**
T1-100	8/15/03	100 ft bgs	Upland	0.0	**5.6**	**5.6**
5106-13	11/29/05	67 to 70 ft bml	Subtidal	0.0	**5.5**	**5.5**
Pier25-8	8/26/05	44 to 47 ft bml	Subtidal	0.0	**5.5**	**5.5**
5106-14	12/1/05	27 to 30 ft bml	Subtidal	0.0	**5.5**	**5.5**
10-100	8/20/12	100 ft bgs	Upland	0.0	**5.5**	**5.5**
C-3	8/14/03	68.5 ft bgs	Upland	0.0	**5.3**	**5.3**
SP-5	6/13/06	88 to 91 ft bgs	Upland	0.9	**5.3**	**6.2**
Pier25-26	1/24/06	61.5 to 64.5 ft bml	Subtidal	0.0	**5.3**	**5.3**
21-48	2/11/03	48 ft bgs	Upland	0.0	**5.3**	**5.3**
5106-26	2/14/06	17 to 20 ft bml	Intertidal	0.0	**5.2**	**5.2**
EA-1	9/22/05	36.5 to 39.5 ft bgs	Upland	0.0	**5.2**	**5.2**
40A-100	1/27/02	100 ft bgs	Upland	0.0	**5.2**	**5.2**
77C-130	7/16/12	130 ft bgs	Upland	0.0	**5.2**	**5.2**
32-50R	8/18/03	50 ft bgs	Upland	0.0	**5.2**	**5.2**
90C-75	9/25/2013	75 ft BGS	Upland	0.0	**5.2**	**5.2**
SP-7	6/30/06	48 to 51 ft bgs	Upland	2.7	**5.0**	**7.7**
5106-21	1/6/06	10.5 to 13.5 ft bml	Subtidal	0.0	**4.9**	**4.9**
C-3	5/11/03	68.5 ft bgs	Upland	0.0	**4.9**	**4.9**
C-4	5/23/06	68.5 ft bgs	Upland	0.0	**4.9**	**4.9**
SP-4	6/22/06	78 to 81 ft bgs	Upland	0.6	**4.9**	**5.5**
C-2	5/11/03	68.5 ft bgs	Upland	0.0	**4.9**	**4.9**
Pier25-20	12/6/05	30 to 33 ft bml	Subtidal	0.0	**4.8**	**4.8**
5106-9	11/1/05	72 to 75 ft bml	Subtidal	0.0	**4.8**	**4.8**
PT-15A	11/9/05	66 to 67 ft bml	Subtidal	0.0	**4.8**	**4.8**
C-3	2/10/03	68.5 ft bgs	Upland	0.0	**4.8**	**4.8**
53-25	5/1/06	25 ft bgs	Upland	0.0	**4.7**	**4.7**
22-50	8/17/12	50 ft bgs	Upland	0.0	**4.5**	**4.5**
T1-100	2/1/02	100 ft bgs	Upland	0.0	**4.5**	**4.5**
32-50R	2/14/04	50 ft bgs	Upland	0.0	**4.5**	**4.5**
21-48	11/7/02	48 ft bgs	Upland	0.0	**4.4**	**4.4**
5106-20	1/4/06	18.5 to 21.5 ft bml	Subtidal	0.0	**4.4**	**4.4**
SP-4	6/21/06	58 to 61 ft bgs	Upland	0.2	**4.4**	**4.6**
5106-13	11/29/05	62 to 65 ft bml	Subtidal	0.0	**4.4**	**4.4**
Pier25-22	1/18/06	50.1 to 53.1 ft bml	Subtidal	0.0	**4.4**	**4.4**
32-50R	4/5/06	50 ft bgs	Upland	0.0	**4.3**	**4.3**
21-25R	1/22/02	25 ft bgs	Upland	0.0	**4.2**	**4.2**
Pier25-27	1/19/06	40.5 to 43.5 ft bml	Subtidal	0.0	**4.2**	**4.2**
PT-13A	11/9/05	71.9 to 74.9 ft bml	Subtidal	0.0	**4.2**	**4.2**

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
EA-1	9/26/05	66.5 to 69.5 ft bgs	Upland	0.0	**4.1**	**4.1**
5106-9	11/1/05	32 to 35 ft bml	Subtidal	0.0	**4.1**	**4.1**
MW-EXT-9-DEEP	7/17/2013	172 to 174 ft BGS	Upland	0.0	**4.1**	**4.1**
5106-10	11/3/05	32 to 35 ft bml	Subtidal	0.0	**4.0**	**4.0**
HYD-4	9/23/05	26 to 29 ft bml	Subtidal	0.0	**4.0**	**4.0**
5106-1	9/28/05	65 to 68 ft bml	Subtidal	0.0	**3.9**	**3.9**
5106-13	11/29/05	77 to 80 ft bml	Subtidal	0.0	**3.8**	**3.8**
T1-50	8/6/02	50 ft bgs	Upland	0.0	**3.8**	**3.8**
90C-75	7/23/12	75 ft bgs	Upland	0.0	**3.6**	**3.6**
C-3	8/2/02	68.5 ft bgs	Upland	0.0	**3.6**	**3.6**
94C-130	9/24/2013	130 ft BGS	Upland	0.0	**3.5**	**3.5**
A-6	5/11/03	68.2 ft bgs	Upland	0.0	**3.4**	**3.4**
22-50	8/4/02	50 ft bgs	Upland	0.0	**3.4**	**3.4**
14-50R	5/4/02	50 ft bgs	Upland	0.0	**3.3**	**3.3**
SP-4	6/20/06	33 to 36 ft bgs	Upland	0.1	**3.3**	**3.4**
MW-H-01	6/27/2013	182 to 184 ft BGS	Upland	0.0	**3.2**	**3.2**
C-3	1/31/02	68.5 ft bgs	Upland	0.0	**3.2**	**3.2**
PT-15A	11/10/05	101 to 104 ft bml	Subtidal	0.0	**3.2**	**3.2**
5106-24	2/9/06	77 to 80 ft bml	Intertidal	0.0	**3.1**	**3.1**
Pier25-17	11/17/05	83.7 to 86.7 ft bml	Subtidal	0.0	**3.1**	**3.1**
A-6	5/14/05	68.2 ft bgs	Upland	0.0	**3.1**	**3.1**
SP-6	6/7/06	88 to 91 ft bgs	Upland	0.5	**3.1**	**3.6**
SP-3	6/19/06	78 to 81 ft bgs	Upland	0.1	**3.1**	**3.2**
C-4	5/11/03	68.5 ft bgs	Upland	0.0	**3.0**	**3.0**
5106-21	1/10/06	45.5 to 48.5 ft bml	Subtidal	0.0	**3.0**	**3.0**
Dock2-8	8/22/05	29 to 32 ft bml	Subtidal	0.0	**3.0**	**3.0**
Pier25-22	1/18/06	40.1 to 43.1 ft bml	Subtidal	0.0	**3.0**	**3.0**
5106-25	4/27/06	9 to 13 ft bml	Intertidal	0.0	**2.9**	**2.9**
SP-3	6/16/06	99 to 101 ft bgs	Upland	0.0	**2.9**	**3.0**
Pier25-8	8/26/05	54 to 57 ft bml	Subtidal	0.0	**2.9**	**2.9**
SB-B-DEEP	8/12/2013	182 to 184 ft BGS	Upland	0.0	**2.9**	**2.9**
EA-2	10/11/05	50 to 53 ft bgs	Upland	0.0	**2.8**	**2.9**
14-50R	2/8/05	50 ft bgs	Upland	0.0	**2.8**	**2.8**
5106-2	1/31/06	74 to 77 ft bml	Subtidal	0.0	**2.8**	**2.8**
5106-1	9/28/05	70 to 73 ft bml	Subtidal	0.0	**2.8**	**2.8**
T1-100	2/10/03	100 ft bgs	Upland	0.0	**2.8**	**2.8**
36-50	8/5/02	50 ft bgs	Upland	0.0	**2.7**	**2.7**
5106-24	2/8/06	37 to 40 ft bml	Intertidal	0.0	**2.7**	**2.7**
SP-3	6/19/06	87 to 90 ft bgs	Upland	0.0	**2.7**	**2.7**
14-50R	2/4/03	50 ft bgs	Upland	0.0	**2.7**	**2.7**
94C-75	7/24/12	75 ft bgs	Upland	0.0	**2.7**	**2.7**
SB-B-DEEP	8/9/2013	172 to 174 ft BGS	Upland	0.0	**2.7**	**2.7**
5106-25	4/14/06	19 to 23 ft bml	Intertidal	0.0	**2.6**	**2.6**
B-4	5/12/03	68.5 ft bgs	Upland	0.0	**2.6**	**2.6**
5106-5	9/9/05	4 to 7 ft bml	Subtidal	0.1	**2.6**	**2.7**
5106-5	9/9/05	9 to 12 ft bml	Subtidal	0.0	**2.6**	**2.6**
14-50R	11/12/04	50 ft bgs	Upland	0.0	**2.6**	**2.6**
22-50	4/13/06	50 ft bgs	Upland	0.0	**2.5**	**2.5**
C-3	5/23/06	68.5 ft bgs	Upland	0.0	**2.5**	**2.5**
Pier25-23	1/11/06	43 to 46 ft bml	Subtidal	0.0	**2.5**	**2.5**
14-50R	5/6/03	50 ft bgs	Upland	0.0	**2.5**	**2.5**
53-50	1/27/02	50 ft bgs	Upland	0.0	**2.5**	**2.5**
T1-50	4/12/06	50 ft bgs	Upland	0.0	**2.5**	**2.5**
A-3	5/11/03	68.4 ft bgs	Upland	0.0	**2.4**	**2.4**
5106-25	4/14/06	29 to 33 ft bml	Intertidal	0.0	**2.4**	**2.4**
53-50	11/9/02	50 ft bgs	Upland	0.0	**2.4**	**2.4**
PT-15A	11/10/05	111 to 114 ft bml	Subtidal	0.0	**2.4**	**2.4**
14-50R	1/29/02	50 ft bgs	Upland	0.0	**2.4**	**2.4**
5106-9	11/1/05	67 to 70 ft bml	Subtidal	0.0	**2.4**	**2.4**

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Location	***Sample Date***	***Depth (ft bml or bgs)***	***Tidal Zone***	***Summed SQ (1) SVOC***	***Summed SQ (1) VOC***	***Summed SQ (1) All Organics***
5106-20	1/5/06	63.5 to 66.5 ft bml	Subtidal	0.0	**2.3**	**2.3**
PT-12	6/10/04	42 to 42.5 ft bml	Subtidal	0.0	**2.3**	**2.3**
14-50R	2/10/04	50 ft bgs	Upland	0.0	**2.3**	**2.3**
PT-15A	11/9/05	56 to 57 ft bml	Subtidal	0.0	**2.3**	**2.3**
21-48	1/22/02	48 ft bgs	Upland	0.0	**2.3**	**2.3**
HYD-1	9/1/05	94 to 97 ft bml	Subtidal	0.0	**2.3**	**2.3**
40A-100	11/9/02	100 ft bgs	Upland	0.0	**2.3**	**2.3**
D-2	5/16/05	68.5 ft bgs	Upland	0.0	**2.3**	**2.3**
Pier25-13	2/2/06	40 to 43 ft bml	Subtidal	0.0	**2.2**	**2.2**
D-2	5/24/06	68.5 ft bgs	Upland	0.0	**2.2**	**2.2**
5106-20	1/4/06	8.5 to 11.5 ft bml	Subtidal	0.0	**2.2**	**2.2**
21-48	8/16/03	48 ft bgs	Upland	0.0	**2.2**	**2.2**
HYD-1	9/1/05	54 to 57 ft bml	Subtidal	0.0	**2.2**	**2.2**
SP-7	6/28/06	23 to 26 ft bgs	Upland	0.2	**2.2**	**2.4**
14-50R	8/17/04	50 ft bgs	Upland	0.0	**2.1**	**2.1**
14-50R	5/12/04	50 ft bgs	Upland	0.0	**2.1**	**2.1**
PZ-SHI-2-100	8/25/12	100 ft bgs	Intertidal	0.0	**2.1**	**2.1**
83C-50	7/25/12	50 ft bgs	Upland	0.0	**2.1**	**2.1**
SP-1	6/27/06	98 to 101 ft bgs	Upland	0.1	**2.1**	**2.2**
PT-14	6/21/04	22 to 23 ft bml	Intertidal	0.0	**2.1**	**2.1**
PT-7	7/24/03	4 to 6 ft bml	Subtidal	0.0	**2.1**	**2.1**
21-48	8/4/02	48 ft bgs	Upland	0.0	**2.0**	**2.0**
SP-4	6/21/06	43 to 46 ft bgs	Upland	0.1	2.0	2.1
EA-2	10/12/05	55 to 58 ft bgs	Upland	0.0	2.0	2.0
Pier25-2	7/18/05	86 to 89 ft bml	Subtidal	0.0	2.0	2.0
Pier25-28	1/24/06	20 to 23 ft bml	Subtidal	0.0	1.9	1.9
MW-EXT-9-DEEP	7/17/2013	182 to 184 ft BGS	Upland	0.0	1.9	1.9
A-2A	5/23/06	132.75 ft bgs	Upland	0.0	1.9	1.9
Pier25-27	1/19/06	30.5 to 33.5 ft bml	Subtidal	0.0	1.9	1.9
5106-20	1/5/06	58.5 to 61.5 ft bml	Subtidal	0.0	1.9	1.9
5106-10	11/3/05	22 to 25 ft bml	Subtidal	0.0	1.9	1.9
64-100	11/15/03	100 ft bgs	Upland	0.0	1.9	1.9
14-50R	11/19/03	50 ft bgs	Upland	0.0	1.9	1.9
14-50R	8/15/03	50 ft bgs	Upland	0.0	1.9	1.9
53C-130	7/24/12	130 ft bgs	Upland	0.0	1.9	1.9
T1-50	2/10/04	50 ft bgs	Upland	0.0	1.8	1.8
5106-23	2/10/06	42 to 45 ft bml	Intertidal	0.0	1.8	1.8
B-4	5/23/06	68.5 ft bgs	Upland	0.0	1.8	1.8
64-100	8/15/03	100 ft bgs	Upland	0.0	1.7	1.7
Pier25-26	1/24/06	71.5 to 74.5 ft bml	Subtidal	0.0	1.7	1.7
83C-75	7/25/12	75 ft bgs	Upland	0.0	1.7	1.7
40A-100	2/6/03	100 ft bgs	Upland	0.0	1.7	1.7
D-2	5/11/03	68.5 ft bgs	Upland	0.0	1.6	1.6
SP-7	7/5/06	78 to 81 ft bgs	Upland	0.0	1.6	1.6
Pier25-26	1/23/06	51.5 to 54.5 ft bml	Subtidal	0.0	1.6	1.6
36-50	1/22/02	50 ft bgs	Upland	0.0	1.6	1.6
36-50	5/4/02	50 ft bgs	Upland	0.0	1.6	1.6
53-50	8/7/02	50 ft bgs	Upland	0.0	1.6	1.6
C-4	5/16/05	68.5 ft bgs	Upland	0.0	1.6	1.6
14-50R	11/21/05	50 ft bgs	Upland	0.0	1.6	1.6
SP-8	7/14/06	48 to 51 ft bgs	Upland	0.0	1.6	1.6
SP-3	6/15/06	58 to 61 ft bgs	Upland	0.2	1.6	1.8
EA-2	10/11/05	40 to 43 ft bgs	Upland	0.2	1.6	1.8
MW-H-01	6/20/2013	112 to 114 ft BGS	Upland	0.0	1.6	1.6
40A-100	8/8/02	100 ft bgs	Upland	0.0	1.5	1.5
13-49	4/26/06	49 ft bgs	Upland	0.0	1.5	1.5
SP-8	10/3/06	104 to 108 ft bgs	Upland	0.0	1.5	1.5
40A-100	5/5/02	100 ft bgs	Upland	0.0	1.5	1.5
5106-10	11/3/05	17 to 20 ft bml	Subtidal	0.0	1.5	1.5

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
40A-100	5/7/03	100 ft bgs	Upland	0.0	1.5	1.5
Pier25-18	12/9/05	82 to 85 ft bml	Subtidal	0.0	1.5	1.5
14-50R	8/13/12	50 ft bgs	Upland	0.0	1.5	1.5
53-50	2/5/03	50 ft bgs	Upland	0.0	1.5	1.5
T1-50	2/10/03	50 ft bgs	Upland	0.0	1.5	1.5
40A-100	8/18/03	100 ft bgs	Upland	0.0	1.4	1.4
A-5	5/14/05	69.3 ft bgs	Upland	0.0	1.4	1.4
57-50	11/11/02	50 ft bgs	Upland	0.0	1.4	1.4
PT-13A	11/10/05	81.9 to 84.9 ft bml	Subtidal	0.0	1.4	1.4
78C-100	7/19/12	100 ft bgs	Upland	0.0	1.4	1.4
83C-160	7/25/12	160 ft bgs	Upland	0.0	1.4	1.4
HYD-2	8/30/05	58 to 61 ft bml	Subtidal	0.0	1.3	1.3
PZ-SHI-2-75	4/28/06	54.5 to 59.5 ft bml	Intertidal	0.0	1.3	1.3
53-50	8/19/03	50 ft bgs	Upland	0.0	1.3	1.3
5106-6	10/17/05	8 to 11 ft bml	Subtidal	0.3	1.3	1.6
PT-17	6/24/04	18 to 19 ft bml	Subtidal	0.0	1.3	1.3
64-100	6/12/03	100 ft bgs	Upland	0.0	1.3	1.3
HYD-4	9/24/05	66 to 69 ft bml	Subtidal	0.0	1.3	1.3
5106-9	11/1/05	62 to 65 ft bml	Subtidal	0.0	1.3	1.3
A-5	2/10/03	69.3 ft bgs	Upland	0.0	1.3	1.3
SP-8	7/18/06	88 to 91 ft bgs	Upland	0.0	1.3	1.3
EA-1	9/28/05	101.5 to 104.5 ft bgs	Upland	0.0	1.2	1.2
53-50	2/12/04	50 ft bgs	Upland	0.0	1.2	1.2
SP-7	6/29/06	33 to 36 ft bgs	Upland	0.0	1.2	1.2
40A-100	11/17/03	100 ft bgs	Upland	0.0	1.2	1.2
GP-5	4/7/04	100 ft bgs	Upland	0.0	1.2	1.2
40A-100	5/13/04	100 ft bgs	Upland	0.0	1.2	1.2
5106-24	2/9/06	62 to 65 ft bml	Intertidal	0.0	1.2	1.2
40A-100	2/16/04	100 ft bgs	Upland	0.0	1.2	1.2
WMUA-13	8/3/06	15 to 16 ft bgs	Upland	0.0	1.2	1.2
11-25	4/15/06	25 ft bgs	Upland	0.0	1.1	1.1
Pier25-19	12/7/05	52.6 to 55.6 ft bml	Subtidal	0.0	1.1	1.1
Pier25-24	1/12/06	34.1 to 37.1 ft bml	Subtidal	0.0	1.1	1.1
36-50	11/11/02	50 ft bgs	Upland	0.0	1.1	1.1
HYD-2	8/30/05	48 to 51 ft bml	Subtidal	0.0	1.1	1.1
14-50R	4/19/06	50 ft bgs	Upland	0.0	1.1	1.1
40-100R	8/21/12	100 ft bgs	Upland	0.0	1.1	1.1
36-50	5/13/03	50 ft bgs	Upland	0.0	1.1	1.1
T1-25	1/28/02	25 ft bgs	Upland	0.0	1.0	1.0
A-5	5/11/03	69.3 ft bgs	Upland	0.0	1.0	1.0
B-4	5/16/05	68.5 ft bgs	Upland	0.0	1.0	1.0
14-50R	11/7/02	50 ft bgs	Upland	0.0	1.0	1.0
Pier25-30	1/27/06	60 to 63 ft bml	Subtidal	0.0	1.0	1.0
A-5	8/14/03	69.3 ft bgs	Upland	0.0	1.0	1.0
SP-7	7/5/06	58 to 61 ft bgs	Upland	0.7	1.0	1.6
A-5	2/14/05	69.3 ft bgs	Upland	0.0	1.0	1.0
94C-75	9/24/2013	75 ft BGS	Upland	0.0	1.0	1.0
12-100	4/26/06	100 ft bgs	Upland	0.0	1.0	1.0
40A-100	2/16/05	100 ft bgs	Upland	0.0	0.9	0.9
A-5	2/5/04	69.3 ft bgs	Upland	0.0	0.9	0.9
WW-A1R	8/24/12	85 to 85 ft bml	Subtidal	0.0	0.9	0.9
EA-1	10/3/05	111.5 to 114.5 ft bgs	Upland	0.0	0.9	0.9
PT-4	7/22/03	6 to 8 ft bml	Subtidal	0.0	0.9	0.9
T1-100	2/10/04	100 ft bgs	Upland	0.0	0.9	0.9
14-25R	8/13/02	25 ft bgs	Upland	0.0	0.9	0.9
A-5	8/10/04	69.3 ft bgs	Upland	0.0	0.9	0.9
5106-2	1/31/06	94 to 97 ft bml	Subtidal	0.0	0.9	0.9
14-50R	8/13/02	50 ft bgs	Upland	0.0	0.9	0.9
MW-EXT-9-DEEP	7/17/2013	192 to 194 ft BGS	Upland	0.0	0.9	0.9

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-5	9/9/05	19 to 22 ft bml	Subtidal	0.0	0.9	0.9
A-5	8/2/02	69.3 ft bgs	Upland	0.0	0.9	0.9
SP-1	6/23/06	34 to 37 ft bgs	Upland	0.0	0.9	0.9
36-50	8/17/03	50 ft bgs	Upland	0.0	0.9	0.9
21-48	2/17/04	48 ft bgs	Upland	0.0	0.8	0.8
MW-F-DEEP	7/3/2013	137 to 139 ft BGS	Upland	0.0	0.8	0.8
52-15	8/24/12	15 ft bgs	Upland	0.0	0.8	0.8
11-75	8/7/12	75 ft bgs	Upland	0.0	0.8	0.8
MW-F-DEEP	9/26/2013	180 ft BGS	Upland	0.0	0.8	0.8
MW-G-DEEP	7/29/2013	172 to 174 ft BGS	Upland	0.0	0.8	0.8
36-50	5/12/04	50 ft bgs	Upland	0.0	0.8	0.8
PT-14	6/21/04	40 to 41 ft bml	Intertidal	0.0	0.8	0.8
Pier25-30	1/27/06	40 to 43 ft bml	Subtidal	0.0	0.8	0.8
PT-13A	11/9/05	21.8 to 24.8 ft bml	Subtidal	0.0	0.8	0.8
5106-1	9/28/05	75 to 78 ft bml	Subtidal	0.0	0.8	0.8
Dock2-1	7/21/05	23 to 26 ft bml	Subtidal	0.0	0.8	0.8
Pier25-23	1/11/06	33 to 36 ft bml	Subtidal	0.0	0.8	0.8
5106-21	1/10/06	60.5 to 63.5 ft bml	Subtidal	0.0	0.8	0.8
36-50	2/10/03	50 ft bgs	Upland	0.0	0.7	0.7
5106-21	1/10/06	50.5 to 53.5 ft bml	Subtidal	0.0	0.7	0.7
5106-14	12/1/05	32 to 35 ft bml	Subtidal	0.0	0.7	0.7
40A-100	4/7/06	100 ft bgs	Upland	0.0	0.7	0.7
41C-130	8/29/12	130 ft bgs	Upland	0.0	0.7	0.7
Pier25-15	11/30/05	39 to 42 ft bml	Subtidal	0.0	0.7	0.7
EA-1	9/22/05	31.5 to 34.5 ft bgs	Upland	0.0	0.7	0.7
24-35	8/15/12	35 ft bgs	Upland	0.0	0.7	0.7
MW-F-DEEP	7/8/2013	167 to 169 ft BGS	Upland	0.0	0.7	0.7
SP-8	7/13/06	23 to 26 ft bgs	Upland	0.0	0.7	0.7
36-50	11/18/03	50 ft bgs	Upland	0.0	0.7	0.7
94C-160	7/24/12	160 ft bgs	Upland	0.0	0.7	0.7
40A-100	11/15/04	100 ft bgs	Upland	0.0	0.7	0.7
Pier25-6	8/18/05	45.9 to 48.9 ft bml	Subtidal	0.0	0.7	0.7
Pier25-19	12/7/05	72.6 to 75.6 ft bml	Subtidal	0.0	0.7	0.7
T6-25	4/12/06	25 ft bgs	Upland	0.0	0.7	0.7
MW-EXT-9-DEEP	7/18/2013	202 to 204 ft BGS	Upland	0.0	0.6	0.6
ESI-1-1	11/11/02	25 ft bgs	Upland	0.0	0.6	0.6
5106-9	11/2/05	77 to 80 ft bml	Subtidal	0.0	0.6	0.6
53C-25	7/24/12	25 ft bgs	Upland	0.0	0.6	0.6
Pier25-20	12/6/05	20 to 23 ft bml	Subtidal	0.0	0.6	0.6
40A-100	5/18/05	100 ft bgs	Upland	0.0	0.6	0.6
34-50	1/22/02	50 ft bgs	Upland	0.0	0.6	0.6
709-MW9-15	8/14/12	15 ft bgs	Upland	0.0	0.6	0.6
40A-100	8/18/04	100 ft bgs	Upland	0.0	0.6	0.6
SP-6	6/5/06	7 to 10 ft bgs	Upland	0.5	0.6	1.0
36-50	11/13/04	50 ft bgs	Upland	0.0	0.6	0.6
EA-2	10/10/05	20 to 23 ft bgs	Upland	0.0	0.6	0.6
12-100	8/24/12	100 ft bgs	Upland	0.0	0.5	0.5
721-MW6-15	7/25/12	15 ft bgs	Upland	0.0	0.5	0.5
61C-100	7/17/12	100 ft bgs	Upland	0.0	0.5	0.5
721-MW6-15	7/19/04	15 ft bgs	Upland	0.0	0.5	0.5
14-25R	11/7/02	25 ft bgs	Upland	0.0	0.5	0.5
721-MW15-15	7/30/12	15 ft bgs	Upland	0.0	0.5	0.5
5106-23	2/10/06	32 to 35 ft bml	Intertidal	0.0	0.5	0.5
68-50	2/19/05	50 ft bgs	Upland	0.0	0.5	0.5
EA-2	10/12/05	60 to 63 ft bgs	Upland	0.0	0.5	0.5
61-100	8/20/03	100 ft bgs	Upland	0.0	0.5	0.5
PT-15	6/29/04	49.42 to 50.42 ft bml	Subtidal	0.0	0.5	0.5
5106-13	11/29/05	72 to 75 ft bml	Subtidal	0.0	0.5	0.5
36-50	8/17/04	50 ft bgs	Upland	0.0	0.5	0.5

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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Pier25-20	12/6/05	50 to 53 ft bml	Subtidal	0.0	0.5	0.5
5106-23	2/10/06	37 to 40 ft bml	Intertidal	0.0	0.5	0.5
40A-100	12/3/08	100 ft bgs	Upland	0.0	0.5	0.5
32-50R	8/24/12	50 ft bgs	Upland	0.0	0.5	0.5
36-50	2/12/04	50 ft bgs	Upland	0.0	0.5	0.5
5106-21	1/10/06	55.5 to 58.5 ft bml	Subtidal	0.0	0.5	0.5
721-GP2	6/21/04	15 ft bgs	Upland	0.0	0.4	0.4
PT-15A	11/15/05	161 to 164 ft bml	Subtidal	0.1	0.4	0.6
14-25R	2/4/03	25 ft bgs	Upland	0.0	0.4	0.4
14-25R	8/15/03	25 ft bgs	Upland	0.0	0.4	0.4
MW-H-01	6/26/2013	172 to 174 ft BGS	Upland	0.0	0.4	0.4
HYD-2	8/29/05	38 to 41 ft bml	Subtidal	0.0	0.4	0.4
1-45	4/13/06	45 ft bgs	Upland	0.0	0.4	0.4
709-MW9-15	3/10/04	15 ft bgs	Upland	0.0	0.4	0.4
EA-1	9/28/05	96.5 to 99.5 ft bgs	Upland	0.0	0.4	0.4
EA-1	9/27/05	81.5 to 84.5 ft bgs	Upland	0.0	0.4	0.4
90C-25	7/23/12	25 ft bgs	Upland	0.0	0.4	0.4
T1-50	8/15/03	50 ft bgs	Upland	0.0	0.4	0.4
B-3	8/14/03	68.5 ft bgs	Upland	0.0	0.4	0.4
5106-10	11/3/05	37 to 40 ft bml	Subtidal	0.0	0.4	0.4
22-70	1/28/02	70 ft bgs	Upland	0.0	0.4	0.4
A-1	5/11/03	68.3 ft bgs	Upland	0.0	0.4	0.4
14-50R	5/11/05	50 ft bgs	Upland	0.0	0.4	0.4
14-25R	1/29/02	25 ft bgs	Upland	0.0	0.4	0.4
5106-25	4/18/06	59 to 63 ft bml	Intertidal	0.0	0.4	0.4
C-3	5/16/05	68.5 ft bgs	Upland	0.0	0.4	0.4
721-MW15-25	7/30/12	25 ft bgs	Upland	0.0	0.4	0.4
89C-25	8/22/12	25 ft bgs	Upland	0.0	0.4	0.4
SP-5	6/2/06	9 to 12 ft bgs	Upland	0.2	0.4	0.5
C-5	5/11/03	68.5 ft bgs	Upland	0.0	0.3	0.3
62-50	6/11/03	50 ft bgs	Upland	0.0	0.3	0.3
61-100	11/14/03	100 ft bgs	Upland	0.0	0.3	0.3
EA-2	10/13/05	75 to 78 ft bgs	Upland	0.0	0.3	0.3
B-2	5/11/03	68.5 ft bgs	Upland	0.0	0.3	0.3
PT-13A	11/10/05	121.9 to 124.9 ft bml	Subtidal	0.0	0.3	0.3
WW-A1R	8/25/12	95 to 95 ft bml	Subtidal	0.0	0.3	0.3
61-100	6/13/03	100 ft bgs	Upland	0.0	0.3	0.3
Pier25-10	10/27/05	86 to 89 ft bml	Subtidal	0.0	0.3	0.3
34-50	8/1/02	50 ft bgs	Upland	0.0	0.3	0.3
90C-50	7/23/12	50 ft bgs	Upland	0.0	0.3	0.3
19-50R	1/23/02	50 ft bgs	Upland	0.0	0.3	0.3
A-3	5/16/05	68.4 ft bgs	Upland	0.0	0.3	0.3
Dock2-1	7/21/05	28 to 31 ft bml	Subtidal	0.0	0.3	0.3
PT-12	6/10/04	22.5 to 23 ft bml	Subtidal	0.0	0.3	0.3
MW-F-DEEP	7/3/2013	127 to 129 ft BGS	Upland	0.0	0.3	0.3
EA-2	10/11/05	45 to 48 ft bgs	Upland	0.1	0.3	0.4
ESI-1-1	11/12/02	50 ft bgs	Upland	0.0	0.3	0.3
SP-2	7/7/06	33 to 36 ft bgs	Upland	0.0	0.3	0.3
Pier25-13	2/2/06	10 to 13 ft bml	Subtidal	0.0	0.3	0.3
B-3	5/12/03	68.5 ft bgs	Upland	0.0	0.3	0.3
34-50	2/7/04	50 ft bgs	Upland	0.0	0.3	0.3
SP-7	7/6/06	88 to 91 ft bgs	Upland	0.0	0.3	0.3
721-MW12-15	7/30/12	15 ft bgs	Upland	0.0	0.3	0.3
Pier25-19	12/7/05	22.6 to 25.6 ft bml	Subtidal	0.0	0.3	0.3
MW-F-INT	9/26/2013	140 ft BGS	Upland	0.0	0.3	0.3
14-25R	5/4/02	25 ft bgs	Upland	0.0	0.3	0.3
5106-14	12/2/05	42 to 45 ft bml	Subtidal	0.0	0.3	0.3
5106-10	11/4/05	77 to 80 ft bml	Subtidal	0.0	0.3	0.3
36-50	4/6/06	50 ft bgs	Upland	0.0	0.3	0.3

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-25	4/17/06	49 to 53 ft bml	Intertidal	0.0	0.3	0.3
HYD-2	8/30/05	98 to 101 ft bml	Subtidal	0.0	0.3	0.3
34-50	4/10/06	50 ft bgs	Upland	0.0	0.3	0.3
62-50	8/18/03	50 ft bgs	Upland	0.0	0.3	0.3
721-GP3	6/22/04	15 ft bgs	Upland	0.0	0.3	0.3
5106-14	12/2/05	62 to 65 ft bml	Subtidal	0.0	0.3	0.3
5106-3	9/20/05	29 to 32 ft bml	Subtidal	0.0	0.3	0.3
721-MW11-15	7/31/12	15 ft bgs	Upland	0.0	0.3	0.3
Pier25-28	1/24/06	10 to 13 ft bml	Subtidal	0.0	0.3	0.3
B-2	5/14/05	68.5 ft bgs	Upland	0.0	0.3	0.3
Pier25-16	11/22/05	74.4 to 77.4 ft bml	Subtidal	0.0	0.3	0.3
EA-1	9/27/05	76.5 to 79.5 ft bgs	Upland	0.0	0.3	0.3
34-50	2/9/03	50 ft bgs	Upland	0.0	0.2	0.2
MW-G-DEEP	7/25/2013	132 to 134 ft BGS	Upland	0.0	0.2	0.2
MW-G-DEEP	7/25/2013	132 to 134 ft BGS	Upland	0.0	0.2	0.2
Dock2-9	9/8/05	9 to 12 ft bml	Subtidal	0.0	0.2	0.3
B-3	2/5/04	68.5 ft bgs	Upland	0.0	0.2	0.2
Pier25-8	8/26/05	64 to 67 ft bml	Subtidal	0.0	0.2	0.2
65-25	7/18/04	25 ft bgs	Upland	0.0	0.2	0.2
MW-EXT-9-DEEP	7/18/2013	202 to 204 ft BGS	Upland	0.0	0.2	0.2
77C-100	7/16/12	100 ft bgs	Upland	0.0	0.2	0.2
34-25R	8/20/12	25 ft bgs	Upland	0.0	0.2	0.2
PT-16	6/11/04	20.5 to 21 ft bml	Subtidal	0.0	0.2	0.2
53-100	1/27/02	100 ft bgs	Upland	0.0	0.2	0.2
5106-6	10/17/05	13 to 16 ft bml	Subtidal	0.0	0.2	0.2
MW-G-DEEP	7/30/2013	192 to 194 ft BGS	Upland	0.0	0.2	0.2
B-3	8/11/04	68.5 ft bgs	Upland	0.0	0.2	0.2
5106-2	1/31/06	104 to 107 ft bml	Subtidal	0.0	0.2	0.2
A-5	1/31/02	69.3 ft bgs	Upland	0.0	0.2	0.2
34-50	8/18/03	50 ft bgs	Upland	0.0	0.2	0.2
Pier25-10	10/27/05	76 to 79 ft bml	Subtidal	0.0	0.2	0.2
HYD-4	9/23/05	36 to 39 ft bml	Subtidal	0.0	0.2	0.2
A-5	5/23/06	69.3 ft bgs	Upland	0.0	0.2	0.2
77C-50	7/16/12	50 ft bgs	Upland	0.0	0.2	0.2
19-50R	7/31/02	50 ft bgs	Upland	0.0	0.2	0.2
19-50R	2/7/03	50 ft bgs	Upland	0.0	0.2	0.2
5106-5	9/9/05	24 to 27 ft bml	Subtidal	0.0	0.2	0.2
A-6	5/23/06	68.2 ft bgs	Upland	0.0	0.2	0.2
Pier25-18	12/9/05	92 to 95 ft bml	Subtidal	0.0	0.2	0.2
53-100	8/7/02	100 ft bgs	Upland	0.0	0.2	0.2
EA-1	9/27/05	71.5 to 74.5 ft bgs	Upland	0.0	0.2	0.2
721-MW14-15	8/8/12	15 ft bgs	Upland	0.0	0.2	0.2
90C-100	7/23/12	100 ft bgs	Upland	0.0	0.2	0.2
19-50R	8/14/03	50 ft bgs	Upland	0.0	0.2	0.2
53-100	2/5/03	100 ft bgs	Upland	0.0	0.2	0.2
36-50	5/12/05	50 ft bgs	Upland	0.0	0.2	0.2
C-6	5/11/03	68.5 ft bgs	Upland	0.0	0.2	0.2
709-MW21-15	7/27/12	15 ft bgs	Upland	0.0	0.2	0.2
Pier25-6	8/18/05	75.9 to 78.9 ft bml	Subtidal	0.0	0.2	0.2
709-MW18-25	7/26/12	25 ft bgs	Upland	0.0	0.2	0.2
PT-13A	11/10/05	91.9 to 94.9 ft bml	Subtidal	0.0	0.2	0.2
5106-27	4/11/06	19 to 23 ft bml	Intertidal	0.0	0.2	0.2
Pier25-13	2/3/06	100 to 103 ft bml	Subtidal	0.0	0.2	0.2
EA-1	10/4/05	121.5 to 124.5 ft bgs	Upland	0.0	0.2	0.2
36-50	2/9/05	50 ft bgs	Upland	0.0	0.2	0.2
MW-G-DEEP	7/30/2013	202 to 204 ft BGS	Upland	0.0	0.2	0.2
Pier25-23	1/11/06	73 to 76 ft bml	Subtidal	0.0	0.2	0.2
5106-13	11/29/05	82 to 85 ft bml	Subtidal	0.0	0.2	0.2
72-50	7/12/04	50 ft bgs	Upland	0.0	0.2	0.2

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ* (1) *SVOC*	*Summed SQ* (1) *VOC*	*Summed SQ* (1) *All Organics*
14-25R	5/6/03	25 ft bgs	Upland	0.0	0.2	0.2
53-100	2/12/04	100 ft bgs	Upland	0.0	0.2	0.2
5106-20	1/5/06	68.5 to 71.5 ft bml	Subtidal	0.0	0.2	0.2
53-100	8/19/03	100 ft bgs	Upland	0.0	0.2	0.2
19-50R	2/4/04	50 ft bgs	Upland	0.0	0.2	0.2
14-25R	8/13/12	25 ft bgs	Upland	0.0	0.2	0.2
94C-50	7/24/12	50 ft bgs	Upland	0.0	0.2	0.2
EA-1	10/3/05	116.5 to 119.5 ft bgs	Upland	0.0	0.2	0.2
A-2	5/11/03	68.5 ft bgs	Upland	0.0	0.1	0.1
83C-25	7/25/12	25 ft bgs	Upland	0.0	0.1	0.1
721-MW8-15	7/20/04	15 ft bgs	Upland	0.0	0.1	0.1
B-3	2/14/05	68.5 ft bgs	Upland	0.0	0.1	0.1
5106-20	1/6/06	88.5 to 91.5 ft bml	Subtidal	0.0	0.1	0.1
5106-10	11/3/05	57 to 60 ft bml	Subtidal	0.0	0.1	0.1
35-25	5/4/02	25 ft bgs	Upland	0.0	0.1	0.1
35-25	5/7/03	25 ft bgs	Upland	0.0	0.1	0.1
SP-8	7/14/06	33 to 36 ft bgs	Upland	0.0	0.1	0.1
EA-2	10/19/05	130 to 133 ft bgs	Upland	0.0	0.1	0.1
721-GP3	6/22/04	50 ft bgs	Upland	0.0	0.1	0.1
14-25R	11/19/03	25 ft bgs	Upland	0.0	0.1	0.1
721-GP6	6/28/04	15 ft bgs	Upland	0.0	0.1	0.1
721-GP5	6/23/04	15 ft bgs	Upland	0.0	0.1	0.1
11-25	8/6/12	25 ft bgs	Upland	0.0	0.1	0.1
35-25	8/6/02	25 ft bgs	Upland	0.0	0.1	0.1
B-3	8/2/02	68.5 ft bgs	Upland	0.0	0.1	0.1
5106-3	9/19/05	19 to 22 ft bml	Subtidal	0.0	0.1	0.2
PT-16	6/11/04	40.5 to 41 ft bml	Subtidal	0.0	0.1	0.1
709-MW1-15	3/9/04	15 ft bgs	Upland	0.0	0.1	0.1
ESI-1-4	11/12/02	50 ft bgs	Upland	0.0	0.1	0.1
35-25	11/8/02	25 ft bgs	Upland	0.0	0.1	0.1
5106-5	9/9/05	29 to 32 ft bml	Subtidal	0.0	0.1	0.1
35-25	2/9/04	25 ft bgs	Upland	0.0	0.1	0.1
19-50R	4/6/06	50 ft bgs	Upland	0.0	0.1	0.1
35-25	8/18/03	25 ft bgs	Upland	0.0	0.1	0.1
HYD-1	9/1/05	104 to 107 ft bml	Subtidal	0.0	0.1	0.1
5106-26	2/15/06	52 to 55 ft bml	Intertidal	0.0	0.1	0.1
HYD-5	10/4/05	14 to 17 ft bml	Subtidal	0.0	0.1	0.1
709-MW9-25	8/14/12	25 ft bgs	Upland	0.0	0.1	0.1
709-MW11-25	7/29/12	25 ft bgs	Upland	0.0	0.1	0.1
5106-24	2/9/06	82 to 85 ft bml	Intertidal	0.0	0.1	0.1
Pier25-13	2/3/06	90 to 93 ft bml	Subtidal	0.0	0.1	0.1
WW-A1R	8/25/12	106 to 106 ft bml	Subtidal	0.0	0.1	0.1
EA-1	9/23/05	56.5 to 59.5 ft bgs	Upland	0.0	0.1	0.1
35-25	11/18/03	25 ft bgs	Upland	0.0	0.1	0.1
Pier25-25	1/20/06	70 to 73 ft bml	Subtidal	0.0	0.1	0.1
EA-2	10/13/05	80 to 83 ft bgs	Upland	0.0	0.1	0.1
41-138	4/22/06	138 ft bgs	Upland	0.0	0.1	0.1
721-GP8	6/24/04	15 ft bgs	Upland	0.0	0.1	0.1
64-170	8/15/03	170 ft bgs	Upland	0.0	0.1	0.1
Pier25-2	7/15/05	56 to 59 ft bml	Subtidal	0.0	0.1	0.1
721-MW7-15	7/19/04	15 ft bgs	Upland	0.0	0.1	0.1
PZ-SHI-3-75	4/27/06	44.5 to 49.5 ft bml	Subtidal	0.0	0.1	0.1
5106-13	11/28/05	7 to 10 ft bml	Subtidal	0.0	0.1	0.1
ESI-1-4	11/12/02	27 ft bgs	Upland	0.0	0.1	0.1
721-MW5-15	7/19/04	15 ft bgs	Upland	0.0	0.1	0.1
709-MW20-15	8/21/12	15 ft bgs	Upland	0.0	0.1	0.1
Dock2-1	7/20/05	13 to 16 ft bml	Subtidal	0.0	0.1	0.1
77C-75	7/16/12	75 ft bgs	Upland	0.0	0.1	0.1
721-GP3	6/22/04	25 ft bgs	Upland	0.0	0.1	0.1

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
WMUA-18	8/4/06	13.5 to 14.5 ft bgs	Upland	0.0	0.1	0.1
721-MW6-25	7/19/04	25 ft bgs	Upland	0.0	0.1	0.1
A-4	5/23/06	68.5 ft bgs	Upland	0.0	0.1	0.1
EA-1	9/26/05	61.5 to 64.5 ft bgs	Upland	0.0	0.1	0.1
PT-15A	11/14/05	141 to 144 ft bml	Subtidal	0.0	0.1	0.1
14-25R	11/21/05	25 ft bgs	Upland	0.0	0.1	0.1
35-25	5/18/05	25 ft bgs	Upland	0.0	0.1	0.1
709-MW20-15	7/21/04	15 ft bgs	Upland	0.0	0.1	0.1
5106-25	4/18/06	69 to 73 ft bml	Intertidal	0.0	0.1	0.1
B-1	5/12/03	68.5 ft bgs	Upland	0.0	0.1	0.1
64-170	11/15/03	170 ft bgs	Upland	0.0	0.1	0.1
709-MW14-15	3/10/04	14 ft bgs	Upland	0.0	0.1	0.1
35-25	2/6/03	25 ft bgs	Upland	0.0	0.1	0.1
B-3	5/14/05	68.5 ft bgs	Upland	0.0	0.1	0.1
35-25	4/14/06	25 ft bgs	Upland	0.0	0.1	0.1
SP-8	7/13/06	10 to 13 ft bgs	Upland	0.1	0.1	0.2
721-GP1	6/22/04	15 ft bgs	Upland	0.0	0.1	0.1
721-GP9	6/24/04	15 ft bgs	Upland	0.0	0.1	0.1
35-25	11/13/04	25 ft bgs	Upland	0.0	0.1	0.1
60-50	5/6/03	50 ft bgs	Upland	0.0	0.1	0.1
5106-27	4/11/06	49 to 53 ft bml	Intertidal	0.0	0.1	0.1
14-25R	4/19/06	25 ft bgs	Upland	0.0	0.1	0.1
HYD-1	9/1/05	114 to 117 ft bml	Subtidal	0.0	0.1	0.1
NL-17	3/31/06	9 to 12 ft bml	Intertidal	0.0	0.1	0.1
5106-26	2/15/06	67 to 70 ft bml	Intertidal	0.0	0.1	0.1
SP-2	7/7/06	23 to 26 ft bgs	Upland	0.0	0.1	0.1
77-140	4/25/06	140 ft bgs	Upland	0.0	0.1	0.1
EA-2	10/11/05	30 to 33 ft bgs	Upland	0.0	0.1	0.1
Pier25-18	12/8/05	12 to 15 ft bml	Subtidal	0.0	0.1	0.1
T1-25	8/6/02	25 ft bgs	Upland	0.0	0.1	0.1
65-50	7/10/04	50 ft bgs	Upland	0.0	0.1	0.1
MW-G-DEEP	7/31/2013	222 to 224 ft BGS	Upland	0.0	0.1	0.1
Pier25-11	10/6/05	45 to 48 ft bml	Subtidal	0.0	0.1	0.1
Pier25-15	12/22/05	24.4 to 27.4 ft bml	Subtidal	0.0	0.1	0.1
SP-3	6/14/06	7 to 10 ft bgs	Upland	1.3	0.1	1.3
721-GP5	6/23/04	25 ft bgs	Upland	0.0	0.1	0.1
SP-8	10/3/06	114 to 118 ft bgs	Upland	0.0	0.1	0.1
Pier25-19	12/7/05	82.6 to 85.6 ft bml	Subtidal	0.0	0.1	0.1
721-MW5-25	7/19/04	25 ft bgs	Upland	0.0	0.1	0.1
35-25	8/15/12	25 ft bgs	Upland	0.0	0.1	0.1
EA-2	10/17/05	105 to 108 ft bgs	Upland	0.0	0.1	0.1
NL-17	3/31/06	6 to 9 ft bml	Intertidal	0.0	0.1	0.1
60-25	5/6/03	25 ft bgs	Upland	0.0	0.1	0.1
721-MW9-25	7/22/12	25 ft bgs	Upland	0.0	0.1	0.1
721-GP2	6/21/04	25 ft bgs	Upland	0.0	0.1	0.1
SP-7	7/5/06	68 to 71 ft bgs	Upland	0.0	0.1	0.1
Dock2-9	9/8/05	14 to 17 ft bml	Subtidal	0.0	0.1	0.1
B-3	1/31/02	68.5 ft bgs	Upland	0.0	0.1	0.1
35-25	2/18/05	25 ft bgs	Upland	0.0	0.1	0.1
PT-13A	11/11/05	141.9 to 144.9 ft bml	Subtidal	0.0	0.1	0.1
NL-23	8/14/06	15 to 18 ft bml	Subtidal	0.0	0.1	0.1
Pier25-16	11/22/05	84.4 to 87.4 ft bml	Subtidal	0.0	0.1	0.1
5106-10	11/4/05	92 to 95 ft bml	Subtidal	0.0	0.1	0.1
8-54	8/19/03	54 ft bgs	Upland	0.0	0.1	0.1
A-3	5/23/06	68.4 ft bgs	Upland	0.0	0.1	0.1
12-25	2/6/03	25 ft bgs	Upland	0.0	0.1	0.1
14-25R	8/17/04	25 ft bgs	Upland	0.0	0.1	0.1
5106-14	12/2/05	47 to 50 ft bml	Subtidal	0.0	0.1	0.1
721-MW9-25	7/20/04	25 ft bgs	Upland	0.0	0.1	0.1

TABLE 4.13

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IN GROUNDWATER
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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-14	12/2/05	67 to 70 ft bml	Subtidal	0.0	0.1	0.1
709-MW21-25	7/27/12	25 ft bgs	Upland	0.0	0.1	0.1
5106-2	1/31/06	84 to 87 ft bml	Subtidal	0.0	0.1	0.1
MW-G-DEEP	7/30/2013	182 to 184 ft BGS	Upland	0.0	0.1	0.1
5106-10	11/3/05	42 to 45 ft bml	Subtidal	0.0	0.1	0.1
64-170	6/12/03	170 ft bgs	Upland	0.0	0.1	0.1
PT-6	7/25/03	4 to 6 ft bml	Subtidal	0.0	0.1	0.1
65-15	7/18/04	15 ft bgs	Upland	0.0	0.1	0.1
721-MW12-25	7/30/12	25 ft bgs	Upland	0.0	0.1	0.1
Pier25-24	1/13/06	74.1 to 77.1 ft bml	Subtidal	0.0	0.1	0.1
14-25R	2/10/04	25 ft bgs	Upland	0.0	0.1	0.1
35-25	12/8/08	25 ft bgs	Upland	0.0	0.1	0.1
SP-8	7/17/06	78 to 81 ft bgs	Upland	0.0	0.1	0.1
EA-3	10/26/05	45 to 48 ft bgs	Upland	0.0	0.1	0.1
T1-25	2/10/03	25 ft bgs	Upland	0.0	0.1	0.1
721-GP7	6/28/04	15 ft bgs	Upland	0.0	0.1	0.1
T1-25	8/15/03	25 ft bgs	Upland	0.0	0.1	0.1
PT-4	7/22/03	4 to 6 ft bml	Subtidal	0.0	0.1	0.1
SP-2	7/7/06	18 to 21 ft bgs	Upland	0.0	0.1	0.1
SP-5	7/31/06	108 to 112 ft bgs	Upland	0.0	0.1	0.1
PT-6	7/25/03	6 to 8 ft bml	Subtidal	0.0	0.1	0.1
35-25	5/12/04	25 ft bgs	Upland	0.0	0.1	0.1
5106-10	11/3/05	62 to 65 ft bml	Subtidal	0.0	0.1	0.1
MW-EXT-9-DEEP	9/27/2013	205 ft BGS	Upland	0.0	0.0	0.0
14-50R	6/1/04	50 ft bgs	Upland	0.0	0.0	0.1
5106-14	12/2/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
709-MW11-15	7/29/12	15 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/8/2013	147 to 149 ft BGS	Upland	0.0	0.0	0.0
PZ-SHI-3-42	4/27/06	14.5 to 15.5 ft bml	Subtidal	0.3	0.0	0.3
5106-24	2/9/06	87 to 90 ft bml	Intertidal	0.0	0.0	0.0
Pier25-27	1/19/06	50.5 to 53.5 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/7/05	122 to 125 ft bml	Subtidal	0.0	0.0	0.0
61-50	8/20/03	50 ft bgs	Upland	0.0	0.0	0.0
NL-23	8/11/06	6 to 9 ft bml	Subtidal	0.0	0.0	0.0
4-175R	8/20/03	175 ft bgs	Upland	0.0	0.0	0.0
Pier25-26	1/23/06	41.5 to 44.5 ft bml	Subtidal	0.0	0.0	0.0
709-MW19-15	3/11/04	15 ft bgs	Upland	0.0	0.0	0.0
Pier25-30	1/27/06	50 to 53 ft bml	Subtidal	0.0	0.0	0.0
5106-24	2/9/06	92 to 95 ft bml	Intertidal	0.0	0.0	0.0
SP-1	6/28/06	88 to 91 ft bgs	Upland	0.2	0.0	0.3
5106-14	12/1/05	37 to 40 ft bml	Subtidal	0.0	0.0	0.0
Pier25-12	2/1/06	20 to 23 ft bml	Subtidal	0.0	0.0	0.0
5106-1	9/28/05	80 to 83 ft bml	Subtidal	0.0	0.0	0.0
Pier25-23	1/11/06	23 to 26 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/14/06	20.5 to 23.5 ft bml	Subtidal	0.0	0.0	0.0
NL-14	12/14/05	10 to 13 ft bml	Subtidal	0.0	0.0	0.0
4-115R	2/4/03	115 ft bgs	Upland	0.0	0.0	0.0
NL-14	12/14/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.1
PT-3	7/25/03	4 to 6 ft bml	Subtidal	0.0	0.0	0.0
HYD-1	9/1/05	124 to 127 ft bml	Subtidal	0.0	0.0	0.0
5106-20	1/5/06	73.5 to 76.5 ft bml	Subtidal	0.0	0.0	0.0
65-50	8/12/12	50 ft bgs	Upland	0.0	0.0	0.0
5106-10	11/4/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0
22-70	8/1/02	70 ft bgs	Upland	0.0	0.0	0.0
Pier25-22	1/18/06	60.1 to 63.1 ft bml	Subtidal	0.0	0.0	0.0
PT-3	7/25/03	8 to 10 ft bml	Subtidal	0.0	0.0	0.0
Dock2-1	7/20/05	18 to 21 ft bml	Subtidal	0.0	0.0	0.0
5106-21	1/10/06	65.5 to 68.5 ft bml	Subtidal	0.0	0.0	0.0
21C-25	7/25/12	25 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Pier25-2	7/19/05	96 to 99 ft bml	Subtidal	0.0	0.0	0.0
SP-1	6/23/06	9 to 12 ft bgs	Upland	0.2	0.0	0.3
5106-1	9/29/05	95 to 98 ft bml	Subtidal	0.0	0.0	0.0
NL-14	12/15/05	16 to 19 ft bml	Subtidal	0.0	0.0	0.0
34-50R	8/20/12	50 ft bgs	Upland	0.0	0.0	0.0
709-MW17-15	3/11/04	15 ft bgs	Upland	0.0	0.0	0.0
HYD-4	9/26/05	86 to 89 ft bml	Subtidal	0.0	0.0	0.0
NL-14	12/14/05	4 to 7 ft bml	Subtidal	0.0	0.0	0.1
61C-75	7/17/12	75 ft bgs	Upland	0.0	0.0	0.0
NL-15	12/16/05	9 to 12 ft bml	Intertidal	0.0	0.0	0.1
Pier25-10	10/27/05	36 to 39 ft bml	Subtidal	0.0	0.0	0.0
34-25	12/8/08	25 ft bgs	Upland	0.0	0.0	0.0
NL-15	12/16/05	6 to 9 ft bml	Intertidal	0.0	0.0	0.0
NL-17	3/30/06	3 to 6 ft bml	Intertidal	0.0	0.0	0.0
5106-5	9/9/05	39 to 42 ft bml	Subtidal	0.0	0.0	0.0
61C-50	7/17/12	50 ft bgs	Upland	0.0	0.0	0.0
709-MW20-25	7/21/04	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-16	11/22/05	104.4 to 107.4 ft bml	Subtidal	0.0	0.0	0.0
4-115R	4/19/06	115 ft bgs	Upland	0.0	0.0	0.0
SP-8	7/18/06	98 to 101 ft bgs	Upland	1.3	0.0	1.3
NL-15	12/16/05	3 to 6 ft bml	Intertidal	0.0	0.0	0.0
MW-G-INT	9/26/2013	171 ft BGS	Upland	0.0	0.0	0.0
Pier25-20	12/6/05	60 to 63 ft bml	Subtidal	0.0	0.0	0.0
61-100	12/4/08	100 ft bgs	Upland	0.0	0.0	0.0
MW-G-INT	9/26/2013	171 ft BGS	Upland	0.0	0.0	0.0
Pier25-23	1/11/06	83 to 86 ft bml	Subtidal	0.0	0.0	0.0
4-175R	1/28/02	175 ft bgs	Upland	0.0	0.0	0.0
5106-3	9/19/05	25 to 28 ft bml	Subtidal	0.0	0.0	0.0
5-50	1/24/02	50 ft bgs	Upland	0.0	0.0	0.0
23-50	5/12/04	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-11	10/20/05	37 to 40 ft bml	Subtidal	0.0	0.0	0.0
4-115R	1/28/02	115 ft bgs	Upland	0.0	0.0	0.0
709-MW11-15	3/10/04	15 ft bgs	Upland	0.0	0.0	0.0
709-MW15A-25	3/10/04	30 ft bgs	Upland	0.0	0.0	0.0
10-50	8/20/12	50 ft bgs	Upland	0.0	0.0	0.0
4-115R	8/20/03	115 ft bgs	Upland	0.0	0.0	0.0
Pier25-13	2/3/06	110 to 113 ft bml	Subtidal	0.0	0.0	0.0
5-25	2/7/03	25 ft bgs	Upland	0.0	0.0	0.0
60-50	5/1/06	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-30	1/27/06	20 to 23 ft bml	Subtidal	0.0	0.0	0.0
HYD-4	9/26/05	96 to 99 ft bml	Subtidal	0.0	0.0	0.0
Pier25-11	10/7/05	55 to 58 ft bml	Subtidal	0.0	0.0	0.0
1-25	5/1/06	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-7	8/24/05	49.3 to 52.3 ft bml	Subtidal	0.0	0.0	0.0
5106-21	1/10/06	70.5 to 73.5 ft bml	Subtidal	0.0	0.0	0.0
36-25	8/5/02	25 ft bgs	Upland	0.0	0.0	0.0
5-25	11/6/02	25 ft bgs	Upland	0.0	0.0	0.0
22-70	8/14/03	70 ft bgs	Upland	0.0	0.0	0.0
35-50	11/8/02	50 ft bgs	Upland	0.0	0.0	0.0
5106-10	11/3/05	47 to 50 ft bml	Subtidal	0.0	0.0	0.0
Dock2-9	9/8/05	29 to 32 ft bml	Subtidal	0.0	0.0	0.0
PT-7	7/24/03	8 to 10 ft bml	Subtidal	0.0	0.0	0.0
709-MW20-25	8/23/12	25 ft bgs	Upland	0.0	0.0	0.0
5106-3	9/20/05	35 to 38 ft bml	Subtidal	0.0	0.0	0.0
23-50	11/12/04	50 ft bgs	Upland	0.0	0.0	0.0
HYD-4	9/26/05	116 to 119 ft bml	Subtidal	0.0	0.0	0.0
NL-13	12/20/05	9 to 12 ft bml	Intertidal	0.0	0.0	0.0
5106-5	9/9/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
5106-5	9/12/05	74 to 77 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
5106-19	1/14/06	30.5 to 33.5 ft bml	Subtidal	0.0	0.0	0.0
NL-24	1/15/07	6.5 to 9.5 ft bml	Subtidal	0.0	0.0	0.0
MW-H-01	9/27/2013	181.2 ft BGS	Upland	0.0	0.0	0.0
Pier25-3	8/16/05	76.7 to 79.7 ft bml	Subtidal	0.0	0.0	0.0
NL-13	12/20/05	3 to 6 ft bml	Intertidal	0.0	0.0	0.0
PT-13A	11/10/05	101.9 to 104.9 ft bml	Subtidal	0.0	0.0	0.0
35-25	8/18/04	25 ft bgs	Upland	0.0	0.0	0.0
PT-7	7/24/03	6 to 8 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/4/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
5106-24	2/8/06	7 to 10 ft bml	Intertidal	0.0	0.0	0.0
15-120	5/13/03	120 ft bgs	Upland	0.0	0.0	0.0
5106-14	12/2/05	77 to 80 ft bml	Subtidal	0.0	0.0	0.0
23-50	8/20/04	50 ft bgs	Upland	0.0	0.0	0.0
709-MW18-15	3/11/04	15 ft bgs	Upland	0.0	0.0	0.0
Pier25-9	10/25/05	41.5 to 44.5 ft bml	Subtidal	0.0	0.0	0.0
4-115R	2/9/04	115 ft bgs	Upland	0.0	0.0	0.0
Pier25-6	8/18/05	85.9 to 88.9 ft bml	Subtidal	0.0	0.0	0.0
34-100	5/1/06	100 ft bgs	Upland	0.0	0.0	0.0
4-175R	8/4/02	175 ft bgs	Upland	0.0	0.0	0.0
709-MW19-15	7/28/12	15 ft bgs	Upland	0.0	0.0	0.0
HYD-7	8/31/05	20 to 23 ft bml	Subtidal	0.0	0.0	0.0
NL-13	12/20/05	6 to 9 ft bml	Intertidal	0.0	0.0	0.0
23-50	2/4/04	50 ft bgs	Upland	0.0	0.0	0.0
6A-24.5	3/23/04	24.5 ft bgs	Upland	0.0	0.0	0.0
5-50	7/31/02	50 ft bgs	Upland	0.0	0.0	0.0
HYD-2	8/31/05	108 to 111 ft bml	Subtidal	0.0	0.0	0.0
68-50	7/14/04	50 ft bgs	Upland	0.0	0.0	0.0
11-45	8/7/12	45 ft bgs	Upland	0.0	0.0	0.0
68-50	4/11/06	50 ft bgs	Upland	0.0	0.0	0.0
709-MW18-15	7/26/12	15 ft bgs	Upland	0.0	0.0	0.0
Pier25-26	1/24/06	81.5 to 84.5 ft bml	Subtidal	0.0	0.0	0.0
709-MW13-15	3/10/04	13 ft bgs	Upland	0.0	0.0	0.0
15-120	2/3/04	120 ft bgs	Upland	0.0	0.0	0.0
5106-26	2/15/06	62 to 65 ft bml	Intertidal	0.0	0.0	0.0
Pier25-19	12/8/05	112.6 to 115.6 ft bml	Subtidal	0.0	0.0	0.0
18-50R	2/7/03	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-23	1/11/06	63 to 66 ft bml	Subtidal	0.0	0.0	0.0
MW-G-DEEP	9/25/2013	225 ft BGS	Upland	0.0	0.0	0.0
Pier25-9	10/25/05	81.5 to 84.5 ft bml	Subtidal	0.0	0.0	0.0
5-50	4/30/02	50 ft bgs	Upland	0.0	0.0	0.0
5106-5	9/9/05	49 to 52 ft bml	Subtidal	0.0	0.0	0.0
Pier25-20	12/6/05	80 to 82 ft bml	Subtidal	0.0	0.0	0.0
PT-11	6/14/04	40.5 to 41 ft bml	Subtidal	0.0	0.0	0.0
15-25R	1/29/02	25 ft bgs	Upland	0.0	0.0	0.0
23-50	11/14/03	50 ft bgs	Upland	0.0	0.0	0.0
23-50	5/17/05	50 ft bgs	Upland	0.0	0.0	0.0
4-175R	2/9/04	175 ft bgs	Upland	0.0	0.0	0.0
23-50	2/7/03	50 ft bgs	Upland	0.0	0.0	0.0
PT-15A	11/11/05	121 to 124 ft bml	Subtidal	0.0	0.0	0.0
709-MW15-15	3/10/04	15 ft bgs	Upland	0.0	0.0	0.0
36-25	11/9/04	25 ft bgs	Upland	0.0	0.0	0.0
709-MW17-15	7/21/12	15 ft bgs	Upland	0.0	0.0	0.0
15-120	8/19/04	120 ft bgs	Upland	0.0	0.0	0.0
36-25	4/30/02	25 ft bgs	Upland	0.0	0.0	0.0
53C-160	7/24/12	160 ft bgs	Upland	0.0	0.0	0.0
4-175R	2/4/03	175 ft bgs	Upland	0.0	0.0	0.0
5-50	8/14/03	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/29/2013	162 to 164 ft BGS	Upland	0.0	0.0	0.0
5106-9	11/2/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
11-183	4/25/06	183 ft bgs	Upland	0.0	0.0	0.0
5-50	2/7/03	50 ft bgs	Upland	0.0	0.0	0.0
50-15	3/16/04	15 ft bgs	Upland	0.0	0.0	0.0
68-50	5/17/05	50 ft bgs	Upland	0.0	0.0	0.0
PT-18	6/22/04	38 to 39 ft bml	Intertidal	0.0	0.0	0.0
HYD-4	9/23/05	56 to 59 ft bml	Subtidal	0.0	0.0	0.0
22-70	4/13/06	70 ft bgs	Upland	0.0	0.0	0.0
8-54	8/19/04	54 ft bgs	Upland	0.0	0.0	0.0
5106-9	11/2/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
MW-G-DEEP	7/24/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
5106-9	11/2/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
Pier25-16	11/22/05	94.4 to 97.4 ft bml	Subtidal	0.0	0.0	0.0
53-100	4/17/06	100 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/31/2013	212 to 214 ft BGS	Upland	0.0	0.0	0.0
14-25R	5/12/04	25 ft bgs	Upland	0.0	0.0	0.0
57-50	5/13/03	50 ft bgs	Upland	0.0	0.0	0.0
14-25R	6/1/04	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-22	1/18/06	70.1 to 73.1 ft bml	Subtidal	0.0	0.0	0.0
12-45	2/6/03	45 ft bgs	Upland	0.0	0.0	0.0
5-50	11/13/03	50 ft bgs	Upland	0.0	0.0	0.0
PT-15A	11/11/05	131 to 134 ft bml	Subtidal	0.0	0.0	0.0
MW-F-DEEP	7/1/2013	67 to 69 ft BGS	Upland	0.0	0.0	0.0
5-50	11/6/02	50 ft bgs	Upland	0.0	0.0	0.0
9-25	3/16/04	25 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/8/2013	157 to 159 ft BGS	Upland	0.0	0.0	0.0
5106-14	12/2/05	57 to 60 ft bml	Subtidal	0.0	0.0	0.0
5106-5	9/9/05	54 to 57 ft bml	Subtidal	0.0	0.0	0.0
23-50	8/14/03	50 ft bgs	Upland	0.0	0.0	0.0
HYD-7	9/1/05	40 to 43 ft bml	Subtidal	0.0	0.0	0.0
40-50	5/5/02	50 ft bgs	Upland	0.0	0.0	0.0
15-25R	11/12/04	25 ft bgs	Upland	0.0	0.0	0.0
HYD-6	9/30/05	12.3 to 15.3 ft bml	Subtidal	0.0	0.0	0.0
8-54	11/12/04	54 ft bgs	Upland	0.0	0.0	0.0
PT-13A	11/10/05	111.9 to 114.9 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/17/05	18 to 21 ft bml	Subtidal	0.2	0.0	0.2
5-50	5/12/03	50 ft bgs	Upland	0.0	0.0	0.0
5106-5	9/9/05	44 to 47 ft bml	Subtidal	0.0	0.0	0.0
Pier25-30	1/27/06	70 to 73 ft bml	Subtidal	0.0	0.0	0.0
21C-50	7/25/12	50 ft bgs	Upland	0.0	0.0	0.0
23-50	5/12/03	50 ft bgs	Upland	0.0	0.0	0.0
46-100	4/12/06	100 ft bgs	Upland	0.0	0.0	0.0
NL-15	12/16/05	12 to 15 ft bml	Intertidal	0.0	0.0	0.0
5106-5	9/12/05	69 to 72 ft bml	Subtidal	0.0	0.0	0.0
24-15	8/15/12	15 ft bgs	Upland	0.0	0.0	0.0
11-183	8/14/03	183 ft bgs	Upland	0.0	0.0	0.0
11-183	2/12/04	183 ft bgs	Upland	0.0	0.0	0.0
15-120	5/13/04	120 ft bgs	Upland	0.0	0.0	0.0
15-25R	8/13/02	25 ft bgs	Upland	0.0	0.0	0.0
48-15	8/10/12	15 ft bgs	Upland	0.0	0.0	0.0
PT-17	6/24/04	38 to 39 ft bml	Subtidal	0.0	0.0	0.0
5106-26	2/15/06	77 to 80 ft bml	Intertidal	0.0	0.0	0.0
MW-F-DEEP	7/9/2013	177 to 179 ft BGS	Upland	0.0	0.0	0.0
15-25R	2/3/04	25 ft bgs	Upland	0.0	0.0	0.0
15-25R	5/12/05	25 ft bgs	Upland	0.0	0.0	0.0
HYD-4	9/23/05	46 to 49 ft bml	Subtidal	0.0	0.0	0.0
5106-14	12/1/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
15-25R	11/19/03	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-9	10/25/05	51.5 to 54.5 ft bml	Subtidal	0.0	0.0	0.0
HYD-3	8/12/05	51 to 54 ft bml	Subtidal	0.0	0.0	0.0

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
15-25R	4/11/06	25 ft bgs	Upland	0.0	0.0	0.0
5106-27	4/12/06	79 to 83 ft bml	Intertidal	0.0	0.0	0.0
PT-18	6/22/04	39 to 42 ft bml	Intertidal	0.0	0.0	0.0
5-50	2/5/04	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-15	11/30/05	49 to 52 ft bml	Subtidal	0.0	0.0	0.0
15-120	5/1/06	120 ft bgs	Upland	0.0	0.0	0.0
50-15	8/11/12	15 ft bgs	Upland	0.0	0.0	0.0
Pier25-13	2/3/06	120 to 123 ft bml	Subtidal	0.0	0.0	0.0
15-25R	8/17/04	25 ft bgs	Upland	0.0	0.0	0.0
PT-15A	11/14/05	151 to 154 ft bml	Subtidal	0.0	0.0	0.0
Pier25-19	12/7/05	12.6 to 15.6 ft bml	Subtidal	0.0	0.0	0.0
51-15	3/17/04	15 ft bgs	Upland	0.0	0.0	0.0
15-25R	5/4/02	25 ft bgs	Upland	0.0	0.0	0.0
15-25R	5/6/03	25 ft bgs	Upland	0.0	0.0	0.0
40-50	8/8/02	50 ft bgs	Upland	0.0	0.0	0.0
5106-24	2/8/06	22 to 25 ft bml	Intertidal	0.0	0.0	0.0
Pier25-28	1/24/06	30 to 33 ft bml	Subtidal	0.0	0.0	0.0
15-120	5/6/02	120 ft bgs	Upland	0.0	0.0	0.0
5-25	5/12/03	25 ft bgs	Upland	0.0	0.0	0.0
5-50	4/6/06	50 ft bgs	Upland	0.0	0.0	0.0
41-138	1/29/02	138 ft bgs	Upland	0.0	0.0	0.0
23-50	2/18/05	50 ft bgs	Upland	0.0	0.0	0.0
15-25R	2/9/05	25 ft bgs	Upland	0.0	0.0	0.0
5106-24	2/8/06	32 to 35 ft bml	Intertidal	0.0	0.0	0.0
Pier25-24	1/13/06	84.1 to 87.1 ft bml	Subtidal	0.0	0.0	0.0
PT-10	6/14/04	39.5 to 40 ft bml	Subtidal	0.0	0.0	0.0
NL-23	8/14/06	9 to 12 ft bml	Subtidal	0.0	0.0	0.0
HYD-1	8/31/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
60-50	8/19/03	50 ft bgs	Upland	0.0	0.0	0.0
11-183	2/11/03	183 ft bgs	Upland	0.0	0.0	0.0
5106-26	2/15/06	57 to 60 ft bml	Intertidal	0.0	0.0	0.0
23-50	4/10/06	50 ft bgs	Upland	0.0	0.0	0.0
5-50	8/16/04	50 ft bgs	Upland	0.0	0.0	0.0
NL-17	3/31/06	12 to 15 ft bml	Intertidal	0.0	0.0	0.0
5-50	5/11/04	50 ft bgs	Upland	0.0	0.0	0.0
69-50	4/11/06	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-17	11/17/05	93.7 to 96.7 ft bml	Subtidal	0.0	0.0	0.0
Dock2-9	9/8/05	19 to 22 ft bml	Subtidal	0.0	0.0	0.0
11-183	8/7/02	183 ft bgs	Upland	0.0	0.0	0.0
5106-5	9/12/05	79 to 82 ft bml	Subtidal	0.0	0.0	0.0
11-183	2/1/02	183 ft bgs	Upland	0.0	0.0	0.0
HYD-3	8/18/05	131 to 134 ft bml	Subtidal	0.0	0.0	0.0
15-25R	11/7/02	25 ft bgs	Upland	0.0	0.0	0.0
15-25R	5/12/04	25 ft bgs	Upland	0.0	0.0	0.0
5106-10	11/4/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
8-54	5/11/04	54 ft bgs	Upland	0.0	0.0	0.0
15-25R	2/4/03	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-8	8/26/05	74 to 77 ft bml	Subtidal	0.0	0.0	0.0
5-50	8/8/12	50 ft bgs	Upland	0.0	0.0	0.0
61-25	8/20/03	25 ft bgs	Upland	0.0	0.0	0.0
15-25R	8/16/03	25 ft bgs	Upland	0.0	0.0	0.0
5-25	5/11/04	25 ft bgs	Upland	0.0	0.0	0.0
8-54	5/19/05	54 ft bgs	Upland	0.0	0.0	0.0
5106-14	12/1/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
19-25	8/14/03	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-6	8/18/05	95.9 to 98.9 ft bml	Subtidal	0.0	0.0	0.0
12A-25	5/1/06	25 ft bgs	Upland	0.0	0.0	0.0
709-MW16-75	7/28/12	75 ft bgs	Upland	0.0	0.0	0.0
8-54	2/5/03	54 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
709-MW15-15	8/15/12	15 ft bgs	Upland	0.0	0.0	0.0
Pier25-23	1/12/06	93 to 96 ft bml	Subtidal	0.0	0.0	0.0
Pier25-28	1/25/06	40 to 43 ft bml	Subtidal	0.0	0.0	0.0
5106-5	9/10/05	59 to 61 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	69 to 72 ft bml	Subtidal	0.0	0.0	0.0
43-25	2/7/04	25 ft bgs	Upland	0.0	0.0	0.0
HYD-4	9/26/05	106 to 109 ft bml	Subtidal	0.0	0.0	0.0
WW-A1R	8/22/12	30 to 30 ft bml	Subtidal	0.0	0.0	0.0
8-54	11/6/02	54 ft bgs	Upland	0.0	0.0	0.0
5-50	11/9/04	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-20	12/6/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
Pier25-8	8/26/05	84 to 87 ft bml	Subtidal	0.0	0.0	0.0
5-50	5/10/05	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-8	8/22/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
SB-B-DEEP	8/12/2013	192 to 194 ft BGS	Upland	0.0	0.0	0.0
25A-25	4/10/06	25 ft bgs	Upland	0.0	0.0	0.0
36-25	8/17/03	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	5/7/03	25 ft bgs	Upland	0.0	0.0	0.0
5-25	8/14/03	25 ft bgs	Upland	0.0	0.0	0.0
NL-24	1/15/07	11.5 to 14.5 ft bml	Subtidal	0.0	0.0	0.0
57-50	2/12/03	50 ft bgs	Upland	0.0	0.0	0.0
SB-B-DEEP	8/12/2013	192 to 194 ft BGS	Upland	0.0	0.0	0.0
55-50	4/13/06	50 ft bgs	Upland	0.0	0.0	0.0
NL-13	12/20/05	12 to 15 ft bml	Intertidal	0.0	0.0	0.0
5106-24	2/9/06	97 to 100 ft bml	Intertidal	0.0	0.0	0.0
12-160	2/6/03	160 ft bgs	Upland	0.0	0.0	0.0
55-25	8/24/12	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-2	7/15/05	66 to 69 ft bml	Subtidal	0.0	0.0	0.0
12A-50	8/21/12	50 ft bgs	Upland	0.0	0.0	0.0
8-54	2/17/05	54 ft bgs	Upland	0.0	0.0	0.0
5-25	1/24/02	25 ft bgs	Upland	0.0	0.0	0.0
64-50	8/15/03	50 ft bgs	Upland	0.0	0.0	0.0
36-100R	5/4/02	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-29	2/7/06	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
NL-23	8/15/06	18 to 21 ft bml	Subtidal	0.0	0.0	0.0
5-50	2/10/05	50 ft bgs	Upland	0.0	0.0	0.0
40-50	2/15/05	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/24/2013	82 to 84 ft BGS	Upland	0.0	0.0	0.0
14-25R	11/12/04	25 ft bgs	Upland	0.0	0.0	0.0
HYD-7	9/1/05	30 to 33 ft bml	Subtidal	0.0	0.0	0.0
Pier25-26	1/24/06	91.5 to 94.5 ft bml	Subtidal	0.0	0.0	0.0
41-138	8/7/02	138 ft bgs	Upland	0.0	0.0	0.0
5106-26	2/15/06	72 to 75 ft bml	Intertidal	0.0	0.0	0.0
PT-11	6/14/04	20.5 to 21 ft bml	Subtidal	0.0	0.0	0.0
NL-17	3/31/06	18 to 21 ft bml	Intertidal	0.0	0.0	0.0
41-138	8/15/03	138 ft bgs	Upland	0.0	0.0	0.0
61C-25	7/17/12	25 ft bgs	Upland	0.0	0.0	0.0
5106-1	9/29/05	90 to 93 ft bml	Subtidal	0.0	0.0	0.0
16-25	5/10/05	25 ft bgs	Upland	0.0	0.0	0.0
64-25	8/15/03	25 ft bgs	Upland	0.0	0.0	0.0
4-175R	4/4/06	175 ft bgs	Upland	0.0	0.0	0.0
5106-20	1/6/06	78.5 to 81.5 ft bml	Subtidal	0.0	0.0	0.0
MW-F-DEEP	7/1/2013	87 to 89 ft BGS	Upland	0.0	0.0	0.0
22-25R	2/8/03	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-1	7/20/05	4.5 to 7.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/7/06	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
15-120	8/20/03	120 ft bgs	Upland	0.0	0.0	0.0
8-54	5/6/03	54 ft bgs	Upland	0.0	0.0	0.0
36-100R	8/1/12	100 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS IN GROUNDWATER OCCIDENTAL CHEMICAL CORPORATION TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
40-50	2/6/03	50 ft bgs	Upland	0.0	0.0	0.0
NL-23	8/14/06	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
Pier25-24	1/12/06	24.1 to 27.1 ft bml	Subtidal	0.0	0.0	0.0
5106-14	12/2/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
HYD-6	10/4/05	92.3 to 95.3 ft bml	Subtidal	0.0	0.0	0.0
22-25R	8/1/02	25 ft bgs	Upland	0.0	0.0	0.0
19-25	1/23/02	25 ft bgs	Upland	0.0	0.0	0.0
40-50	5/13/04	50 ft bgs	Upland	0.0	0.0	0.0
8-54	11/17/03	54 ft bgs	Upland	0.0	0.0	0.0
709-MW16-50	7/28/12	50 ft bgs	Upland	0.0	0.0	0.0
NL-13	12/21/05	15 to 18 ft bml	Intertidal	0.0	0.0	0.0
32-100	5/1/06	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-9	10/25/05	61.5 to 64.5 ft bml	Subtidal	0.0	0.0	0.0
5106-20	1/4/06	3.5 to 6.5 ft bml	Subtidal	0.0	0.0	0.0
NL-24	1/15/07	16.5 to 19.5 ft bml	Subtidal	0.0	0.0	0.0
14-25R	5/11/05	25 ft bgs	Upland	0.0	0.0	0.0
34C-100	8/21/12	100 ft bgs	Upland	0.0	0.0	0.0
5-25	8/16/04	25 ft bgs	Upland	0.0	0.0	0.0
40-50	11/15/04	50 ft bgs	Upland	0.0	0.0	0.0
41-138	8/18/04	138 ft bgs	Upland	0.0	0.0	0.0
19-25	8/13/04	25 ft bgs	Upland	0.0	0.0	0.0
48-15	3/16/04	15 ft bgs	Upland	0.0	0.0	0.0
MW-F-SHALLOW-NEW	10/11/2013	100.5 ft BGS	Upland	0.0	0.0	0.0
41-138	2/13/04	138 ft bgs	Upland	0.0	0.0	0.0
Pier25-22	1/18/06	80.1 to 83.1 ft bml	Subtidal	0.0	0.0	0.0
11-45	4/25/06	45 ft bgs	Upland	0.0	0.0	0.0
709-MW16-15	7/27/12	15 ft bgs	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	4 to 7 ft bml	Subtidal	0.0	0.0	0.0
19-25	7/31/02	25 ft bgs	Upland	0.0	0.0	0.0
5-25	5/10/05	25 ft bgs	Upland	0.0	0.0	0.0
PT-13A	11/10/05	131.9 to 134.9 ft bml	Subtidal	0.0	0.0	0.0
19-25	2/4/04	25 ft bgs	Upland	0.0	0.0	0.0
5-25	4/7/06	25 ft bgs	Upland	0.0	0.0	0.0
5106-10	11/3/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
8-54	2/17/04	54 ft bgs	Upland	0.0	0.0	0.0
41-138	2/11/03	138 ft bgs	Upland	0.0	0.0	0.0
41-138	2/16/05	138 ft bgs	Upland	0.0	0.0	0.0
5-25	2/17/05	25 ft bgs	Upland	0.0	0.0	0.0
HYD-3	8/11/05	41 to 44 ft bml	Subtidal	0.0	0.0	0.0
Pier25-2	8/19/05	126 to 129 ft bml	Subtidal	0.0	0.0	0.0
15-120	11/19/03	120 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/25/2013	112 to 114 ft BGS	Upland	0.0	0.0	0.0
NL-23	8/15/06	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
5-25	4/30/02	25 ft bgs	Upland	0.0	0.0	0.0
15-120	2/21/05	120 ft bgs	Upland	0.0	0.0	0.0
21-48	5/1/06	48 ft bgs	Upland	0.0	0.0	0.0
21C-75	7/25/12	75 ft bgs	Upland	0.0	0.0	0.0
5-25	11/13/03	25 ft bgs	Upland	0.0	0.0	0.0
40-50	11/12/02	50 ft bgs	Upland	0.0	0.0	0.0
55-25	4/17/06	25 ft bgs	Upland	0.0	0.0	0.0
NL-23	8/15/06	21 to 24 ft bml	Subtidal	0.0	0.0	0.0
5106-26	2/14/06	12 to 15 ft bml	Intertidal	0.0	0.0	0.0
MW-G-DEEP	7/23/2013	52 to 54 ft BGS	Upland	0.0	0.0	0.0
Pier25-3	8/17/05	116.7 to 119.7 ft bml	Subtidal	0.0	0.0	0.0
23-50	4/30/02	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-8	8/22/05	44 to 47 ft bml	Subtidal	0.0	0.0	0.0
Pier25-8	8/26/05	114 to 117 ft bml	Subtidal	0.0	0.0	0.0
40-50	5/18/05	50 ft bgs	Upland	0.0	0.0	0.0
36-25	5/13/03	25 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
69-50	7/14/04	50 ft bgs	Upland	0.0	0.0	0.0
5106-1	9/28/05	85 to 88 ft bml	Subtidal	0.0	0.0	0.0
40-50	4/13/06	50 ft bgs	Upland	0.0	0.0	0.0
19-25	2/9/05	25 ft bgs	Upland	0.0	0.0	0.0
5-25	11/9/04	25 ft bgs	Upland	0.0	0.0	0.0
NL-14	12/14/05	13 to 16 ft bml	Subtidal	0.0	0.0	0.0
23-50	7/31/02	50 ft bgs	Upland	0.0	0.0	0.0
19-25	4/6/06	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-11	10/7/05	85 to 88 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	39 to 42 ft bml	Subtidal	0.0	0.0	0.0
PT-3	7/25/03	6 to 8 ft bml	Subtidal	0.0	0.0	0.0
5106-13	11/30/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
43-25	8/18/03	25 ft bgs	Upland	0.0	0.0	0.0
19-25	2/7/03	25 ft bgs	Upland	0.0	0.0	0.0
30-15	3/17/04	15 ft bgs	Upland	0.0	0.0	0.0
64-25	11/15/03	25 ft bgs	Upland	0.0	0.0	0.0
5-100	2/10/04	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-10	10/28/05	106 to 109 ft bml	Subtidal	0.0	0.0	0.0
Pier25-6	8/18/05	105.9 to 108.9 ft bml	Subtidal	0.0	0.0	0.0
8-54	5/5/02	54 ft bgs	Upland	0.0	0.0	0.0
40-50	8/18/04	50 ft bgs	Upland	0.0	0.0	0.0
PZ-SHI-1-75	4/27/06	41 to 46 ft bml	Subtidal	0.0	0.0	0.0
8-54	4/25/06	54 ft bgs	Upland	0.0	0.0	0.0
5106-11	10/13/05	27 to 30 ft bml	Subtidal	0.0	0.0	0.0
Pier25-30	1/27/06	80 to 83 ft bml	Subtidal	0.0	0.0	0.0
40-50	5/7/03	50 ft bgs	Upland	0.0	0.0	0.0
35-100R	12/9/08	100 ft bgs	Upland	0.0	0.0	0.0
14-25R	2/8/05	25 ft bgs	Upland	0.0	0.0	0.0
5106-20	1/6/06	93.5 to 96.5 ft bml	Subtidal	0.0	0.0	0.0
8-23	5/19/05	23 ft bgs	Upland	0.0	0.0	0.0
11-183	8/7/12	183 ft bgs	Upland	0.0	0.0	0.0
64-25	6/12/03	25 ft bgs	Upland	0.0	0.0	0.0
34C-130	8/20/12	130 ft bgs	Upland	0.0	0.0	0.0
Dock2-4	7/28/05	19 to 22 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	59.3 to 62.3 ft bml	Subtidal	0.0	0.0	0.0
5-100	8/16/03	100 ft bgs	Upland	0.0	0.0	0.0
15-120	8/8/02	120 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/1/2013	77 to 79 ft BGS	Upland	0.0	0.0	0.0
5106-9	11/2/05	107 to 110 ft bml	Subtidal	0.0	0.0	0.0
Pier25-15	11/30/05	59 to 62 ft bml	Subtidal	0.0	0.0	0.0
Pier25-9	10/25/05	71.5 to 74.5 ft bml	Subtidal	0.0	0.0	0.0
15-120	5/11/05	120 ft bgs	Upland	0.0	0.0	0.0
40-50	8/18/03	50 ft bgs	Upland	0.0	0.0	0.0
28-15	3/23/04	15 ft bgs	Upland	0.0	0.0	0.0
5106-13	11/30/05	107 to 110 ft bml	Subtidal	0.0	0.0	0.0
5106-14	12/2/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
15-120	8/15/12	120 ft bgs	Upland	0.0	0.0	0.0
709-MW16-15	3/11/04	15 ft bgs	Upland	0.0	0.0	0.0
19-25	12/5/08	25 ft bgs	Upland	0.0	0.0	0.0
22-25R	1/28/02	25 ft bgs	Upland	0.0	0.0	0.0
5106-13	11/30/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
36-100R	1/26/02	100 ft bgs	Upland	0.0	0.0	0.0
35-50	5/7/03	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-16	11/22/05	114.4 to 117.4 ft bml	Subtidal	0.0	0.0	0.0
Dock2-10	9/13/05	22.6 to 25.6 ft bml	Subtidal	0.0	0.0	0.0
40-50	1/27/02	50 ft bgs	Upland	0.0	0.0	0.0
60-25	4/11/06	25 ft bgs	Upland	0.0	0.0	0.0
57-50	8/17/03	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-17	12/12/05	15.5 to 18.5 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

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IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
Pier25-24	1/13/06	94.1 to 97.1 ft bml	Subtidal	0.0	0.0	0.0
5-100	5/17/05	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-9	10/25/05	31.5 to 34.5 ft bml	Subtidal	0.0	0.0	0.0
65-25	8/12/12	25 ft bgs	Upland	0.0	0.0	0.0
36-25	8/1/12	25 ft bgs	Upland	0.0	0.0	0.0
HYD-7	9/14/05	50 to 53 ft bml	Subtidal	0.0	0.0	0.0
Pier25-20	12/6/05	70 to 73 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/2/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
5-25	7/31/02	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	59 to 62 ft bml	Subtidal	0.0	0.0	0.0
36-100R	2/10/03	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-3	8/17/05	96.7 to 99.7 ft bml	Subtidal	0.0	0.0	0.0
41-100	2/16/05	100 ft bgs	Upland	0.0	0.0	0.0
709-MW16-25	7/27/12	25 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/25/2013	122 to 124 ft BGS	Upland	0.0	0.0	0.0
Dock2-8	8/22/05	14 to 17 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
49-15	8/11/12	15 ft bgs	Upland	0.0	0.0	0.0
5106-8	8/3/05	19 to 22 ft bml	Subtidal	0.0	0.0	0.0
Dock2-10	9/13/05	12.6 to 15.6 ft bml	Subtidal	0.0	0.0	0.0
Dock2-1	7/20/05	8 to 11 ft bml	Subtidal	0.0	0.0	0.0
29-14	3/23/04	14 ft bgs	Upland	0.0	0.0	0.0
Dock2-12	11/8/05	37 to 40 ft bml	Subtidal	0.0	0.0	0.0
21C-100	7/25/12	100 ft bgs	Upland	0.0	0.0	0.0
40-50	2/16/04	50 ft bgs	Upland	0.0	0.0	0.0
34C-160	8/20/12	160 ft bgs	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
Dock2-10	9/13/05	32.6 to 35.6 ft bml	Subtidal	0.0	0.0	0.0
Dock2-10	9/13/05	17.9 to 20.6 ft bml	Subtidal	0.0	0.0	0.0
45-50	1/26/02	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/23/2013	62 to 64 ft BGS	Upland	0.0	0.0	0.0
3-25	6/2/04	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-25	1/20/06	90 to 93 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	49 to 52 ft bml	Subtidal	0.0	0.0	0.0
5106-24	2/8/06	27 to 30 ft bml	Intertidal	0.0	0.0	0.0
69-25	5/17/05	25 ft bgs	Upland	0.0	0.0	0.0
36-100R	5/13/03	100 ft bgs	Upland	0.0	0.0	0.0
36-100R	11/11/02	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-3	8/16/05	56.7 to 59.7 ft bml	Subtidal	0.0	0.0	0.0
15-50R	8/17/04	50 ft bgs	Upland	0.0	0.0	0.0
43-25	1/22/02	25 ft bgs	Upland	0.0	0.0	0.0
21C-130	7/25/12	130 ft bgs	Upland	0.0	0.0	0.0
43-25	5/10/05	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
Pier25-6	2/4/06	41 to 44 ft bml	Subtidal	0.0	0.0	0.0
Dock2-10	9/13/05	37.6 to 40.6 ft bml	Subtidal	0.0	0.0	0.0
12-160	4/26/06	160 ft bgs	Upland	0.0	0.0	0.0
36-100R	8/5/02	100 ft bgs	Upland	0.0	0.0	0.0
SB-B-DEEP	8/6/2013	82 to 84 ft BGS	Upland	0.0	0.0	0.0
Pier25-3	8/17/05	126.7 to 129.7 ft bml	Subtidal	0.0	0.0	0.0
Pier25-3	8/16/05	86.7 to 89.7 ft bml	Subtidal	0.0	0.0	0.0
16-25	2/4/04	25 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	6/28/2013	57 to 59 ft BGS	Upland	0.0	0.0	0.0
Dock2-8	8/23/05	74 to 77 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/7/05	117 to 120 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
22-25R	8/14/03	25 ft bgs	Upland	0.0	0.0	0.0
12-75	8/24/12	75 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS IN GROUNDWATER OCCIDENTAL CHEMICAL CORPORATION TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
69-25	2/19/05	25 ft bgs	Upland	0.0	0.0	0.0
18-50R	2/4/04	50 ft bgs	Upland	0.0	0.0	0.0
60-50	8/15/12	50 ft bgs	Upland	0.0	0.0	0.0
5106-10	11/7/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
60-25	8/19/03	25 ft bgs	Upland	0.0	0.0	0.0
8-23	8/19/03	23 ft bgs	Upland	0.0	0.0	0.0
Dock2-10	9/12/05	7.6 to 10.6 ft bml	Subtidal	0.0	0.0	0.0
Pier25-6	2/4/06	31 to 34 ft bml	Subtidal	0.0	0.0	0.0
41C-75	7/16/12	75 ft bgs	Upland	0.0	0.0	0.0
Dock2-10	9/13/05	27.6 to 30.6 ft bml	Subtidal	0.0	0.0	0.0
5106-13	11/29/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0
MW-H-01	6/20/2013	102 to 104 ft BGS	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	39 to 42 ft bml	Subtidal	0.0	0.0	0.0
46C-25	8/22/12	25 ft bgs	Upland	0.0	0.0	0.0
5-25	8/8/12	25 ft bgs	Upland	0.0	0.0	0.0
22-25R	8/14/04	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-18	12/9/05	112 to 115 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/10/05	11 to 14 ft bml	Subtidal	0.0	0.0	0.0
43-25	8/1/02	25 ft bgs	Upland	0.0	0.0	0.0
69-25	4/11/06	25 ft bgs	Upland	0.0	0.0	0.0
5106-26	2/16/06	87 to 90 ft bml	Intertidal	0.0	0.0	0.0
64-100	12/4/08	100 ft bgs	Upland	0.0	0.0	0.0
21C-160	7/25/12	160 ft bgs	Upland	0.0	0.0	0.0
Pier25-9	10/26/05	121.5 to 124.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/20/05	4 to 7 ft bml	Subtidal	0.0	0.0	0.0
8-54	12/2/08	54 ft bgs	Upland	0.0	0.0	0.0
67-25	7/26/12	25 ft bgs	Upland	0.0	0.0	0.0
64-170	7/26/12	170 ft bgs	Upland	0.0	0.0	0.0
56-50	8/17/03	50 ft bgs	Upland	0.0	0.0	0.0
8-23	11/17/03	23 ft bgs	Upland	0.0	0.0	0.0
Pier25-30	1/27/06	90 to 93 ft bml	Subtidal	0.0	0.0	0.0
25-25	8/20/04	25 ft bgs	Upland	0.0	0.0	0.0
5106-13	11/30/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
45-50	4/18/06	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-20	12/6/05	90 to 93 ft bml	Subtidal	0.0	0.0	0.0
5106-20	1/6/06	83.5 to 86.5 ft bml	Subtidal	0.0	0.0	0.0
40A-25	2/16/05	25 ft bgs	Upland	0.0	0.0	0.0
43-25	5/11/04	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-4	7/29/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
36-25	5/10/05	25 ft bgs	Upland	0.0	0.0	0.0
18-50R	5/11/05	50 ft bgs	Upland	0.0	0.0	0.0
SB-B-DEEP	8/6/2013	72 to 74 ft BGS	Upland	0.0	0.0	0.0
Pier25-8	8/26/05	104 to 107 ft bml	Subtidal	0.0	0.0	0.0
40-25	2/15/05	25 ft bgs	Upland	0.0	0.0	0.0
69-25	7/27/12	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-17	11/21/05	103.7 to 106.7 ft bml	Subtidal	0.0	0.0	0.0
16-25	8/14/03	25 ft bgs	Upland	0.0	0.0	0.0
MW-EXT-9-DEEP	7/11/2013	72 to 74 ft BGS	Upland	0.0	0.0	0.0
3-25	8/28/12	25 ft bgs	Upland	0.0	0.0	0.0
43-25	5/7/03	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-8	8/26/05	124 to 127 ft bml	Subtidal	0.0	0.0	0.0
HYD-3	8/12/05	61 to 64 ft bml	Subtidal	0.0	0.0	0.0
Pier25-6	2/4/06	21 to 24 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/10/05	16 to 19 ft bml	Subtidal	0.0	0.0	0.0
43-25	8/14/04	25 ft bgs	Upland	0.0	0.0	0.0
69-25	7/14/04	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	54 to 57 ft bml	Subtidal	0.0	0.0	0.0
40A-25	11/15/04	25 ft bgs	Upland	0.0	0.0	0.0
43-25	11/14/03	25 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
40A-25	5/18/05	25 ft bgs	Upland	0.0	0.0	0.0
41C-50	7/16/12	50 ft bgs	Upland	0.0	0.0	0.0
NL-28	1/17/07	11.5 to 14.5 ft bml	Intertidal	0.0	0.0	0.0
15-50R	5/4/02	50 ft bgs	Upland	0.0	0.0	0.0
5106-26	2/14/06	7 to 10 ft bml	Intertidal	0.0	0.0	0.0
709-MW18-50	7/26/12	50 ft bgs	Upland	0.0	0.0	0.0
5106-21	1/11/06	85.5 to 88.5 ft bml	Subtidal	0.0	0.0	0.0
25-50	8/17/03	50 ft bgs	Upland	0.0	0.0	0.0
35-50	8/18/04	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-10	10/28/05	116 to 119 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/3/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
12A-25	8/21/12	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-3	7/22/05	8 to 11 ft bml	Subtidal	0.0	0.0	0.0
NL-14	12/15/05	19 to 22 ft bml	Subtidal	0.0	0.0	0.0
22-25R	2/18/05	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-3	8/16/05	66.7 to 69.7 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/4/05	67 to 70 ft bml	Subtidal	0.0	0.0	0.0
43-25	4/30/02	25 ft bgs	Upland	0.0	0.0	0.0
36-25	4/21/06	25 ft bgs	Upland	0.0	0.0	0.0
NL-15	12/16/05	15 to 18 ft bml	Intertidal	0.0	0.0	0.0
Pier25-1	7/26/05	54.5 to 56.5 ft bml	Subtidal	0.0	0.0	0.0
35-50	5/18/05	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/25/2013	102 to 104 ft BGS	Upland	0.0	0.0	0.0
17C-25	8/6/12	25 ft bgs	Upland	0.0	0.0	0.0
5106-8	8/3/05	14 to 17 ft bml	Subtidal	0.0	0.0	0.0
42-25	5/10/05	25 ft bgs	Upland	0.0	0.0	0.0
25-50	5/18/05	50 ft bgs	Upland	0.0	0.0	0.0
HYD-6	10/1/05	52.3 to 55.3 ft bml	Subtidal	0.0	0.0	0.0
15-50R	11/12/04	50 ft bgs	Upland	0.0	0.0	0.0
NL-28	1/17/07	16.5 to 19.5 ft bml	Intertidal	0.0	0.0	0.0
Pier25-19	12/8/05	102.6 to 105.6 ft bml	Subtidal	0.0	0.0	0.0
57-50	5/12/05	50 ft bgs	Upland	0.0	0.0	0.0
43-25	11/8/02	25 ft bgs	Upland	0.0	0.0	0.0
15-120	2/12/03	120 ft bgs	Upland	0.0	0.0	0.0
35-100	8/18/04	100 ft bgs	Upland	0.0	0.0	0.0
43-25	11/9/04	25 ft bgs	Upland	0.0	0.0	0.0
34-75	8/20/12	75 ft bgs	Upland	0.0	0.0	0.0
17-24	4/7/06	24 ft bgs	Upland	0.0	0.0	0.0
Pier25-11	10/7/05	75 to 78 ft bml	Subtidal	0.0	0.0	0.0
36-100R	8/17/03	100 ft bgs	Upland	0.0	0.0	0.0
43-25	4/5/06	25 ft bgs	Upland	0.0	0.0	0.0
5106-26	2/16/06	82 to 85 ft bml	Intertidal	0.0	0.0	0.0
46C-50	8/22/12	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-6	9/6/05	5.7 to 8.7 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0
56-50	5/12/04	50 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	117 to 119 ft BGS	Upland	0.0	0.0	0.0
Pier25-3	8/17/05	136.7 to 139.7 ft bml	Subtidal	0.0	0.0	0.0
PZ-SHI-3-75	8/25/12	75 ft bgs	Subtidal	0.0	0.0	0.0
5106-7	8/10/05	6 to 9 ft bml	Subtidal	0.0	0.0	0.0
40A-25	2/1/02	25 ft bgs	Upland	0.0	0.0	0.0
63-50	6/11/03	50 ft bgs	Upland	0.0	0.0	0.0
43-25	2/9/03	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-27	1/19/06	60.5 to 63.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-30	1/27/06	30 to 33 ft bml	Subtidal	0.0	0.0	0.0
36-100R	2/9/05	100 ft bgs	Upland	0.0	0.0	0.0
40A-25	12/3/08	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-23	1/12/06	103 to 106 ft bml	Subtidal	0.0	0.0	0.0
46C-130	8/22/12	130 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ* (1) *SVOC*	*Summed SQ* (1) *VOC*	*Summed SQ* (1) *All Organics*
40A-25	8/18/03	25 ft bgs	Upland	0.0	0.0	0.0
5106-23	2/10/06	7 to 10 ft bml	Intertidal	0.0	0.0	0.0
41C-100	7/16/12	100 ft bgs	Upland	0.0	0.0	0.0
5106-11	10/13/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
5-100	2/10/03	100 ft bgs	Upland	0.0	0.0	0.0
SB-B-DEEP	8/7/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
Dock2-6	9/7/05	35.7 to 38.7 ft bml	Subtidal	0.0	0.0	0.0
Dock2-6	9/7/05	40.7 to 43.7 ft bml	Subtidal	0.0	0.0	0.0
40-75	8/21/12	75 ft bgs	Upland	0.0	0.0	0.0
MW-EXT-9-DEEP	7/12/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
Pier25-12	2/1/06	10 to 13 ft bml	Subtidal	0.0	0.0	0.0
15-50R	2/9/05	50 ft bgs	Upland	0.0	0.0	0.0
16-25	5/12/03	25 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/24/2013	72 to 74 ft BGS	Upland	0.0	0.0	0.0
67-50	4/17/06	50 ft bgs	Upland	0.0	0.0	0.0
17C-160	8/7/12	160 ft bgs	Upland	0.0	0.0	0.0
15-120	11/16/04	120 ft bgs	Upland	0.0	0.0	0.0
NL-16	5/19/06	11 to 14 ft bml	Subtidal	0.0	0.0	0.0
15-50R	8/16/03	50 ft bgs	Upland	0.0	0.0	0.0
16-25	4/4/06	25 ft bgs	Upland	0.0	0.0	0.0
18-25	8/13/12	25 ft bgs	Upland	0.0	0.0	0.0
2-25	4/17/06	25 ft bgs	Upland	0.0	0.0	0.0
57-50	8/5/02	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-27	1/19/06	70.5 to 73.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	99.3 to 102.3 ft bml	Subtidal	0.0	0.0	0.0
25-25	5/4/02	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-29	2/7/06	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
5106-27	4/12/06	69 to 73 ft bml	Intertidal	0.0	0.0	0.0
5106-12	10/12/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	19 to 22 ft bml	Subtidal	0.0	0.0	0.0
46C-75	8/22/12	75 ft bgs	Upland	0.0	0.0	0.0
Dock2-6	9/6/05	25.7 to 28.7 ft bml	Subtidal	0.0	0.0	0.0
22-70	2/5/04	70 ft bgs	Upland	0.0	0.0	0.0
5106-11	10/14/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
NL-14	12/15/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
12-25	11/8/02	25 ft bgs	Upland	0.0	0.0	0.0
18-50R	11/9/04	50 ft bgs	Upland	0.0	0.0	0.0
43-50	11/13/04	50 ft bgs	Upland	0.0	0.0	0.0
46C-160	8/22/12	160 ft bgs	Upland	0.0	0.0	0.0
5106-24	2/8/06	12 to 15 ft bml	Intertidal	0.0	0.0	0.0
Pier25-25	1/20/06	80 to 83 ft bml	Subtidal	0.0	0.0	0.0
Pier25-10	10/27/05	96 to 99 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/7/06	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
67-50	7/26/12	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-29	2/7/06	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
12-45	11/8/02	45 ft bgs	Upland	0.0	0.0	0.0
25-50	11/8/02	50 ft bgs	Upland	0.0	0.0	0.0
35-50	11/13/04	50 ft bgs	Upland	0.0	0.0	0.0
5106-30	4/25/06	9 to 13 ft bml	Intertidal	0.0	0.0	0.0
Dock2-12	11/8/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/4/06	70.5 to 73.5 ft bml	Subtidal	0.0	0.0	0.0
17C-130	8/6/12	130 ft bgs	Upland	0.0	0.0	0.0
25-50	11/13/04	50 ft bgs	Upland	0.0	0.0	0.0
NL-26	1/18/07	16.5 to 19.5 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
Pier25-14	11/16/05	74.1 to 77.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-22	1/18/06	100.1 to 103.1 ft bml	Subtidal	0.0	0.0	0.0
43-25	2/8/05	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-9	9/8/05	49 to 52 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [1] SVOC*	*Summed SQ [1] VOC*	*Summed SQ [1] All Organics*
Dock2-4	7/29/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	5.3 to 8.3 ft bml	Subtidal	0.0	0.0	0.0
16-25	11/9/04	25 ft bgs	Upland	0.0	0.0	0.0
25-25	11/13/04	25 ft bgs	Upland	0.0	0.0	0.0
35-50	5/12/04	50 ft bgs	Upland	0.0	0.0	0.0
57-50	4/6/06	50 ft bgs	Upland	0.0	0.0	0.0
55-100	5/11/05	100 ft bgs	Upland	0.0	0.0	0.0
Dock2-8	8/22/05	9 to 12 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	112 to 115 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/17/06	110.5 to 113.5 ft bml	Subtidal	0.0	0.0	0.0
46C-100	8/22/12	100 ft bgs	Upland	0.0	0.0	0.0
12-160	11/8/02	160 ft bgs	Upland	0.0	0.0	0.0
25-25	11/8/02	25 ft bgs	Upland	0.0	0.0	0.0
43-50	11/8/02	50 ft bgs	Upland	0.0	0.0	0.0
5106-7	8/10/05	21 to 24 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/6/06	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
5-75	8/24/12	75 ft bgs	Upland	0.0	0.0	0.0
34-100	12/5/08	100 ft bgs	Upland	0.0	0.0	0.0
Dock2-6	9/6/05	15.7 to 18.7 ft bml	Subtidal	0.0	0.0	0.0
Dock2-6	9/6/05	20.7 to 23.7 ft bml	Subtidal	0.0	0.0	0.0
68-25	4/17/06	25 ft bgs	Upland	0.0	0.0	0.0
NL-26	1/17/07	11.5 to 14.5 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/16/06	40.5 to 43.5 ft bml	Subtidal	0.0	0.0	0.0
8-23	2/16/05	23 ft bgs	Upland	0.0	0.0	0.0
15-120	1/29/02	120 ft bgs	Upland	0.0	0.0	0.0
15-50R	2/4/03	50 ft bgs	Upland	0.0	0.0	0.0
36-100R	11/13/04	100 ft bgs	Upland	0.0	0.0	0.0
36-25	2/9/03	25 ft bgs	Upland	0.0	0.0	0.0
41-50	2/16/05	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-5	8/2/05	27 to 30 ft bml	Subtidal	0.0	0.0	0.0
Pier25-11	10/7/05	105 to 108 ft bml	Subtidal	0.0	0.0	0.0
NL-14	12/15/05	25 to 28 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	45.3 to 48.3 ft bml	Subtidal	0.0	0.0	0.0
NL-15	12/19/05	27 to 30 ft bml	Intertidal	0.0	0.0	0.0
41C-160	7/17/12	160 ft bgs	Upland	0.0	0.0	0.0
57-50	5/12/04	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-4	7/28/05	14 to 17 ft bml	Subtidal	0.0	0.0	0.0
NL-24	1/15/07	21.5 to 24.5 ft bml	Subtidal	0.0	0.0	0.0
46-50	4/12/06	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	8/15/12	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-3	7/22/05	3 to 6 ft bml	Subtidal	0.0	0.0	0.0
NL-28	1/17/07	6.5 to 9.5 ft bml	Intertidal	0.0	0.0	0.0
Pier25-19	12/8/05	92.6 to 95.6 ft bml	Subtidal	0.0	0.0	0.0
15-50R	1/29/02	50 ft bgs	Upland	0.0	0.0	0.0
5-100	11/12/04	100 ft bgs	Upland	0.0	0.0	0.0
17C-50	8/6/12	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-4	7/28/05	4 to 7 ft bml	Subtidal	0.0	0.0	0.0
Dock2-5	8/1/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
55-100	4/13/06	100 ft bgs	Upland	0.0	0.0	0.0
NL-13	12/21/05	18 to 21 ft bml	Intertidal	0.0	0.0	0.0
Dock2-7	9/7/05	23 to 26 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/10/05	26 to 29 ft bml	Subtidal	0.0	0.0	0.0
11-45	8/18/03	45 ft bgs	Upland	0.0	0.0	0.0
36-25	5/12/04	25 ft bgs	Upland	0.0	0.0	0.0
56-50	8/17/04	50 ft bgs	Upland	0.0	0.0	0.0
35-50	12/15/08	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-16	12/12/05	14.4 to 17.4 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	109.3 to 112.3 ft bml	Subtidal	0.0	0.0	0.0
Dock2-6	9/6/05	10.7 to 13.7 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
NL-16	5/18/06	5 to 8 ft bml	Subtidal	0.0	0.0	0.0
HYD-8	9/13/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
55-100	12/5/08	100 ft bgs	Upland	0.0	0.0	0.0
HYD-6	9/30/05	22.3 to 25.3 ft bml	Subtidal	0.0	0.0	0.0
36-25	12/5/08	25 ft bgs	Upland	0.0	0.0	0.0
45-50	8/10/12	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-7	9/7/05	33 to 36 ft bml	Subtidal	0.0	0.0	0.0
Pier25-16	12/12/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/15/05	70 to 73 ft bml	Subtidal	0.0	0.0	0.0
HYD-4	9/24/05	76 to 79 ft bml	Subtidal	0.0	0.0	0.0
Pier25-18	12/9/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
23-50	1/23/02	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-2	8/19/05	106 to 109 ft bml	Subtidal	0.0	0.0	0.0
12-45	8/19/03	45 ft bgs	Upland	0.0	0.0	0.0
Dock2-6	9/7/05	30.7 to 33.7 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
63-50	8/17/03	50 ft bgs	Upland	0.0	0.0	0.0
5106-7	8/11/05	41 to 44 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/4/06	50.5 to 53.5 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/14/05	60 to 63 ft bml	Subtidal	0.0	0.0	0.0
36-100R	12/5/08	100 ft bgs	Upland	0.0	0.0	0.0
Dock2-7	9/7/05	8 to 11 ft bml	Subtidal	0.0	0.0	0.0
15-50R	4/11/06	50 ft bgs	Upland	0.0	0.0	0.0
36-100R	4/6/06	100 ft bgs	Upland	0.0	0.0	0.0
23-25R	4/10/06	25 ft bgs	Upland	0.0	0.0	0.0
64-100	7/26/12	100 ft bgs	Upland	0.0	0.0	0.0
5106-6	10/18/05	53 to 56 ft bml	Subtidal	0.1	0.0	0.1
56-50	5/12/05	50 ft bgs	Upland	0.0	0.0	0.0
25-25	8/17/03	25 ft bgs	Upland	0.0	0.0	0.0
NL-14	12/15/05	28 to 31 ft bml	Subtidal	0.0	0.0	0.0
15-50R	2/3/04	50 ft bgs	Upland	0.0	0.0	0.0
25-25	4/13/06	25 ft bgs	Upland	0.0	0.0	0.0
5106-11	10/13/05	37 to 40 ft bml	Subtidal	0.0	0.0	0.0
NL-16	5/18/06	8 to 11 ft bml	Subtidal	0.0	0.0	0.0
15-50R	5/12/05	50 ft bgs	Upland	0.0	0.0	0.0
HYD-8	9/14/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
2-50	4/24/06	50 ft bgs	Upland	0.0	0.0	0.0
40-50	11/17/03	50 ft bgs	Upland	0.0	0.0	0.0
23-25R	8/17/12	25 ft bgs	Upland	0.0	0.0	0.0
8-23	11/12/04	23 ft bgs	Upland	0.0	0.0	0.0
36-25	11/11/02	25 ft bgs	Upland	0.0	0.0	0.0
18-50R	8/14/03	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-23	1/12/06	113 to 116 ft bml	Subtidal	0.0	0.0	0.0
70-25	4/15/06	25 ft bgs	Upland	0.0	0.0	0.0
2-100	4/24/06	100 ft bgs	Upland	0.0	0.0	0.0
43-50	5/11/05	50 ft bgs	Upland	0.0	0.0	0.0
15-50R	5/12/04	50 ft bgs	Upland	0.0	0.0	0.0
HYD-8	9/14/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
57-50	8/17/04	50 ft bgs	Upland	0.0	0.0	0.0
HYD-9	9/15/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
NL-13	12/21/05	21 to 24 ft bml	Intertidal	0.0	0.0	0.0
15-50R	11/19/03	50 ft bgs	Upland	0.0	0.0	0.0
42-25	2/21/05	25 ft bgs	Upland	0.0	0.0	0.0
HYD-6	9/30/05	32.3 to 35.4 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	89.3 to 92.3 ft bml	Subtidal	0.0	0.0	0.0
56-50	11/18/03	50 ft bgs	Upland	0.0	0.0	0.0
5106-12	10/12/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/6/06	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
Pier25-14	11/16/05	44.1 to 47.1 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
6A-50	8/8/12	50 ft bgs	Upland	0.0	0.0	0.0
HYD-9	9/15/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
Pier25-6	2/4/06	11 to 14 ft bml	Subtidal	0.0	0.0	0.0
40-25	4/17/06	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-14	11/16/05	54.1 to 57.1 ft bml	Subtidal	0.0	0.0	0.0
NL-26	1/17/07	6.5 to 9.5 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/7/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
5106-10	11/7/05	107 to 110 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/10/05	36 to 39 ft bml	Subtidal	0.0	0.0	0.0
Pier25-27	1/19/06	80.5 to 83.5 ft bml	Subtidal	0.0	0.0	0.0
64-25	12/4/08	25 ft bgs	Upland	0.0	0.0	0.0
5106-30	4/26/06	69 to 73 ft bml	Intertidal	0.0	0.0	0.0
56-50	11/15/04	50 ft bgs	Upland	0.0	0.0	0.0
12-25	11/15/04	25 ft bgs	Upland	0.0	0.0	0.0
56-50	11/11/02	50 ft bgs	Upland	0.0	0.0	0.0
5106-3	9/22/05	109 to 112 ft bml	Subtidal	0.0	0.0	0.0
40A-25	11/9/02	25 ft bgs	Upland	0.0	0.0	0.0
5106-23	2/10/06	27 to 30 ft bml	Intertidal	0.0	0.0	0.0
HYD-8	9/13/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
43-50	8/28/12	50 ft bgs	Upland	0.0	0.0	0.0
WW-A1R	8/21/12	6 to 6 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/16/06	90.5 to 93.5 ft bml	Subtidal	0.0	0.0	0.0
5106-5	9/10/05	64 to 67 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
18-25	4/17/06	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-7	9/7/05	18 to 21 ft bml	Subtidal	0.0	0.0	0.0
35-100	4/27/06	100 ft bgs	Upland	0.0	0.0	0.0
Pier25-2	7/14/05	6 to 9 ft bml	Subtidal	0.0	0.0	0.0
9-25	8/8/12	25 ft bgs	Upland	0.0	0.0	0.0
5106-6	10/18/05	48 to 51 ft bml	Subtidal	0.0	0.0	0.0
5106-3	9/21/05	89 to 92 ft bml	Subtidal	0.0	0.0	0.0
HYD-9	9/15/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
17C-75	8/6/12	75 ft bgs	Upland	0.0	0.0	0.0
5106-6	10/18/05	28 to 31 ft bml	Subtidal	0.0	0.0	0.0
57-50	11/15/04	50 ft bgs	Upland	0.0	0.0	0.0
HYD-8	9/14/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
Dock2-7	9/7/05	28 to 31 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/18/05	33 to 36 ft bml	Subtidal	0.0	0.0	0.0
64-50	11/15/03	50 ft bgs	Upland	0.0	0.0	0.0
5106-8	8/5/05	54 to 57 ft bml	Subtidal	0.0	0.0	0.0
HYD-9	9/15/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
12-45	11/15/04	45 ft bgs	Upland	0.0	0.0	0.0
12-160	11/15/04	160 ft bgs	Upland	0.0	0.0	0.0
40A-50	12/3/08	50 ft bgs	Upland	0.0	0.0	0.0
5106-19	1/16/06	80.5 to 83.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-27	1/19/06	90.5 to 93.5 ft bml	Subtidal	0.0	0.0	0.0
MW-EXT-9-DEEP	7/11/2013	82 to 84 ft BGS	Upland	0.0	0.0	0.0
Pier25-8	8/26/05	34 to 47 ft bml	Subtidal	0.0	0.0	0.0
16-25	2/7/03	25 ft bgs	Upland	0.0	0.0	0.0
35-50	2/9/04	50 ft bgs	Upland	0.0	0.0	0.0
NL-29	1/18/07	16.5 to 19.5 ft bml	Subtidal	0.0	0.0	0.0
HYD-9	9/15/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
25-25	5/13/04	25 ft bgs	Upland	0.0	0.0	0.0
5106-6	10/18/05	43 to 46 ft bml	Subtidal	0.0	0.0	0.0
Dock2-7	9/7/05	3 to 6 ft bml	Subtidal	0.0	0.0	0.0
NL-16	5/19/06	17 to 20 ft bml	Subtidal	0.0	0.0	0.0
5106-23	2/10/06	22 to 25 ft bml	Intertidal	0.0	0.0	0.0
15-50R	8/13/12	50 ft bgs	Upland	0.0	0.0	0.0
35-50	8/18/03	50 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

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IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
5106-14	12/5/05	107 to 110 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/25/05	129.3 to 132.3 ft bml	Subtidal	0.0	0.0	0.0
41-50	8/18/04	50 ft bgs	Upland	0.0	0.0	0.0
35-100	2/6/03	100 ft bgs	Upland	0.0	0.0	0.0
Dock2-1	7/21/05	33 to 36 ft bml	Subtidal	0.0	0.0	0.0
Dock2-5	8/1/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
NL-26	1/18/07	21.5 to 24.5 ft bml	Subtidal	0.0	0.0	0.0
8-23	8/11/12	23 ft bgs	Upland	0.0	0.0	0.0
36-100R	5/12/05	100 ft bgs	Upland	0.0	0.0	0.0
5106-3	9/21/05	84 to 87 ft bml	Subtidal	0.0	0.0	0.0
25-50	2/10/03	50 ft bgs	Upland	0.0	0.0	0.0
5106-6	10/17/05	23 to 26 ft bml	Subtidal	0.2	0.0	0.2
35-50	4/17/06	50 ft bgs	Upland	0.0	0.0	0.0
HYD-8	9/13/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
HYD-8	9/14/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
18-25	12/2/08	25 ft bgs	Upland	0.0	0.0	0.0
709-MW15A-50	8/14/12	50 ft bgs	Upland	0.0	0.0	0.0
12-25	8/24/12	25 ft bgs	Upland	0.0	0.0	0.0
HYD-10	9/16/05	55.3 to 58.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-27	1/19/06	20.5 to 23.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-4	7/28/05	9 to 12 ft bml	Subtidal	0.0	0.0	0.0
Pier25-14	11/16/05	24.1 to 27.1 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/4/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
NL-28	1/17/07	21.5 to 24.5 ft bml	Intertidal	0.0	0.0	0.0
5106-11	10/13/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
HYD-5	10/5/05	44 to 47 ft bml	Subtidal	0.0	0.0	0.0
Pier25-15	12/22/05	4.4 to 7.4 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/27/05	74.5 to 76.5 ft bml	Subtidal	0.0	0.0	0.0
67-25	4/11/06	25 ft bgs	Upland	0.0	0.0	0.0
12-45	5/11/04	45 ft bgs	Upland	0.0	0.0	0.0
5106-11	10/14/05	77 to 80 ft bml	Subtidal	0.0	0.0	0.0
Pier25-17	12/12/05	6.1 to 9.1 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/4/05	39 to 42 ft bml	Subtidal	0.0	0.0	0.0
8-23	5/11/04	23 ft bgs	Upland	0.0	0.0	0.0
5106-27	4/12/06	59 to 63 ft bml	Intertidal	0.0	0.0	0.0
WW-B4	5/2/06	80 to 82 ft bml	Intertidal	0.0	0.0	0.0
5106-7	8/10/05	31 to 34 ft bml	Subtidal	0.0	0.0	0.0
65-130	4/17/06	130 ft bgs	Upland	0.0	0.0	0.0
9-50	8/7/12	50 ft bgs	Upland	0.0	0.0	0.0
70-25	8/26/12	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-1	6/30/05	3 to 5 ft bml	Subtidal	0.0	0.0	0.0
16-50	4/4/06	50 ft bgs	Upland	0.0	0.0	0.0
HYD-9	9/15/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
12-25	12/3/08	25 ft bgs	Upland	0.0	0.0	0.0
12-160	5/11/04	160 ft bgs	Upland	0.0	0.0	0.0
Pier25-2	7/15/05	46 to 49 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	75.3 to 78.3 ft bml	Subtidal	0.0	0.0	0.0
17C-100	8/7/12	100 ft bgs	Upland	0.0	0.0	0.0
HYD-6	10/3/05	72.3 to 75.3 ft bml	Subtidal	0.0	0.0	0.0
Dock2-2	7/13/05	32.5 to 35.5 ft bml	Subtidal	0.0	0.0	0.0
HYD-6	10/4/05	102.3 to 105.3 ft bml	Subtidal	0.0	0.0	0.0
42-25	8/10/12	25 ft bgs	Upland	0.0	0.0	0.0
44-25	8/10/12	25 ft bgs	Upland	0.0	0.0	0.0
5-100	4/6/06	100 ft bgs	Upland	0.0	0.0	0.0
8-23	4/14/06	23 ft bgs	Upland	0.0	0.0	0.0
Dock2-3	7/25/05	23 to 26 ft bml	Subtidal	0.0	0.0	0.0
WW-A1R	8/22/12	20 to 20 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/4/05	29 to 32 ft bml	Subtidal	0.0	0.0	0.0
Pier25-11	10/7/05	65 to 68 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
43-50	8/18/03	50 ft bgs	Upland	0.0	0.0	0.0
NL-16	5/19/06	14 to 17 ft bml	Subtidal	0.0	0.0	0.0
8-23	2/5/03	23 ft bgs	Upland	0.0	0.0	0.0
Dock2-5	8/2/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/4/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
43-50	5/11/04	50 ft bgs	Upland	0.0	0.0	0.0
WW-B4	5/3/06	115 to 117 ft bml	Intertidal	0.0	0.0	0.0
Pier25-8	8/26/05	94 to 97 ft bml	Subtidal	0.0	0.0	0.0
WW-A1R	8/21/12	11 to 11 ft bml	Subtidal	0.0	0.0	0.0
5106-24	2/8/06	17 to 20 ft bml	Intertidal	0.0	0.0	0.0
55-50	8/24/12	50 ft bgs	Upland	0.0	0.0	0.0
56-50	2/11/04	50 ft bgs	Upland	0.0	0.0	0.0
61-50	12/4/08	50 ft bgs	Upland	0.0	0.0	0.0
70-50	4/15/06	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-8	8/22/05	54 to 57 ft bml	Subtidal	0.0	0.0	0.0
Pier25-30	1/26/06	10 to 13 ft bml	Subtidal	0.0	0.0	0.0
5106-3	9/21/05	74 to 77 ft bml	Subtidal	0.0	0.0	0.0
12-25	5/11/05	25 ft bgs	Upland	0.0	0.0	0.0
16-50	2/7/03	50 ft bgs	Upland	0.0	0.0	0.0
5106-8	8/9/05	104 to 107 ft bml	Subtidal	0.0	0.0	0.0
Dock2-3	7/25/05	28 to 31 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	39.3 to 42.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/1/05	14.5 to 16.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-4	8/12/05	67.1 to 70.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-4	8/12/05	47.1 to 50.1 ft bml	Subtidal	0.0	0.0	0.0
25-25	5/18/05	25 ft bgs	Upland	0.0	0.0	0.0
Pier25-4	8/12/05	77.1 to 80.1 ft bml	Subtidal	0.0	0.0	0.0
Dock2-5	8/2/05	37 to 40 ft bml	Subtidal	0.0	0.0	0.0
5106-26	2/16/06	92 to 95 ft bml	Intertidal	0.0	0.0	0.0
5106-14	12/5/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
Pier25-8	8/25/05	4 to 7 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/11/05	46 to 49 ft bml	Subtidal	0.0	0.0	0.0
NL-15	12/19/05	21 to 24 ft bml	Intertidal	0.0	0.0	0.0
Pier25-3	8/17/05	106.7 to 109.7 ft bml	Subtidal	0.0	0.0	0.0
Pier25-14	11/16/05	34.1 to 37.1 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	64 to 67 ft bml	Subtidal	0.0	0.0	0.0
Pier25-2	8/19/05	116 to 119 ft bml	Subtidal	0.0	0.0	0.0
HYD-6	10/1/05	42.3 to 45.4 ft bml	Subtidal	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	107 to 109 ft BGS	Upland	0.0	0.0	0.0
5106-9	11/2/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
12-25	4/6/06	25 ft bgs	Upland	0.0	0.0	0.0
WW-B4	5/2/06	85 to 87 ft bml	Intertidal	0.0	0.0	0.0
NL-15	12/19/05	24 to 27 ft bml	Intertidal	0.0	0.0	0.0
12-160	5/11/05	160 ft bgs	Upland	0.0	0.0	0.0
Pier25-8	8/25/05	14 to 17 ft bml	Subtidal	0.0	0.0	0.0
Pier25-11	10/7/05	95 to 98 ft bml	Subtidal	0.0	0.0	0.0
36-50	8/1/12	50 ft bgs	Upland	0.0	0.0	0.0
HYD-3	8/10/05	21 to 24 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/5/05	44 to 47 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/16/06	70.5 to 73.5 ft bml	Subtidal	0.0	0.0	0.0
5106-25	4/18/06	79 to 83 ft bml	Intertidal	0.0	0.0	0.0
5106-8	8/8/05	79 to 82 ft bml	Subtidal	0.0	0.0	0.0
43-50	12/8/08	50 ft bgs	Upland	0.0	0.0	0.0
5106-19	1/13/06	10.5 to 13.5 ft bml	Subtidal	0.0	0.0	0.0
HYD-2	8/29/05	28 to 31 ft bml	Subtidal	0.0	0.0	0.0
HYD-3	8/10/05	11 to 14 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/26/05	64.5 to 66.5 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/13/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-14	12/5/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
41-100	12/8/08	100 ft bgs	Upland	0.0	0.0	0.0
25A-50	5/1/06	50 ft bgs	Upland	0.0	0.0	0.0
NL-15	12/19/05	18 to 21 ft bml	Intertidal	0.0	0.0	0.0
HYD-5	10/5/05	54 to 57 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	65.3 to 68.3 ft bml	Subtidal	0.0	0.0	0.0
40-25	8/21/12	25 ft bgs	Upland	0.0	0.0	0.0
Dock2-8	8/23/05	89 to 92 ft bml	Subtidal	0.0	0.0	0.0
HYD-6	10/4/05	112.3 to 115.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-11	10/8/05	115 to 118 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/29/12	77 to 77 ft bml	Subtidal	0.0	0.0	0.0
PZ-SHI-3-100	4/27/06	70 to 75 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/16/06	60.5 to 63.5 ft bml	Subtidal	0.0	0.0	0.0
5106-21	1/10/06	75.5 to 78.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-25	1/20/06	10 to 13 ft bml	Subtidal	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	97 to 99 ft BGS	Upland	0.0	0.0	0.0
5106-3	9/22/05	114 to 117 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/8/05	69 to 72 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/16/06	50.5 to 53.5 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/26/12	6 to 6 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/13/05	17 to 20 ft bml	Subtidal	0.0	0.0	0.0
NL-13	12/21/05	24 to 27 ft bml	Intertidal	0.0	0.0	0.0
42-50	8/10/12	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-27	1/19/06	10.5 to 13.5 ft bml	Subtidal	0.0	0.0	0.0
41C-25	7/16/12	25 ft bgs	Upland	0.0	0.0	0.0
40A-50	4/13/06	50 ft bgs	Upland	0.0	0.0	0.0
35-100R	8/15/12	100 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	97 to 99 ft BGS	Upland	0.0	0.0	0.0
42-50	4/5/06	50 ft bgs	Upland	0.0	0.0	0.0
Pier25-7	8/24/05	79.3 to 82.3 ft bml	Subtidal	0.0	0.0	0.0
44-50	8/11/12	50 ft bgs	Upland	0.0	0.0	0.0
5106-7	8/11/05	71 to 74 ft bml	Subtidal	0.0	0.0	0.0
12-45	4/6/06	45 ft bgs	Upland	0.0	0.0	0.0
Pier25-2	7/14/05	16 to 19 ft bml	Subtidal	0.0	0.0	0.0
Dock2-7	9/7/05	13 to 16 ft bml	Subtidal	0.0	0.0	0.0
12A-50	5/1/06	50 ft bgs	Upland	0.0	0.0	0.0
40A-25	4/13/06	25 ft bgs	Upland	0.0	0.0	0.0
5106-8	8/8/05	74 to 77 ft bml	Subtidal	0.0	0.0	0.0
Pier25-2	7/14/05	36 to 39 ft bml	Subtidal	0.0	0.0	0.0
5106-21	1/10/06	80.5 to 83.5 ft bml	Subtidal	0.0	0.0	0.0
NL-13	12/21/05	27 to 30 ft bml	Intertidal	0.0	0.0	0.0
Pier25-5	8/15/05	50.5 to 53.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/5/05	34.5 to 36.5 ft bml	Subtidal	0.0	0.0	0.0
MW-H-01	6/20/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
Pier25-3	8/16/05	46.7 to 49.7 ft bml	Subtidal	0.0	0.0	0.0
MW-H-01	6/20/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
Pier25-5	8/15/05	40.5 to 43.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-1	7/21/05	38 to 41 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	17 to 20 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
11-45	1/27/02	45 ft bgs	Upland	0.0	0.0	0.0
11-45	8/7/02	45 ft bgs	Upland	0.0	0.0	0.0
11-45	2/11/03	45 ft bgs	Upland	0.0	0.0	0.0
11-45	2/12/04	45 ft bgs	Upland	0.0	0.0	0.0
12-45	1/30/02	45 ft bgs	Upland	0.0	0.0	0.0
12-45	5/5/02	45 ft bgs	Upland	0.0	0.0	0.0
12-45	5/7/03	45 ft bgs	Upland	0.0	0.0	0.0
12-45	8/16/04	45 ft bgs	Upland	0.0	0.0	0.0
12-45	2/8/05	45 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
12-45	11/17/03	45 ft bgs	Upland	0.0	0.0	0.0
12-45	2/13/04	45 ft bgs	Upland	0.0	0.0	0.0
12-45	8/5/02	45 ft bgs	Upland	0.0	0.0	0.0
12-45	5/11/05	45 ft bgs	Upland	0.0	0.0	0.0
12-45	12/3/08	45 ft bgs	Upland	0.0	0.0	0.0
9-50	3/16/04	50 ft bgs	Upland	0.0	0.0	0.0
8-54	8/6/02	54 ft bgs	Upland	0.0	0.0	0.0
5-25	2/5/04	25 ft bgs	Upland	0.0	0.0	0.0
8-23	5/5/02	23 ft bgs	Upland	0.0	0.0	0.0
8-23	8/6/02	23 ft bgs	Upland	0.0	0.0	0.0
8-23	11/6/02	23 ft bgs	Upland	0.0	0.0	0.0
8-23	5/6/03	23 ft bgs	Upland	0.0	0.0	0.0
8-23	2/17/04	23 ft bgs	Upland	0.0	0.0	0.0
8-23	8/19/04	23 ft bgs	Upland	0.0	0.0	0.0
8-23	12/2/08	23 ft bgs	Upland	0.0	0.0	0.0
12-25	8/19/03	25 ft bgs	Upland	0.0	0.0	0.0
12-25	1/30/02	25 ft bgs	Upland	0.0	0.0	0.0
12-25	5/5/02	25 ft bgs	Upland	0.0	0.0	0.0
12-25	11/17/03	25 ft bgs	Upland	0.0	0.0	0.0
12-25	2/13/04	25 ft bgs	Upland	0.0	0.0	0.0
12-25	5/11/04	25 ft bgs	Upland	0.0	0.0	0.0
12-25	8/16/04	25 ft bgs	Upland	0.0	0.0	0.0
12-25	2/8/05	25 ft bgs	Upland	0.0	0.0	0.0
12-25	5/7/03	25 ft bgs	Upland	0.0	0.0	0.0
12-25	8/5/02	25 ft bgs	Upland	0.0	0.0	0.0
12-160	8/19/03	160 ft bgs	Upland	0.0	0.0	0.0
12-160	1/30/02	160 ft bgs	Upland	0.0	0.0	0.0
12-160	5/5/02	160 ft bgs	Upland	0.0	0.0	0.0
12-160	5/7/03	160 ft bgs	Upland	0.0	0.0	0.0
12-160	11/17/03	160 ft bgs	Upland	0.0	0.0	0.0
12-160	2/13/04	160 ft bgs	Upland	0.0	0.0	0.0
12-160	8/16/04	160 ft bgs	Upland	0.0	0.0	0.0
12-160	2/8/05	160 ft bgs	Upland	0.0	0.0	0.0
12-160	8/5/02	160 ft bgs	Upland	0.0	0.0	0.0
12-160	8/24/12	160 ft bgs	Upland	0.0	0.0	0.0
15-120	11/7/02	120 ft bgs	Upland	0.0	0.0	0.0
15-50R	8/13/02	50 ft bgs	Upland	0.0	0.0	0.0
15-50R	11/7/02	50 ft bgs	Upland	0.0	0.0	0.0
15-50R	5/6/03	50 ft bgs	Upland	0.0	0.0	0.0
16-25	1/23/02	25 ft bgs	Upland	0.0	0.0	0.0
16-25	4/30/02	25 ft bgs	Upland	0.0	0.0	0.0
16-25	7/31/02	25 ft bgs	Upland	0.0	0.0	0.0
16-25	11/6/02	25 ft bgs	Upland	0.0	0.0	0.0
16-25	5/13/04	25 ft bgs	Upland	0.0	0.0	0.0
16-25	8/14/04	25 ft bgs	Upland	0.0	0.0	0.0
16-25	2/10/05	25 ft bgs	Upland	0.0	0.0	0.0
16-25	11/19/03	25 ft bgs	Upland	0.0	0.0	0.0
16-25	7/5/04	25 ft bgs	Upland	0.0	0.0	0.0
16-50	1/23/02	50 ft bgs	Upland	0.0	0.0	0.0
16-50	7/31/02	50 ft bgs	Upland	0.0	0.0	0.0
16-50	8/14/03	50 ft bgs	Upland	0.0	0.0	0.0
16-50	2/4/04	50 ft bgs	Upland	0.0	0.0	0.0
16-50	8/14/04	50 ft bgs	Upland	0.0	0.0	0.0
16-50	2/18/05	50 ft bgs	Upland	0.0	0.0	0.0
16-50	7/5/04	50 ft bgs	Upland	0.0	0.0	0.0
17-24	1/23/02	24 ft bgs	Upland	0.0	0.0	0.0
17-24	7/20/04	24 ft bgs	Upland	0.0	0.0	0.0
17-50R	6/1/04	50 ft bgs	Upland	0.0	0.0	0.0
17-50R	1/23/02	50 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

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IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
17-50R	4/4/06	50 ft bgs	Upland	0.0	0.0	0.0
17-50R	7/5/04	50 ft bgs	Upland	0.0	0.0	0.0
18-25	1/23/02	25 ft bgs	Upland	0.0	0.0	0.0
18-50R	1/23/02	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	4/30/02	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	8/1/02	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	11/6/02	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	5/12/03	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	5/13/04	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	8/14/04	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	2/10/05	50 ft bgs	Upland	0.0	0.0	0.0
18-50R	11/14/03	50 ft bgs	Upland	0.0	0.0	0.0
22-25R	2/5/04	25 ft bgs	Upland	0.0	0.0	0.0
22-70	2/8/03	70 ft bgs	Upland	0.0	0.0	0.0
23-25R	1/23/02	25 ft bgs	Upland	0.0	0.0	0.0
23-50	11/6/02	50 ft bgs	Upland	0.0	0.0	0.0
25-25	1/26/02	25 ft bgs	Upland	0.0	0.0	0.0
25-25	2/10/03	25 ft bgs	Upland	0.0	0.0	0.0
25-25	5/7/03	25 ft bgs	Upland	0.0	0.0	0.0
25-25	11/18/03	25 ft bgs	Upland	0.0	0.0	0.0
25-25	2/14/04	25 ft bgs	Upland	0.0	0.0	0.0
25-25	2/17/05	25 ft bgs	Upland	0.0	0.0	0.0
25-25	8/5/02	25 ft bgs	Upland	0.0	0.0	0.0
25-50	1/26/02	50 ft bgs	Upland	0.0	0.0	0.0
25-50	5/4/02	50 ft bgs	Upland	0.0	0.0	0.0
25-50	11/18/03	50 ft bgs	Upland	0.0	0.0	0.0
25-50	2/14/04	50 ft bgs	Upland	0.0	0.0	0.0
25-50	5/13/04	50 ft bgs	Upland	0.0	0.0	0.0
25-50	8/20/04	50 ft bgs	Upland	0.0	0.0	0.0
25-50	2/17/05	50 ft bgs	Upland	0.0	0.0	0.0
25-50	8/5/02	50 ft bgs	Upland	0.0	0.0	0.0
25-50	5/7/03	50 ft bgs	Upland	0.0	0.0	0.0
25-50	4/13/06	50 ft bgs	Upland	0.0	0.0	0.0
35-100	1/26/02	100 ft bgs	Upland	0.0	0.0	0.0
35-100	8/6/02	100 ft bgs	Upland	0.0	0.0	0.0
35-100	8/18/03	100 ft bgs	Upland	0.0	0.0	0.0
35-100	2/9/04	100 ft bgs	Upland	0.0	0.0	0.0
35-100	2/18/05	100 ft bgs	Upland	0.0	0.0	0.0
35-50	5/4/02	50 ft bgs	Upland	0.0	0.0	0.0
35-50	8/6/02	50 ft bgs	Upland	0.0	0.0	0.0
35-50	2/6/03	50 ft bgs	Upland	0.0	0.0	0.0
35-50	2/18/05	50 ft bgs	Upland	0.0	0.0	0.0
36-100R	11/18/03	100 ft bgs	Upland	0.0	0.0	0.0
36-100R	2/12/04	100 ft bgs	Upland	0.0	0.0	0.0
36-100R	5/12/04	100 ft bgs	Upland	0.0	0.0	0.0
36-100R	8/17/04	100 ft bgs	Upland	0.0	0.0	0.0
36-25	1/22/02	25 ft bgs	Upland	0.0	0.0	0.0
36-25	11/14/03	25 ft bgs	Upland	0.0	0.0	0.0
36-25	2/7/04	25 ft bgs	Upland	0.0	0.0	0.0
36-25	8/17/04	25 ft bgs	Upland	0.0	0.0	0.0
36-25	2/9/05	25 ft bgs	Upland	0.0	0.0	0.0
36-50	12/5/08	50 ft bgs	Upland	0.0	0.0	0.0
38-55	3/17/04	55 ft bgs	Upland	0.0	0.0	0.0
40-25	5/18/05	25 ft bgs	Upland	0.0	0.0	0.0
40-50	8/21/12	50 ft bgs	Upland	0.0	0.0	0.0
40A-25	5/6/02	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	2/6/03	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	11/17/03	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	2/16/04	25 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
40A-25	5/13/04	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	8/18/04	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	8/8/02	25 ft bgs	Upland	0.0	0.0	0.0
41-100	8/15/03	100 ft bgs	Upland	0.0	0.0	0.0
41-100	1/29/02	100 ft bgs	Upland	0.0	0.0	0.0
41-100	8/7/02	100 ft bgs	Upland	0.0	0.0	0.0
41-100	2/11/03	100 ft bgs	Upland	0.0	0.0	0.0
41-100	2/13/04	100 ft bgs	Upland	0.0	0.0	0.0
41-100	8/18/04	100 ft bgs	Upland	0.0	0.0	0.0
41-100	4/15/06	100 ft bgs	Upland	0.0	0.0	0.0
4-115R	8/4/02	115 ft bgs	Upland	0.0	0.0	0.0
41-50	8/15/03	50 ft bgs	Upland	0.0	0.0	0.0
41-50	2/11/03	50 ft bgs	Upland	0.0	0.0	0.0
41-50	2/13/04	50 ft bgs	Upland	0.0	0.0	0.0
41-50	1/29/02	50 ft bgs	Upland	0.0	0.0	0.0
41-50	8/7/02	50 ft bgs	Upland	0.0	0.0	0.0
41-50	4/15/06	50 ft bgs	Upland	0.0	0.0	0.0
42-25	1/22/02	25 ft bgs	Upland	0.0	0.0	0.0
42-25	4/5/06	25 ft bgs	Upland	0.0	0.0	0.0
42-50	1/22/02	50 ft bgs	Upland	0.0	0.0	0.0
43-50	1/22/02	50 ft bgs	Upland	0.0	0.0	0.0
43-50	5/4/02	50 ft bgs	Upland	0.0	0.0	0.0
43-50	8/6/02	50 ft bgs	Upland	0.0	0.0	0.0
43-50	2/11/03	50 ft bgs	Upland	0.0	0.0	0.0
43-50	5/7/03	50 ft bgs	Upland	0.0	0.0	0.0
43-50	11/17/03	50 ft bgs	Upland	0.0	0.0	0.0
43-50	2/14/04	50 ft bgs	Upland	0.0	0.0	0.0
43-50	8/14/04	50 ft bgs	Upland	0.0	0.0	0.0
43-50	2/8/05	50 ft bgs	Upland	0.0	0.0	0.0
43-50	4/5/06	50 ft bgs	Upland	0.0	0.0	0.0
44-25	1/26/02	25 ft bgs	Upland	0.0	0.0	0.0
44-25	4/21/06	25 ft bgs	Upland	0.0	0.0	0.0
44-50	1/26/02	50 ft bgs	Upland	0.0	0.0	0.0
44-50	4/18/06	50 ft bgs	Upland	0.0	0.0	0.0
45-100	1/26/02	100 ft bgs	Upland	0.0	0.0	0.0
45-100	8/10/12	100 ft bgs	Upland	0.0	0.0	0.0
45-100	4/18/06	100 ft bgs	Upland	0.0	0.0	0.0
46-100	1/25/02	100 ft bgs	Upland	0.0	0.0	0.0
46-50	1/25/02	50 ft bgs	Upland	0.0	0.0	0.0
49-15	3/16/04	15 ft bgs	Upland	0.0	0.0	0.0
5-100	1/26/02	100 ft bgs	Upland	0.0	0.0	0.0
5-100	4/30/02	100 ft bgs	Upland	0.0	0.0	0.0
5-100	8/4/02	100 ft bgs	Upland	0.0	0.0	0.0
5-100	11/6/02	100 ft bgs	Upland	0.0	0.0	0.0
5-100	5/13/03	100 ft bgs	Upland	0.0	0.0	0.0
5-100	11/19/03	100 ft bgs	Upland	0.0	0.0	0.0
5-100	5/11/04	100 ft bgs	Upland	0.0	0.0	0.0
5-100	8/16/04	100 ft bgs	Upland	0.0	0.0	0.0
5-100	2/10/05	100 ft bgs	Upland	0.0	0.0	0.0
5-100	8/8/12	100 ft bgs	Upland	0.0	0.0	0.0
5106-10	11/7/05	112 to 115 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/13/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/13/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/13/05	47 to 50 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	47 to 50 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	57 to 60 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	67 to 70 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/14/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-11	10/14/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
5106-11	10/15/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	27 to 30 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	37 to 40 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	107 to 110 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/11/05	47 to 50 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	67 to 70 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	77 to 80 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
5106-12	10/12/05	57 to 60 ft bml	Subtidal	0.0	0.0	0.0
5106-14	12/3/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
5106-14	12/3/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/15/05	101 to 104 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/14/05	21 to 24 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/14/05	31 to 34 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/14/05	41 to 44 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/14/05	51 to 54 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/15/05	61 to 64 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/15/05	71 to 74 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/15/05	81 to 84 ft bml	Subtidal	0.0	0.0	0.0
5106-16	11/15/05	91 to 94 ft bml	Subtidal	0.0	0.0	0.0
5106-19	1/17/06	100.5 to 103.5 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/25/06	10 to 13 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/25/06	20 to 23 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/25/06	30 to 33 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/25/06	40 to 43 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	50 to 53 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	60 to 63 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	70 to 73 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	80 to 83 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	90 to 93 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	100 to 103 ft bml	Subtidal	0.0	0.0	0.0
5106-22	1/26/06	110 to 113 ft bml	Subtidal	0.0	0.0	0.0
5106-23	2/10/06	12 to 15 ft bml	Intertidal	0.0	0.0	0.0
5106-23	2/10/06	17 to 20 ft bml	Intertidal	0.0	0.0	0.0
5106-27	4/10/06	5 to 9 ft bml	Intertidal	0.0	0.0	0.0
5106-27	4/10/06	10 to 14 ft bml	Intertidal	0.0	0.0	0.0
5106-27	4/11/06	15 to 19 ft bml	Intertidal	0.0	0.0	0.0
5106-28	4/20/06	9 to 13 ft bml	Intertidal	0.0	0.0	0.0
5106-28	4/20/06	19 to 23 ft bml	Intertidal	0.0	0.0	0.0
5106-28	4/20/06	29 to 33 ft bml	Intertidal	0.0	0.0	0.0
5106-28	4/20/06	44 to 48 ft bml	Intertidal	0.0	0.0	0.0
5106-29	4/21/06	9 to 13 ft bml	Intertidal	0.0	0.0	0.0
5106-29	4/24/06	29 to 33 ft bml	Intertidal	0.0	0.0	0.0
5106-29	4/24/06	39 to 43 ft bml	Intertidal	0.0	0.0	0.0
5106-29	4/24/06	49 to 53 ft bml	Intertidal	0.0	0.0	0.0
5106-29	4/21/06	19 to 23 ft bml	Intertidal	0.0	0.0	0.0
5106-3	9/22/05	104 to 107 ft bml	Subtidal	0.0	0.0	0.0
5106-3	9/22/05	99 to 102 ft bml	Subtidal	0.0	0.0	0.0
5106-3	9/21/05	79 to 82 ft bml	Subtidal	0.0	0.0	0.0
5106-3	9/21/05	94 to 97 ft bml	Subtidal	0.0	0.0	0.0
5106-30	4/25/06	19 to 23 ft bml	Intertidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
5106-30	4/25/06	29 to 33 ft bml	Intertidal	0.0	0.0	0.0
5106-30	4/25/06	39 to 43 ft bml	Intertidal	0.0	0.0	0.0
5106-30	4/26/06	59 to 63 ft bml	Intertidal	0.0	0.0	0.0
5106-30	4/25/06	49 to 53 ft bml	Intertidal	0.0	0.0	0.0
5106-31	4/28/06	9 to 13 ft bml	Intertidal	0.0	0.0	0.0
5106-31	4/28/06	19 to 23 ft bml	Intertidal	0.0	0.0	0.0
5106-31	4/28/06	29 to 33 ft bml	Intertidal	0.0	0.0	0.0
5106-31	4/29/06	59 to 63 ft bml	Intertidal	0.0	0.0	0.0
5106-31	4/29/06	49 to 53 ft bml	Intertidal	0.0	0.0	0.0
5106-31	4/29/06	39 to 43 ft bml	Intertidal	0.0	0.0	0.0
5106-32	5/3/06	9 to 13 ft bml	Subtidal	0.0	0.0	0.0
5106-32	5/3/06	19 to 23 ft bml	Subtidal	0.0	0.0	0.0
5106-32	5/4/06	29 to 33 ft bml	Subtidal	0.0	0.0	0.0
5106-32	5/4/06	39 to 43 ft bml	Subtidal	0.0	0.0	0.0
5106-32	5/4/06	49 to 53 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/18/05	38 to 41 ft bml	Subtidal	0.1	0.0	0.1
5106-6	10/18/05	58 to 61 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/18/05	63 to 66 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/18/05	68 to 71 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/18/05	73 to 76 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/19/05	78 to 81 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/19/05	83 to 86 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/19/05	88 to 91 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/19/05	93 to 96 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/19/05	98 to 101 ft bml	Subtidal	0.0	0.0	0.0
5106-6	10/19/05	103 to 106 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/11/05	51 to 54 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/11/05	56 to 59 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/11/05	66 to 69 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/12/05	76 to 79 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/12/05	81 to 84 ft bml	Subtidal	0.0	0.0	0.0
5106-7	8/11/05	61 to 64 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/8/05	89 to 92 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/9/05	94 to 97 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/5/05	49 to 52 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/9/05	109 to 112 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/9/05	99 to 102 ft bml	Subtidal	0.0	0.0	0.0
5106-8	8/8/05	84 to 87 ft bml	Subtidal	0.0	0.0	0.0
5106-9	11/2/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
55-100	2/18/05	100 ft bgs	Upland	0.0	0.0	0.0
56-50	1/22/02	50 ft bgs	Upland	0.0	0.0	0.0
56-50	5/4/02	50 ft bgs	Upland	0.0	0.0	0.0
56-50	2/12/03	50 ft bgs	Upland	0.0	0.0	0.0
56-50	5/13/03	50 ft bgs	Upland	0.0	0.0	0.0
56-50	2/9/05	50 ft bgs	Upland	0.0	0.0	0.0
56-50	8/5/02	50 ft bgs	Upland	0.0	0.0	0.0
56-50	4/6/06	50 ft bgs	Upland	0.0	0.0	0.0
57-50	1/26/02	50 ft bgs	Upland	0.0	0.0	0.0
57-50	5/4/02	50 ft bgs	Upland	0.0	0.0	0.0
57-50	11/18/03	50 ft bgs	Upland	0.0	0.0	0.0
57-50	2/11/04	50 ft bgs	Upland	0.0	0.0	0.0
57-50	2/9/05	50 ft bgs	Upland	0.0	0.0	0.0
61-25	6/13/03	25 ft bgs	Upland	0.0	0.0	0.0
61-25	11/14/03	25 ft bgs	Upland	0.0	0.0	0.0
61-25	12/4/08	25 ft bgs	Upland	0.0	0.0	0.0
61-50	6/13/03	50 ft bgs	Upland	0.0	0.0	0.0
61-50	11/14/03	50 ft bgs	Upland	0.0	0.0	0.0
64-50	6/12/03	50 ft bgs	Upland	0.0	0.0	0.0
65-100	8/12/12	100 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
65-130	8/12/12	130 ft bgs	Upland	0.0	0.0	0.0
66-15	7/10/04	15 ft bgs	Upland	0.0	0.0	0.0
66-25	7/10/04	25 ft bgs	Upland	0.0	0.0	0.0
66-50	7/10/04	50 ft bgs	Upland	0.0	0.0	0.0
67-25	7/15/04	25 ft bgs	Upland	0.0	0.0	0.0
67-50	7/15/04	50 ft bgs	Upland	0.0	0.0	0.0
68-25	7/14/04	25 ft bgs	Upland	0.0	0.0	0.0
6A-100	8/8/12	100 ft bgs	Upland	0.0	0.0	0.0
70-25	7/13/04	25 ft bgs	Upland	0.0	0.0	0.0
70-50	7/13/04	50 ft bgs	Upland	0.0	0.0	0.0
709-MW20-50	7/21/04	50 ft bgs	Upland	0.0	0.0	0.0
Dock2-11	10/20/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	27 to 30 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	47 to 50 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	57 to 60 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	67 to 70 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/21/05	87 to 90 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/21/05	97 to 100 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/21/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	17 to 20 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/19/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/20/05	77 to 80 ft bml	Subtidal	0.0	0.0	0.0
Dock2-11	10/21/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	7 to 10 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	17 to 20 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	27 to 30 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	47 to 50 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/9/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/9/05	67 to 70 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/9/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
Dock2-12	11/8/05	57 to 60 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/31/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/28/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/28/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/29/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/29/05	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/29/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/29/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/31/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/31/05	92 to 95 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/31/05	102 to 105 ft bml	Subtidal	0.0	0.0	0.0
Dock2-14	10/31/05	112 to 115 ft bml	Subtidal	0.0	0.0	0.0
Dock2-2	7/11/05	7.5 to 10.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-2	7/12/05	12.5 to 15.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-2	7/12/05	17.5 to 20.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-2	7/12/05	22.5 to 25.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-2	7/12/05	27.5 to 30.5 ft bml	Subtidal	0.0	0.0	0.0
Dock2-3	7/25/05	13 to 16 ft bml	Subtidal	0.0	0.0	0.0
Dock2-3	7/25/05	18 to 21 ft bml	Subtidal	0.0	0.0	0.0
Dock2-4	7/29/05	29 to 32 ft bml	Subtidal	0.0	0.0	0.0
Dock2-5	8/2/05	17 to 20 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
Dock2-5	8/2/05	22 to 25 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/22/05	59 to 62 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/23/05	94 to 97 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/23/05	84 to 87 ft bml	Subtidal	0.0	0.0	0.0
Dock2-8	8/23/05	79 to 82 ft bml	Subtidal	0.0	0.0	0.0
Dock2-9	9/8/05	44 to 47 ft bml	Subtidal	0.0	0.0	0.0
EA-3	10/27/05	70 to 73 ft bgs	Upland	0.4	0.0	0.4
EA-3	10/27/05	65 to 68 ft bgs	Upland	0.3	0.0	0.3
HYD-1	8/31/05	4 to 7 ft bml	Subtidal	0.0	0.0	0.0
HYD-1	8/31/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
HYD-1	8/31/05	14 to 17 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	95.3 to 98.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/17/05	105.3 to 108.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	35.3 to 38.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	25.3 to 28.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	15.3 to 18.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-10	9/16/05	85.3 to 88.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-2	8/29/05	8 to 11 ft bml	Subtidal	0.0	0.0	0.0
HYD-2	8/29/05	18 to 21 ft bml	Subtidal	0.0	0.0	0.0
HYD-3	8/11/05	31 to 34 ft bml	Subtidal	0.0	0.0	0.0
HYD-5	10/5/05	34 to 37 ft bml	Subtidal	0.0	0.0	0.0
HYD-5	10/5/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
HYD-5	10/5/05	64 to 67 ft bml	Subtidal	0.0	0.0	0.0
HYD-5	10/5/05	74 to 84 ft bml	Subtidal	0.0	0.0	0.0
HYD-6	10/4/05	82.3 to 85.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-6	10/3/05	62.3 to 65.3 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/15/05	80 to 83 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/15/05	90 to 93 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/16/05	110 to 113 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/16/05	100 to 103 ft bml	Subtidal	0.0	0.0	0.0
HYD-7	9/16/05	120 to 123 ft bml	Subtidal	0.0	0.0	0.0
HYD-8	9/14/05	72 to 75 ft bml	Subtidal	0.0	0.0	0.0
HYD-9	9/14/05	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
HYD-9	9/15/05	62 to 65 ft bml	Subtidal	0.0	0.0	0.0
HYD-9	9/15/05	52 to 55 ft bml	Subtidal	0.0	0.0	0.0
MW-H-01	6/19/2013	72 to 74 ft BGS	Upland	0.0	0.0	0.0
MW-H-01	6/19/2013	82 to 84 ft BGS	Upland	0.0	0.0	0.0
NL-16	5/19/06	20 to 23 ft bml	Subtidal	0.0	0.0	0.0
NL-25	1/18/07	6.5 to 9.5 ft bml	Subtidal	0.0	0.0	0.0
NL-25	1/18/07	11.5 to 14.5 ft bml	Subtidal	0.0	0.0	0.0
NL-25	1/18/07	16.5 to 19.5 ft bml	Subtidal	0.0	0.0	0.0
NL-25	1/19/07	21.5 to 24.5 ft bml	Subtidal	0.0	0.0	0.0
NL-29	1/18/07	6.5 to 9.5 ft bml	Subtidal	0.0	0.0	0.0
NL-29	1/18/07	11.5 to 14.5 ft bml	Subtidal	0.0	0.0	0.0
NL-29	1/18/07	21.5 to 24.5 ft bml	Subtidal	0.0	0.0	0.0
NL-30	1/19/07	6.5 to 9.5 ft bml	Subtidal	0.0	0.0	0.0
NL-30	1/19/07	11.5 to 14.5 ft bml	Subtidal	0.0	0.0	0.0
NL-30	1/19/07	16.5 to 19.5 ft bml	Subtidal	0.0	0.0	0.0
NL-30	1/19/07	21.5 to 24.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/1/05	24.5 to 26.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/5/05	44.5 to 46.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-1	7/27/05	84.5 to 86.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-10	10/26/05	26 to 29 ft bml	Subtidal	0.0	0.0	0.0
Pier25-11	10/6/05	25 to 28 ft bml	Subtidal	0.0	0.0	0.0
Pier25-14	11/16/05	64.1 to 67.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-15	12/1/05	69 to 72 ft bml	Subtidal	0.0	0.0	0.0
Pier25-15	12/1/05	82 to 85 ft bml	Subtidal	0.0	0.0	0.0
Pier25-15	12/22/05	14.4 to 17.4 ft bml	Subtidal	0.0	0.0	0.0
Pier25-18	12/9/05	122 to 125 ft bml	Subtidal	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ [(1)] SVOC*	*Summed SQ [(1)] VOC*	*Summed SQ [(1)] All Organics*
Pier25-2	8/19/05	146 to 149 ft bml	Subtidal	0.0	0.0	0.0
Pier25-2	7/14/05	26 to 29 ft bml	Subtidal	0.0	0.0	0.0
Pier25-20	12/6/05	100 to 103 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/3/06	10.5 to 13.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/3/06	30.5 to 33.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/4/06	60.5 to 63.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/4/06	80.5 to 83.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/4/06	90.5 to 93.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-21	1/3/06	20.5 to 23.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-22	1/17/06	10.1 to 13.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-22	1/17/06	20.1 to 23.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-22	1/17/06	30.1 to 33.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-22	1/18/06	90.1 to 93.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-22	1/18/06	110.1 to 113.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-23	1/11/06	13 to 16 ft bml	Subtidal	0.0	0.0	0.0
Pier25-24	1/12/06	4.1 to 7.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-24	1/12/06	14.1 to 17.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-24	1/13/06	104.1 to 107.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-24	1/13/06	114.1 to 117.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-26	1/23/06	11.5 to 14.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-26	1/23/06	21.5 to 24.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-26	1/23/06	31.5 to 34.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-26	1/24/06	101.5 to 104.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/6/06	12 to 15 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/6/06	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
Pier25-29	2/6/06	42 to 45 ft bml	Subtidal	0.0	0.0	0.0
Pier25-3	8/16/05	36.7 to 39.7 ft bml	Subtidal	0.0	0.0	0.0
Pier25-30	1/27/06	100 to 103 ft bml	Subtidal	0.0	0.0	0.0
Pier25-4	8/13/05	87.1 to 90.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-4	8/12/05	37.1 to 40.1 ft bml	Subtidal	0.0	0.0	0.0
Pier25-5	8/16/05	66.5 to 69.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-5	8/16/05	60.5 to 63.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-5	8/15/05	32 to 35 ft bml	Subtidal	0.0	0.0	0.0
Pier25-6	8/19/05	115.9 to 118.9 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	19.3 to 22.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	29.3 to 32.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/24/05	69.3 to 72.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-7	8/25/05	119.3 to 122.3 ft bml	Subtidal	0.0	0.0	0.0
Pier25-8	8/26/05	24 to 27 ft bml	Subtidal	0.0	0.0	0.0
Pier25-9	10/25/05	91.5 to 94.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-9	10/26/05	101.5 to 104.5 ft bml	Subtidal	0.0	0.0	0.0
Pier25-9	10/26/05	111.5 to 114.5 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/28/12	47 to 47 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/26/12	11 to 11 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/31/12	110 to 110 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/29/12	67 to 67 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/29/12	87 to 87 ft bml	Subtidal	0.0	0.0	0.0
WW-A1D	8/30/12	97 to 97 ft bml	Subtidal	0.0	0.0	0.0
WW-B4	5/2/06	90 to 92 ft bml	Intertidal	0.0	0.0	0.0
709-MW20-50	8/21/12	50 ft bgs	Upland	0.0	0.0	0.0
709-MW20-75	8/22/12	75 ft bgs	Upland	0.0	0.0	0.0
709-MW2-15	3/9/04	14 ft bgs	Upland	0.0	0.0	0.0
709-MW2-15	7/21/12	15 ft bgs	Upland	0.0	0.0	0.0
709-MW21-50	7/27/12	50 ft bgs	Upland	0.0	0.0	0.0
709-MW3-15	3/9/04	15 ft bgs	Upland	0.0	0.0	0.0
709-MW4-15	7/22/12	15 ft bgs	Upland	0.0	0.0	0.0
709-MW4-15	3/9/04	15 ft bgs	Upland	0.0	0.0	0.0
709-MW5-15	3/9/04	15 ft bgs	Upland	0.0	0.0	0.0
709-MW5-15	7/22/12	15 ft bgs	Upland	0.0	0.0	0.0
709-MW6-15	3/10/04	15 ft bgs	Upland	0.0	0.0	0.0
709-MW6-15	8/9/12	15 ft bgs	Upland	0.0	0.0	0.0
709-MW6-25	8/9/12	25 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.13

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*Summed SQ (1) All Organics*
709-MW6-50	8/9/12	50 ft bgs	Upland	0.0	0.0	0.0
709-MW7-15	3/10/04	15 ft bgs	Upland	0.0	0.0	0.0
709-MW7-15	7/28/12	15 ft bgs	Upland	0.0	0.0	0.0
709-MW8-15	8/9/12	15 ft bgs	Upland	0.0	0.0	0.0
7-100	8/8/12	100 ft bgs	Upland	0.0	0.0	0.0
7-100	5/1/06	100 ft bgs	Upland	0.0	0.0	0.0
71-25	7/27/12	25 ft bgs	Upland	0.0	0.0	0.0
71-25	4/22/06	25 ft bgs	Upland	0.0	0.0	0.0
71-25	7/13/04	25 ft bgs	Upland	0.0	0.0	0.0
71-50	2/19/05	50 ft bgs	Upland	0.0	0.0	0.0
71-50	5/19/05	50 ft bgs	Upland	0.0	0.0	0.0
71-50	4/22/06	50 ft bgs	Upland	0.0	0.0	0.0
71-50	7/27/12	50 ft bgs	Upland	0.0	0.0	0.0
71-50	7/13/04	50 ft bgs	Upland	0.0	0.0	0.0
7-181	8/8/12	181 ft bgs	Upland	0.0	0.0	0.0
721-GP1	6/22/04	25 ft bgs	Upland	0.0	0.0	0.0
721-GP1	6/22/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP2	6/21/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP4	6/29/04	15 ft bgs	Upland	0.0	0.0	0.0
721-GP4	6/29/04	25 ft bgs	Upland	0.0	0.0	0.0
721-GP4	6/29/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP5	6/23/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP6	6/28/04	25 ft bgs	Upland	0.0	0.0	0.0
721-GP6	6/28/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP7	6/28/04	25 ft bgs	Upland	0.0	0.0	0.0
721-GP7	6/28/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP8	6/24/04	25 ft bgs	Upland	0.0	0.0	0.0
721-GP8	6/24/04	50 ft bgs	Upland	0.0	0.0	0.0
721-GP9	6/24/04	25 ft bgs	Upland	0.0	0.0	0.0
721-GP9	6/24/04	50 ft bgs	Upland	0.0	0.0	0.0
721-MW10-15	8/8/12	15 ft bgs	Upland	0.0	0.0	0.0
721-MW10-15	7/21/04	15 ft bgs	Upland	0.0	0.0	0.0
721-MW10-25	8/7/12	25 ft bgs	Upland	0.0	0.0	0.0
721-MW10-25	7/21/04	25 ft bgs	Upland	0.0	0.0	0.0
721-MW10-50	7/21/04	50 ft bgs	Upland	0.0	0.0	0.0
721-MW10-50	8/6/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW10-75	8/7/12	75 ft bgs	Upland	0.0	0.0	0.0
721-MW11-25	7/31/12	25 ft bgs	Upland	0.0	0.0	0.0
721-MW11-50	8/1/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW11-75	7/31/12	75 ft bgs	Upland	0.0	0.0	0.0
721-MW12-50	7/30/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW13-15	7/31/12	15 ft bgs	Upland	0.0	0.0	0.0
721-MW13-25	7/31/12	25 ft bgs	Upland	0.0	0.0	0.0
721-MW13-50	7/31/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW14-25	8/9/12	25 ft bgs	Upland	0.0	0.0	0.0
721-MW14-50	8/9/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW15-50	7/30/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW5-15	8/25/12	15 ft bgs	Upland	0.0	0.0	0.0
721-MW5-25	8/25/12	25 ft bgs	Upland	0.0	0.0	0.0
721-MW5-50	7/19/04	50 ft bgs	Upland	0.0	0.0	0.0
721-MW5-50	8/25/12	50 ft bgs	Upland	0.0	0.0	0.0
721-MW5-75	8/25/12	75 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.14

SUMMARY OF SCREENING OF METALS IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
Pier25-12	2/1/2006	20 to 23 ft bml	Subtidal	**135.8**	**14.1**	2	Lead (dissolved)
CH-5	6/8/2006	9 to 12 ft bgs	Upland	**119.5**	**15.0**	1	Lead (dissolved)
709-MW5-15	7/22/2012	15 ft BGS	Upland	**107.2**	**9.8**	1	Lead
SP-1	6/28/2006	88 to 91 ft bgs	Upland	**106.4**	**13.5**	1	Mercury (dissolved)
CH-3	7/27/2006	98 to 102 ft bgs	Upland	**90.6**	**11.3**	1	Mercury (dissolved)
WW-A1D	8/27/2012	22 to 22 ft BML	Subtidal	**52.5**	**8.7**	8	Lead
WW-A1R	8/25/2012	95 to 95 ft BML	Subtidal	**48.8**	**5.4**	4	Lead
NL-14	12/14/2005	7 to 10 ft bml	Subtidal	**36.2**	**4.6**	1	Lead (dissolved)
5106-2	1/30/2006	14 to 17 ft bml	Subtidal	**27.7**	**4.0**	2	Zinc (dissolved)
Pier25-1	7/1/2005	14.5 to 16.5 ft bml	Subtidal	**23.9**	**3.0**	1	Zinc (dissolved)
NL-14	12/14/2005	4 to 7 ft bml	Subtidal	**22.8**	**3.0**	1	Lead (dissolved)
5106-16	11/15/2005	71 to 74 ft bml	Subtidal	**18.8**	**2.4**	1	Mercury (dissolved)
EA-3	11/3/2005	135 to 138 ft bgs	Upland	**17.7**	**2.3**	1	Lead (dissolved)
CH-4	7/25/2006	48 to 52 ft bgs	Upland	**15.7**	**2.4**	2	Zinc (dissolved)
11-100	8/7/2012	100 ft BGS	Upland	**10.9**	1.0	1	Lead
14-50R	6/1/2004	50 ft bgs	Upland	**9.3**	0.9	1	Lead
NL-13	12/20/2005	9 to 12 ft bml	Intertidal	**8.3**	1.2	1	Lead (dissolved)
NL-23	8/15/2006	18 to 21 ft bml	Subtidal	**7.6**	1.1	1	Lead (dissolved)
Pier25-1	7/5/2005	44.5 to 46.5 ft bml	Subtidal	**7.2**	0.9	1	Zinc (dissolved)
70-25	8/26/2012	25 ft BGS	Upland	**7.1**	1.2	2	Nickel
5106-15	11/15/2005	32 to 35 ft bml	Subtidal	**6.1**	0.8	1	Mercury (dissolved)
5106-6	10/18/2005	63 to 66 ft bml	Subtidal	**6.0**	0.9	1	Lead (dissolved)
NL-26	1/17/2007	11.5 to 14.5 ft bml	Subtidal	**5.9**	0.8	1	Mercury (dissolved)
Pier25-1	6/30/2005	3 to 5 ft bml	Subtidal	**5.8**	0.7	1	Zinc (dissolved)
NL-28	1/17/2007	21.5 to 24.5 ft bml	Intertidal	**5.6**	0.7	1	Mercury (dissolved)
5106-6	10/18/2005	43 to 46 ft bml	Subtidal	**5.5**	**1.6**	2	Nickel (dissolved)
SP-7	8/30/2006	107 to 111 ft bgs	Upland	**5.1**	1.5	2	Mercury (dissolved)
5106-16	11/14/2005	11 to 14 ft bml	Subtidal	**5.1**	0.7	1	Mercury (dissolved)
NL-26	1/17/2007	6.5 to 9.5 ft bml	Subtidal	**5.1**	0.7	1	Mercury (dissolved)
Dock2-11	10/20/2005	47 to 50 ft bml	Subtidal	**4.6**	0.9	2	Zinc (dissolved)
EA-1	10/3/2005	111.5 to 114.5 ft bgs	Upland	**4.6**	1.2	2	Mercury (dissolved)
5106-2	1/31/2006	84 to 87 ft bml	Subtidal	**4.4**	1.0	2	Zinc (dissolved)
SP-8	7/20/2006	112 to 115 ft bgs	Upland	**4.3**	0.7	1	Mercury (dissolved)
Pier25-1	7/5/2005	34.5 to 36.5 ft bml	Subtidal	**4.3**	0.6	1	Zinc (dissolved)
NL-29	1/18/2007	21.5 to 24.5 ft bml	Subtidal	**4.2**	0.6	1	Mercury (dissolved)
NL-24	1/15/2007	11.5 to 14.5 ft bml	Subtidal	**4.1**	0.6	1	Mercury (dissolved)
82-230	6/11/2010	105 to 110 ft BGS	Upland	**4.0**	0.7	2	Nickel (dissolved)
SP-2	9/12/2006	121 to 122 ft bgs	Upland	**3.6**	1.1	2	Mercury (dissolved)
Dock2-12	11/9/2005	62 to 65 ft bml	Subtidal	**3.6**	0.5	1	Mercury (dissolved)
SP-4	9/21/2006	118 to 122 ft bgs	Upland	**3.5**	0.6	1	Lead (dissolved)
5106-6	10/17/2005	13 to 16 ft bml	Subtidal	**3.4**	1.0	2	Mercury (dissolved)
SP-6	6/7/2006	78 to 81 ft bgs	Upland	**3.4**	0.7	1	Lead (dissolved)
HW-1	1/24/2007	20 to 22 ft bml	Subtidal	**3.4**	0.6	1	Lead (dissolved)
SP-6	6/7/2006	88 to 91 ft bgs	Upland	**3.4**	0.6	1	Lead (dissolved)
5106-1	9/28/2005	70 to 73 ft bml	Subtidal	**3.3**	0.6	1	Nickel (dissolved)
NL-24	1/15/2007	21.5 to 24.5 ft bml	Subtidal	**3.2**	0.5	1	Mercury (dissolved)
3-25	6/2/2004	25 ft bgs	Upland	**3.2**	0.5	2	Nickel
EA-2	10/18/2005	120 to 123 ft bgs	Upland	**3.2**	0.6	1	Mercury (dissolved)
5106-9	11/1/2005	47 to 50 ft bml	Subtidal	**3.0**	0.5	1	Lead (dissolved)
5106-6	10/18/2005	33 to 36 ft bml	Subtidal	**2.9**	1.0	2	Nickel (dissolved)
EA-1	10/5/2005	131.5 to 134.5 ft bgs	Upland	**2.8**	0.5	1	Nickel (dissolved)
SP-6	6/5/2006	7 to 10 ft bgs	Upland	**2.8**	0.4	1	Lead (dissolved)
MW-EXT-9-INT	9/27/2013	155 ft BGS	Upland	**2.8**	0.7	2	Mercury
Pier25-1	7/1/2005	24.5 to 26.5 ft bml	Subtidal	**2.8**	0.4	1	Zinc (dissolved)
Pier25-12	2/1/2006	80 to 83 ft bml	Subtidal	**2.7**	0.6	1	Nickel (dissolved)
EA-3	10/28/2005	95 to 98 ft bgs	Upland	**2.7**	0.9	2	Lead (dissolved)
EA-3	10/31/2005	100 to 103 ft bgs	Upland	**2.7**	0.5	1	Lead (dissolved)
NL-26	1/18/2007	21.5 to 24.5 ft bml	Subtidal	**2.7**	0.4	1	Mercury (dissolved)
79-50	7/6/2009	50 ft bgs	Upland	**2.7**	0.3	1	Zinc (dissolved)
PZ-SHI-3-42	4/27/2006	14.5 to 15.5 ft bml	Subtidal	**2.7**	0.4	1	Nickel (dissolved)
82-150	7/6/2010	15 to 20 ft BGS	Upland	**2.7**	0.3	1	Lead (dissolved)
SP-3	6/16/2006	99 to 101 ft bgs	Upland	**2.7**	0.6	1	Mercury (dissolved)
CH-1	7/20/2006	98 to 102 ft bgs	Upland	**2.7**	0.5	1	Mercury (dissolved)
SP-8	7/19/2006	108 to 111 ft bgs	Upland	**2.7**	0.4	1	Mercury (dissolved)
CH-1	7/20/2006	73 to 77 ft bgs	Upland	**2.7**	0.4	1	Mercury (dissolved)
SP-8	7/18/2006	98 to 101 ft bgs	Upland	**2.7**	0.4	1	Mercury (dissolved)
SP-1	6/23/2006	9 to 12 ft bgs	Upland	**2.6**	0.4	1	Lead (dissolved)
5106-19	1/14/2006	20.5 to 23.5 ft bml	Subtidal	**2.6**	0.6	1	Lead (dissolved)
WW-A1R	8/23/2012	75 to 75 ft BML	Subtidal	**2.6**	0.5	2	Silver (dissolved)
5106-14	12/2/2005	57 to 60 ft bml	Subtidal	**2.6**	0.6	2	Nickel (dissolved)
EA-1	10/3/2005	116.5 to 119.5 ft bgs	Upland	**2.5**	0.5	1	Nickel (dissolved)

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OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
HYD-2	8/30/2005	68 to 71 ft bml	Subtidal	**2.4**	0.4	1	Nickel (dissolved)
5106-1	9/28/2005	65 to 68 ft bml	Subtidal	**2.4**	0.5	1	Nickel (dissolved)
EA-2	10/13/2005	75 to 78 ft bgs	Upland	**2.3**	0.6	2	Chromium (dissolved)
PT-12A	10/24/2005	78.9 to 81.9 ft bml	Subtidal	**2.3**	0.4	1	Mercury (dissolved)
5106-10	11/3/2005	47 to 50 ft bml	Subtidal	**2.2**	0.7	1	Mercury (dissolved)
SP-2	9/13/2006	148 to 152 ft bgs	Upland	**2.2**	0.3	1	Mercury (dissolved)
25-50	7/6/2009	50 ft bgs	Upland	**2.2**	0.2	1	Mercury (dissolved)
EA-2	10/19/2005	130 to 133 ft bgs	Upland	**2.2**	0.5	1	Nickel (dissolved)
HYD-1	9/1/2005	84 to 87 ft bml	Subtidal	**2.2**	0.4	1	Nickel (dissolved)
PZ-SHI-1-100	4/27/2006	66 to 71 ft bml	Subtidal	**2.2**	0.3	1	Nickel (dissolved)
5106-16	11/14/2005	51 to 54 ft bml	Subtidal	**2.1**	0.3	1	Mercury (dissolved)
5106-2	1/30/2006	44 to 47 ft bml	Subtidal	**2.1**	0.7	1	Lead (dissolved)
82-230	6/10/2010	70 to 75 ft BGS	Upland	**2.1**	0.5	1	Zinc (dissolved)
91C-50	7/18/2012	50 ft BGS	Upland	**2.1**	0.2	1	Lead
NL-13	12/20/2005	12 to 15 ft bml	Intertidal	**2.1**	0.4	1	Lead (dissolved)
55-25	7/6/2009	25 ft bgs	Upland	**2.1**	0.3	1	Lead (dissolved)
Pier25-12	2/1/2006	70 to 73 ft bml	Subtidal	**2.1**	0.4	1	Nickel (dissolved)
82-230	6/10/2010	85 to 90 ft BGS	Upland	**2.0**	0.3	1	Zinc (dissolved)
NL-25	1/18/2007	6.5 to 9.5 ft bml	Subtidal	**2.0**	0.3	1	Mercury (dissolved)
SP-5	6/12/2006	48 to 51 ft bgs	Upland	**2.0**	0.4	1	Mercury (dissolved)
Pier25-15	12/1/2005	82 to 85 ft bml	Subtidal	**2.0**	0.3	1	Mercury (dissolved)
Pier25-12	2/1/2006	60 to 63 ft bml	Subtidal	**2.0**	0.3	1	Nickel (dissolved)
5106-13	11/29/2005	77 to 80 ft bml	Subtidal	**1.9**	0.5	1	Nickel (dissolved)
EA-1	10/4/2005	121.5 to 124.5 ft bgs	Upland	**1.9**	0.3	1	Nickel (dissolved)
PT-15A	11/11/2005	121 to 124 ft bml	Subtidal	**1.9**	0.5	1	Mercury (dissolved)
5106-10	11/4/2005	67 to 70 ft bml	Subtidal	**1.9**	0.7	1	Chromium (dissolved)
EA-2	10/17/2005	100 to 103 ft bgs	Upland	**1.9**	0.4	1	Nickel (dissolved)
Pier25-15	11/30/2005	29 to 32 ft bml	Subtidal	**1.8**	0.3	1	Lead (dissolved)
5106-6	10/17/2005	23 to 26 ft bml	Subtidal	**1.8**	0.6	1	Mercury (dissolved)
PT-12A	10/24/2005	68.9 to 71.9 ft bml	Subtidal	**1.8**	0.3	1	Mercury (dissolved)
5106-16	11/15/2005	101 to 104 ft bml	Subtidal	**1.8**	0.3	1	Mercury (dissolved)
HYD-4	9/23/2005	46 to 49 ft bml	Subtidal	**1.8**	0.3	1	Nickel (dissolved)
55-25	8/24/2012	25 ft BGS	Upland	**1.8**	0.2	1	Lead
5106-14	12/2/2005	52 to 55 ft bml	Subtidal	**1.8**	0.4	1	Nickel (dissolved)
PS4-IP	2/25/2008	50 to 53 ft bgs	Upland	**1.8**	0.3	1	Zinc (dissolved)
Dock2-12	11/8/2005	52 to 55 ft bml	Subtidal	**1.8**	0.3	1	Mercury (dissolved)
SP-1	9/6/2006	128 to 132 ft bgs	Upland	**1.7**	0.4	1	Lead (dissolved)
SP-1	9/6/2006	118 to 122 ft bgs	Upland	**1.7**	0.4	1	Lead (dissolved)
SP-5	6/2/2006	18 to 21 ft bgs	Upland	**1.7**	0.3	1	Lead (dissolved)
SP-5	6/2/2006	23 to 26 ft bgs	Upland	**1.7**	0.3	1	Lead (dissolved)
HW-2	1/25/2007	20 to 22 ft bml	Subtidal	**1.7**	0.3	1	Mercury (dissolved)
SP-2	9/13/2006	138 to 142 ft bgs	Upland	**1.7**	0.3	1	Mercury (dissolved)
5106-1	9/28/2005	60 to 63 ft bml	Subtidal	**1.7**	0.3	1	Nickel (dissolved)
5106-2	1/31/2006	64 to 67 ft bml	Subtidal	**1.7**	0.4	1	Nickel (dissolved)
5106-22	1/26/2006	110 to 113 ft bml	Subtidal	**1.6**	0.3	1	Zinc (dissolved)
5106-14	12/2/2005	42 to 45 ft bml	Subtidal	**1.6**	0.4	1	Nickel (dissolved)
SP-7	7/5/2006	78 to 81 ft bgs	Upland	**1.6**	0.5	1	Nickel (dissolved)
5106-1	9/28/2005	50 to 53 ft bml	Subtidal	**1.6**	0.3	1	Nickel (dissolved)
5106-6	10/17/2005	8 to 11 ft bml	Subtidal	**1.6**	0.5	1	Thallium (dissolved)
23-25R	7/6/2009	25 ft bgs	Upland	**1.6**	0.2	1	Lead (dissolved)
Pier25-13	2/2/2006	60 to 63 ft bml	Subtidal	**1.6**	0.5	1	Mercury (dissolved)
SP-2	7/11/2006	68 to 71 ft bgs	Upland	**1.6**	0.3	1	Mercury (dissolved)
3-50	7/6/2009	50 ft bgs	Upland	**1.6**	0.2	1	Mercury (dissolved)
PT-13A	11/9/2005	71.9 to 74.9 ft bml	Subtidal	**1.6**	0.3	1	Nickel (dissolved)
71-25	7/27/2012	25 ft BGS	Upland	**1.6**	0.3	1	Nickel
Pier25-24	1/13/2006	64.1 to 67.1 ft bml	Subtidal	**1.6**	0.4	1	Nickel (dissolved)
94C-130	9/24/2013	130 ft BGS	Upland	**1.5**	0.3	1	Lead
5106-10	11/3/2005	62 to 65 ft bml	Subtidal	**1.5**	0.7	1	Chromium (dissolved)
82-100	7/29/2012	100 ft BGS	Upland	**1.5**	0.2	1	Silver
SP-8	10/4/2006	124 to 128 ft bgs	Upland	**1.5**	0.3	1	Nickel (dissolved)
5106-12	10/11/2005	22 to 25 ft bml	Subtidal	1.5	0.3	0	
SP-2	7/10/2006	58 to 61 ft bgs	Upland	1.5	0.5	0	
NL-26	1/18/2007	16.5 to 19.5 ft bml	Subtidal	1.5	0.2	0	
5106-9	11/2/2005	92 to 95 ft bml	Subtidal	1.5	0.3	0	
5106-6	10/17/2005	18 to 21 ft bml	Subtidal	1.5	0.6	0	
11-75	8/7/2012	75 ft BGS	Upland	1.5	0.1	0	
5106-8	8/3/2005	14 to 17 ft bml	Subtidal	1.5	0.2	0	
5106-2	1/31/2006	54 to 57 ft bml	Subtidal	1.4	0.4	0	
PT-15A	11/10/2005	111 to 114 ft bml	Subtidal	1.4	0.3	0	
5106-8	8/3/2005	19 to 22 ft bml	Subtidal	1.4	0.2	0	

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
SP-2	7/12/2006	98 to 101 ft bgs	Upland	1.4	0.4	0	
HYD-4	9/23/2005	56 to 59 ft bml	Subtidal	1.4	0.3	0	
PT-13A	11/10/2005	81.9 to 84.9 ft bml	Subtidal	1.4	0.3	0	
18-25	8/13/2012	25 ft BGS	Upland	1.4	0.2	0	
EA-2	10/19/2005	125 to 128 ft bgs	Upland	1.4	0.3	0	
Pier25-25	1/20/2006	50 to 52 ft bml	Subtidal	1.4	0.3	0	
5106-13	11/29/2005	57 to 60 ft bml	Subtidal	1.4	0.3	0	
SP-5	8/1/2006	138 to 142 ft bgs	Upland	1.4	0.2	0	
5106-10	11/3/2005	52 to 55 ft bml	Subtidal	1.4	0.6	0	
5106-10	11/3/2005	42 to 45 ft bml	Subtidal	1.4	0.6	0	
5106-10	11/3/2005	57 to 60 ft bml	Subtidal	1.4	0.5	0	
EA-3	10/31/2005	105 to 108 ft bgs	Upland	1.4	0.4	0	
5106-9	11/1/2005	52 to 55 ft bml	Subtidal	1.4	0.4	0	
Pier25-13	2/3/2006	70 to 73 ft bml	Subtidal	1.4	0.4	0	
EA-3	11/1/2005	115 to 118 ft bgs	Upland	1.4	0.4	0	
EA-3	10/27/2005	85 to 88 ft bgs	Upland	1.4	0.4	0	
EA-3	10/28/2005	90 to 93 ft bgs	Upland	1.4	0.4	0	
EA-3	11/2/2005	120 to 123 ft bgs	Upland	1.4	0.4	0	
Pier25-13	2/2/2006	50 to 53 ft bml	Subtidal	1.4	0.4	0	
EA-3	10/26/2005	45 to 48 ft bgs	Upland	1.4	0.4	0	
5106-9	11/1/2005	67 to 70 ft bml	Subtidal	1.4	0.4	0	
5106-10	11/4/2005	72 to 75 ft bml	Subtidal	1.4	0.4	0	
5106-9	11/1/2005	62 to 65 ft bml	Subtidal	1.4	0.3	0	
EA-3	10/27/2005	80 to 83 ft bgs	Upland	1.4	0.3	0	
EA-3	10/26/2005	55 to 58 ft bgs	Upland	1.4	0.3	0	
Pier25-13	2/2/2006	40 to 43 ft bml	Subtidal	1.4	0.3	0	
5106-10	11/3/2005	32 to 35 ft bml	Subtidal	1.4	0.3	0	
5106-9	11/1/2005	57 to 60 ft bml	Subtidal	1.4	0.3	0	
5106-10	11/3/2005	27 to 30 ft bml	Subtidal	1.4	0.3	0	
EA-3	11/1/2005	110 to 113 ft bgs	Upland	1.4	0.3	0	
SP-3	6/14/2006	23 to 26 ft bgs	Upland	1.4	0.3	0	
EA-3	10/27/2005	70 to 73 ft bgs	Upland	1.4	0.3	0	
Pier25-24	1/13/2006	54.1 to 57.1 ft bml	Subtidal	1.4	0.3	0	
EA-3	10/26/2005	60 to 63 ft bgs	Upland	1.4	0.3	0	
5106-9	11/1/2005	72 to 75 ft bml	Subtidal	1.4	0.3	0	
Pier25-13	2/3/2006	80 to 83 ft bml	Subtidal	1.4	0.3	0	
EA-3	10/27/2005	65 to 68 ft bgs	Upland	1.4	0.3	0	
EA-3	10/26/2005	50 to 53 ft bgs	Upland	1.4	0.3	0	
Pier25-24	1/12/2006	14.1 to 17.1 ft bml	Subtidal	1.4	0.3	0	
Pier25-24	1/12/2006	24.1 to 27.1 ft bml	Subtidal	1.4	0.3	0	
Pier25-24	1/12/2006	34.1 to 37.1 ft bml	Subtidal	1.4	0.3	0	
5106-10	11/4/2005	77 to 80 ft bml	Subtidal	1.4	0.3	0	
EA-3	11/3/2005	130 to 133 ft bgs	Upland	1.4	0.2	0	
Pier25-22	1/18/2006	40.1 to 43.1 ft bml	Subtidal	1.4	0.2	0	
5106-1	9/27/2005	45 to 48 ft bml	Subtidal	1.4	0.3	0	
EA-1	9/28/2005	91.5 to 94.5 ft bgs	Upland	1.3	0.2	0	
EA-2	10/18/2005	115 to 118 ft bgs	Upland	1.3	0.3	0	
5106-16	11/14/2005	31 to 34 ft bml	Subtidal	1.3	0.2	0	
5106-10	11/3/2005	22 to 25 ft bml	Subtidal	1.3	0.2	0	
41C-100	7/16/2012	100 ft BGS	Upland	1.3	0.1	0	
5106-12	10/11/2005	32 to 35 ft bml	Subtidal	1.3	0.4	0	
82-100	7/26/2010	90 to 95 ft BGS	Upland	1.2	0.3	0	
5106-12	10/11/2005	27 to 30 ft bml	Subtidal	1.2	0.3	0	
NL-15	12/16/2005	9 to 12 ft bml	Intertidal	1.2	0.2	0	
12-75	8/24/2012	75 ft BGS	Upland	1.2	0.1	0	
5106-1	9/28/2005	55 to 58 ft bml	Subtidal	1.2	0.2	0	
83C-130	7/25/2012	130 ft BGS	Upland	1.2	0.2	0	
PT-15A	11/10/2005	101 to 104 ft bml	Subtidal	1.2	0.2	0	
SP-7	7/5/2006	68 to 71 ft bgs	Upland	1.2	0.4	0	
SP-3	6/15/2006	68 to 71 ft bgs	Upland	1.2	0.3	0	
5106-13	11/29/2005	67 to 70 ft bml	Subtidal	1.2	0.3	0	
SP-2	9/12/2006	108 to 112 ft bgs	Upland	1.2	0.1	0	
HYD-3	8/17/2005	111 to 114 ft bml	Subtidal	1.2	0.3	0	
5106-19	1/14/2006	30.5 to 33.5 ft bml	Subtidal	1.1	0.3	0	
HYD-4	9/23/2005	36 to 39 ft bml	Subtidal	1.1	0.2	0	
EA-1	9/27/2005	81.5 to 84.5 ft bgs	Upland	1.1	0.3	0	
5106-12	10/11/2005	12 to 15 ft bml	Subtidal	1.1	0.3	0	
23-25R	8/17/2012	25 ft BGS	Upland	1.1	0.1	0	
EA-1	10/4/2005	126.5 to 129.5 ft bgs	Upland	1.1	0.2	0	
5106-14	12/1/2005	37 to 40 ft bml	Subtidal	1.1	0.3	0	

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5106-6	10/18/2005	48 to 51 ft bml	Subtidal	1.1	0.5	0	
5106-13	11/29/2005	62 to 65 ft bml	Subtidal	1.1	0.2	0	
721-MW9-25	7/22/2012	25 ft BGS	Upland	1.1	0.2	0	
HYD-4	9/22/2005	6 to 9 ft bml	Subtidal	1.1	0.2	0	
EA-1	9/28/2005	96.5 to 99.5 ft bgs	Upland	1.1	0.2	0	
82-230	6/8/2010	30 to 35 ft BGS	Upland	1.1	0.2	0	
5106-10	11/7/2005	122 to 125 ft bml	Subtidal	1.1	0.2	0	
Dock2-11	10/20/2005	22 to 25 ft bml	Subtidal	1.1	0.4	0	
PT-15A	11/11/2005	131 to 134 ft bml	Subtidal	1.1	0.3	0	
SP-5	6/13/2006	88 to 91 ft bgs	Upland	1.1	0.3	0	
SP-5	6/12/2006	58 to 61 ft bgs	Upland	1.1	0.2	0	
5106-16	11/14/2005	21 to 24 ft bml	Subtidal	1.1	0.4	0	
5106-11	10/13/2005	27 to 30 ft bml	Subtidal	1.1	0.3	0	
CH-4	7/25/2006	73 to 77 ft bgs	Upland	1.1	0.4	0	
CH-4	7/25/2006	98 to 102 ft bgs	Upland	1.1	0.4	0	
75-50	7/6/2009	50 ft bgs	Upland	1.1	0.2	0	
5106-6	10/18/2005	28 to 31 ft bml	Subtidal	1.1	0.6	0	
SP-1	6/26/2006	43 to 46 ft bgs	Upland	1.0	0.2	0	
36-100R	8/1/2012	100 ft BGS	Upland	1.0	0.1	0	
EA-2	10/17/2005	110 to 113 ft bgs	Upland	1.0	0.2	0	
90C-75	7/23/2012	75 ft BGS	Upland	1.0	0.2	0	
PT-13A	11/9/2005	61.9 to 64.9 ft bml	Subtidal	1.0	0.2	0	
82-230	6/16/2010	145 to 150 ft BGS	Upland	1.0	0.2	0	
5106-11	10/13/2005	47 to 50 ft bml	Subtidal	1.0	0.3	0	
709-MW18-50	7/26/2012	50 ft BGS	Upland	1.0	0.1	0	
SP-6	6/8/2006	98 to 101 ft bgs	Upland	1.0	0.3	0	
SP-8	10/3/2006	104 to 108 ft bgs	Upland	1.0	0.2	0	
5106-11	10/13/2005	32 to 35 ft bml	Subtidal	1.0	0.2	0	
SP-7	8/30/2006	117 to 121 ft bgs	Upland	1.0	0.4	0	
5106-12	10/11/2005	7 to 10 ft bml	Subtidal	1.0	0.3	0	
NL-13	12/20/2005	6 to 9 ft bml	Intertidal	1.0	0.2	0	
SP-2	9/14/2006	178 to 182 ft bgs	Upland	1.0	0.2	0	
SP-3	6/15/2006	58 to 61 ft bgs	Upland	1.0	0.3	0	
5106-10	11/7/2005	117 to 120 ft bml	Subtidal	1.0	0.1	0	
HYD-4	9/23/2005	26 to 29 ft bml	Subtidal	1.0	0.2	0	
5106-13	11/29/2005	72 to 75 ft bml	Subtidal	1.0	0.2	0	
709-MW21-50	7/27/2012	50 ft BGS	Upland	1.0	0.1	0	
5106-5	9/9/2005	14 to 17 ft bml	Subtidal	1.0	0.2	0	
EA-2	10/13/2005	80 to 83 ft bgs	Upland	1.0	0.2	0	
MW-G-SHALLOW	9/25/2013	145 ft BGS	Upland	0.9	0.2	0	
5106-1	9/27/2005	35 to 38 ft bml	Subtidal	0.9	0.2	0	
Dock2-12	11/8/2005	57 to 60 ft bml	Subtidal	0.9	0.2	0	
5106-11	10/14/2005	47 to 50 ft bml	Subtidal	0.9	0.3	0	
5106-14	12/1/2005	27 to 30 ft bml	Subtidal	0.9	0.2	0	
5106-11	10/13/2005	37 to 40 ft bml	Subtidal	0.9	0.2	0	
81-50	7/6/2009	50 ft bgs	Upland	0.9	0.2	0	
SP-2	7/10/2006	43 to 46 ft bgs	Upland	0.9	0.3	0	
NL-24	1/15/2007	6.5 to 9.5 ft bml	Subtidal	0.9	0.2	0	
NL-23	8/15/2006	21 to 24 ft bml	Subtidal	0.9	0.2	0	
NL-28	1/17/2007	16.5 to 19.5 ft bml	Intertidal	0.9	0.2	0	
5106-14	12/2/2005	47 to 50 ft bml	Subtidal	0.9	0.2	0	
24-35	8/15/2012	35 ft BGS	Upland	0.9	0.1	0	
17-50	7/6/2009	50 ft bgs	Upland	0.9	0.1	0	
5106-7	8/10/2005	6 to 9 ft bml	Subtidal	0.9	0.2	0	
5106-5	9/9/2005	29 to 32 ft bml	Subtidal	0.9	0.2	0	
Dock2-9	9/8/2005	9 to 12 ft bml	Subtidal	0.9	0.2	0	
5106-20	1/5/2006	53.5 to 56.5 ft bml	Subtidal	0.9	0.2	0	
5106-8	8/4/2005	24 to 27 ft bml	Subtidal	0.9	0.2	0	
5106-26	2/14/2006	27 to 30 ft bml	Intertidal	0.9	0.2	0	
5106-10	11/4/2005	92 to 95 ft bml	Subtidal	0.9	0.1	0	
NL-23	8/14/2006	9 to 12 ft bml	Subtidal	0.9	0.2	0	
NL-23	8/14/2006	15 to 18 ft bml	Subtidal	0.9	0.2	0	
5106-13	11/29/2005	47 to 50 ft bml	Subtidal	0.9	0.2	0	
SP-3	6/15/2006	48 to 51 ft bgs	Upland	0.8	0.3	0	
EA-2	10/14/2005	90 to 93 ft bgs	Upland	0.8	0.2	0	
5106-2	1/31/2006	74 to 77 ft bml	Subtidal	0.8	0.4	0	
HYD-4	9/22/2005	16 to 19 ft bml	Subtidal	0.8	0.2	0	
94C-130	7/24/2012	130 ft BGS	Upland	0.8	0.2	0	
Dock2-11	10/19/2005	7 to 10 ft bml	Subtidal	0.8	0.2	0	
5106-11	10/14/2005	57 to 60 ft bml	Subtidal	0.8	0.2	0	

TABLE 4.14

SUMMARY OF SCREENING OF METALS IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
Pier25-25	1/20/2006	60 to 63 ft bml	Subtidal	0.8	0.2	0	
5106-26	2/14/2006	12 to 15 ft bml	Intertidal	0.8	0.1	0	
SP-7	7/5/2006	58 to 61 ft bgs	Upland	0.8	0.2	0	
Pier25-15	11/30/2005	49 to 52 ft bml	Subtidal	0.8	0.2	0	
Dock2-12	11/8/2005	47 to 50 ft bml	Subtidal	0.8	0.1	0	
SP-2	7/7/2006	23 to 26 ft bgs	Upland	0.8	0.1	0	
5106-10	11/3/2005	37 to 40 ft bml	Subtidal	0.8	0.1	0	
T6-60	8/24/2012	60 ft BGS	Upland	0.8	0.2	0	
66-15	7/10/2004	15 ft bgs	Upland	0.8	0.1	0	
91C-75	7/18/2012	75 ft BGS	Upland	0.8	0.1	0	
HYD-2	8/30/2005	78 to 81 ft bml	Subtidal	0.8	0.1	0	
SP-3	9/26/2006	108 to 112 ft bgs	Upland	0.8	0.3	0	
EA-1	9/27/2005	76.5 to 79.5 ft bgs	Upland	0.8	0.2	0	
53C-100	7/24/2012	100 ft BGS	Upland	0.8	0.1	0	
5106-11	10/13/2005	22 to 25 ft bml	Subtidal	0.8	0.2	0	
PZ-SHI-2-75	4/28/2006	54.5 to 59.5 ft bml	Intertidal	0.8	0.2	0	
EA-1	9/28/2005	106.5 to 109.5 ft bgs	Upland	0.8	0.2	0	
36-25	8/1/2012	25 ft BGS	Upland	0.8	0.1	0	
73-50	7/12/2004	50 ft bgs	Upland	0.8	0.1	0	
709-MW6-25	8/9/2012	25 ft BGS	Upland	0.8	0.1	0	
Dock2-11	10/20/2005	27 to 30 ft bml	Subtidal	0.8	0.3	0	
5106-13	11/28/2005	7 to 10 ft bml	Subtidal	0.8	0.2	0	
CH-2	8/2/2006	23 to 27 ft bgs	Upland	0.8	0.1	0	
Pier25-22	1/18/2006	50.1 to 53.1 ft bml	Subtidal	0.7	0.2	0	
5106-13	11/29/2005	52 to 55 ft bml	Subtidal	0.7	0.2	0	
Dock2-12	11/8/2005	7 to 10 ft bml	Subtidal	0.7	0.1	0	
NL-28	1/17/2007	6.5 to 9.5 ft bml	Intertidal	0.7	0.1	0	
NL-30	1/19/2007	11.5 to 14.5 ft bml	Subtidal	0.7	0.1	0	
SP-5	6/9/2006	43 to 46 ft bgs	Upland	0.7	0.2	0	
NL-23	8/14/2006	12 to 15 ft bml	Subtidal	0.7	0.1	0	
W-EXT-9-SHALLO	9/27/2013	123 ft BGS	Upland	0.7	0.2	0	
709-MW20-15	8/21/2012	15 ft BGS	Upland	0.7	0.1	0	
5106-13	11/30/2005	107 to 110 ft bml	Subtidal	0.7	0.1	0	
5106-8	8/4/2005	29 to 32 ft bml	Subtidal	0.7	0.1	0	
EA-1	9/27/2005	71.5 to 74.5 ft bgs	Upland	0.7	0.1	0	
82-230	6/21/2010	185 to 190 ft BGS	Upland	0.7	0.1	0	
Pier25-21	1/3/2006	10.5 to 13.5 ft bml	Subtidal	0.7	0.1	0	
41C-75	7/16/2012	75 ft BGS	Upland	0.7	0.1	0	
5106-21	1/10/2006	35.5 to 38.5 ft bml	Subtidal	0.7	0.2	0	
5106-1	9/27/2005	30 to 33 ft bml	Subtidal	0.7	0.1	0	
5106-1	9/27/2005	25 to 28 ft bml	Subtidal	0.7	0.1	0	
Pier25-12	2/1/2006	50 to 53 ft bml	Subtidal	0.7	0.1	0	
5106-6	10/18/2005	53 to 56 ft bml	Subtidal	0.7	0.4	0	
5106-6	10/18/2005	38 to 41 ft bml	Subtidal	0.7	0.4	0	
5106-13	11/28/2005	27 to 30 ft bml	Subtidal	0.7	0.1	0	
Dock2-12	11/8/2005	42 to 45 ft bml	Subtidal	0.7	0.1	0	
NL-30	1/19/2007	6.5 to 9.5 ft bml	Subtidal	0.7	0.1	0	
NL-30	1/19/2007	21.5 to 24.5 ft bml	Subtidal	0.7	0.1	0	
SP-3	6/19/2006	87 to 90 ft bgs	Upland	0.7	0.2	0	
EA-2	10/12/2005	55 to 58 ft bgs	Upland	0.7	0.2	0	
NL-14	12/14/2005	10 to 13 ft bml	Subtidal	0.7	0.2	0	
44-50	8/11/2012	50 ft BGS	Upland	0.7	0.1	0	
Dock2-8	8/22/2005	24 to 27 ft bml	Subtidal	0.7	0.2	0	
5106-6	10/18/2005	58 to 61 ft bml	Subtidal	0.7	0.4	0	
5106-2	1/30/2006	34 to 37 ft bml	Subtidal	0.7	0.3	0	
SP-3	9/26/2006	118 to 122 ft bgs	Upland	0.7	0.2	0	
5106-2	1/30/2006	24 to 27 ft bml	Subtidal	0.7	0.2	0	
Pier25-26	1/23/2006	41.5 to 44.5 ft bml	Subtidal	0.7	0.2	0	
Pier25-26	1/24/2006	71.5 to 74.5 ft bml	Subtidal	0.7	0.2	0	
Pier25-26	1/23/2006	31.5 to 34.5 ft bml	Subtidal	0.7	0.1	0	
Pier25-26	1/24/2006	61.5 to 64.5 ft bml	Subtidal	0.7	0.1	0	
Pier25-26	1/23/2006	51.5 to 54.5 ft bml	Subtidal	0.7	0.1	0	
Pier25-23	1/11/2006	33 to 36 ft bml	Subtidal	0.7	0.1	0	
Pier25-26	1/23/2006	21.5 to 24.5 ft bml	Subtidal	0.7	0.1	0	
SP-5	6/2/2006	9 to 12 ft bgs	Upland	0.7	0.1	0	
55-25	2/11/2009	25 ft bgs	Upland	0.7	0.1	0	
Pier25-23	1/11/2006	63 to 66 ft bml	Subtidal	0.7	0.1	0	
CH-1	7/20/2006	48 to 52 ft bgs	Upland	0.7	0.2	0	
9-25	8/8/2012	25 ft BGS	Upland	0.7	0.1	0	
14-50R	8/13/2012	50 ft BGS	Upland	0.7	0.1	0	

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
Dock2-9	9/8/2005	4 to 7 ft bml	Subtidal	0.7	0.2	0	
PZ-SHI-1-126	4/27/2006	96 to 101 ft bml	Subtidal	0.7	0.1	0	
721-MW15-50	7/30/2012	50 ft BGS	Upland	0.7	0.1	0	
HYD-2	8/30/2005	88 to 91 ft bml	Subtidal	0.7	0.1	0	
EA-1	9/27/2005	86.5 to 89.5 ft bgs	Upland	0.7	0.1	0	
Dock2-11	10/20/2005	12 to 15 ft bml	Subtidal	0.7	0.2	0	
50-15	8/11/2012	15 ft BGS	Upland	0.6	0.1	0	
44-25	8/10/2012	25 ft BGS	Upland	0.6	0.1	0	
SP-3	6/15/2006	43 to 46 ft bgs	Upland	0.6	0.2	0	
EA-2	10/12/2005	60 to 63 ft bgs	Upland	0.6	0.2	0	
PZ-SHI-2-75	8/25/2012	75 ft BGS	Intertidal	0.6	0.2	0	
WW-A1R	8/24/2012	85 to 85 ft BML	Subtidal	0.6	0.1	8	
5106-11	10/13/2005	17 to 20 ft bml	Subtidal	0.6	0.2	0	
49-15	8/11/2012	15 ft BGS	Upland	0.6	0.1	0	
Dock2-12	11/8/2005	12 to 15 ft bml	Subtidal	0.6	0.2	0	
PT-12A	10/24/2005	88.9 to 91.9 ft bml	Subtidal	0.6	0.2	0	
5106-13	11/29/2005	42 to 45 ft bml	Subtidal	0.6	0.1	0	
NL-23	8/15/2006	24 to 27 ft bml	Subtidal	0.6	0.1	0	
91C-100	7/18/2012	100 ft BGS	Upland	0.6	0.1	0	
15-120	8/15/2012	120 ft BGS	Upland	0.6	0.1	0	
HYD-3	8/16/2005	101 to 104 ft bml	Subtidal	0.6	0.1	0	
5106-3	9/19/2005	4 to 7 ft bml	Subtidal	0.6	0.1	0	
5106-24	2/9/2006	77 to 80 ft bml	Intertidal	0.6	0.1	0	
SP-1	6/26/2006	68 to 71 ft bgs	Upland	0.6	0.3	0	
SP-1	6/26/2006	58 to 61 ft bgs	Upland	0.6	0.2	0	
SP-4	6/22/2006	88 to 91 ft bgs	Upland	0.6	0.2	0	
SP-1	6/27/2006	98 to 101 ft bgs	Upland	0.6	0.1	0	
SP-1	6/26/2006	48 to 51 ft bgs	Upland	0.6	0.1	0	
SP-1	6/23/2006	18 to 21 ft bgs	Upland	0.6	0.1	0	
Pier25-10	10/26/2005	26 to 29 ft bml	Subtidal	0.6	0.2	0	
5106-12	10/11/2005	17 to 20 ft bml	Subtidal	0.6	0.2	0	
SP-5	6/13/2006	98 to 101 ft bgs	Upland	0.6	0.2	0	
SP-7	7/6/2006	88 to 91 ft bgs	Upland	0.6	0.2	0	
5106-20	1/5/2006	38.5 to 41.5 ft bml	Subtidal	0.6	0.1	0	
Dock2-8	8/22/2005	9 to 12 ft bml	Subtidal	0.6	0.1	0	
23-25R	2/11/2009	25 ft bgs	Upland	0.6	0.1	0	
5106-7	8/10/2005	31 to 34 ft bml	Subtidal	0.6	0.1	0	
EA-2	10/12/2005	65 to 68 ft bgs	Upland	0.6	0.2	0	
SP-2	7/10/2006	48 to 51 ft bgs	Upland	0.6	0.2	0	
Dock2-12	11/8/2005	32 to 35 ft bml	Subtidal	0.6	0.1	0	
SP-1	6/23/2006	23 to 26 ft bgs	Upland	0.6	0.1	0	
5106-20	1/5/2006	63.5 to 66.5 ft bml	Subtidal	0.6	0.1	0	
91C-130	7/18/2012	130 ft BGS	Upland	0.6	0.1	0	
5106-5	9/9/2005	34 to 37 ft bml	Subtidal	0.6	0.1	0	
80-25	7/6/2009	25 ft bgs	Upland	0.6	0.1	0	
SP-4	9/20/2006	108 to 112 ft bgs	Upland	0.6	0.1	0	
34-75	8/20/2012	75 ft BGS	Upland	0.6	0.1	0	
5106-7	8/10/2005	11 to 14 ft bml	Subtidal	0.6	0.2	0	
5106-6	10/19/2005	98 to 101 ft bml	Subtidal	0.6	0.1	0	
Pier25-13	2/2/2006	10 to 13 ft bml	Subtidal	0.6	0.1	0	
SP-6	6/7/2006	58 to 61 ft bgs	Upland	0.6	0.2	0	
5106-8	8/8/2005	74 to 77 ft bml	Subtidal	0.6	0.1	0	
5106-3	9/19/2005	9 to 12 ft bml	Subtidal	0.5	0.1	0	
Dock2-8	8/22/2005	19 to 22 ft bml	Subtidal	0.5	0.1	0	
HYD-7	9/15/2005	80 to 83 ft bml	Subtidal	0.5	0.1	0	
NL-15	12/16/2005	6 to 9 ft bml	Intertidal	0.5	0.1	0	
PZ-SHI-2-100	8/25/2012	100 ft BGS	Intertidal	0.5	0.1	0	
WW-A1R	8/22/2012	45 to 45 ft BML	Subtidal	0.5	0.1	2	
5106-1	9/27/2005	40 to 43 ft bml	Subtidal	0.5	0.1	0	
SP-1	6/23/2006	34 to 37 ft bgs	Upland	0.5	0.1	0	
SP-4	6/22/2006	78 to 81 ft bgs	Upland	0.5	0.1	0	
NL-28	1/17/2007	11.5 to 14.5 ft bml	Intertidal	0.5	0.1	0	
CH-4	7/25/2006	23 to 27 ft bgs	Upland	0.5	0.1	0	
SP-2	7/7/2006	33 to 36 ft bgs	Upland	0.5	0.1	0	
709-MW16-25	7/27/2012	25 ft BGS	Upland	0.5	0.1	0	
5106-5	9/10/2005	59 to 61 ft bml	Subtidal	0.5	0.1	0	
5106-7	8/10/2005	16 to 19 ft bml	Subtidal	0.5	0.1	0	
53C-130	7/24/2012	130 ft BGS	Upland	0.5	0.2	0	
HYD-6	10/1/2005	42.3 to 45.4 ft bml	Subtidal	0.5	0.1	0	
CH-2	8/4/2006	123 to 127 ft bgs	Upland	0.5	0.1	0	

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
Pier25-17	11/17/2005	83.7 to 86.7 ft bml	Subtidal	0.5	0.1	0	
HW-4	1/23/2007	20 to 22 ft bml	Subtidal	0.5	0.1	0	
Pier25-21	1/4/2006	70.5 to 73.5 ft bml	Subtidal	0.5	0.1	0	
46C-160	8/22/2012	160 ft BGS	Upland	0.5	0.1	0	
Dock2-8	8/22/2005	14 to 17 ft bml	Subtidal	0.5	0.1	0	
Pier25-12	2/1/2006	40 to 43 ft bml	Subtidal	0.5	0.1	0	
5106-8	8/4/2005	39 to 42 ft bml	Subtidal	0.5	0.1	0	
65-50	8/12/2012	50 ft BGS	Upland	0.5	0.1	0	
77C-50	7/16/2012	50 ft BGS	Upland	0.5	0.1	0	
21C-100	7/25/2012	100 ft BGS	Upland	0.5	0.1	0	
EA-2	10/12/2005	70 to 73 ft bgs	Upland	0.5	0.1	0	
EA-3	10/27/2005	75 to 78 ft bgs	Upland	0.5	0.2	0	
80-25	7/27/2012	25 ft BGS	Upland	0.5	0.1	0	
75-100	3/30/2010	100 ft bgs	Upland	0.5	0.1	0	
Dock2-11	10/20/2005	82 to 85 ft bml	Subtidal	0.5	0.1	0	
EA-1	9/28/2005	101.5 to 104.5 ft bgs	Upland	0.5	0.1	0	
Dock2-8	8/22/2005	54 to 57 ft bml	Subtidal	0.5	0.1	0	
Dock2-12	11/8/2005	37 to 40 ft bml	Subtidal	0.5	0.1	0	
709-MW11-15	7/29/2012	15 ft BGS	Upland	0.5	0.1	0	
SP-3	6/19/2006	78 to 81 ft bgs	Upland	0.5	0.2	0	
SP-5	8/1/2006	118 to 122 ft bgs	Upland	0.5	0.2	0	
SP-6	8/23/2006	117 to 121 ft bgs	Upland	0.5	0.2	0	
SP-5	7/31/2006	108 to 112 ft bgs	Upland	0.5	0.2	0	
HYD-4	9/24/2005	66 to 69 ft bml	Subtidal	0.5	0.1	0	
WW-A1R	8/22/2012	55 to 55 ft BML	Subtidal	0.5	0.1	2	
Pier25-18	12/9/2005	92 to 95 ft bml	Subtidal	0.5	0.1	0	
5106-3	9/19/2005	14 to 17 ft bml	Subtidal	0.5	0.1	0	
5106-8	8/8/2005	69 to 72 ft bml	Subtidal	0.5	0.1	0	
HYD-7	9/1/2005	40 to 43 ft bml	Subtidal	0.5	0.1	0	
MW-H-01	9/27/2013	181.2 ft BGS	Upland	0.5	0.1	0	
HYD-3	8/15/2005	71 to 74 ft bml	Subtidal	0.5	0.1	0	
5106-8	8/4/2005	34 to 37 ft bml	Subtidal	0.5	0.1	0	
82-230	6/9/2010	50 to 55 ft BGS	Upland	0.5	0.1	0	
65-15	7/18/2004	15 ft bgs	Upland	0.5	0.1	0	
Dock2-11	10/21/2005	97 to 100 ft bml	Subtidal	0.5	0.1	0	
709-MW18-25	7/26/2012	25 ft BGS	Upland	0.5	0.1	0	
Dock2-8	8/20/2005	4 to 7 ft bml	Subtidal	0.5	0.1	0	
HYD-3	8/15/2005	81 to 84 ft bml	Subtidal	0.5	0.1	0	
Dock2-11	10/20/2005	72 to 75 ft bml	Subtidal	0.5	0.1	0	
5106-5	9/9/2005	9 to 12 ft bml	Subtidal	0.5	0.1	0	
Dock2-11	10/20/2005	77 to 80 ft bml	Subtidal	0.5	0.1	0	
5106-27	4/11/2006	49 to 53 ft bml	Intertidal	0.5	0.1	0	
5106-7	8/10/2005	36 to 39 ft bml	Subtidal	0.5	0.1	0	
Pier25-12	2/1/2006	30 to 33 ft bml	Subtidal	0.5	0.1	0	
HYD-3	8/15/2005	91 to 94 ft bml	Subtidal	0.4	0.1	0	
721-MW10-15	8/8/2012	15 ft BGS	Upland	0.4	0.1	0	
SP-6	6/6/2006	43 to 46 ft bgs	Upland	0.4	0.1	0	
5106-13	11/28/2005	22 to 25 ft bml	Subtidal	0.4	0.1	0	
79-50	2/10/2009	50 ft bgs	Upland	0.4	0.1	0	
Pier25-17	11/17/2005	73.7 to 76.7 ft bml	Subtidal	0.4	0.2	0	
77C-100	7/16/2012	100 ft BGS	Upland	0.4	0.1	0	
41C-160	7/17/2012	160 ft BGS	Upland	0.4	0.1	0	
Dock2-11	10/20/2005	67 to 70 ft bml	Subtidal	0.4	0.1	0	
SP-2	7/7/2006	8 to 11 ft bgs	Upland	0.4	0.1	0	
SP-7	6/30/2006	48 to 51 ft bgs	Upland	0.4	0.2	0	
5106-3	9/19/2005	19 to 22 ft bml	Subtidal	0.4	0.1	0	
36-50	8/1/2012	50 ft BGS	Upland	0.4	0.1	0	
HYD-4	9/26/2005	116 to 119 ft bml	Subtidal	0.4	0.1	0	
SP-4	6/21/2006	68 to 71 ft bgs	Upland	0.4	0.2	0	
90C-100	7/23/2012	100 ft BGS	Upland	0.4	0.1	0	
18-50R	8/15/2012	50 ft BGS	Upland	0.4	0.1	0	
T5-120	8/25/2012	120 ft BGS	Upland	0.4	0.1	0	
65-100	8/12/2012	100 ft BGS	Upland	0.4	0.1	0	
83C-100	7/25/2012	100 ft BGS	Upland	0.4	0.1	0	
75-50	8/9/2012	50 ft BGS	Upland	0.4	0.1	0	
55-50	8/24/2012	50 ft BGS	Upland	0.4	0.1	0	
75-75	8/9/2012	75 ft BGS	Upland	0.4	0.1	0	
90C-130	7/23/2012	130 ft BGS	Upland	0.4	0.1	0	
HW-4	1/23/2007	9 to 11 ft bml	Subtidal	0.4	0.1	0	
5-75	8/24/2012	75 ft BGS	Upland	0.4	0.0	0	

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
5106-14	12/1/2005	32 to 35 ft bml	Subtidal	0.4	0.1	0	
Pier25-8	8/26/2005	114 to 117 ft bml	Subtidal	0.4	0.1	0	
46C-25	8/22/2012	25 ft BGS	Upland	0.4	0.1	0	
SP-8	10/4/2006	134 to 138 ft bgs	Upland	0.4	0.1	0	
5106-24	2/9/2006	47 to 50 ft bml	Intertidal	0.4	0.1	0	
5106-13	11/28/2005	17 to 20 ft bml	Subtidal	0.4	0.1	0	
Dock2-12	11/8/2005	17 to 20 ft bml	Subtidal	0.4	0.1	0	
PZ-SHI-3-75	4/27/2006	44.5 to 49.5 ft bml	Subtidal	0.4	0.1	0	
73-25	7/12/2004	25 ft bgs	Upland	0.4	0.1	0	
Pier25-6	8/18/2005	55.9 to 58.9 ft bml	Subtidal	0.4	0.1	0	
EA-1	9/23/2005	51.5 to 54.5 ft bgs	Upland	0.4	0.1	0	
5106-9	11/2/2005	87 to 90 ft bml	Subtidal	0.4	0.1	0	
SP-7	6/29/2006	43 to 46 ft bgs	Upland	0.4	0.2	0	
HYD-2	8/30/2005	58 to 61 ft bml	Subtidal	0.4	0.1	0	
SP-6	6/7/2006	68 to 71 ft bgs	Upland	0.4	0.1	0	
Pier25-19	12/7/2005	62.6 to 65.6 ft bml	Subtidal	0.4	0.1	0	
Pier25-9	10/25/2005	31.5 to 34.5 ft bml	Subtidal	0.4	0.1	0	
CH-2	8/3/2006	98 to 102 ft bgs	Upland	0.4	0.1	0	
5106-24	2/9/2006	42 to 45 ft bml	Intertidal	0.4	0.1	0	
Dock2-1	7/20/2005	18 to 21 ft bml	Subtidal	0.4	0.1	0	
Dock2-12	11/8/2005	27 to 30 ft bml	Subtidal	0.4	0.1	0	
HYD-7	8/31/2005	20 to 23 ft bml	Subtidal	0.4	0.1	0	
5106-20	1/5/2006	48.5 to 51.5 ft bml	Subtidal	0.4	0.1	0	
5106-9	11/2/2005	107 to 110 ft bml	Subtidal	0.4	0.1	0	
HYD-1	9/1/2005	74 to 77 ft bml	Subtidal	0.4	0.1	0	
EA-1	10/5/2005	136.5 to 139.5 ft bgs	Upland	0.4	0.1	0	
69-50	7/14/2004	50 ft bgs	Upland	0.4	0.1	0	
5106-24	2/9/2006	52 to 55 ft bml	Intertidal	0.4	0.1	0	
5106-16	11/15/2005	61 to 64 ft bml	Subtidal	0.4	0.1	0	
5106-9	11/2/2005	97 to 100 ft bml	Subtidal	0.4	0.1	0	
5106-23	2/10/2006	42 to 45 ft bml	Intertidal	0.4	0.1	0	
Dock2-9	9/8/2005	14 to 17 ft bml	Subtidal	0.4	0.1	0	
SP-2	7/7/2006	18 to 21 ft bgs	Upland	0.4	0.1	0	
5106-1	9/27/2005	6 to 9 ft bml	Subtidal	0.4	0.1	0	
Pier25-29	2/7/2006	92 to 95 ft bml	Subtidal	0.4	0.1	0	
Dock2-8	8/22/2005	49 to 52 ft bml	Subtidal	0.4	0.0	0	
5106-8	8/8/2005	84 to 87 ft bml	Subtidal	0.4	0.1	0	
Dock2-2	7/13/2005	32.5 to 35.5 ft bml	Subtidal	0.4	0.1	0	
NL-29	1/18/2007	6.5 to 9.5 ft bml	Subtidal	0.4	0.1	0	
Pier25-10	10/27/2005	56 to 59 ft bml	Subtidal	0.4	0.1	0	
HYD-9	9/15/2005	92 to 95 ft bml	Subtidal	0.4	0.1	0	
5106-14	12/1/2005	17 to 20 ft bml	Subtidal	0.4	0.1	0	
Pier25-2	7/18/2005	76 to 79 ft bml	Subtidal	0.4	0.1	0	
NL-16	5/19/2006	11 to 14 ft bml	Subtidal	0.4	0.1	0	
EA-1	9/23/2005	41.5 to 44.5 ft bgs	Upland	0.4	0.1	0	
5106-13	11/28/2005	37 to 40 ft bml	Subtidal	0.4	0.1	0	
5106-7	8/10/2005	21 to 24 ft bml	Subtidal	0.4	0.1	0	
Pier25-19	12/7/2005	42.6 to 45.6 ft bml	Subtidal	0.4	0.0	0	
EA-1	9/23/2005	56.5 to 59.5 ft bgs	Upland	0.4	0.1	0	
5106-5	9/9/2005	54 to 57 ft bml	Subtidal	0.4	0.1	0	
HYD-9	9/15/2005	82 to 85 ft bml	Subtidal	0.3	0.0	0	
Dock2-14	10/31/2005	102 to 105 ft bml	Subtidal	0.3	0.1	0	
EA-3	11/7/2005	155 to 158 ft bgs	Upland	0.3	0.1	0	
5106-24	2/8/2006	37 to 40 ft bml	Intertidal	0.3	0.0	0	
SP-6	6/6/2006	23 to 26 ft bgs	Upland	0.3	0.1	0	
NL-15	12/19/2005	27 to 30 ft bml	Intertidal	0.3	0.1	0	
HYD-2	8/29/2005	38 to 41 ft bml	Subtidal	0.3	0.0	0	
NL-16	5/19/2006	20 to 23 ft bml	Subtidal	0.3	0.0	0	
5106-13	11/28/2005	32 to 35 ft bml	Subtidal	0.3	0.1	0	
SP-7	6/29/2006	33 to 36 ft bgs	Upland	0.3	0.1	0	
5106-15	11/15/2005	22 to 25 ft bml	Subtidal	0.3	0.1	0	
SP-7	6/28/2006	23 to 26 ft bgs	Upland	0.3	0.1	0	
SP-2	7/12/2006	88 to 91 ft bgs	Upland	0.3	0.1	0	
5106-16	11/14/2005	41 to 44 ft bml	Subtidal	0.3	0.1	0	
Dock2-11	10/21/2005	102 to 105 ft bml	Subtidal	0.3	0.1	0	
SP-6	6/6/2006	48 to 51 ft bgs	Upland	0.3	0.1	0	
Dock2-11	10/20/2005	37 to 40 ft bml	Subtidal	0.3	0.1	0	
SP-7	6/28/2006	8 to 11 ft bgs	Upland	0.3	0.1	0	
Dock2-11	10/21/2005	92 to 95 ft bml	Subtidal	0.3	0.1	0	
Dock2-11	10/21/2005	87 to 90 ft bml	Subtidal	0.3	0.1	0	

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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
SP-7	6/28/2006	18 to 21 ft bgs	Upland	0.3	0.1	0	
CH-3	7/27/2006	73 to 77 ft bgs	Upland	0.3	0.1	0	
5106-13	11/28/2005	12 to 15 ft bml	Subtidal	0.3	0.1	0	
EA-3	10/25/2005	20 to 23 ft bgs	Upland	0.3	0.1	0	
EA-3	10/25/2005	25 to 28 ft bgs	Upland	0.3	0.1	0	
Dock2-11	10/20/2005	17 to 20 ft bml	Subtidal	0.3	0.1	0	
CH-2	8/2/2006	48 to 52 ft bgs	Upland	0.3	0.1	0	
Dock2-11	10/20/2005	42 to 45 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/25/2005	41.5 to 44.5 ft bml	Subtidal	0.3	0.1	0	
CH-3	7/27/2006	48 to 52 ft bgs	Upland	0.3	0.1	0	
Pier25-17	11/17/2005	33.7 to 36.7 ft bml	Subtidal	0.3	0.1	0	
Pier25-17	11/17/2005	63.7 to 66.7 ft bml	Subtidal	0.3	0.1	0	
5106-16	11/15/2005	91 to 94 ft bml	Subtidal	0.3	0.1	0	
5106-15	11/15/2005	12 to 15 ft bml	Subtidal	0.3	0.1	0	
5106-13	11/30/2005	97 to 100 ft bml	Subtidal	0.3	0.1	0	
CH-2	8/3/2006	73 to 77 ft bgs	Upland	0.3	0.1	0	
Pier25-17	11/17/2005	53.7 to 56.7 ft bml	Subtidal	0.3	0.1	0	
Pier25-15	11/30/2005	59 to 62 ft bml	Subtidal	0.3	0.1	0	
Pier25-15	12/1/2005	69 to 72 ft bml	Subtidal	0.3	0.1	0	
EA-3	10/24/2005	12 to 15 ft bgs	Upland	0.3	0.1	0	
Pier25-15	11/30/2005	39 to 42 ft bml	Subtidal	0.3	0.1	0	
SP-2	7/11/2006	78 to 81 ft bgs	Upland	0.3	0.1	0	
EA-3	10/25/2005	35 to 38 ft bgs	Upland	0.3	0.1	0	
Dock2-11	10/20/2005	32 to 35 ft bml	Subtidal	0.3	0.1	0	
Dock2-11	10/20/2005	62 to 65 ft bml	Subtidal	0.3	0.1	0	
SP-2	9/13/2006	168 to 172 ft bgs	Upland	0.3	0.1	0	
5106-13	11/30/2005	102 to 105 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/25/2005	51.5 to 54.5 ft bml	Subtidal	0.3	0.1	0	
5106-16	11/15/2005	81 to 84 ft bml	Subtidal	0.3	0.1	0	
Dock2-11	10/20/2005	52 to 55 ft bml	Subtidal	0.3	0.1	0	
Dock2-11	10/20/2005	57 to 60 ft bml	Subtidal	0.3	0.1	0	
75-50	2/10/2009	50 ft bgs	Upland	0.3	0.1	0	
EA-3	10/25/2005	30 to 33 ft bgs	Upland	0.3	0.1	0	
5106-15	11/15/2005	52 to 55 ft bml	Subtidal	0.3	0.1	0	
5106-10	11/7/2005	107 to 110 ft bml	Subtidal	0.3	0.1	0	
5106-10	11/7/2005	112 to 115 ft bml	Subtidal	0.3	0.1	0	
5106-15	11/16/2005	72 to 75 ft bml	Subtidal	0.3	0.1	0	
5106-15	11/16/2005	62 to 65 ft bml	Subtidal	0.3	0.1	0	
EA-3	10/25/2005	40 to 43 ft bgs	Upland	0.3	0.1	0	
5106-10	11/7/2005	102 to 105 ft bml	Subtidal	0.3	0.1	0	
5106-13	11/29/2005	82 to 85 ft bml	Subtidal	0.3	0.1	0	
SP-2	9/14/2006	198 to 202 ft bgs	Upland	0.3	0.1	0	
Pier25-9	10/25/2005	71.5 to 74.5 ft bml	Subtidal	0.3	0.1	0	
5106-10	11/4/2005	87 to 90 ft bml	Subtidal	0.3	0.1	0	
5106-13	11/30/2005	92 to 95 ft bml	Subtidal	0.3	0.1	0	
Pier25-17	11/21/2005	103.7 to 106.7 ft bml	Subtidal	0.3	0.1	0	
5106-10	11/7/2005	97 to 100 ft bml	Subtidal	0.3	0.1	0	
SP-2	9/14/2006	218 to 222 ft bgs	Upland	0.3	0.1	0	
5106-15	11/15/2005	42 to 45 ft bml	Subtidal	0.3	0.1	0	
5106-13	11/29/2005	87 to 90 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/25/2005	81.5 to 84.5 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/25/2005	61.5 to 64.5 ft bml	Subtidal	0.3	0.1	0	
5106-10	11/4/2005	82 to 85 ft bml	Subtidal	0.3	0.1	0	
Pier25-17	11/17/2005	93.7 to 96.7 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/26/2005	101.5 to 104.5 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/26/2005	111.5 to 114.5 ft bml	Subtidal	0.3	0.1	0	
Pier25-9	10/25/2005	91.5 to 94.5 ft bml	Subtidal	0.3	0.1	0	
90C-75	9/25/2013	75 ft BGS	Upland	0.3	0.1	0	
5106-11	10/13/2005	12 to 15 ft bml	Subtidal	0.3	0.1	0	
5106-24	2/9/2006	72 to 75 ft bml	Intertidal	0.3	0.1	0	
34C-160	8/20/2012	160 ft BGS	Upland	0.3	0.1	0	
5106-7	8/10/2005	26 to 29 ft bml	Subtidal	0.3	0.1	0	
81-50	2/12/2009	50 ft bgs	Upland	0.3	0.1	0	
5106-2	1/31/2006	94 to 97 ft bml	Subtidal	0.3	0.1	0	
87C-50	7/24/2012	50 ft BGS	Upland	0.3	0.1	0	
5106-24	2/8/2006	32 to 35 ft bml	Intertidal	0.3	0.0	0	
5106-23	2/10/2006	37 to 40 ft bml	Intertidal	0.3	0.0	0	
5-100	8/8/2012	100 ft BGS	Upland	0.3	0.1	0	
EA-1	9/22/2005	36.5 to 39.5 ft bgs	Upland	0.3	0.0	0	
HYD-9	9/15/2005	72 to 75 ft bml	Subtidal	0.3	0.0	0	

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
Pier25-9	10/26/2005	121.5 to 124.5 ft bml	Subtidal	0.3	0.1	0	
CH-1	6/1/2006	7 to 10 ft bgs	Upland	0.3	0.1	0	
HYD-2	8/30/2005	48 to 51 ft bml	Subtidal	0.3	0.0	0	
Pier25-6	8/18/2005	65.9 to 68.9 ft bml	Subtidal	0.3	0.0	0	
82-150	7/7/2010	125 to 130 ft BGS	Upland	0.3	0.1	0	
82-30	7/26/2010	29 to 34 ft BGS	Upland	0.3	0.1	0	
Dock2-12	11/9/2005	67 to 70 ft bml	Subtidal	0.3	0.1	0	
82-150	7/26/2010	145 to 150 ft BGS	Upland	0.3	0.1	0	
15-50R	8/13/2012	50 ft BGS	Upland	0.3	0.1	0	
HYD-7	9/15/2005	70 to 73 ft bml	Subtidal	0.3	0.0	0	
NL-16	5/18/2006	8 to 11 ft bml	Subtidal	0.3	0.0	0	
Dock2-9	9/8/2005	54 to 57 ft bml	Subtidal	0.3	0.0	0	
5106-14	12/2/2005	67 to 70 ft bml	Subtidal	0.3	0.1	0	
EA-1	9/23/2005	46.5 to 49.5 ft bgs	Upland	0.3	0.0	0	
Pier25-5	8/15/2005	50.5 to 53.5 ft bml	Subtidal	0.3	0.1	0	
HYD-10	9/16/2005	75.3 to 78.3 ft bml	Subtidal	0.3	0.0	0	
5106-5	9/9/2005	44 to 47 ft bml	Subtidal	0.3	0.1	0	
Pier25-4	8/12/2005	47.1 to 50.1 ft bml	Subtidal	0.3	0.1	0	
5106-3	9/22/2005	109 to 112 ft bml	Subtidal	0.3	0.0	0	
HYD-9	9/15/2005	62 to 65 ft bml	Subtidal	0.3	0.0	0	
Dock2-1	7/20/2005	13 to 16 ft bml	Subtidal	0.3	0.1	0	
5106-14	12/1/2005	22 to 25 ft bml	Subtidal	0.3	0.1	0	
Pier25-5	8/15/2005	32 to 35 ft bml	Subtidal	0.3	0.1	0	
Pier25-5	8/15/2005	40.5 to 43.5 ft bml	Subtidal	0.3	0.1	0	
5106-21	1/10/2006	45.5 to 48.5 ft bml	Subtidal	0.3	0.1	0	
EA-1	9/22/2005	24.5 to 27.5 ft bgs	Upland	0.3	0.0	0	
Pier25-8	8/26/2005	44 to 47 ft bml	Subtidal	0.3	0.0	0	
5106-24	2/9/2006	57 to 60 ft bml	Intertidal	0.3	0.0	0	
21C-160	7/25/2012	160 ft BGS	Upland	0.3	0.1	0	
SP-8	7/18/2006	88 to 91 ft bgs	Upland	0.3	0.1	0	
EA-1	9/26/2005	66.5 to 69.5 ft bgs	Upland	0.3	0.1	0	
65-50	7/10/2004	50 ft bgs	Upland	0.3	0.1	0	
17-50R	7/5/2004	50 ft bgs	Upland	0.3	0.1	0	
5106-8	8/5/2005	49 to 52 ft bml	Subtidal	0.3	0.1	0	
Pier25-8	8/26/2005	54 to 57 ft bml	Subtidal	0.3	0.0	0	
Pier25-19	12/7/2005	32.6 to 35.6 ft bml	Subtidal	0.3	0.0	0	
Pier25-6	2/4/2006	21 to 24 ft bml	Subtidal	0.3	0.0	0	
NL-16	5/18/2006	5 to 8 ft bml	Subtidal	0.3	0.0	0	
HYD-9	9/15/2005	32 to 35 ft bml	Subtidal	0.3	0.0	0	
EA-2	10/14/2005	95 to 98 ft bgs	Upland	0.3	0.1	0	
5106-14	12/2/2005	62 to 65 ft bml	Subtidal	0.3	0.1	0	
Pier25-18	12/8/2005	22 to 25 ft bml	Subtidal	0.3	0.0	0	
3-25	8/28/2012	25 ft BGS	Upland	0.3	0.1	0	
5106-26	2/15/2006	77 to 80 ft bml	Intertidal	0.3	0.1	0	
5106-9	11/1/2005	17 to 20 ft bml	Subtidal	0.3	0.1	0	
86C-75	7/25/2012	75 ft BGS	Upland	0.3	0.0	0	
Pier25-10	10/27/2005	66 to 69 ft bml	Subtidal	0.3	0.1	0	
SP-6	8/29/2006	177 to 181 ft bgs	Upland	0.3	0.1	0	
SP-5	8/1/2006	128 to 132 ft bgs	Upland	0.3	0.0	0	
40-100R	8/21/2012	100 ft BGS	Upland	0.3	0.1	0	
Pier25-6	2/4/2006	11 to 14 ft bml	Subtidal	0.3	0.0	0	
Pier25-8	8/26/2005	124 to 127 ft bml	Subtidal	0.3	0.0	0	
5106-24	2/9/2006	67 to 70 ft bml	Intertidal	0.3	0.0	0	
NL-16	5/19/2006	17 to 20 ft bml	Subtidal	0.3	0.1	0	
Pier25-18	12/9/2005	42 to 45 ft bml	Subtidal	0.3	0.0	0	
Pier25-4	8/12/2005	67.1 to 70.1 ft bml	Subtidal	0.3	0.0	0	
Pier25-6	8/18/2005	105.9 to 108.9 ft bml	Subtidal	0.3	0.1	0	
5106-23	2/10/2006	27 to 30 ft bml	Intertidal	0.3	0.0	0	
5106-8	8/5/2005	44 to 47 ft bml	Subtidal	0.3	0.1	0	
HYD-10	9/16/2005	65.3 to 68.3 ft bml	Subtidal	0.3	0.0	0	
5106-14	12/1/2005	7 to 10 ft bml	Subtidal	0.3	0.1	0	
HYD-3	8/17/2005	121 to 124 ft bml	Subtidal	0.3	0.0	0	
5106-8	8/5/2005	54 to 57 ft bml	Subtidal	0.3	0.1	0	
5106-21	1/9/2006	30.5 to 33.5 ft bml	Subtidal	0.3	0.0	0	
5106-25	4/17/2006	39 to 43 ft bml	Intertidal	0.3	0.0	0	
721-MW12-50	7/30/2012	50 ft BGS	Upland	0.3	0.0	0	
5106-24	2/9/2006	92 to 95 ft bml	Intertidal	0.3	0.0	0	
HYD-8	9/13/2005	32 to 35 ft bml	Subtidal	0.3	0.0	0	
SP-3	6/15/2006	33 to 36 ft bgs	Upland	0.3	0.1	0	
Dock2-12	11/8/2005	22 to 25 ft bml	Subtidal	0.3	0.1	0	

TABLE 4.14

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
HYD-7	9/1/2005	30 to 33 ft bml	Subtidal	0.3	0.1	0	
Dock2-9	9/8/2005	19 to 22 ft bml	Subtidal	0.3	0.1	0	
5106-8	8/8/2005	89 to 92 ft bml	Subtidal	0.3	0.0	0	
HYD-10	9/17/2005	105.3 to 108.3 ft bml	Subtidal	0.3	0.0	0	
5106-24	2/8/2006	17 to 20 ft bml	Intertidal	0.3	0.0	0	
Pier25-6	2/4/2006	41 to 44 ft bml	Subtidal	0.3	0.0	0	
Pier25-11	10/6/2005	35 to 38 ft bml	Subtidal	0.3	0.0	0	
Dock2-3	7/25/2005	18 to 21 ft bml	Subtidal	0.3	0.0	0	
5106-24	2/8/2006	22 to 25 ft bml	Intertidal	0.3	0.0	0	
5106-23	2/10/2006	32 to 35 ft bml	Intertidal	0.3	0.0	0	
90C-25	7/23/2012	25 ft BGS	Upland	0.3	0.0	0	
Pier25-24	1/13/2006	74.1 to 77.1 ft bml	Subtidal	0.3	0.1	0	
HYD-7	9/14/2005	50 to 53 ft bml	Subtidal	0.3	0.0	0	
Pier25-32	4/6/2006	67 to 71 ft bgs	Upland	0.3	0.0	0	
91C-160	7/18/2012	160 ft BGS	Upland	0.3	0.1	0	
Pier25-6	2/4/2006	31 to 34 ft bml	Subtidal	0.3	0.0	0	
5106-9	11/1/2005	42 to 45 ft bml	Subtidal	0.3	0.1	0	
5106-24	2/8/2006	27 to 30 ft bml	Intertidal	0.3	0.0	0	
17-50R	6/1/2004	50 ft bgs	Upland	0.3	0.1	0	
721-MW14-50	8/9/2012	50 ft BGS	Upland	0.3	0.0	0	
HYD-8	9/14/2005	42 to 45 ft bml	Subtidal	0.3	0.0	0	
91C-25	7/18/2012	25 ft BGS	Upland	0.3	0.0	0	
5106-9	11/2/2005	102 to 105 ft bml	Subtidal	0.3	0.1	0	
5106-10	11/3/2005	17 to 20 ft bml	Subtidal	0.3	0.1	0	
5106-9	11/2/2005	82 to 85 ft bml	Subtidal	0.3	0.1	0	
Pier25-29	2/6/2006	52 to 55 ft bml	Subtidal	0.3	0.1	0	
Pier25-29	2/6/2006	22 to 25 ft bml	Subtidal	0.3	0.1	0	
Dock2-14	10/31/2005	92 to 95 ft bml	Subtidal	0.3	0.1	0	
Pier25-29	2/6/2006	12 to 15 ft bml	Subtidal	0.3	0.1	0	
Pier25-29	2/6/2006	32 to 35 ft bml	Subtidal	0.3	0.1	0	
Dock2-14	10/28/2005	12 to 15 ft bml	Subtidal	0.3	0.1	0	
HW-3	1/22/2007	9 to 11 ft bml	Subtidal	0.3	0.1	0	
HYD-7	9/16/2005	100 to 103 ft bml	Subtidal	0.3	0.0	0	
5106-1	9/27/2005	20 to 23 ft bml	Subtidal	0.3	0.0	0	
NL-25	1/19/2007	21.5 to 24.5 ft bml	Subtidal	0.3	0.1	0	
Pier25-4	8/12/2005	37.1 to 40.1 ft bml	Subtidal	0.3	0.0	0	
5106-23	2/10/2006	17 to 20 ft bml	Intertidal	0.3	0.0	0	
5106-23	2/10/2006	22 to 25 ft bml	Intertidal	0.3	0.0	0	
Pier25-6	8/18/2005	75.9 to 78.9 ft bml	Subtidal	0.3	0.0	0	
19-50	7/6/2009	50 ft bgs	Upland	0.3	0.1	0	
SP-3	6/14/2006	18 to 21 ft bgs	Upland	0.3	0.1	0	
5-25	7/6/2009	25 ft bgs	Upland	0.3	0.1	0	
PS5-003	2/12/2009	45 to 50 ft bgs	Upland	0.3	0.1	0	
80-25	2/12/2009	25 ft bgs	Upland	0.3	0.1	0	
PS5-002R	2/12/2009	20 to 25 ft bgs	Upland	0.3	0.0	0	
45-100	7/6/2009	100 ft bgs	Upland	0.3	0.0	0	
66-25	7/10/2004	25 ft bgs	Upland	0.3	0.0	0	
Pier25-30	1/27/2006	70 to 73 ft bml	Subtidal	0.3	0.0	0	
17C-130	8/6/2012	130 ft BGS	Upland	0.3	0.0	0	
HYD-2	8/30/2005	98 to 101 ft bml	Subtidal	0.3	0.0	0	
Pier25-14	11/16/2005	74.1 to 77.1 ft bml	Subtidal	0.3	0.0	0	
Dock2-3	7/25/2005	23 to 26 ft bml	Subtidal	0.3	0.0	0	
81-50	8/14/2012	50 ft BGS	Upland	0.3	0.1	0	
WW-A1R	8/23/2012	65 to 65 ft BML	Subtidal	0.3	0.1	0	
PZ-SHI-3-75	8/25/2012	75 ft BGS	Subtidal	0.3	0.1	0	
77C-130	7/16/2012	130 ft BGS	Upland	0.3	0.0	0	
61C-130	7/17/2012	130 ft BGS	Upland	0.3	0.1	0	
5106-5	9/9/2005	19 to 22 ft bml	Subtidal	0.3	0.0	0	
5106-21	1/9/2006	25.5 to 28.5 ft bml	Subtidal	0.3	0.0	0	
Dock2-2	7/12/2005	17.5 to 20.5 ft bml	Subtidal	0.3	0.1	0	
Dock2-9	9/8/2005	49 to 52 ft bml	Subtidal	0.3	0.0	0	
5106-9	11/1/2005	32 to 35 ft bml	Subtidal	0.3	0.1	0	
5106-24	2/8/2006	12 to 15 ft bml	Intertidal	0.3	0.0	0	
5106-21	1/10/2006	50.5 to 53.5 ft bml	Subtidal	0.3	0.0	0	
SP-3	6/14/2006	7 to 10 ft bgs	Upland	0.3	0.1	0	
5106-24	2/9/2006	62 to 65 ft bml	Intertidal	0.3	0.0	0	
HYD-1	9/1/2005	44 to 47 ft bml	Subtidal	0.3	0.0	0	
Pier25-30	1/27/2006	40 to 43 ft bml	Subtidal	0.3	0.0	0	
5106-3	9/19/2005	25 to 28 ft bml	Subtidal	0.3	0.0	0	
PS4-001	2/22/2008	50 to 53 ft bgs	Upland	0.3	0.1	0	

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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
PS4-002	2/22/2008	50.5 to 53.5 ft bgs	Upland	0.3	0.1	0	
SP-8	10/5/2006	154 to 158 ft bgs	Upland	0.3	0.1	0	
PZ-SHI-3-100	4/27/2006	70 to 75 ft bml	Subtidal	0.3	0.0	0	
HYD-10	9/16/2005	85.3 to 88.3 ft bml	Subtidal	0.3	0.0	0	
5106-21	1/10/2006	40.5 to 43.5 ft bml	Subtidal	0.3	0.0	0	
HYD-6	10/3/2005	62.3 to 65.3 ft bml	Subtidal	0.3	0.1	0	
Pier25-2	8/19/2005	126 to 129 ft bml	Subtidal	0.3	0.1	0	
HYD-9	9/15/2005	42 to 45 ft bml	Subtidal	0.3	0.0	0	
Pier25-25	1/20/2006	20 to 23 ft bml	Subtidal	0.3	0.0	0	
5106-9	11/1/2005	37 to 40 ft bml	Subtidal	0.3	0.1	0	
5106-7	8/11/2005	56 to 59 ft bml	Subtidal	0.3	0.1	0	
5106-20	1/5/2006	43.5 to 46.5 ft bml	Subtidal	0.3	0.1	0	
Pier25-8	8/26/2005	24 to 27 ft bml	Subtidal	0.3	0.0	0	
5106-19	1/16/2006	40.5 to 43.5 ft bml	Subtidal	0.3	0.0	0	
5106-7	8/11/2005	46 to 49 ft bml	Subtidal	0.3	0.0	0	
5106-20	1/5/2006	28.5 to 31.5 ft bml	Subtidal	0.3	0.0	0	
5106-9	11/1/2005	7 to 10 ft bml	Subtidal	0.3	0.1	0	
NL-16	5/19/2006	14 to 17 ft bml	Subtidal	0.3	0.0	0	
5106-20	1/5/2006	33.5 to 36.5 ft bml	Subtidal	0.3	0.0	0	
Dock2-2	7/12/2005	27.5 to 30.5 ft bml	Subtidal	0.3	0.0	0	
5106-11	10/13/2005	42 to 45 ft bml	Subtidal	0.2	0.1	0	
NL-30	1/19/2007	16.5 to 19.5 ft bml	Subtidal	0.2	0.1	0	
Dock2-1	7/20/2005	8 to 11 ft bml	Subtidal	0.2	0.1	0	
Dock2-1	7/20/2005	4.5 to 7.5 ft bml	Subtidal	0.2	0.1	0	
HYD-10	9/16/2005	45.3 to 48.3 ft bml	Subtidal	0.2	0.0	0	
5106-11	10/13/2005	7 to 10 ft bml	Subtidal	0.2	0.1	0	
Pier25-4	8/12/2005	77.1 to 80.1 ft bml	Subtidal	0.2	0.0	0	
Pier25-10	10/27/2005	76 to 79 ft bml	Subtidal	0.2	0.1	0	
Pier25-17	12/12/2005	25.5 to 28.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-10	10/27/2005	46 to 49 ft bml	Subtidal	0.2	0.1	0	
5106-19	1/17/2006	110.5 to 113.5 ft bml	Subtidal	0.2	0.0	0	
5106-14	12/2/2005	72 to 75 ft bml	Subtidal	0.2	0.1	0	
5106-7	8/11/2005	41 to 44 ft bml	Subtidal	0.2	0.0	0	
5106-8	8/9/2005	94 to 97 ft bml	Subtidal	0.2	0.0	0	
HW-3	1/22/2007	20 to 22 ft bml	Subtidal	0.2	0.1	0	
EA-1	9/22/2005	31.5 to 34.5 ft bgs	Upland	0.2	0.0	0	
5106-21	1/9/2006	15.5 to 18.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-16	11/22/2005	74.4 to 77.4 ft bml	Subtidal	0.2	0.0	0	
HYD-8	9/14/2005	82 to 85 ft bml	Subtidal	0.2	0.0	0	
5106-8	8/8/2005	79 to 82 ft bml	Subtidal	0.2	0.1	0	
Pier25-13	2/2/2006	30 to 33 ft bml	Subtidal	0.2	0.1	0	
5106-6	10/19/2005	103 to 106 ft bml	Subtidal	0.2	0.1	0	
5106-1	9/27/2005	15 to 18 ft bml	Subtidal	0.2	0.0	0	
Pier25-19	12/8/2005	112.6 to 115.6 ft bml	Subtidal	0.2	0.0	0	
14-25R	6/1/2004	25 ft bgs	Upland	0.2	0.1	0	
Pier25-7	8/24/2005	49.3 to 52.3 ft bml	Subtidal	0.2	0.0	0	
HYD-8	9/14/2005	52 to 55 ft bml	Subtidal	0.2	0.0	0	
HYD-1	9/1/2005	64 to 67 ft bml	Subtidal	0.2	0.0	0	
HYD-1	9/1/2005	54 to 57 ft bml	Subtidal	0.2	0.0	0	
7-25	8/8/2012	25 ft BGS	Upland	0.2	0.0	0	
SP-7	8/31/2006	147 to 151 ft bgs	Upland	0.2	0.1	0	
HYD-10	9/16/2005	55.3 to 58.3 ft bml	Subtidal	0.2	0.0	0	
EA-2	10/13/2005	85 to 88 ft bgs	Upland	0.2	0.0	0	
5-50	8/8/2012	50 ft BGS	Upland	0.2	0.1	0	
5106-5	9/10/2005	64 to 67 ft bml	Subtidal	0.2	0.0	0	
Dock2-8	8/22/2005	29 to 32 ft bml	Subtidal	0.2	0.1	0	
5106-19	1/16/2006	60.5 to 63.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-7	8/24/2005	19.3 to 22.3 ft bml	Subtidal	0.2	0.0	0	
Pier25-3	8/17/2005	126.7 to 129.7 ft bml	Subtidal	0.2	0.0	0	
Pier25-30	1/27/2006	80 to 83 ft bml	Subtidal	0.2	0.0	0	
Pier25-30	1/27/2006	30 to 33 ft bml	Subtidal	0.2	0.0	0	
Dock2-9	9/8/2005	59 to 62 ft bml	Subtidal	0.2	0.0	0	
NL-23	8/11/2006	6 to 9 ft bml	Subtidal	0.2	0.1	0	
5106-7	8/11/2005	71 to 74 ft bml	Subtidal	0.2	0.0	0	
5106-7	8/11/2005	66 to 69 ft bml	Subtidal	0.2	0.0	0	
Pier25-30	1/27/2006	90 to 93 ft bml	Subtidal	0.2	0.0	0	
41C-50	7/16/2012	50 ft BGS	Upland	0.2	0.0	0	
5106-25	4/14/2006	29 to 33 ft bml	Intertidal	0.2	0.0	0	
SP-6	6/5/2006	18 to 21 ft bgs	Upland	0.2	0.1	0	
Dock2-7	9/7/2005	33 to 36 ft bml	Subtidal	0.2	0.0	0	

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Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
Pier25-21	1/4/2006	80.5 to 83.5 ft bml	Subtidal	0.2	0.1	0	
86C-50	7/24/2012	50 ft BGS	Upland	0.2	0.0	0	
5106-1	9/27/2005	10 to 13 ft bml	Subtidal	0.2	0.0	0	
5106-20	1/6/2006	88.5 to 91.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-27	1/19/2006	50.5 to 53.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-30	1/27/2006	20 to 23 ft bml	Subtidal	0.2	0.0	0	
Dock2-5	8/1/2005	12 to 15 ft bml	Subtidal	0.2	0.0	0	
Pier25-7	8/24/2005	29.3 to 32.3 ft bml	Subtidal	0.2	0.0	0	
PS4-003	2/22/2008	50.5 to 53.5 ft bgs	Upland	0.2	0.1	0	
HYD-3	8/11/2005	41 to 44 ft bml	Subtidal	0.2	0.0	0	
5106-9	11/2/2005	77 to 80 ft bml	Subtidal	0.2	0.1	0	
NL-29	1/18/2007	16.5 to 19.5 ft bml	Subtidal	0.2	0.1	0	
5106-10	11/3/2005	12 to 15 ft bml	Subtidal	0.2	0.1	0	
NL-29	1/18/2007	11.5 to 14.5 ft bml	Subtidal	0.2	0.1	0	
5106-10	11/2/2005	7 to 10 ft bml	Subtidal	0.2	0.1	0	
NL-25	1/18/2007	16.5 to 19.5 ft bml	Subtidal	0.2	0.1	0	
NL-25	1/18/2007	11.5 to 14.5 ft bml	Subtidal	0.2	0.1	0	
Pier25-20	12/6/2005	60 to 63 ft bml	Subtidal	0.2	0.1	0	
5106-24	2/9/2006	82 to 85 ft bml	Intertidal	0.2	0.0	0	
Pier25-8	8/25/2005	4 to 7 ft bml	Subtidal	0.2	0.0	0	
HYD-8	9/13/2005	22 to 25 ft bml	Subtidal	0.2	0.0	0	
5106-9	11/1/2005	27 to 30 ft bml	Subtidal	0.2	0.1	0	
5106-25	4/17/2006	49 to 53 ft bml	Intertidal	0.2	0.0	0	
5106-9	11/1/2005	22 to 25 ft bml	Subtidal	0.2	0.1	0	
Pier25-7	8/24/2005	39.3 to 42.3 ft bml	Subtidal	0.2	0.0	0	
Pier25-14	11/16/2005	54.1 to 57.1 ft bml	Subtidal	0.2	0.0	0	
Pier25-19	12/7/2005	22.6 to 25.6 ft bml	Subtidal	0.2	0.0	0	
WW-A1D	8/29/2012	87 to 87 ft BML	Subtidal	0.2	0.0	2	
SP-5	6/12/2006	68 to 71 ft bgs	Upland	0.2	0.1	0	
Pier25-19	12/7/2005	72.6 to 75.6 ft bml	Subtidal	0.2	0.0	0	
Dock2-3	7/25/2005	13 to 16 ft bml	Subtidal	0.2	0.0	0	
5106-21	1/9/2006	20.5 to 23.5 ft bml	Subtidal	0.2	0.0	0	
5106-12	10/12/2005	87 to 90 ft bml	Subtidal	0.2	0.0	0	
709-MW9-15	8/14/2012	15 ft BGS	Upland	0.2	0.0	0	
5106-5	9/12/2005	74 to 77 ft bml	Subtidal	0.2	0.0	0	
NL-13	12/20/2005	3 to 6 ft bml	Intertidal	0.2	0.1	0	
Pier25-8	8/25/2005	14 to 17 ft bml	Subtidal	0.2	0.0	0	
5106-20	1/6/2006	93.5 to 96.5 ft bml	Subtidal	0.2	0.0	0	
Dock2-4	7/29/2005	29 to 32 ft bml	Subtidal	0.2	0.0	0	
HYD-8	9/14/2005	62 to 65 ft bml	Subtidal	0.2	0.0	0	
70-50	7/13/2004	50 ft bgs	Upland	0.2	0.0	0	
HYD-9	9/15/2005	22 to 25 ft bml	Subtidal	0.2	0.0	0	
61C-100	7/17/2012	100 ft BGS	Upland	0.2	0.0	0	
Pier25-19	12/7/2005	52.6 to 55.6 ft bml	Subtidal	0.2	0.0	0	
HYD-3	8/12/2005	61 to 64 ft bml	Subtidal	0.2	0.0	0	
Pier25-30	1/27/2006	60 to 63 ft bml	Subtidal	0.2	0.0	0	
Dock2-9	9/8/2005	44 to 47 ft bml	Subtidal	0.2	0.0	0	
Pier25-23	1/11/2006	23 to 26 ft bml	Subtidal	0.2	0.1	0	
SP-8	7/13/2006	18 to 21 ft bgs	Upland	0.2	0.1	0	
Pier25-16	11/22/2005	104.4 to 107.4 ft bml	Subtidal	0.2	0.0	0	
5106-11	10/14/2005	77 to 80 ft bml	Subtidal	0.2	0.0	0	
68-50	7/14/2004	50 ft bgs	Upland	0.2	0.0	0	
5106-22	1/26/2006	70 to 73 ft bml	Subtidal	0.2	0.0	0	
WW-A1D	8/31/2012	110 to 110 ft BML	Subtidal	0.2	0.0	0	
5106-8	8/9/2005	99 to 102 ft bml	Subtidal	0.2	0.0	0	
PZ-SHI-1-75	4/27/2006	41 to 46 ft bml	Subtidal	0.2	0.0	0	
5106-25	4/18/2006	59 to 63 ft bml	Intertidal	0.2	0.0	0	
Pier25-8	8/26/2005	34 to 47 ft bml	Subtidal	0.2	0.0	0	
Dock2-2	7/12/2005	12.5 to 15.5 ft bml	Subtidal	0.2	0.0	0	
24-50	8/15/2012	50 ft BGS	Upland	0.2	0.0	0	
48-15	8/10/2012	15 ft BGS	Upland	0.2	0.0	0	
Pier25-25	1/20/2006	40 to 43 ft bml	Subtidal	0.2	0.1	0	
94C-160	7/24/2012	160 ft BGS	Upland	0.2	0.0	0	
5106-7	8/11/2005	61 to 64 ft bml	Subtidal	0.2	0.0	0	
Pier25-3	8/17/2005	116.7 to 119.7 ft bml	Subtidal	0.2	0.0	0	
71-50	7/27/2012	50 ft BGS	Upland	0.2	0.0	0	
89C-50	8/22/2012	50 ft BGS	Upland	0.2	0.0	0	
Dock2-3	7/22/2005	3 to 6 ft bml	Subtidal	0.2	0.0	0	
Dock2-4	7/29/2005	24 to 27 ft bml	Subtidal	0.2	0.0	0	
88C-75	8/16/2012	75 ft BGS	Upland	0.2	0.0	0	

TABLE 4.14

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
5106-9	11/1/2005	12 to 15 ft bml	Subtidal	0.2	0.1	0	
Dock2-5	8/1/2005	7 to 10 ft bml	Subtidal	0.2	0.0	0	
5106-21	1/10/2006	60.5 to 63.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-30	1/26/2006	10 to 13 ft bml	Subtidal	0.2	0.0	0	
Pier25-2	7/14/2005	6 to 9 ft bml	Subtidal	0.2	0.0	0	
Pier25-8	8/26/2005	104 to 107 ft bml	Subtidal	0.2	0.0	0	
5106-20	1/6/2006	83.5 to 86.5 ft bml	Subtidal	0.2	0.0	0	
5106-7	8/12/2005	76 to 79 ft bml	Subtidal	0.2	0.0	0	
5106-21	1/6/2006	5.5 to 8.5 ft bml	Subtidal	0.2	0.0	0	
Dock2-7	9/7/2005	8 to 11 ft bml	Subtidal	0.2	0.0	0	
5106-21	1/6/2006	10.5 to 13.5 ft bml	Subtidal	0.2	0.0	0	
HYD-8	9/13/2005	12 to 15 ft bml	Subtidal	0.2	0.0	0	
CH-3	5/30/2006	21 to 24 ft bgs	Upland	0.2	0.0	0	
Dock2-7	9/7/2005	23 to 26 ft bml	Subtidal	0.2	0.0	0	
40-75	8/21/2012	75 ft BGS	Upland	0.2	0.0	0	
709-MW2-15	7/21/2012	15 ft BGS	Upland	0.2	0.0	0	
6A-50	8/8/2012	50 ft BGS	Upland	0.2	0.0	0	
Pier25-2	7/14/2005	26 to 29 ft bml	Subtidal	0.2	0.0	0	
Pier25-10	10/28/2005	116 to 119 ft bml	Subtidal	0.2	0.1	0	
Pier25-25	1/20/2006	10 to 13 ft bml	Subtidal	0.2	0.0	0	
Pier25-16	12/12/2005	7 to 10 ft bml	Subtidal	0.2	0.0	0	
Dock2-2	7/12/2005	22.5 to 25.5 ft bml	Subtidal	0.2	0.0	0	
5106-19	1/13/2006	10.5 to 13.5 ft bml	Subtidal	0.2	0.0	0	
34C-130	8/20/2012	130 ft BGS	Upland	0.2	0.0	0	
SP-3	9/28/2006	158 to 162 ft bgs	Upland	0.2	0.0	0	
Pier25-16	11/22/2005	84.4 to 87.4 ft bml	Subtidal	0.2	0.0	0	
Pier25-31	5/10/2006	49 to 53 ft bgs	Upland	0.2	0.0	0	
34-50R	8/20/2012	50 ft BGS	Upland	0.2	0.0	0	
HYD-9	9/14/2005	12 to 15 ft bml	Subtidal	0.2	0.0	0	
Pier25-27	1/19/2006	30.5 to 33.5 ft bml	Subtidal	0.2	0.0	0	
WW-A1D	8/30/2012	97 to 97 ft BML	Subtidal	0.2	0.0	0	
5106-1	9/28/2005	75 to 78 ft bml	Subtidal	0.2	0.0	0	
5106-25	4/14/2006	19 to 23 ft bml	Intertidal	0.2	0.0	0	
Pier25-33	5/8/2006	9 to 13 ft bgs	Upland	0.2	0.0	0	
HYD-3	8/11/2005	31 to 34 ft bml	Subtidal	0.2	0.0	0	
9-50	8/7/2012	50 ft BGS	Upland	0.2	0.0	0	
5106-21	1/10/2006	55.5 to 58.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-16	12/12/2005	14.4 to 17.4 ft bml	Subtidal	0.2	0.0	0	
HYD-7	9/14/2005	60 to 63 ft bml	Subtidal	0.2	0.0	0	
17C-160	8/7/2012	160 ft BGS	Upland	0.2	0.0	0	
Pier25-2	7/14/2005	16 to 19 ft bml	Subtidal	0.2	0.0	0	
Dock2-9	9/8/2005	39 to 42 ft bml	Subtidal	0.2	0.0	0	
PT-13A	11/10/2005	121.9 to 124.9 ft bml	Subtidal	0.2	0.0	0	
5106-6	10/19/2005	93 to 96 ft bml	Subtidal	0.2	0.1	0	
5106-30	4/26/2006	69 to 73 ft bml	Intertidal	0.2	0.0	0	
Pier25-10	10/27/2005	36 to 39 ft bml	Subtidal	0.2	0.1	0	
5106-5	9/12/2005	69 to 72 ft bml	Subtidal	0.2	0.0	0	
HYD-3	8/12/2005	51 to 54 ft bml	Subtidal	0.2	0.0	0	
Pier25-18	12/9/2005	32 to 35 ft bml	Subtidal	0.2	0.0	0	
Pier25-17	12/12/2005	6.1 to 9.1 ft bml	Subtidal	0.2	0.0	0	
Pier25-27	1/19/2006	40.5 to 43.5 ft bml	Subtidal	0.2	0.0	0	
SP-5	6/12/2006	78 to 81 ft bgs	Upland	0.2	0.1	0	
Pier25-16	11/22/2005	114.4 to 117.4 ft bml	Subtidal	0.2	0.0	0	
HYD-6	10/1/2005	52.3 to 55.3 ft bml	Subtidal	0.2	0.0	0	
Dock2-2	7/11/2005	7.5 to 10.5 ft bml	Subtidal	0.2	0.0	0	
NL-24	1/15/2007	16.5 to 19.5 ft bml	Subtidal	0.2	0.1	0	
SP-1	9/8/2006	188 to 192 ft bgs	Upland	0.2	0.1	0	
SP-1	9/7/2006	158 to 162 ft bgs	Upland	0.2	0.0	0	
SP-1	9/8/2006	178 to 182 ft bgs	Upland	0.2	0.0	0	
SP-1	9/7/2006	148 to 152 ft bgs	Upland	0.2	0.0	0	
SP-7	8/31/2006	137 to 141 ft bgs	Upland	0.2	0.0	0	
SP-1	9/7/2006	138 to 142 ft bgs	Upland	0.2	0.0	0	
75-130	3/30/2010	130 ft bgs	Upland	0.2	0.0	0	
Dock2-10	9/13/2005	12.6 to 15.6 ft bml	Subtidal	0.2	0.0	0	
60-50	8/15/2012	50 ft BGS	Upland	0.2	0.0	0	
MW-F-DEEP	9/26/2013	180 ft BGS	Upland	0.2	0.0	0	
5106-20	1/5/2006	73.5 to 76.5 ft bml	Subtidal	0.2	0.0	0	
Dock2-5	8/2/2005	37 to 40 ft bml	Subtidal	0.2	0.0	0	
Pier25-19	12/7/2005	82.6 to 85.6 ft bml	Subtidal	0.2	0.0	0	
Pier25-24	1/12/2006	44.1 to 47.1 ft bml	Subtidal	0.2	0.1	0	

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TACOMA, WASHINGTON

Location	Sample Date	Depth (ft bml or bgs)	Tidal Zone	Max SQ Metal (1)	Average SQ Metal (2)	# Metals With SQ > 1	Most Problematic Chemicals
Pier25-2	7/15/2005	66 to 69 ft bml	Subtidal	0.2	0.0	0	
Pier25-8	8/26/2005	84 to 87 ft bml	Subtidal	0.2	0.0	0	
5106-12	10/12/2005	72 to 75 ft bml	Subtidal	0.2	0.0	0	
5106-19	1/16/2006	50.5 to 53.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-23	1/11/2006	83 to 86 ft bml	Subtidal	0.2	0.1	0	
Pier25-17	12/12/2005	15.5 to 18.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-2	7/14/2005	36 to 39 ft bml	Subtidal	0.2	0.0	0	
5106-22	1/26/2006	50 to 53 ft bml	Subtidal	0.2	0.1	0	
5106-14	12/2/2005	82 to 85 ft bml	Subtidal	0.2	0.0	0	
NL-15	12/19/2005	21 to 24 ft bml	Intertidal	0.2	0.0	0	
Dock2-9	9/8/2005	29 to 32 ft bml	Subtidal	0.2	0.0	0	
Pier25-27	1/19/2006	20.5 to 23.5 ft bml	Subtidal	0.2	0.0	0	
Pier25-20	12/6/2005	40 to 43 ft bml	Subtidal	0.2	0.1	0	
HYD-3	8/10/2005	21 to 24 ft bml	Subtidal	0.2	0.0	0	
Pier25-19	12/7/2005	12.6 to 15.6 ft bml	Subtidal	0.2	0.0	0	
88C-25	8/16/2012	25 ft BGS	Upland	0.2	0.0	0	
Pier25-7	8/25/2005	129.3 to 132.3 ft bml	Subtidal	0.2	0.0	0	
709-MW16-15	7/27/2012	15 ft bgs	Upland	0.2	0.0	0	
Pier25-2	7/19/2005	96 to 99 ft bml	Subtidal	0.2	0.0	0	
Pier25-2	7/15/2005	56 to 59 ft bml	Subtidal	0.2	0.0	0	
EA-2	10/10/2005	25 to 28 ft bgs	Upland	0.2	0.0	0	
Dock2-10	9/13/2005	27.6 to 30.6 ft bml	Subtidal	0.2	0.0	0	
Dock2-10	9/13/2005	37.6 to 40.6 ft bml	Subtidal	0.2	0.0	0	
Dock2-7	9/7/2005	28 to 31 ft bml	Subtidal	0.2	0.0	0	
Pier25-32	4/6/2006	54 to 58 ft bgs	Upland	0.2	0.0	0	
Pier25-1	7/26/2005	54.5 to 56.5 ft bml	Subtidal	0.2	0.0	0	
5106-26	2/14/2006	22 to 25 ft bml	Intertidal	0.2	0.1	0	
14-25R	8/13/2012	25 ft BGS	Upland	0.2	0.0	0	
Dock2-7	9/7/2005	18 to 21 ft bml	Subtidal	0.2	0.0	0	
7-181	8/8/2012	181 ft BGS	Upland	0.2	0.0	0	
Pier25-15	12/22/2005	24.4 to 27.4 ft bml	Subtidal	0.2	0.0	0	
Pier25-10	10/27/2005	86 to 89 ft bml	Subtidal	0.2	0.1	0	
5106-12	10/12/2005	77 to 80 ft bml	Subtidal	0.2	0.0	0	
Pier25-8	8/26/2005	64 to 67 ft bml	Subtidal	0.2	0.0	0	
Dock2-9	9/8/2005	24 to 27 ft bml	Subtidal	0.2	0.0	0	
5-25	8/8/2012	25 ft BGS	Upland	0.2	0.0	0	
Pier25-22	1/18/2006	70.1 to 73.1 ft bml	Subtidal	0.2	0.1	0	
NL-15	12/19/2005	18 to 21 ft bml	Intertidal	0.2	0.0	0	
Dock2-10	9/13/2005	32.6 to 35.6 ft bml	Subtidal	0.2	0.0	0	
5106-14	12/1/2005	12 to 15 ft bml	Subtidal	0.2	0.0	0	
Pier25-7	8/24/2005	89.3 to 92.3 ft bml	Subtidal	0.2	0.0	0	
HYD-3	8/10/2005	11 to 14 ft bml	Subtidal	0.2	0.0	0	
Pier25-32	4/5/2006	44 to 47 ft bgs	Upland	0.2	0.0	0	
Pier25-20	12/6/2005	50 to 53 ft bml	Subtidal	0.2	0.0	0	
Pier25-2	7/18/2005	86 to 89 ft bml	Subtidal	0.2	0.0	0	
HYD-8	9/14/2005	72 to 75 ft bml	Subtidal	0.2	0.0	0	
PS4-005	2/22/2008	50.5 to 53.5 ft bgs	Upland	0.2	0.1	0	
SP-2	9/18/2006	228 to 232 ft bgs	Upland	0.2	0.0	0	
Pier25-8	8/26/2005	74 to 77 ft bml	Subtidal	0.2	0.0	0	
Pier25-27	1/19/2006	10.5 to 13.5 ft bml	Subtidal	0.2	0.0	0	
89C-100	8/24/2012	100 ft BGS	Upland	0.2	0.0	0	
EA-2	10/20/2005	135 to 138 ft bgs	Upland	0.2	0.0	0	
5106-19	1/16/2006	90.5 to 93.5 ft bml	Subtidal	0.2	0.0	0	
WW-A1D	8/29/2012	77 to 77 ft BML	Subtidal	0.2	0.0	5	
Pier25-3	8/17/2005	96.7 to 99.7 ft bml	Subtidal	0.2	0.0	0	
Pier25-20	12/6/2005	30 to 33 ft bml	Subtidal	0.2	0.0	0	
Pier25-14	11/16/2005	24.1 to 27.1 ft bml	Subtidal	0.2	0.0	0	
5106-19	1/16/2006	80.5 to 83.5 ft bml	Subtidal	0.1	0.0	0	
EA-2	10/11/2005	50 to 53 ft bgs	Upland	0.1	0.0	0	
HYD-5	10/5/2005	44 to 47 ft bml	Subtidal	0.1	0.0	0	
5106-12	10/12/2005	112 to 115 ft bml	Subtidal	0.1	0.0	0	
NL-15	12/16/2005	12 to 15 ft bml	Intertidal	0.1	0.0	0	
Pier25-11	10/7/2005	85 to 88 ft bml	Subtidal	0.1	0.0	0	
64-170	7/26/2012	170 ft BGS	Upland	0.1	0.0	0	
Pier25-22	1/18/2006	80.1 to 83.1 ft bml	Subtidal	0.1	0.1	0	
Pier25-2	7/15/2005	46 to 49 ft bml	Subtidal	0.1	0.0	0	
Pier25-28	1/24/2006	20 to 23 ft bml	Subtidal	0.1	0.0	0	
75-130	8/9/2012	130 ft BGS	Upland	0.1	0.0	0	
PS4-004	2/22/2008	50 to 53 ft bgs	Upland	0.1	0.1	0	
Pier25-3	8/16/2005	46.7 to 49.7 ft bml	Subtidal	0.1	0.0	0	

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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* [(1)]	*Average SQ Metal* [(2)]	*# Metals With SQ > 1*	*Most Problematic Chemicals*
SP-3	10/2/2006	198 to 202 ft bgs	Upland	0.1	0.0	0	
5106-14	12/2/2005	77 to 80 ft bml	Subtidal	0.1	0.0	0	
SP-6	6/6/2006	33 to 36 ft bgs	Upland	0.1	0.0	0	
Pier25-3	8/16/2005	66.7 to 69.7 ft bml	Subtidal	0.1	0.0	0	
Pier25-11	10/6/2005	25 to 28 ft bml	Subtidal	0.1	0.0	0	
89C-130	8/24/2012	130 ft BGS	Upland	0.1	0.0	0	
NL-14	12/15/2005	16 to 19 ft bml	Subtidal	0.1	0.0	0	
EA-2	10/10/2005	15 to 18 ft bgs	Upland	0.1	0.0	0	
HYD-5	10/5/2005	34 to 37 ft bml	Subtidal	0.1	0.0	0	
Dock2-12	11/9/2005	72 to 75 ft bml	Subtidal	0.1	0.0	0	
5106-22	1/26/2006	60 to 63 ft bml	Subtidal	0.1	0.0	0	
Dock2-6	9/7/2005	35.7 to 38.7 ft bml	Subtidal	0.1	0.0	0	
Dock2-9	9/8/2005	34 to 37 ft bml	Subtidal	0.1	0.0	0	
NL-15	12/16/2005	3 to 6 ft bml	Intertidal	0.1	0.0	0	
NL-15	12/19/2005	24 to 27 ft bml	Intertidal	0.1	0.0	0	
Pier25-15	12/22/2005	14.4 to 17.4 ft bml	Subtidal	0.1	0.0	0	
Pier25-13	2/2/2006	20 to 23 ft bml	Subtidal	0.1	0.1	0	
5106-22	1/26/2006	100 to 103 ft bml	Subtidal	0.1	0.0	0	
Pier25-20	12/6/2005	20 to 23 ft bml	Subtidal	0.1	0.0	0	
Dock2-4	7/29/2005	34 to 37 ft bml	Subtidal	0.1	0.0	0	
5106-8	8/9/2005	104 to 107 ft bml	Subtidal	0.1	0.0	0	
HYD-2	8/29/2005	28 to 31 ft bml	Subtidal	0.1	0.0	0	
Dock2-7	9/7/2005	13 to 16 ft bml	Subtidal	0.1	0.0	0	
5106-32	5/4/2006	29 to 33 ft bml	Subtidal	0.1	0.0	0	
Pier25-30	1/27/2006	50 to 53 ft bml	Subtidal	0.1	0.0	0	
Pier25-7	8/24/2005	99.3 to 102.3 ft bml	Subtidal	0.1	0.0	0	
17-24	7/20/2004	24 ft bgs	Upland	0.1	0.0	0	
Pier25-15	12/22/2005	4.4 to 7.4 ft bml	Subtidal	0.1	0.0	0	
5106-22	1/25/2006	30 to 33 ft bml	Subtidal	0.1	0.1	0	
5106-24	2/9/2006	97 to 100 ft bml	Intertidal	0.1	0.0	0	
Pier25-21	1/4/2006	90.5 to 93.5 ft bml	Subtidal	0.1	0.0	0	
PS3-001	7/27/2007	20 to 23 ft bgs	Upland	0.1	0.0	0	
Pier25-20	12/6/2005	70 to 73 ft bml	Subtidal	0.1	0.0	0	
Dock2-1	7/21/2005	38 to 41 ft bml	Subtidal	0.1	0.0	0	
5106-21	1/10/2006	65.5 to 68.5 ft bml	Subtidal	0.1	0.0	0	
88C-100	8/16/2012	100 ft BGS	Upland	0.1	0.0	0	
16-50	7/5/2004	50 ft bgs	Upland	0.1	0.0	0	
EA-1	9/22/2005	19.5 to 22.5 ft bgs	Upland	0.1	0.0	0	
NL-13	12/21/2005	21 to 24 ft bml	Intertidal	0.1	0.0	0	
Pier25-3	8/16/2005	56.7 to 59.7 ft bml	Subtidal	0.1	0.0	0	
5106-24	2/9/2006	87 to 90 ft bml	Intertidal	0.1	0.0	0	
65-25	7/18/2004	25 ft bgs	Upland	0.1	0.0	0	
5106-22	1/25/2006	10 to 13 ft bml	Subtidal	0.1	0.1	0	
5106-22	1/25/2006	20 to 23 ft bml	Subtidal	0.1	0.1	0	
5106-6	10/18/2005	73 to 76 ft bml	Subtidal	0.1	0.1	0	
Pier25-23	1/11/2006	43 to 46 ft bml	Subtidal	0.1	0.1	0	
5106-2	1/30/2006	4 to 7 ft bml	Subtidal	0.1	0.1	0	
5106-6	10/19/2005	83 to 86 ft bml	Subtidal	0.1	0.1	0	
5106-22	1/25/2006	40 to 43 ft bml	Subtidal	0.1	0.1	0	
Dock2-14	10/29/2005	62 to 65 ft bml	Subtidal	0.1	0.1	0	
5106-6	10/18/2005	68 to 71 ft bml	Subtidal	0.1	0.1	0	
5106-6	10/19/2005	88 to 91 ft bml	Subtidal	0.1	0.1	0	
Pier25-24	1/12/2006	4.1 to 7.1 ft bml	Subtidal	0.1	0.1	0	
Pier25-22	1/17/2006	20.1 to 23.1 ft bml	Subtidal	0.1	0.1	0	
Pier25-23	1/11/2006	53 to 56 ft bml	Subtidal	0.1	0.1	0	
Pier25-21	1/3/2006	20.5 to 23.5 ft bml	Subtidal	0.1	0.1	0	
Pier25-29	2/7/2006	62 to 65 ft bml	Subtidal	0.1	0.1	0	
5106-6	10/19/2005	78 to 81 ft bml	Subtidal	0.1	0.0	0	
Dock2-14	10/31/2005	112 to 115 ft bml	Subtidal	0.1	0.0	0	
Pier25-22	1/17/2006	10.1 to 13.1 ft bml	Subtidal	0.1	0.0	0	
Pier25-29	2/6/2006	42 to 45 ft bml	Subtidal	0.1	0.0	0	
Dock2-14	10/29/2005	42 to 45 ft bml	Subtidal	0.1	0.0	0	
Pier25-22	1/17/2006	30.1 to 33.1 ft bml	Subtidal	0.1	0.0	0	
Dock2-14	10/29/2005	52 to 55 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/14/2006	17 to 20 ft bml	Intertidal	0.1	0.0	0	
Dock2-14	10/31/2005	82 to 85 ft bml	Subtidal	0.1	0.0	0	
Pier25-26	1/23/2006	11.5 to 14.5 ft bml	Subtidal	0.1	0.0	0	
Pier25-23	1/11/2006	73 to 76 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/15/2006	42 to 45 ft bml	Intertidal	0.1	0.0	0	
5106-26	2/14/2006	37 to 40 ft bml	Intertidal	0.1	0.0	0	

TABLE 4.14

SUMMARY OF SCREENING OF METALS IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
5106-26	2/14/2006	32 to 35 ft bml	Intertidal	0.1	0.0	0	
5106-26	2/15/2006	67 to 70 ft bml	Intertidal	0.1	0.0	0	
Pier25-24	1/13/2006	114.1 to 117.1 ft bml	Subtidal	0.1	0.0	0	
Dock2-14	10/31/2005	72 to 75 ft bml	Subtidal	0.1	0.0	0	
Dock2-14	10/29/2005	32 to 35 ft bml	Subtidal	0.1	0.0	0	
Pier25-13	2/3/2006	90 to 93 ft bml	Subtidal	0.1	0.0	0	
Pier25-23	1/11/2006	13 to 16 ft bml	Subtidal	0.1	0.0	0	
Dock2-14	10/28/2005	22 to 25 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/15/2006	62 to 65 ft bml	Intertidal	0.1	0.0	0	
5106-26	2/15/2006	72 to 75 ft bml	Intertidal	0.1	0.0	0	
5106-26	2/16/2006	82 to 85 ft bml	Intertidal	0.1	0.0	0	
Pier25-10	10/28/2005	106 to 109 ft bml	Subtidal	0.1	0.0	0	
5106-22	1/26/2006	80 to 83 ft bml	Subtidal	0.1	0.0	0	
Pier25-26	1/24/2006	91.5 to 94.5 ft bml	Subtidal	0.1	0.0	0	
Pier25-24	1/13/2006	84.1 to 87.1 ft bml	Subtidal	0.1	0.0	0	
Pier25-23	1/12/2006	113 to 116 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/15/2006	47 to 50 ft bml	Intertidal	0.1	0.0	0	
Pier25-10	10/27/2005	96 to 99 ft bml	Subtidal	0.1	0.0	0	
Pier25-22	1/18/2006	90.1 to 93.1 ft bml	Subtidal	0.1	0.0	0	
5106-2	1/31/2006	104 to 107 ft bml	Subtidal	0.1	0.0	0	
Pier25-21	1/4/2006	60.5 to 63.5 ft bml	Subtidal	0.1	0.0	0	
Pier25-13	2/3/2006	100 to 103 ft bml	Subtidal	0.1	0.0	0	
Pier25-22	1/18/2006	110.1 to 113.1 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/15/2006	57 to 60 ft bml	Intertidal	0.1	0.0	0	
EA-3	11/2/2005	125 to 128 ft bgs	Upland	0.1	0.0	0	
5106-26	2/14/2006	7 to 10 ft bml	Intertidal	0.1	0.0	0	
Pier25-29	2/7/2006	82 to 85 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/15/2006	52 to 55 ft bml	Intertidal	0.1	0.0	0	
Pier25-23	1/12/2006	103 to 106 ft bml	Subtidal	0.1	0.0	0	
Pier25-13	2/3/2006	110 to 113 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/16/2006	92 to 95 ft bml	Intertidal	0.1	0.0	0	
Pier25-24	1/13/2006	94.1 to 97.1 ft bml	Subtidal	0.1	0.0	0	
Pier25-23	1/12/2006	93 to 96 ft bml	Subtidal	0.1	0.0	0	
Pier25-24	1/13/2006	104.1 to 107.1 ft bml	Subtidal	0.1	0.0	0	
Pier25-29	2/7/2006	72 to 75 ft bml	Subtidal	0.1	0.0	0	
EA-3	11/4/2005	150 to 153 ft bgs	Upland	0.1	0.0	0	
EA-3	11/4/2005	145 to 148 ft bgs	Upland	0.1	0.0	0	
Pier25-22	1/18/2006	100.1 to 103.1 ft bml	Subtidal	0.1	0.0	0	
EA-3	11/3/2005	140 to 143 ft bgs	Upland	0.1	0.0	0	
Pier25-26	1/24/2006	101.5 to 104.5 ft bml	Subtidal	0.1	0.0	0	
5106-26	2/16/2006	87 to 90 ft bml	Intertidal	0.1	0.0	0	
5106-22	1/26/2006	90 to 93 ft bml	Subtidal	0.1	0.0	0	
Pier25-29	2/7/2006	102 to 105 ft bml	Subtidal	0.1	0.0	0	
Pier25-28	1/24/2006	10 to 13 ft bml	Subtidal	0.1	0.0	0	
Pier25-7	8/24/2005	109.3 to 112.3 ft bml	Subtidal	0.1	0.0	0	
Pier25-3	8/16/2005	76.7 to 79.7 ft bml	Subtidal	0.1	0.0	0	
11-183	8/7/2012	183 ft BGS	Upland	0.1	0.0	0	
5106-27	4/11/2006	39 to 43 ft bml	Intertidal	0.1	0.0	0	
SP-4	6/20/2006	18 to 21 ft bgs	Upland	0.1	0.1	0	
5106-23	2/10/2006	7 to 10 ft bml	Intertidal	0.1	0.0	0	
Pier25-12	2/1/2006	10 to 13 ft bml	Subtidal	0.1	0.0	0	
Pier25-3	8/17/2005	136.7 to 139.7 ft bml	Subtidal	0.1	0.0	0	
Pier25-20	12/6/2005	90 to 93 ft bml	Subtidal	0.1	0.0	0	
PS3-005	7/27/2007	20 to 23 ft bgs	Upland	0.1	0.0	0	
5106-11	10/14/2005	62 to 65 ft bml	Subtidal	0.1	0.0	0	
Dock2-8	8/22/2005	44 to 47 ft bml	Subtidal	0.1	0.0	0	
Pier25-11	10/8/2005	115 to 118 ft bml	Subtidal	0.1	0.0	0	
Dock2-1	7/21/2005	28 to 31 ft bml	Subtidal	0.1	0.0	0	
SP-4	6/20/2006	23 to 26 ft bgs	Upland	0.1	0.1	0	
SP-4	6/20/2006	9 to 12 ft bgs	Upland	0.1	0.0	0	
SP-4	6/21/2006	48 to 51 ft bgs	Upland	0.1	0.0	0	
SP-4	6/21/2006	43 to 46 ft bgs	Upland	0.1	0.0	0	
SP-4	6/21/2006	58 to 61 ft bgs	Upland	0.1	0.0	0	
SP-4	6/20/2006	33 to 36 ft bgs	Upland	0.1	0.0	0	
5106-20	1/5/2006	58.5 to 61.5 ft bml	Subtidal	0.1	0.0	0	
Dock2-5	8/2/2005	17 to 20 ft bml	Subtidal	0.1	0.0	0	
Dock2-8	8/22/2005	39 to 42 ft bml	Subtidal	0.1	0.0	0	
SP-6	8/28/2006	167 to 171 ft bgs	Upland	0.1	0.0	0	
Dock2-8	8/22/2005	69 to 72 ft bml	Subtidal	0.1	0.0	0	
Pier25-6	8/18/2005	45.9 to 48.9 ft bml	Subtidal	0.1	0.0	0	

TABLE 4.14

SUMMARY OF SCREENING OF METALS IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* (1)	*Average SQ Metal* (2)	*# Metals With SQ > 1*	*Most Problematic Chemicals*
CH-4	5/31/2006	9 to 13 ft bgs	Upland	0.1	0.0	0	
NL-13	12/21/2005	15 to 18 ft bml	Intertidal	0.1	0.0	0	
SP-4	9/25/2006	178 to 182 ft bgs	Upland	0.1	0.0	0	
HYD-10	9/16/2005	35.3 to 38.3 ft bml	Subtidal	0.1	0.0	0	
5106-23	2/10/2006	12 to 15 ft bml	Intertidal	0.1	0.0	0	
5106-25	4/18/2006	69 to 73 ft bml	Intertidal	0.1	0.0	0	
86C-25	7/24/2012	25 ft BGS	Upland	0.1	0.0	0	
Pier25-18	12/9/2005	82 to 85 ft bml	Subtidal	0.1	0.0	0	
NL-15	12/16/2005	15 to 18 ft bml	Intertidal	0.1	0.0	0	
Pier25-25	1/20/2006	30 to 33 ft bml	Subtidal	0.1	0.0	0	
5106-20	1/5/2006	68.5 to 71.5 ft bml	Subtidal	0.1	0.0	0	
HYD-4	9/26/2005	96 to 99 ft bml	Subtidal	0.1	0.0	0	
HYD-2	8/29/2005	18 to 21 ft bml	Subtidal	0.1	0.0	0	
Dock2-6	9/6/2005	20.7 to 23.7 ft bml	Subtidal	0.1	0.0	0	
HYD-2	8/29/2005	8 to 11 ft bml	Subtidal	0.1	0.0	0	
Dock2-7	9/7/2005	3 to 6 ft bml	Subtidal	0.1	0.0	0	
WW-A1R	8/21/2012	6 to 6 ft BML	Subtidal	0.1	0.0	0	
CH-3	5/30/2006	10 to 14 ft bgs	Upland	0.1	0.0	0	
WW-A1D	8/28/2012	47 to 47 ft BML	Subtidal	0.1	0.0	0	
PT-13A	11/10/2005	111.9 to 114.9 ft bml	Subtidal	0.1	0.0	0	
MW-G-INT	9/26/2013	171 ft BGS	Upland	0.1	0.0	0	
NL-13	12/21/2005	27 to 30 ft bml	Intertidal	0.1	0.0	0	
Dock2-8	8/22/2005	34 to 37 ft bml	Subtidal	0.1	0.0	0	
Pier25-31	5/11/2006	59 to 63 ft bgs	Upland	0.1	0.0	0	
Dock2-6	9/6/2005	25.7 to 28.7 ft bml	Subtidal	0.1	0.0	0	
Pier25-3	8/16/2005	36.7 to 39.7 ft bml	Subtidal	0.1	0.0	0	
Dock2-5	8/2/2005	27 to 30 ft bml	Subtidal	0.1	0.0	0	
HYD-6	10/3/2005	72.3 to 75.3 ft bml	Subtidal	0.1	0.0	0	
Dock2-1	7/21/2005	33 to 36 ft bml	Subtidal	0.1	0.0	0	
HYD-10	9/16/2005	5.3 to 8.3 ft bml	Subtidal	0.1	0.0	0	
HYD-2	8/31/2005	108 to 111 ft bml	Subtidal	0.1	0.0	0	
78C-75	7/19/2012	75 ft BGS	Upland	0.1	0.0	0	
HYD-9	9/15/2005	52 to 55 ft bml	Subtidal	0.1	0.0	0	
5106-20	1/4/2006	18.5 to 21.5 ft bml	Subtidal	0.1	0.0	0	
709-MW21-25	7/27/2012	25 ft BGS	Upland	0.1	0.0	0	
5106-14	12/3/2005	92 to 95 ft bml	Subtidal	0.1	0.0	0	
SP-5	6/5/2006	33 to 36 ft bgs	Upland	0.1	0.0	0	
53C-25	7/24/2012	25 ft BGS	Upland	0.1	0.0	0	
Dock2-6	9/6/2005	5.7 to 8.7 ft bml	Subtidal	0.1	0.0	0	
95-15	8/25/2012	15 ft BGS	Upland	0.1	0.0	0	
74-100	8/20/2012	100 ft BGS	Upland	0.1	0.0	0	
8-23	8/11/2012	23 ft BGS	Upland	0.1	0.0	0	
721-MW7-15	8/9/2012	15 ft BGS	Upland	0.1	0.0	0	
11-25	8/6/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW5-25	8/25/2012	25 ft BGS	Upland	0.1	0.0	0	
64-100	7/26/2012	100 ft BGS	Upland	0.1	0.0	0	
21C-25	7/25/2012	25 ft BGS	Upland	0.1	0.0	0	
709-MW8-15	8/9/2012	15 ft BGS	Upland	0.1	0.0	0	
12-25	8/24/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW5-15	8/25/2012	15 ft BGS	Upland	0.1	0.0	0	
10-24	8/21/2012	24 ft BGS	Upland	0.1	0.0	0	
45-50	8/10/2012	50 ft BGS	Upland	0.1	0.0	0	
21C-130	7/25/2012	130 ft BGS	Upland	0.1	0.0	0	
89C-25	8/22/2012	25 ft BGS	Upland	0.1	0.0	0	
709-MW20-50	8/21/2012	50 ft BGS	Upland	0.1	0.0	0	
53C-75	7/24/2012	75 ft BGS	Upland	0.1	0.0	0	
7-100	8/8/2012	100 ft BGS	Upland	0.1	0.0	0	
67-50	7/26/2012	50 ft BGS	Upland	0.1	0.0	0	
32-50R	8/24/2012	50 ft BGS	Upland	0.1	0.0	0	
90C-160	7/23/2012	160 ft BGS	Upland	0.1	0.0	0	
77C-160	7/16/2012	160 ft BGS	Upland	0.1	0.0	0	
35-100R	8/15/2012	100 ft BGS	Upland	0.1	0.0	0	
74-75	8/20/2012	75 ft BGS	Upland	0.1	0.0	0	
83C-25	7/25/2012	25 ft BGS	Upland	0.1	0.0	0	
90C-50	7/23/2012	50 ft BGS	Upland	0.1	0.0	0	
42-50	8/10/2012	50 ft BGS	Upland	0.1	0.0	0	
53C-50	7/24/2012	50 ft BGS	Upland	0.1	0.0	0	
709-MW15-15	8/15/2012	15 ft bgs	Upland	0.1	0.0	0	
93C-130	7/17/2012	130 ft BGS	Upland	0.1	0.0	0	
709-MW4-15	7/22/2012	15 ft BGS	Upland	0.1	0.0	0	

TABLE 4.14

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
34-25R	8/20/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW10-75	8/7/2012	75 ft BGS	Upland	0.1	0.0	0	
709-MW6-15	8/9/2012	15 ft BGS	Upland	0.1	0.0	0	
12A-50	8/21/2012	50 ft BGS	Upland	0.1	0.0	0	
41C-130	8/29/2012	130 ft BGS	Upland	0.1	0.0	0	
52-15	8/24/2012	15 ft BGS	Upland	0.1	0.0	0	
17C-50	8/6/2012	50 ft BGS	Upland	0.1	0.0	0	
92C-130	7/18/2012	130 ft BGS	Upland	0.1	0.0	0	
10-100	8/20/2012	100 ft BGS	Upland	0.1	0.0	0	
709-MW17-15	7/21/2012	15 ft bgs	Upland	0.1	0.0	0	
92C-100	7/18/2012	100 ft BGS	Upland	0.1	0.0	0	
92C-50	7/18/2012	50 ft BGS	Upland	0.1	0.0	0	
86C-160	7/25/2012	160 ft BGS	Upland	0.1	0.0	0	
709-MW20-25	8/23/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW10-25	8/7/2012	25 ft BGS	Upland	0.1	0.0	0	
709-MW18-15	7/26/2012	15 ft bgs	Upland	0.1	0.0	0	
65-130	8/12/2012	130 ft BGS	Upland	0.1	0.0	0	
74-50	8/20/2012	50 ft BGS	Upland	0.1	0.0	0	
84C-130	7/18/2012	130 ft BGS	Upland	0.1	0.0	0	
46C-50	8/22/2012	50 ft BGS	Upland	0.1	0.0	0	
87C-100	7/24/2012	100 ft BGS	Upland	0.1	0.0	0	
84C-75	7/18/2012	75 ft BGS	Upland	0.1	0.0	0	
46C-130	8/22/2012	130 ft BGS	Upland	0.1	0.0	0	
95C-75	7/19/2012	75 ft BGS	Upland	0.1	0.0	0	
87C-75	7/24/2012	75 ft BGS	Upland	0.1	0.0	0	
89C-75	8/23/2012	75 ft BGS	Upland	0.1	0.0	0	
709-MW15A-50	8/14/2012	50 ft BGS	Upland	0.1	0.0	0	
94C-100	7/24/2012	100 ft BGS	Upland	0.1	0.0	0	
86C-100	7/25/2012	100 ft BGS	Upland	0.1	0.0	0	
WW-A1R	8/21/2012	11 to 11 ft BML	Subtidal	0.1	0.0	0	
94C-50	7/24/2012	50 ft BGS	Upland	0.1	0.0	0	
40-50	8/21/2012	50 ft BGS	Upland	0.1	0.0	0	
709-MW9-25	8/14/2012	25 ft BGS	Upland	0.1	0.0	0	
42-25	8/10/2012	25 ft BGS	Upland	0.1	0.0	0	
77C-75	7/16/2012	75 ft BGS	Upland	0.1	0.0	0	
88C-130	8/16/2012	130 ft BGS	Upland	0.1	0.0	0	
88C-160	8/16/2012	160 ft BGS	Upland	0.1	0.0	0	
17C-75	8/6/2012	75 ft BGS	Upland	0.1	0.0	0	
84C-160	7/18/2012	160 ft BGS	Upland	0.1	0.0	0	
88C-50	8/16/2012	50 ft BGS	Upland	0.1	0.0	0	
93C-160	7/17/2012	160 ft BGS	Upland	0.1	0.0	0	
85C-160	7/20/2012	160 ft BGS	Upland	0.1	0.0	0	
61C-50	7/17/2012	50 ft BGS	Upland	0.1	0.0	0	
85C-130	7/20/2012	130 ft BGS	Upland	0.1	0.0	0	
46C-100	8/22/2012	100 ft BGS	Upland	0.1	0.0	0	
67-25	7/26/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW12-15	7/30/2012	15 ft BGS	Upland	0.1	0.0	0	
721-MW5-75	8/25/2012	75 ft BGS	Upland	0.1	0.0	0	
12-100	8/24/2012	100 ft BGS	Upland	0.1	0.0	0	
12-160	8/24/2012	160 ft BGS	Upland	0.1	0.0	0	
721-MW12-25	7/30/2012	25 ft BGS	Upland	0.1	0.0	0	
65-25	8/12/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW15-25	7/30/2012	25 ft BGS	Upland	0.1	0.0	0	
75-100	8/9/2012	100 ft BGS	Upland	0.1	0.0	0	
93C-25	7/17/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW5-50	8/25/2012	50 ft BGS	Upland	0.1	0.0	0	
85C-25	7/20/2012	25 ft BGS	Upland	0.1	0.0	0	
709-MW6-50	8/9/2012	50 ft BGS	Upland	0.1	0.0	0	
41C-25	7/16/2012	25 ft BGS	Upland	0.1	0.0	0	
87C-25	7/24/2012	25 ft BGS	Upland	0.1	0.0	0	
92C-25	7/18/2012	25 ft BGS	Upland	0.1	0.0	0	
84C-25	7/18/2012	25 ft BGS	Upland	0.1	0.0	0	
34C-100	8/21/2012	100 ft BGS	Upland	0.1	0.0	0	
83C-50	7/25/2012	50 ft BGS	Upland	0.1	0.0	0	
721-MW9-15	7/22/2012	15 ft BGS	Upland	0.1	0.0	0	
95C-50	7/19/2012	50 ft BGS	Upland	0.1	0.0	0	
721-MW9-50	7/22/2012	50 ft BGS	Upland	0.1	0.0	0	
78C-25	7/19/2012	25 ft BGS	Upland	0.1	0.0	0	
35-25	8/15/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW14-25	8/9/2012	25 ft BGS	Upland	0.1	0.0	0	

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal (1)*	*Average SQ Metal (2)*	*# Metals With SQ > 1*	*Most Problematic Chemicals*
78C-50	7/19/2012	50 ft BGS	Upland	0.1	0.0	0	
93C-100	7/17/2012	100 ft BGS	Upland	0.1	0.0	0	
17C-25	8/6/2012	25 ft BGS	Upland	0.1	0.0	0	
78C-100	7/19/2012	100 ft BGS	Upland	0.1	0.0	0	
21C-50	7/25/2012	50 ft BGS	Upland	0.1	0.0	0	
84C-50	7/18/2012	50 ft BGS	Upland	0.1	0.0	0	
53C-160	7/24/2012	160 ft BGS	Upland	0.1	0.0	0	
46C-75	8/22/2012	75 ft BGS	Upland	0.1	0.0	0	
21C-75	7/25/2012	75 ft BGS	Upland	0.1	0.0	0	
87C-160	7/24/2012	160 ft BGS	Upland	0.1	0.0	0	
721-MW15-15	7/30/2012	15 ft BGS	Upland	0.1	0.0	0	
84C-100	7/18/2012	100 ft BGS	Upland	0.1	0.0	0	
95C-25	7/19/2012	25 ft BGS	Upland	0.1	0.0	0	
61C-75	7/17/2012	75 ft BGS	Upland	0.1	0.0	0	
6A-100	8/8/2012	100 ft BGS	Upland	0.1	0.0	0	
45-100	8/10/2012	100 ft BGS	Upland	0.1	0.0	0	
709-MW20-75	8/22/2012	75 ft BGS	Upland	0.1	0.0	0	
85C-75	7/20/2012	75 ft BGS	Upland	0.1	0.0	0	
87C-130	7/24/2012	130 ft BGS	Upland	0.1	0.0	0	
94C-25	7/24/2012	25 ft BGS	Upland	0.1	0.0	0	
94C-75	7/24/2012	75 ft BGS	Upland	0.1	0.0	0	
92C-75	7/18/2012	75 ft BGS	Upland	0.1	0.0	0	
77C-25	7/16/2012	25 ft BGS	Upland	0.1	0.0	0	
85C-50	7/20/2012	50 ft BGS	Upland	0.1	0.0	0	
12A-25	8/21/2012	25 ft BGS	Upland	0.1	0.0	0	
721-MW11-50	8/1/2012	50 ft BGS	Upland	0.1	0.0	0	
CH-1	7/21/2006	148 to 152 ft bgs	Upland	0.1	0.0	0	
CH-4	7/26/2006	148 to 152 ft bgs	Upland	0.1	0.0	0	
SP-8	7/14/2006	48 to 51 ft bgs	Upland	0.1	0.0	0	
SP-8	7/14/2006	43 to 46 ft bgs	Upland	0.1	0.0	0	
SP-8	7/13/2006	10 to 13 ft bgs	Upland	0.1	0.0	0	
SP-8	7/17/2006	78 to 81 ft bgs	Upland	0.1	0.0	0	
SP-8	7/14/2006	33 to 36 ft bgs	Upland	0.1	0.0	0	
CH-1	7/20/2006	23 to 27 ft bgs	Upland	0.1	0.0	0	
SP-8	7/13/2006	23 to 26 ft bgs	Upland	0.1	0.0	0	
SP-8	7/17/2006	68 to 71 ft bgs	Upland	0.1	0.0	0	
CH-1	7/21/2006	123 to 126 ft bgs	Upland	0.1	0.0	0	
SP-8	7/17/2006	58 to 61 ft bgs	Upland	0.1	0.0	0	
CH-4	7/26/2006	123 to 127 ft bgs	Upland	0.1	0.0	0	
CH-3	7/28/2006	123 to 127 ft bgs	Upland	0.1	0.0	0	
WW-A1R	8/22/2012	30 to 30 ft BML	Subtidal	0.1	0.0	0	
WW-A1D	8/29/2012	67 to 67 ft BML	Subtidal	0.1	0.0	0	
WW-A1R	8/22/2012	20 to 20 ft BML	Subtidal	0.1	0.0	1	
40-25	8/21/2012	25 ft BGS	Upland	0.1	0.0	0	
709-MW21-15	7/27/2012	15 ft BGS	Upland	0.1	0.0	0	
10-50	8/20/2012	50 ft BGS	Upland	0.1	0.0	0	
92C-160	7/18/2012	160 ft BGS	Upland	0.1	0.0	0	
MW-G-INT	9/26/2013	171 ft BGS	Upland	0.1	0.0	0	
MW-G-DEEP	9/25/2013	225 ft BGS	Upland	0.1	0.0	0	
MW-EXT-9-DEEP	9/27/2013	205 ft BGS	Upland	0.1	0.0	0	
MW-F-INT	9/26/2013	140 ft BGS	Upland	0.1	0.0	0	
85C-100	7/20/2012	100 ft BGS	Upland	0.1	0.0	0	
Dock2-1	7/21/2005	23 to 26 ft bml	Subtidal	0.1	0.0	0	
5106-11	10/14/2005	72 to 75 ft bml	Subtidal	0.1	0.0	0	
5106-20	1/5/2006	23.5 to 26.5 ft bml	Subtidal	0.1	0.0	0	
SP-4	9/22/2006	158 to 162 ft bgs	Upland	0.1	0.0	0	
5106-20	1/6/2006	78.5 to 81.5 ft bml	Subtidal	0.1	0.0	0	
Pier25-11	10/7/2005	105 to 108 ft bml	Subtidal	0.1	0.0	0	
83C-75	7/25/2012	75 ft BGS	Upland	0.1	0.0	0	
T3-50	7/29/2012	50 ft BGS	Upland	0.1	0.0	0	
94C-75	9/24/2013	75 ft BGS	Upland	0.1	0.0	0	
94C-100	9/24/2013	100 ft BGS	Upland	0.1	0.0	0	
SP-8	10/5/2006	164 to 168 ft bgs	Upland	0.1	0.0	0	
SP-7	8/31/2006	167 to 171 ft bgs	Upland	0.1	0.0	0	
721-MW11-15	7/31/2012	15 ft BGS	Upland	0.1	0.0	0	
71-50	7/13/2004	50 ft bgs	Upland	0.1	0.0	0	
HYD-4	9/26/2005	106 to 109 ft bml	Subtidal	0.1	0.0	0	
HYD-1	8/31/2005	34 to 37 ft bml	Subtidal	0.1	0.0	0	
EA-1	9/26/2005	61.5 to 64.5 ft bgs	Upland	0.1	0.0	0	
EA-2	10/10/2005	20 to 23 ft bgs	Upland	0.1	0.0	0	

TABLE 4.14

SUMMARY OF SCREENING OF METALS IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Max SQ Metal* [(1)]	*Average SQ Metal* [(2)]	*# Metals With SQ > 1*	*Most Problematic Chemicals*
709-MW16-50	7/28/2012	50 ft BGS	Upland	0.1	0.0	0	
5106-7	8/11/2005	51 to 54 ft bml	Subtidal	0.1	0.0	0	
Pier25-2	8/19/2005	146 to 149 ft bml	Subtidal	0.1	0.0	0	
Dock2-10	9/12/2005	7.6 to 10.6 ft bml	Subtidal	0.1	0.0	0	
HYD-10	9/16/2005	15.3 to 18.3 ft bml	Subtidal	0.1	0.0	0	
PS3-003	7/27/2007	20 to 23 ft bgs	Upland	0.1	0.0	0	
Pier25-20	12/6/2005	12 to 15 ft bml	Subtidal	0.1	0.0	0	
72-25	7/12/2004	25 ft bgs	Upland	0.1	0.0	0	
69-25	7/27/2012	25 ft BGS	Upland	0.1	0.0	0	
Dock2-6	9/6/2005	15.7 to 18.7 ft bml	Subtidal	0.1	0.0	0	
Pier25-32	4/4/2006	9 to 12 ft bgs	Upland	0.1	0.0	0	
5106-20	1/4/2006	13.5 to 16.5 ft bml	Subtidal	0.1	0.0	0	
Pier25-25	1/20/2006	70 to 73 ft bml	Subtidal	0.1	0.0	0	
SP-3	9/30/2006	188 to 192 ft bgs	Upland	0.1	0.0	0	
EA-2	10/11/2005	35 to 38 ft bgs	Upland	0.1	0.0	0	
Dock2-4	7/28/2005	9 to 12 ft bml	Subtidal	0.1	0.0	0	
Dock2-6	9/7/2005	30.7 to 33.7 ft bml	Subtidal	0.1	0.0	0	
WW-A1R	8/25/2012	106 to 106 ft BML	Subtidal	0.1	0.0	2	
SP-3	9/27/2006	138 to 142 ft bgs	Upland	0.1	0.0	0	
Pier25-20	12/6/2005	80 to 82 ft bml	Subtidal	0.1	0.0	0	
Pier25-20	12/6/2005	100 to 103 ft bml	Subtidal	0.1	0.0	0	
5106-21	1/10/2006	70.5 to 73.5 ft bml	Subtidal	0.1	0.0	0	
Dock2-4	7/28/2005	4 to 7 ft bml	Subtidal	0.1	0.0	0	
72-50	7/12/2004	50 ft bgs	Upland	0.1	0.0	0	
HYD-3	8/18/2005	131 to 134 ft bml	Subtidal	0.1	0.0	0	
5106-20	1/4/2006	8.5 to 11.5 ft bml	Subtidal	0.1	0.0	0	
5106-24	2/8/2006	7 to 10 ft bml	Intertidal	0.1	0.0	0	
NL-13	12/21/2005	18 to 21 ft bml	Intertidal	0.1	0.0	0	
Pier25-11	10/7/2005	75 to 78 ft bml	Subtidal	0.1	0.0	0	
Pier25-3	8/16/2005	86.7 to 89.7 ft bml	Subtidal	0.1	0.0	0	
HYD-1	9/1/2005	114 to 117 ft bml	Subtidal	0.1	0.0	0	
16-25	7/5/2004	25 ft bgs	Upland	0.1	0.0	0	
Pier25-32	4/4/2006	30 to 34 ft bgs	Upland	0.1	0.0	0	
Dock2-4	7/28/2005	19 to 22 ft bml	Subtidal	0.1	0.0	0	
NL-14	12/14/2005	13 to 16 ft bml	Subtidal	0.1	0.0	0	
EA-2	10/11/2005	30 to 33 ft bgs	Upland	0.1	0.0	0	
5106-27	4/12/2006	59 to 63 ft bml	Intertidal	0.1	0.0	0	
Pier25-18	12/8/2005	12 to 15 ft bml	Subtidal	0.1	0.0	0	
Dock2-4	7/28/2005	14 to 17 ft bml	Subtidal	0.1	0.0	0	

TABLE 4.15

SUMMARY OF SCREENING OF pH IN SURFACE SEDIMENTS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
Area 1/2	Area 1 Sediment	0	Intertidal	8.00	0.32
Area 2/3-7	Area 2 Sediment	0	Intertidal	8.00	0.32
Area 3 Sediment	Area 3 Sediment	0	Intertidal	7.80	0.20
Area 4/13-16	Area 4 Sediment	0	Intertidal	7.90	0.25
Area 5/17,18,21	Area 5 Sediment	0	Intertidal	7.50	0.10
Area 6/19,20	Area 6 Sediment	0	Intertidal	8.00	0.32
Area 7/22,23	Area 7 Sediment	0	Intertidal	7.80	0.20
Area 8 Sediment	Area 8 Sediment	0	Intertidal	7.80	0.20
Area 9/26-28	Area 9 Sediment	0	Intertidal	7.80	0.20

Notes:

(1) Screening Quotient (SQ)

TABLE 4.16

SUMMARY OF SCREENING OF pH IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
SM3	GW-061106-SM-3-JL-009	0	Subtidal	8.03	0.34
SM3	GW-061106-SM-3-JL-008	0	Subtidal	8.02	0.33
SM3	GW-061106-SM-3-JL-010	0	Subtidal	8.02	0.33
SM3	GW-061106-SM-3-JL-007	0	Subtidal	8.01	0.32
SM3	GW-061106-SM-3-JL-005	0	Subtidal	7.98	0.30
SM3	GW-061106-SM-3-JL-006	0	Subtidal	7.97	0.30
SM3	GW-061106-SM-3-JL-004	0	Subtidal	7.96	0.29
SM3	GW-061106-SM-3-JL-003	0	Subtidal	7.93	0.27
SM3	GW-061506-SM-3-JPL-001	0	Subtidal	7.87	0.23
SM3	GW-061106-SM-3-JL-002	0	Subtidal	7.85	0.22
SM15	GW-061606-SM-15-JPL-005	0	Subtidal	7.75	0.18
SM8	GW-061506-SM-8-JPL-008	0	Subtidal	7.74	0.17
SM1	GW-061206-SM-1-GH-005	0	Subtidal	7.73	0.17
SM8	GW-061506-SM-8-JPL-009	0	Subtidal	7.73	0.17
SM16	GW-062806-SM-16-GH-001	0	Subtidal	7.73	0.17
SM1	GW-061206-SM-1-GH-006	0	Subtidal	7.72	0.17
SM8	GW-061506-SM-8-JPL-007	0	Subtidal	7.71	0.16
SM26	GW-062906-SM-26-GH-004	0	Intertidal	7.71	0.16
SM8	GW-061506-SM-8-JPL-005	0	Subtidal	7.70	0.16
SM8	GW-061506-SM-8-JPL-006	0	Subtidal	7.70	0.16
SM8	GW-061506-SM-8-JPL-010	0	Subtidal	7.70	0.16
SM14	GW-062306-SM-14-GH-007	0	Subtidal	7.70	0.16
SM1	GW-061206-SM-1-GH-003	0	Subtidal	7.68	0.15
SM3	GW-061106-SM-3-JL-001	0	Subtidal	7.68	0.15
SM3	GW-061506-SM-3-JPL-002	0	Subtidal	7.67	0.15
SM26	GW-062906-SM-26-GH-009	0	Intertidal	7.67	0.15
SM14	GW-062306-SM-14-GH-009	0	Subtidal	7.66	0.14
SM15	GW-061606-SM-15-JPL-010	0	Subtidal	7.66	0.14
SM26	GW-062906-SM-26-GH-003	0	Intertidal	7.66	0.14
SM26	GW-062906-SM-26-GH-010	0	Intertidal	7.66	0.14
SM1	GW-061206-SM-1-GH-007	0	Subtidal	7.65	0.14
SM26	GW-062906-SM-26-GH-002	0	Intertidal	7.65	0.14
SM6	GW-061506-SM-6-JPL-002	0	Subtidal	7.64	0.14
SM8	GW-061506-SM-8-JPL-003	0	Subtidal	7.64	0.14
SM25	GW-062706-SM-25-GH-006	0	Subtidal	7.64	0.14
SM26	GW-062906-SM-26-GH-006	0	Intertidal	7.64	0.14
SM1	GW-061206-SM-1-GH-002	0	Subtidal	7.63	0.13
SM9	GW-061306-SM-9-GH-010	0	Subtidal	7.63	0.13
SM15	GW-061606-SM-15-JPL-003	0	Subtidal	7.63	0.13
SM6	GW-061506-SM-6-JPL-003	0	Subtidal	7.62	0.13
SM9	GW-061306-SM-9-GH-004	0	Subtidal	7.62	0.13
SM9	GW-061306-SM-9-GH-008	0	Subtidal	7.62	0.13
SM9	GW-061306-SM-9-GH-009	0	Subtidal	7.62	0.13
SM15	GW-061606-SM-15-JPL-006	0	Subtidal	7.62	0.13
SM15	GW-061606-SM-15-JPL-009	0	Subtidal	7.62	0.13

TABLE 4.16

SUMMARY OF SCREENING OF pH IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
SM1	GW-061206-SM-1-GH-004	0	Subtidal	7.61	0.13
SM2	GW-061006-SM-2-JL-003	0	Subtidal	7.61	0.13
SM6	GW-061506-SM-6-JPL-001	0	Subtidal	7.61	0.13
SM9	GW-061306-SM-9-GH-005	0	Subtidal	7.60	0.13
SM15	GW-061606-SM-15-JPL-002	0	Subtidal	7.60	0.13
SM15	GW-061606-SM-15-JPL-007	0	Subtidal	7.60	0.13
SM26	GW-062906-SM-26-GH-005	0	Intertidal	7.60	0.13
SM26	GW-062906-SM-26-GH-007	0	Intertidal	7.60	0.13
SM5	GW-061206-SM-5-GH-001	0	Subtidal	7.59	0.12
SM9	GW-061306-SM-9-GH-003	0	Subtidal	7.59	0.12
SM14	GW-062306-SM-14-GH-004	0	Subtidal	7.59	0.12
SM14	GW-062306-SM-14-GH-008	0	Subtidal	7.59	0.12
SM20	GW-062306-SM-20-GH-003	0	Subtidal	7.59	0.12
SM2	GW-061006-SM-2-JL-002	0	Subtidal	7.58	0.12
SM6	GW-061506-SM-6-JPL-004	0	Subtidal	7.58	0.12
SM9	GW-061306-SM-9-GH-006	0	Subtidal	7.58	0.12
SM14	GW-062306-SM-14-GH-002	0	Subtidal	7.58	0.12
SM6	GW-061506-SM-6-JPL-008	0	Subtidal	7.57	0.12
SM9	GW-061306-SM-9-GH-002	0	Subtidal	7.57	0.12
SM15	GW-061606-SM-15-JPL-008	0	Subtidal	7.57	0.12
SM6	GW-061506-SM-6-JPL-006	0	Subtidal	7.56	0.11
SM7	GW-062606-SM-7-GH-001	0	Subtidal	7.56	0.11
SM9	GW-061306-SM-9-GH-007	0	Subtidal	7.56	0.11
SM15	GW-061606-SM-15-JPL-001	0	Subtidal	7.56	0.11
SM18	GW-062206-SM-18-GH-010	0	Subtidal	7.55	0.11
SM25	GW-062706-SM-25-GH-003	0	Subtidal	7.55	0.11
SM7	GW-062606-SM-7-GH-003	0	Subtidal	7.54	0.11
SM19	GW-062206-SM-19-GH-006	0	Subtidal	7.54	0.11
SM1	GW-061206-SM-1-GH-001	0	Subtidal	7.53	0.11
SM2	GW-061006-SM-2-JL-004	0	Subtidal	7.53	0.11
SM6	GW-061506-SM-6-JPL-005	0	Subtidal	7.53	0.11
SM14	GW-062306-SM-14-GH-001	0	Subtidal	7.53	0.11
SM18	GW-062206-SM-18-GH-002	0	Subtidal	7.53	0.11
SM18	GW-062206-SM-18-GH-008	0	Subtidal	7.53	0.11
SM1	GW-061206-SM-1-GH-009	0	Subtidal	7.51	0.10
SM5	GW-061206-SM-5-GH-009	0	Subtidal	7.51	0.10
SM19	GW-062206-SM-19-GH-005	0	Subtidal	7.51	0.10
SM1	GW-061206-SM-1-GH-008	0	Subtidal	7.50	0.10
SM2	GW-061006-SM-2-JL-005	0	Subtidal	7.50	0.10
SM5	GW-061206-SM-5-GH-010	0	Subtidal	7.50	0.10
SM6	GW-061506-SM-6-JPL-007	0	Subtidal	7.50	0.10
SM20	GW-062306-SM-20-GH-006	0	Subtidal	7.50	0.10
SM20	GW-062306-SM-20-GH-004	0	Subtidal	7.49	0.10
SM25	GW-062706-SM-25-GH-004	0	Subtidal	7.49	0.10
SM25	GW-062706-SM-25-GH-005	0	Subtidal	7.49	0.10

TABLE 4.16

SUMMARY OF SCREENING OF pH IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
SM2	GW-061006-SM-2-JL-006	0	Subtidal	7.48	0.10
SM5	GW-061206-SM-5-GH-008	0	Subtidal	7.48	0.10
SM25	GW-062706-SM-25-GH-002	0	Subtidal	7.48	0.10
SM1	GW-061206-SM-1-GH-010	0	Subtidal	7.47	0.09
SM14	GW-062306-SM-14-GH-003	0	Subtidal	7.47	0.09
SM18	GW-062206-SM-18-GH-007	0	Subtidal	7.47	0.09
SM20	GW-062306-SM-20-GH-005	0	Subtidal	7.47	0.09
SM20	GW-062306-SM-20-GH-007	0	Subtidal	7.47	0.09
SM20	GW-062306-SM-20-GH-009	0	Subtidal	7.47	0.09
SM23	GW-062706-SM-23-GH-001	0	Subtidal	7.47	0.09
SM21	GW-062606-SM-21-GH-003	0	Subtidal	7.46	0.09
SM19	GW-062206-SM-19-GH-003	0	Subtidal	7.45	0.09
SM23	GW-062706-SM-23-GH-003	0	Subtidal	7.45	0.09
SM19	GW-062206-SM-19-GH-004	0	Subtidal	7.44	0.09
SM20	GW-062306-SM-20-GH-010	0	Subtidal	7.44	0.09
SM2	GW-061006-SM-2-JL-008	0	Subtidal	7.43	0.09
SM2	GW-061006-SM-2-JL-009	0	Subtidal	7.43	0.09
SM9	GW-061306-SM-9-GH-001	0	Subtidal	7.43	0.09
SM20	GW-062306-SM-20-GH-002	0	Subtidal	7.43	0.09
SM21	GW-062606-SM-21-GH-010	0	Subtidal	7.43	0.09
SM23	GW-062406-SM-23-GH-004	0	Subtidal	7.43	0.09
SM2	GW-061006-SM-2-JL-010	0	Subtidal	7.42	0.08
SM19	GW-062206-SM-19-GH-002	0	Subtidal	7.42	0.08
SM2	GW-061006-SM-2-JL-007	0	Subtidal	7.41	0.08
SM23	GW-062406-SM-23-GH-003	0	Subtidal	7.41	0.08
SM18	GW-062206-SM-18-GH-009	0	Subtidal	7.40	0.08
SM7	GW-062606-SM-7-GH-005	0	Subtidal	7.39	0.08
SM25	GW-062706-SM-25-GH-007	0	Subtidal	7.39	0.08
SM7	GW-062606-SM-7-GH-007	0	Subtidal	7.38	0.08
SM18	GW-062206-SM-18-GH-003	0	Subtidal	7.36	0.07
SM26	GW-062906-SM-26-GH-008	0	Intertidal	7.36	0.07
SM14	GW-062306-SM-14-GH-010	0	Subtidal	7.35	0.07
SM7	GW-062606-SM-7-GH-006	0	Subtidal	7.34	0.07
SM26	GW-062906-SM-26-GH-001	0	Intertidal	7.34	0.07
SM23	GW-062406-SM-23-GH-002	0	Subtidal	7.33	0.07
SM2	GW-061006-SM-2-JL-001	0	Subtidal	7.31	0.06
SM20	GW-062306-SM-20-GH-008	0	Subtidal	7.31	0.06
SM23	GW-062706-SM-23-GH-004	0	Subtidal	7.29	0.06
SM23	GW-062406-SM-23-GH-001	0	Subtidal	7.26	0.06
SM18	GW-062206-SM-18-GH-001	0	Subtidal	7.25	0.06
SM25	GW-062706-SM-25-GH-001	0	Subtidal	7.24	0.05
SM11	GW-061406-SM-11-GH-002	0	Subtidal	7.21	0.05
SM23	GW-062706-SM-23-GH-006	0	Subtidal	7.19	0.05
SM21	GW-062606-SM-21-GH-001	0	Subtidal	7.18	0.05
SM19	GW-062206-SM-19-GH-001	0	Subtidal	7.17	0.05
SM23	GW-062706-SM-23-GH-007	0	Subtidal	7.15	0.04

TABLE 4.16

SUMMARY OF SCREENING OF pH IN SEEPAGE METER SAMPLES
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
SM23	GW-062706-SM-23-GH-008	0	Subtidal	7.15	0.04
SM11	GW-061406-SM-11-GH-008	0	Subtidal	7.07	0.04
SM23	GW-062706-SM-23-GH-009	0	Subtidal	7.02	0.03
SM11	GW-061406-SM-11-GH-003	0	Subtidal	7.00	0.03
SM11	GW-061406-SM-11-GH-004	0	Subtidal	6.99	0.03
SM11	GW-061406-SM-11-GH-006	0	Subtidal	6.99	0.03
SM11	GW-061406-SM-11-GH-005	0	Subtidal	6.98	0.03
SM11	GW-061406-SM-11-GH-007	0	Subtidal	6.98	0.03
SM25	GW-062706-SM-25-GH-008	0	Subtidal	6.94	0.03
SM25	GW-062706-SM-25-GH-011	0	Subtidal	6.94	0.03
SM20	GW-062306-SM-20-GH-001	0	Subtidal	6.92	0.03
SM23	GW-062706-SM-23-GH-005	0	Subtidal	6.91	0.03
SM11	GW-061406-SM-11-GH-001	0	Subtidal	6.88	0.02
SM23	GW-062706-SM-23-GH-002	0	Subtidal	6.70	0.02
SM25	GW-062706-SM-25-GH-009	0	Subtidal	6.68	0.02

Notes:

(1) Screening Quotient (SQ)

TABLE 4.17

SUMMARY OF SCREENING OF pH IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
NL-17	GW-033006-RB-NL-17-001	0 to 3	Subtidal	11.62	**1318.26**
NL-17	GW-033006-RB-NL-17-002	3 to 6	Subtidal	11.54	**1096.48**
NL-24	GW-011207-BS-NL-24-001	1.5 to 4.5	Subtidal	11.36	**724.44**
HW-1	GW-012407-BS-HW-1-001	0.5 to 2.5	Subtidal	11.17	**467.74**
NL-15	GW-121605-NL-15-002	3 to 6	Subtidal	10.22	**52.48**
HYD-6	GW-093005-HYD-6-001	2.3 to 5.3	Subtidal	10.21	**51.29**
NL-13	GW-122005-NL-13-002	3 to 6	Subtidal	9.93	**26.92**
NL-13	GW-122005-NL-13-001	0 to 3	Subtidal	9.53	**10.72**
WW-B1	GW-031006-WW-B1-DR-001	2 to 4	Subtidal	9.26	**5.75**
PZ-SHI-1-33	GW-042706-TR-PZ-SHI-1-4	2.25 to 3.25	Subtidal	9.24	**5.50**
5106-12	GW-101005-5106-12-001	2 to 5	Subtidal	9.15	**4.47**
Dock2-5	GW-080105-DOCK2-5-001	2 to 5	Subtidal	9.11	**4.07**
Dock2-5	GW-080105-DOCK2-5-002	2 to 5	Subtidal	9.11	**4.07**
Pier25-29	GW-020606-PIER25-29-001	0 to 3	Subtidal	8.96	**2.88**
721-PZ-2	PZ2-0604-OUT	1 to 2	Intertidal	8.92	**2.63**
Dock2-3	GW-072205-DOCK2-3-001	3 to 6	Subtidal	8.80	**2.00**
Dock2-3	GW-072205-DOCK2-3-002	3 to 6	Subtidal	8.80	**2.00**
NL-25	GW-011807-ILM-NL-25-001	1.5 to 4.5	Subtidal	8.7	**1.58**
PZ-SHI-1-33	PZ-SHI-1-42	2.25 to 3.25	Subtidal	8.65	1.41
HYD-8	GW-091305-HYD-8-002	2 to 5	Subtidal	8.63	1.35
NL-29	GW-011807-BS-NL-29-001	1.5 to 4.5	Subtidal	8.48	0.95
NL-28	GW-011607-BS-NL-28-001	1.5 to 3.5	Subtidal	8.44	0.87
5106-11	GW-101305-5106-11-001	2 to 5	Subtidal	8.43	0.85
Pier25-27	GW-011906-PIER25-27-001	0.5 to 3.5	Subtidal	8.42	0.83
721-PZ-3	721-PZ-3~Outgoing~Duplicate	1 to 2	Subtidal	8.40	0.79
721-PZ-3	PZ3-0604-OUT	1 to 2	Intertidal	8.4	0.79
NL-14	GW-121405-NL-14-001	1 to 4	Subtidal	8.39	0.78
Pier25-29	GW-020606-PIER25-29-002	2 to 5	Subtidal	8.37	0.74
Dock2-10	GW-091205-DOCK2-10-002	2.6 to 5.6	Subtidal	8.36	0.72
Dock2-10	GW-091205-DOCK2-10-001	2.6 to 5.6	Subtidal	8.36	0.72
NL-30	GW-011907-BS-NL-30-001	1.5 to 4.5	Subtidal	8.34	0.69
HYD-9	GW-091405-HYD-9-001	2 to 5	Subtidal	8.33	0.68
NL-15	GW-121605-NL-15-001	0 to 3	Subtidal	8.28	0.60
5106-16	GW-111405-5106-16-001	1 to 4	Subtidal	8.27	0.59
721-PZ-1	PZ1-0604-OUT	1 to 2	Intertidal	8.26	0.58
Dock2-11	GW-101905-DOCK2-11-001	2 to 5	Subtidal	8.24	0.55
HW-2	GW-012507-BS-HW-2-001	2.5 to 4.5	Subtidal	8.23	0.54
721-PZ-4	721-PZ-4~Outgoing~	1 to 2	Subtidal	8.20	0.50
NL-23	GW-081106-LH-NL23-001	0 to 3	Subtidal	8.18	0.48
Pier25-13	GW-020206-PIER25-13-001	0 to 3	Subtidal	8.15	0.45
Dock2-6	GW-090605-DOCK2-6-001	0.7 to 3.7	Subtidal	8.10	0.40
5106-23	GW-021006-5106-23-001	0 to 3	Subtidal	8.09	0.39

TABLE 4.17

SUMMARY OF SCREENING OF pH IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
5106-10	GW-110205-5106-10-001	2 to 5	Subtidal	8.08	0.38
WW-A1	GW-031606-WW-A1-MM-001	2 to 5	Subtidal	8.08	0.38
Dock2-14	GW-102805-Dock2-14-001	2 to 5	Subtidal	8.07	0.37
Pier25-12	GW-020106-Pier25-12-001	0 to 3	Subtidal	8.06	0.36
5106-32	GW-050306-5106-32-BS-001	1 to 5	Subtidal	8.05	0.35
Pier25-25	GW-012006-PIER25-25-001	0 to 3	Subtidal	8.03	0.34
Pier25-20	GW-120605-PIER25-20-001	2 to 5	Subtidal	8.01	0.32
721-PZ-5	721-PZ-5~Outgoing~	1 to 2	Subtidal	7.98	0.30
Pier25-6	GW-020306-PIER25-6-001	0.5 to 3.5	Subtidal	7.95	0.28
Pier25-24	GW-011206-PIER25-24-001	0.5 to 3.5	Subtidal	7.95	0.28
WW-B3	GW-050906-WW-B3-GH-001	2 to 4	Subtidal	7.95	0.28
Pier25-26	GW-012306-PIER25-26-001	1.5 to 4.5	Subtidal	7.93	0.27
5106-24	GW-020806-5106-24-001	2 to 5	Subtidal	7.91	0.26
Pier25-19	GW-120705-PIER25-19-001	2.6 to 5.6	Subtidal	7.90	0.25
Pier25-30	GW-012606-PIER25-30-001	0 to 3	Subtidal	7.89	0.25
WW-C1	GW-030606-WW-C1-MM-001	1 to 4	Subtidal	7.89	0.25
5106-9	GW-110105-5106-9-001	2 to 5	Subtidal	7.84	0.22
5106-20	GW-010406-5106-20-001	0.5 to 3.5	Subtidal	7.83	0.21
Dock2-7	GW-090705-Dock2-7-001	3 to 6	Subtidal	7.82	0.21
5106-2	GW-013006-5106-2-001	0 to 3	Subtidal	7.80	0.20
5106-26	GW-021406-5106-26-001	0 to 3	Subtidal	7.80	0.20
Dock2-12	GW-110805-DOCK2-12-001	2 to 5	Subtidal	7.80	0.20
Pier25-23	GW-011106-PIER25-23-001	2 to 5	Subtidal	7.79	0.19
Pier25-18	GW-120805-PIER25-18-001	2 to 5	Subtidal	7.78	0.19
WW-D1	GW-042806-WW-D1-MM-001	2 to 4	Subtidal	7.77	0.19
5106-25	GW-042706-5106-25-009	1 to 5	Subtidal	7.75	0.18
Pier25-28	GW-012406-PIER25-28-001	0 to 3	Subtidal	7.74	0.17
WW-C2	GW-033006-WW-C2-ZF-001	2 to 5	Subtidal	7.69	0.15
5106-15	GW-111505-5106-15-001	2 to 5	Subtidal	7.68	0.15
5106-15	GW-111505-5106-15-002	2 to 5	Subtidal	7.68	0.15
Pier25-16	GW-121205-PIER25-16-001	2 to 5	Subtidal	7.68	0.15
Pier25-21	GW-010306-PIER25-21-001	0.5 to 3.5	Subtidal	7.68	0.15
Pier25-22	GW-011706-PIER25-22-001	0.5 to 3.5	Subtidal	7.67	0.15
WW-A2	GW-040506-WW-A2-MM-001	2 to 4	Subtidal	7.67	0.15
5106-13	GW-112805-5106-13-001	2 to 5	Subtidal	7.63	0.13
WW-B2	GW-041306-WW-B2-MM-001	2 to 4	Subtidal	7.54	0.11
5106-21	GW-010606-5106-21-001	0.5 to 3.5	Subtidal	7.50	0.10
NL-16	GW-051806-NL-16-BI-001	1 to 4	Subtidal	7.48	0.10
5106-19	GW-011306-5106-19-001	0.5 to 3.5	Subtidal	7.46	0.09
Pier25-1	GW-063005-PIER25-1-001	3 to 5	Subtidal	7.36	0.07
5106-22	GW-012506-5106-22-001	0 to 3	Subtidal	7.26	0.06
5106-22	GW-012506-5106-22-002	0 to 3	Subtidal	7.26	0.06

TABLE 4.17

SUMMARY OF SCREENING OF pH IN SEDIMENT POREWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
5106-14	GW-120105-5106-14-001	2 to 5	Subtidal	7.25	0.06
5106-14	GW-120105-5106-14-002	2 to 5	Subtidal	7.25	0.06
5106-29	GW-042106-5106-29-001	0 to 4	Subtidal	7.09	0.04
5106-31	GW-042806-5106-31-001	1 to 5	Subtidal	6.94	0.03
5106-27	GW-041006-5106-27-001	0 to 4	Subtidal	6.86	0.02
5106-30	GW-042606-5106-30-009	1 to 5	Subtidal	6.78	0.02

Notes:

(1) Screening Quotient (SQ)

Bold SQ > 1.5

TABLE 4.18

SUMMARY OF SCREENING OF pH IN SEEPS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Sample Type*	*Filtered*	*pH, field s.u.*	*pH SQ* [(1)]
Milky-Seep1-02	MS-1	Surface	N	11.20	**501.19**
Milky-Seep4-02	MS-4	Surface	N	11.20	**501.19**
Milky-Seep8-02	MS-8	Surface	N	11.20	**501.19**
Milky-Seep9-02	MS-9	Surface	N	11.20	**501.19**
Milky-Seep5-02	MS-5	Surface	N	11.10	**398.11**
Milky-Seep3-02	MS-3	Surface	N	11.00	**316.23**
Milky-Seep7-02	MS-7	Surface	N	10.20	**50.12**
Milky-Seep10-02	MS-10	Surface	N	9.80	**19.95**
Milky-Seep6-02	MS-6	Surface	N	9.80	**19.95**
Seep No.001	Seep 1-Incoming	Surface	N	9.74	**17.38**
Seep No.002	Seep 2-Outgoing	Surface	N	9.66	**14.45**
Seep No.001	Seep 1-Outgoing	Surface	N	9.54	**10.96**
Seep No.002	Seep 2-Incoming	Surface	N	9.37	**7.41**
DC-14	P063004-DC14	Surface	N	9.09	**3.89**
DC-30	P070204-DC30	Surface	N	8.94	**2.75**
DC-20	P063004-DC20	Surface	N	8.65	1.41
DC-01	P063004-DC01	Surface	N	8.63	1.35
NAVY-3-04	P-012004-BDM-003	Surface	N	8.63	1.35
DC-21	P063004-DC21	Surface	N	8.60	1.26
DC-05	P063004-DC05	Surface	N	8.45	0.89
DC-19	P063004-DC19	Surface	N	8.41	0.81
Seep-No.004	Seep 4-Outgoing	Surface	N	8.36	0.72
Seep-No.005	Seep 5-Incoming	Surface	N	8.14	0.44
Seep-No.005	Seep 5-Outgoing	Surface	N	8.14	0.44
DC-09	P063004-DC09	Surface	N	8.11	0.41
ESI-E-1-02	SP-07842-110602-JAS-034	Surface	N	8.10	0.40
NAVY-1	SP-010403-JJW-087	Surface	N	8.10	0.40
NAVY-2	SP-010503-JJW-090	Surface	N	8.10	0.40
NAVY-2	SP-010503-JJW-091	Surface	N	8.10	0.40
Seep No.003	Seep 3-Incoming	Surface	N	8.07	0.37
Seep No.003	Seep 3-Outgoing	Surface	N	8.07	0.37
DC-16	P063004-DC16	Surface	N	8.02	0.33
Milky-Seep2-02	MS-2	Surface	N	8.00	0.32
NAVY-1	NAVY-1	Surface	N	8.00	0.32
NAVY-2	SP-010403-JJW-088	Surface	N	8.00	0.32
ESI-A-10-02	SP-07842-110502-JJW-010	Surface	N	7.90	0.25
ESI-A-5-02	SP-07842-110502-JJW-005	Surface	N	7.90	0.25
ESI-A-5-02	SP-07842-110502-JJW-006	Surface	N	7.90	0.25
ESI-A-8-02	SP-07842-110502-JJW-007	Surface	N	7.90	0.25
ESI-A-9-02	SP-07842-110502-JSV-009	Surface	N	7.90	0.25
ESI-D-3-02	SP-07842-110602-JJW-035	Surface	N	7.90	0.25
ESI-E-11-02	SP-07842-110802-JSV-072	Surface	N	7.90	0.25

TABLE 4.18

SUMMARY OF SCREENING OF pH IN SEEPS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Sample Type*	*Filtered*	*pH, field s.u.*	*pH SQ* (1)
Seep-No.004	Seep 4-Incoming	Surface	N	7.89	0.25
DC-08	P063004-DC08	Surface	N	7.88	0.24
DC-03	P063004-DC03	Surface	N	7.83	0.21
ESI-A-2-02	SP-07842-110502-DMC-004	Surface	N	7.80	0.20
ESI-A-3-02	SP-07842-110502-JAS-003	Surface	N	7.80	0.20
ESI-A-7-02	SP-07842-110502-JAS-011	Surface	N	7.80	0.20
ESI-C-2-02	SP-07842-110802-DMC-069	Surface	N	7.80	0.20
ESI-C-8-02	SP-07842-110802-JAS-075	Surface	N	7.80	0.20
ESI-C-9-02	SP-07842-110802-DMC-074	Surface	N	7.80	0.20
ESI-E-9-02	SP-07842-110702-JSV-070	Surface	N	7.80	0.20
Seep-94	SEEP-94	Surface	N	7.80	0.20
ESI-A-10-02	SP-07842-110502-DMC-016	Surface	N	7.70	0.16
ESI-C-3-02	SP-07842-110502-JSV-025	Surface	N	7.70	0.16
ESI-C-4-02	SP-07842-110502-JSV-026	Surface	N	7.70	0.16
ESI-C-5-02	SP-07842-110502-JJW-027	Surface	N	7.70	0.16
ESI-C-6-02	SP-07842-110802-DMC-067	Surface	N	7.70	0.16
ESI-D-1-02	SP-07842-110602-JSV-038	Surface	N	7.70	0.16
ESI-D-3-02	SP-07842-110602-JJW-036	Surface	N	7.70	0.16
ESI-E-10-02	SP-07842-110802-JSV-071	Surface	N	7.70	0.16
DC-06	P063004-DC06	Surface	N	7.67	0.15
DC-18	P063004-DC18	Surface	N	7.64	0.14
DC-02	P063004-DC02	Surface	N	7.61	0.13
ESI-A-4-02	SP-07842-110502-JSV-002	Surface	N	7.60	0.13
ESI-B-4-02	SP-07842-110602-JJW-050	Surface	N	7.60	0.13
ESI-D-2-02	SP-07842-110702-JSV-059	Surface	N	7.60	0.13
DC-12	P063004-DC12	Surface	N	7.59	0.12
NAVY-1-04	P-012004-JEC-001	Surface	N	7.57	0.12
DC-15	P063004-DC15	Surface	N	7.56	0.11
DC-13	P063004-DC13	Surface	N	7.55	0.11
DC-10	P063004-DC10	Surface	N	7.54	0.11
DC-11	P063004-DC11	Surface	N	7.54	0.11
DC-07	P063004-DC07	Surface	N	7.53	0.11
ESI-A-6-02	SP-07842-110502-JAS-020	Surface	N	7.50	0.10
ESI-C-1-02	SP-07842-110702-JJW-066	Surface	N	7.50	0.10
ESI-E-2-02	SP-07842-110602-DMC-040	Surface	N	7.50	0.10
ESI-E-3-02	SP-07842-110602-JAS-039	Surface	N	7.50	0.10
ESI-E-5-02	SP-07842-110602-JAS-042	Surface	N	7.50	0.10
ESI-E-6-02	SP-07842-110602-DMC-044	Surface	N	7.50	0.10
ESI-E-6-02	SP-07842-110702-DMC-048	Surface	N	7.50	0.10
ESI-E-7-02	SP-07842-110602-JAS-046	Surface	N	7.50	0.10
ESI-F-1-02	SP-07842-110602-JSV-047	Surface	N	7.50	0.10
NAVY-2-04	P-012004-BDM-002	Surface	N	7.47	0.09

TABLE 4.18

SUMMARY OF SCREENING OF pH IN SEEPS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample*	*Sample Type*	*Filtered*	*pH, field s.u.*	*pH SQ* (1)
DC-04	P063004-DC04	Surface	N	7.46	0.09
DC-17	P063004-DC17	Surface	N	7.45	0.09
DC-17	P063004-FD01	Surface	N	7.45	0.09
ESI-E-4-02	SP-07842-110602-JM-043	Surface	N	7.40	0.08
ESI-E-8-02	SP-07842-110602-DMC-045	Surface	N	7.40	0.08
ESI-C-3-02	SP-07842-110702-JAS-064	Surface	N	7.10	0.04
ESI-A-1-02	SP-07842-110502-JJW-001	Surface	N	6.90	0.03
DC-29	P070104-DC29	Surface	N	6.79	0.02
ESI-C-7-02	SP-07842-110702-JJW-063	Surface	N	6.70	0.02
DC-22	P070104-DC22	Surface	N	6.35	0.01
DC-23	P070104-DC23	Surface	N	6.04	0.00
DC-24	P070104-DC24	Surface	N	6.02	0.00
ESI-B-1-02	SP-07842-110502-JSV-013	Surface	N	6.00	0.00
ESI-B-2-02	SP-07842-110502-JJW-012	Surface	N	6.00	0.00
DC-27	P070104-DC27	Surface	N	5.74	0.00
DC-27	P070104-FD02	Surface	N	5.74	0.00
DC-25	P070104-DC25	Surface	N	5.66	0.00
DC-26	P070104-DC26	Surface	N	5.13	0.00
DC-28	P070104-DC28	Surface	N	3.50	0.00

Notes:

(1) Screening Quotient (SQ)

Bold SQ > 1.5

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
81-50	8/14/2012	50 ft BGS	Upland	14.26	**575,439.9**
PS4-GP1A	12/10/2007	45 to 46 ft bgs	Upland	14.11	**407,380.3**
CH-5	6/8/2006	9 to 12 ft bgs	Upland	14.04	**346,736.9**
PS2-GP3A	3/22/2007	13 to 14 ft bgs	Upland	14.00	**316,227.8**
PS2-GP5A	3/22/2007	13 to 14 ft bgs	Upland	14.00	**316,227.8**
PS4-GP1A	12/10/2007	50 to 51 ft bgs	Upland	14.00	**316,227.8**
PS4-GP4A	12/11/2007	50 to 51 ft bgs	Upland	14.00	**316,227.8**
PS4-GP4A	12/11/2007	55 to 56 ft bgs	Upland	14.00	**316,227.8**
PS4-GP3A	12/13/2007	55 to 56 ft bgs	Upland	14.00	**316,227.8**
PS4-GP3A	12/13/2007	60 to 61 ft bgs	Upland	14.00	**316,227.8**
PS4-GP3A	12/13/2007	63 to 64 ft bgs	Upland	14.00	**316,227.8**
PS4-GP2A	12/17/2007	60 to 59 ft bgs	Upland	14.00	**316,227.8**
PS4-GP2A	12/17/2007	65 to 66 ft bgs	Upland	14.00	**316,227.8**
PS4-GP1A	12/18/2007	58 to 59 ft bgs	Upland	14.00	**316,227.8**
82-230	6/10/2010	85 to 90 ft BGS	Upland	14.00	**316,227.8**
PS2-GP3A	3/22/2007	10 to 11 ft bgs	Upland	13.97	**295,120.9**
EA-2	10/14/2005	95 to 98 ft bgs	Upland	13.94	**275,422.9**
82-230	6/10/2010	70 to 75 ft BGS	Upland	13.93	**269,153.5**
PS2-GP5A	3/22/2007	22 to 23 ft bgs	Upland	13.92	**263,026.8**
82-230	6/9/2010	50 to 55 ft BGS	Upland	13.90	**251,188.6**
PS4-GP1A	12/10/2007	55 to 56 ft bgs	Upland	13.87	**234,422.9**
SP-8	10/3/2006	104 to 108 ft bgs	Upland	13.80	**199,526.2**
EA-3	10/27/2005	80 to 83 ft bgs	Upland	13.77	**186,208.7**
EA-3	10/28/2005	90 to 93 ft bgs	Upland	13.77	**186,208.7**
SP-2	7/12/2006	88 to 91 ft bgs	Upland	13.76	**181,970.1**
CH-1	7/20/2006	48 to 52 ft bgs	Upland	13.76	**181,970.1**
PS4-GP5A	12/12/2007	55 to 56 ft bgs	Upland	13.76	**181,970.1**
PS2-GP7A	3/22/2007	13 to 14 ft bgs	Upland	13.73	**169,824.4**
48-15	3/16/2004	15 ft bgs	Upland	13.72	**165,958.7**
ESI-1-4	11/12/2002	100 ft bgs	Upland	13.70	**158,489.3**
PS4-GP3A	12/13/2007	50 to 51 ft bgs	Upland	13.66	**144,544.0**
PS5-CMT1-P7	2/13/2009	55 to 56 ft bgs	Upland	13.66	**144,544.0**
PS5-CMT3-P7	2/13/2009	55 to 56 ft bgs	Upland	13.65	**141,253.8**
1-100R	8/3/2006	100 ft bgs	Upland	13.63	**134,896.3**
PS5-CMT4-P7	2/12/2009	55 to 56 ft bgs	Upland	13.61	**128,825.0**
5106-1	9/28/2005	60 to 63 ft bml	Subtidal	13.59	**123,026.9**
82-150	7/6/2010	15 to 20 ft BGS	Upland	13.48	**95,499.3**
PS5-CMT1-P6	2/13/2009	45 to 46 ft bgs	Upland	13.43	**85,113.8**
PZ-SHI-2-100	8/17/2006	77.7 to 82.7 ft bml	Intertidal	13.40	**79,432.8**
PS5-CMT4-P6	2/12/2009	45 to 46 ft bgs	Upland	13.39	**77,624.7**
5106-1	9/28/2005	65 to 68 ft bml	Subtidal	13.38	**75,857.8**
PS5-CMT2-P6	2/13/2009	44.2 to 45.2 ft bgs	Upland	13.33	**67,608.3**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
69-25	2/19/2005	25 ft bgs	Upland	13.31	**64,565.4**
ESI-2-20	11/26/2002	15 ft bgs	Upland	13.30	**63,095.7**
ESI-1-5	12/4/2002	25 ft bgs	Upland	13.30	**63,095.7**
ESI-2-34	1/26/2004	15 ft bgs	Upland	13.30	**63,095.7**
PS5-CMT1-P5	2/13/2009	39 to 40 ft bgs	Upland	13.29	**61,659.5**
PS5-CMT3-P6	2/13/2009	45 to 46 ft bgs	Upland	13.29	**61,659.5**
CH-4	7/25/2006	48 to 52 ft bgs	Upland	13.27	**58,884.4**
PS5-CMT2-P7	2/13/2009	54.2 to 55.2 ft bgs	Upland	13.27	**58,884.4**
PS5-IP	2/16/2009	45 to 50 ft bgs	Upland	13.27	**58,884.4**
82-230	6/11/2010	105 to 110 ft BGS	Upland	13.27	**58,884.4**
HYD-4	9/23/2005	26 to 29 ft bml	Subtidal	13.23	**53,703.2**
PS5-CMT2-P5	2/13/2009	38.2 to 39.2 ft bgs	Upland	13.21	**51,286.1**
SP-8	7/19/2006	108 to 111 ft bgs	Upland	13.20	**50,118.7**
HYD-4	9/23/2005	36 to 39 ft bml	Subtidal	13.18	**47,863.0**
5106-1	9/28/2005	55 to 58 ft bml	Subtidal	13.17	**46,773.5**
PS4-GP4A	12/11/2007	35 to 36 ft bgs	Upland	13.17	**46,773.5**
69-25	5/17/2005	25 ft bgs	Upland	13.15	**44,668.4**
EA-1	9/28/2005	106.5 to 109.5 ft bgs	Upland	13.15	**44,668.4**
PZ-SHI-2-100	8/25/2012	100 ft BGS	Intertidal	13.13	**42,658.0**
PS5-CMT1-P2	2/10/2009	21 to 22 ft bgs	Upland	13.10	**39,810.7**
PS5-CMT1-P1	2/11/2009	15 to 16 ft bgs	Upland	13.10	**39,810.7**
5-25	12/5/2008	25 ft bgs	Upland	13.09	**38,904.5**
PS2-GP3A	3/22/2007	7 to 8 ft bgs	Upland	13.08	**38,018.9**
PS5-CMT4-P5	2/12/2009	39 to 40 ft bgs	Upland	13.08	**38,018.9**
5106-1	9/28/2005	70 to 73 ft bml	Subtidal	13.06	**36,307.8**
PS4-GP3A	12/13/2007	20 to 21 ft bgs	Upland	13.04	**34,673.7**
ESI-2-31	1/27/2004	15 ft bgs	Upland	13.00	**31,622.8**
ESI-2-43	1/27/2004	15 ft bgs	Upland	13.00	**31,622.8**
ESI-2-30	1/28/2004	15 ft bgs	Upland	13.00	**31,622.8**
PS5-CMT3-P1	2/11/2009	15 to 16 ft bgs	Upland	13.00	**31,622.8**
PS5-CMT3-P2	2/11/2009	21 to 22 ft bgs	Upland	13.00	**31,622.8**
PS5-CMT4-P1	2/11/2009	15 to 16 ft bgs	Upland	13.00	**31,622.8**
PS4-GP4A	12/11/2007	45 to 46 ft bgs	Upland	12.99	**30,903.0**
PS5-CMT1-P4	2/13/2009	33 to 34 ft bgs	Upland	12.98	**30,199.5**
PS5-IP	2/16/2009	20 to 25 ft bgs	Upland	12.93	**26,915.3**
5106-6	10/17/2005	18 to 21 ft bml	Subtidal	12.92	**26,302.7**
MW-EXT-9-INT	12/4/2013		Upland	12.91	**25,704.0**
SP-4	6/22/2006	88 to 91 ft bgs	Upland	12.91	**25,704.0**
PS5-CMT3-P5	2/13/2009	39 to 40 ft bgs	Upland	12.91	**25,704.0**
ESI-2-33	1/29/2004	15 ft bgs	Upland	12.90	**25,118.9**
PS5-CMT4-P2	2/11/2009	21 to 22 ft bgs	Upland	12.90	**25,118.9**
HYD-4	9/22/2005	16 to 19 ft bml	Subtidal	12.89	**24,547.1**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
5106-6	10/17/2005	8 to 11 ft bml	Subtidal	12.87	**23,442.3**
48-15	8/10/2012	15 ft BGS	Upland	12.83	**21,379.6**
PS4-GP4A	12/11/2007	25 to 26 ft bgs	Upland	12.82	**20,893.0**
HYD-4	9/23/2005	56 to 59 ft bml	Subtidal	12.81	**20,417.4**
ESI-1-1	11/12/2002	100 ft bgs	Upland	12.80	**19,952.6**
ESI-2-36	1/29/2004	25 ft bgs	Upland	12.80	**19,952.6**
PS5-CMT2-P2	2/11/2009	20.2 to 21.2 ft bgs	Upland	12.80	**19,952.6**
PS4-GP4A	12/11/2007	30 to 31 ft bgs	Upland	12.78	**19,054.6**
5106-1	9/28/2005	50 to 53 ft bml	Subtidal	12.77	**18,620.9**
HYD-4	9/23/2005	46 to 49 ft bml	Subtidal	12.75	**17,782.8**
PS4-GP3A	12/13/2007	15 to 16 ft bgs	Upland	12.74	**17,378.0**
ESI-1-3	11/13/2002	25 ft bgs	Upland	12.70	**15,848.9**
ESI-2-19	11/21/2002	15 ft bgs	Upland	12.70	**15,848.9**
ESI-2-35	1/30/2004	15 ft bgs	Upland	12.70	**15,848.9**
PS4-GP3A	12/13/2007	30 to 31 ft bgs	Upland	12.70	**15,848.9**
PS5-CMT1-P3	2/10/2009	27 to 28 ft bgs	Upland	12.70	**15,848.9**
PS5-CMT2-P1	2/11/2009	14.2 to 15.2 ft bgs	Upland	12.70	**15,848.9**
PS5-CMT3-P4	2/13/2009	33 to 34 ft bgs	Upland	12.70	**15,848.9**
5106-1	9/27/2005	45 to 48 ft bml	Subtidal	12.69	**15,488.2**
1-100R	4/18/2006	100 ft bgs	Upland	12.69	**15,488.2**
PS2-005	3/21/2007	21 to 26 ft bgs	Upland	12.69	**15,488.2**
PS4-GP3A	12/13/2007	45 to 46 ft bgs	Upland	12.69	**15,488.2**
PS4-GP1A	12/10/2007	25 to 26 ft bgs	Upland	12.68	**15,135.6**
PS4-GP5A	12/12/2007	20 to 21 ft bgs	Upland	12.68	**15,135.6**
PS5-CMT4-P4	2/12/2009	33 to 34 ft bgs	Upland	12.68	**15,135.6**
PS4-GP1A	12/10/2007	20 to 21 ft bgs	Upland	12.67	**14,791.1**
SP-2	7/12/2006	98 to 101 ft bgs	Upland	12.64	**13,803.8**
PS3-GP5A	6/29/2007	17 to 20 ft bgs	Upland	12.63	**13,489.6**
PS2-006	3/21/2007	21 to 26 ft bgs	Upland	12.62	**13,182.6**
PS4-GP4A	12/11/2007	40 to 41 ft bgs	Upland	12.62	**13,182.6**
PS4-GP4A	12/12/2007	20 to 21 ft bgs	Upland	12.59	**12,302.7**
MW-EXT-9-DEEP	7/16/2013	152 to 154 ft BGS	Upland	12.57	**11,749.0**
PS5-IP	2/16/2009	32.5 to 37.5 ft bgs	Upland	12.57	**11,749.0**
EA-3	10/27/2005	85 to 88 ft bgs	Upland	12.56	**11,481.5**
PZ-SHI-1-100	7/20/2006	66 to 71 ft bml	Subtidal	12.55	**11,220.2**
PS5-CMT2-P4	2/13/2009	33.2 to 34.2 ft bgs	Upland	12.55	**11,220.2**
CH-4	7/25/2006	23 to 27 ft bgs	Upland	12.54	**10,964.8**
PS4-GP2A	12/13/2007	15 to 16 ft bgs	Upland	12.54	**10,964.8**
PS4-GP1A	12/10/2007	15 to 16 ft bgs	Upland	12.53	**10,715.2**
PS4-GP5A	12/12/2007	25 to 26 ft bgs	Upland	12.53	**10,715.2**
PS4-GP3A	12/13/2007	25 to 26 ft bgs	Upland	12.53	**10,715.2**
PS4-GP2A	12/14/2007	20 to 21 ft bgs	Upland	12.51	**10,232.9**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
ESI-2-34	1/26/2004	25 ft bgs	Upland	12.50	**10,000.0**
ESI-2-29	1/29/2004	15 ft bgs	Upland	12.50	**10,000.0**
EA-3	10/31/2005	100 to 103 ft bgs	Upland	12.50	**10,000.0**
PS5-CMT2-P3	2/11/2009	26.2 to 27.2 ft bgs	Upland	12.50	**10,000.0**
PS5-CMT3-P3	2/11/2009	27 to 28 ft bgs	Upland	12.50	**10,000.0**
PS5-CMT4-P3	2/11/2009	27 to 28 ft bgs	Upland	12.50	**10,000.0**
PS4-GP5A	12/12/2007	50 to 51 ft bgs	Upland	12.49	**9,772.4**
PS2-004	3/21/2007	21 to 26 ft bgs	Upland	12.48	**9,549.9**
PS2-GP3A	3/22/2007	19 to 20 ft bgs	Upland	12.45	**8,912.5**
PS4-GP2A	12/14/2007	55 to 56 ft bgs	Upland	12.45	**8,912.5**
68-50	2/19/2005	50 ft bgs	Upland	12.44	**8,709.6**
SP-8	7/20/2006	112 to 115 ft bgs	Upland	12.44	**8,709.6**
PS4-GP1A	12/10/2007	30 to 31 ft bgs	Upland	12.44	**8,709.6**
709-MW6-25	8/9/2012	25 ft BGS	Upland	12.42	**8,317.6**
EA-1	9/28/2005	101.5 to 104.5 ft bgs	Upland	12.41	**8,128.3**
PZ-SHI-1-100	4/27/2006	66 to 71 ft bml	Subtidal	12.41	**8,128.3**
ESI-2-27	11/29/2002	50 ft bgs	Upland	12.40	**7,943.3**
EA-2	10/17/2005	100 to 103 ft bgs	Upland	12.38	**7,585.8**
CH-3	7/27/2006	48 to 52 ft bgs	Upland	12.37	**7,413.1**
53C-130	7/24/2012	130 ft BGS	Upland	12.37	**7,413.1**
SB-B-DEEP	8/12/2013	182 to 184 ft BGS	Upland	12.36	**7,244.4**
PS2-GP3A	3/22/2007	16 to 17 ft bgs	Upland	12.36	**7,244.4**
PS4-GP1A	12/10/2007	40 to 41 ft bgs	Upland	12.35	**7,079.5**
PS4-GP3A	12/13/2007	40 to 41 ft bgs	Upland	12.35	**7,079.5**
PS4-GP2A	12/14/2007	30 to 31 ft bgs	Upland	12.33	**6,760.8**
PS2-GP3A	3/22/2007	22 to 23 ft bgs	Upland	12.32	**6,606.9**
5106-3	9/20/2005	29 to 32 ft bml	Subtidal	12.31	**6,456.5**
5106-1	9/27/2005	40 to 43 ft bml	Subtidal	12.31	**6,456.5**
PS4-GP2A	12/14/2007	25 to 26 ft bgs	Upland	12.31	**6,456.5**
ESI-2-15	11/18/2002	25 ft bgs	Upland	12.30	**6,309.6**
ESI-2-9	11/24/2002	15 ft bgs	Upland	12.30	**6,309.6**
ESI-2-35	2/2/2004	25 ft bgs	Upland	12.30	**6,309.6**
ESI-1-8	2/4/2004	25 ft bgs	Upland	12.30	**6,309.6**
15-120	2/21/2005	120 ft bgs	Upland	12.30	**6,309.6**
PT-15A	11/10/2005	101 to 104 ft bml	Subtidal	12.29	**6,166.0**
69-25	7/27/2012	25 ft BGS	Upland	12.28	**6,025.6**
PS4-GP5A	12/12/2007	30 to 31 ft bgs	Upland	12.27	**5,888.4**
PS3-GP3A	6/29/2007	24 to 27 ft bgs	Upland	12.25	**5,623.4**
5106-3	9/20/2005	54 to 57 ft bml	Subtidal	12.24	**5,495.4**
PS4-GP2A	12/13/2007	10 to 11 ft bgs	Upland	12.23	**5,370.3**
69-25	7/27/2010	25 ft BGS	Upland	12.23	**5,370.3**
5106-3	9/20/2005	49 to 52 ft bml	Subtidal	12.22	**5,248.1**

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ [(1)]*
PS3-GP4A	7/5/2007	24 to 27 ft bgs	Upland	12.22	**5,248.1**
PS4-GP5A	12/12/2007	15 to 16 ft bgs	Upland	12.21	**5,128.6**
16-50	2/18/2005	50 ft bgs	Upland	12.20	**5,011.9**
69-25	7/14/2004	25 ft bgs	Upland	12.19	**4,897.8**
HYD-3	8/16/2005	101 to 104 ft bml	Subtidal	12.19	**4,897.8**
EA-3	10/31/2005	105 to 108 ft bgs	Upland	12.19	**4,897.8**
68-50	5/17/2005	50 ft bgs	Upland	12.18	**4,786.3**
5106-3	9/20/2005	45 to 48 ft bml	Subtidal	12.18	**4,786.3**
PS4-GP1A	12/10/2007	35 to 36 ft bgs	Upland	12.18	**4,786.3**
709-MW3-15	3/9/2004	15 ft bgs	Upland	12.15	**4,466.8**
EA-3	10/27/2005	75 to 78 ft bgs	Upland	12.15	**4,466.8**
PS2-GP3A	3/22/2007	31 to 32 ft bgs	Upland	12.14	**4,365.2**
PS4-GP3A	12/13/2007	35 to 36 ft bgs	Upland	12.13	**4,265.8**
69-25	7/11/2006	25 ft bgs	Upland	12.12	**4,168.7**
90C-130	7/23/2012	130 ft BGS	Upland	12.12	**4,168.7**
ESI-1-3	11/13/2002	86 ft bgs	Upland	12.10	**3,981.1**
ESI-2-9	11/24/2002	25 ft bgs	Upland	12.10	**3,981.1**
ESI-2-50	1/26/2004	25 ft bgs	Upland	12.10	**3,981.1**
ESI-2-33	1/30/2004	25 ft bgs	Upland	12.10	**3,981.1**
ESI-1-7	2/3/2004	25 ft bgs	Upland	12.10	**3,981.1**
5106-12	10/11/2005	12 to 15 ft bml	Subtidal	12.10	**3,981.1**
94C-130	7/24/2012	130 ft BGS	Upland	12.10	**3,981.1**
83C-130	7/25/2012	130 ft BGS	Upland	12.10	**3,981.1**
PT-17A	2/2/2007	10 to 12 ft bml	Subtidal	12.09	**3,890.5**
11-183	8/7/2012	183 ft BGS	Upland	12.09	**3,890.5**
15-120	8/15/2012	120 ft BGS	Upland	12.09	**3,890.5**
SP-8	7/18/2006	98 to 101 ft bgs	Upland	12.08	**3,801.9**
53C-130	7/10/2013	130 ft BGS	Upland	12.07	**3,715.4**
MW-EXT-9-INT	9/27/2013	155 ft BGS	Upland	12.07	**3,715.4**
1-100R	2/1/2003	100 ft bgs	Upland	12.07	**3,715.4**
EA-3	10/27/2005	65 to 68 ft bgs	Upland	12.07	**3,715.4**
PT-15A	11/11/2005	121 to 124 ft bml	Subtidal	12.06	**3,630.8**
18-25	4/17/2006	25 ft bgs	Upland	12.06	**3,630.8**
SP-5	7/31/2006	108 to 112 ft bgs	Upland	12.06	**3,630.8**
HYD-7	8/31/2005	20 to 23 ft bml	Subtidal	12.05	**3,548.1**
EA-1	10/3/2005	116.5 to 119.5 ft bgs	Upland	12.05	**3,548.1**
SP-7	8/30/2006	107 to 111 ft bgs	Upland	12.05	**3,548.1**
721-MW12-50	7/30/2012	50 ft BGS	Upland	12.05	**3,548.1**
EA-1	10/3/2005	111.5 to 114.5 ft bgs	Upland	12.04	**3,467.4**
5106-6	10/17/2005	13 to 16 ft bml	Subtidal	12.04	**3,467.4**
SP-3	6/16/2006	99 to 101 ft bgs	Upland	12.04	**3,467.4**
SP-1	6/27/2006	98 to 101 ft bgs	Upland	12.04	**3,467.4**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
PS3-GP5A	6/29/2007	13 to 16 ft bgs	Upland	12.04	**3,467.4**
SB-B-DEEP	8/9/2013	162 to 164 ft BGS	Upland	12.03	**3,388.4**
709-MW16-75	7/28/2012	75 ft BGS	Upland	12.03	**3,388.4**
82-100	7/29/2012	100 ft BGS	Upland	12.03	**3,388.4**
PT-15A	11/10/2005	111 to 114 ft bml	Subtidal	12.02	**3,311.3**
D-4	5/26/2006	104.9 ft bgs	Upland	12.02	**3,311.3**
HW-1	1/24/2007	20 to 22 ft bml	Subtidal	12.02	**3,311.3**
MW-H-01	6/25/2013	152 to 154 ft BGS	Upland	12.00	**3,162.3**
ESI-2-5	11/15/2002	15 ft bgs	Upland	12.00	**3,162.3**
ESI-2-8	11/21/2002	25 ft bgs	Upland	12.00	**3,162.3**
ESI-2-31	1/27/2004	25 ft bgs	Upland	12.00	**3,162.3**
ESI-2-52	2/5/2004	25 ft bgs	Upland	12.00	**3,162.3**
ESI-2-53	2/6/2004	25 ft bgs	Upland	12.00	**3,162.3**
5106-11	10/13/2005	37 to 40 ft bml	Subtidal	12.00	**3,162.3**
EA-3	10/27/2005	70 to 73 ft bgs	Upland	11.99	**3,090.3**
SP-1	6/28/2006	88 to 91 ft bgs	Upland	11.99	**3,090.3**
CH-2	8/2/2006	48 to 52 ft bgs	Upland	11.99	**3,090.3**
SP-8	10/3/2006	114 to 118 ft bgs	Upland	11.99	**3,090.3**
PS2-GP3A	3/22/2007	25 to 26 ft bgs	Upland	11.99	**3,090.3**
PS2-GP3A	3/22/2007	28 to 29 ft bgs	Upland	11.99	**3,090.3**
T5-120	8/25/2012	120 ft BGS	Upland	11.99	**3,090.3**
6A-100	8/8/2012	100 ft BGS	Upland	11.97	**2,951.2**
1-100R	2/10/2004	100 ft bgs	Upland	11.96	**2,884.0**
SP-3	9/26/2006	108 to 112 ft bgs	Upland	11.96	**2,884.0**
EA-3	10/26/2005	55 to 58 ft bgs	Upland	11.95	**2,818.4**
15-120	5/1/2006	120 ft bgs	Upland	11.95	**2,818.4**
14-50R	5/6/2003	50 ft bgs	Upland	11.94	**2,754.2**
EA-3	10/25/2005	20 to 23 ft bgs	Upland	11.94	**2,754.2**
PS3-GP2A	7/5/2007	24 to 27 ft bgs	Upland	11.94	**2,754.2**
PS4-GP4A	12/12/2007	15 to 16 ft bgs	Upland	11.94	**2,754.2**
PS4-GP5A	12/12/2007	35 to 36 ft bgs	Upland	11.94	**2,754.2**
SB-B-DEEP	8/8/2013	142 to 144 ft BGS	Upland	11.93	**2,691.5**
EA-2	10/10/2005	25 to 28 ft bgs	Upland	11.93	**2,691.5**
PS4-GP5A	12/12/2007	45 to 46 ft bgs	Upland	11.92	**2,630.3**
82-230	6/16/2010	145 to 150 ft BGS	Upland	11.91	**2,570.4**
ESI-2-4	11/15/2002	50 ft bgs	Upland	11.90	**2,511.9**
ESI-2-21	11/22/2002	25 ft bgs	Upland	11.90	**2,511.9**
ESI-2-27	11/29/2002	25 ft bgs	Upland	11.90	**2,511.9**
ESI-2-37	1/28/2004	25 ft bgs	Upland	11.90	**2,511.9**
EA-2	10/17/2005	110 to 113 ft bgs	Upland	11.90	**2,511.9**
PS4-GP5A	12/12/2007	40 to 41 ft bgs	Upland	11.90	**2,511.9**
5106-3	9/20/2005	39 to 42 ft bml	Subtidal	11.89	**2,454.7**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
6A-50	8/8/2012	50 ft BGS	Upland	11.89	**2,454.7**
SB-B-DEEP	8/9/2013	172 to 174 ft BGS	Upland	11.88	**2,398.8**
15-120	5/11/2005	120 ft bgs	Upland	11.88	**2,398.8**
EA-2	10/14/2005	90 to 93 ft bgs	Upland	11.88	**2,398.8**
HYD-2	8/30/2005	78 to 81 ft bml	Subtidal	11.87	**2,344.2**
5106-3	9/20/2005	35 to 38 ft bml	Subtidal	11.87	**2,344.2**
SP-2	7/7/2006	18 to 21 ft bgs	Upland	11.87	**2,344.2**
PS2-GP3A	3/22/2007	34 to 35 ft bgs	Upland	11.86	**2,290.9**
PS2-GP5A	3/22/2007	33 to 35 ft bgs	Upland	11.86	**2,290.9**
EA-3	11/1/2005	110 to 113 ft bgs	Upland	11.85	**2,238.7**
EA-3	10/26/2005	50 to 53 ft bgs	Upland	11.83	**2,138.0**
4-115R	7/25/2006	115 ft bgs	Upland	11.83	**2,138.0**
82-150	7/7/2010	125 to 130 ft BGS	Upland	11.83	**2,138.0**
EA-3	11/2/2005	120 to 123 ft bgs	Upland	11.82	**2,089.3**
SP-5	8/1/2006	118 to 122 ft bgs	Upland	11.82	**2,089.3**
SP-2	9/12/2006	121 to 122 ft bgs	Upland	11.82	**2,089.3**
PS3-GP2A-1	6/28/2007	24 to 25 ft bgs	Upland	11.82	**2,089.3**
4-115R	4/19/2006	115 ft bgs	Upland	11.81	**2,041.7**
ESI-2-24	11/25/2002	25 ft bgs	Upland	11.80	**1,995.3**
59-50	11/26/2002	50 ft bgs	Upland	11.80	**1,995.3**
ESI-2-20	11/26/2002	25 ft bgs	Upland	11.80	**1,995.3**
ESI-3-11	12/11/2002	15 ft bgs	Upland	11.80	**1,995.3**
ESI-2-32	1/27/2004	25 ft bgs	Upland	11.80	**1,995.3**
ESI-2-43	1/27/2004	25 ft bgs	Upland	11.80	**1,995.3**
4-115R	2/9/2004	115 ft bgs	Upland	11.80	**1,995.3**
PS2-GP7A	3/22/2007	33 to 35 ft bgs	Upland	11.80	**1,995.3**
90C-100	7/23/2012	100 ft BGS	Upland	11.80	**1,995.3**
EA-2	10/18/2005	120 to 123 ft bgs	Upland	11.79	**1,949.8**
82-230	6/8/2010	30 to 35 ft BGS	Upland	11.79	**1,949.8**
15-120	8/19/2004	120 ft bgs	Upland	11.78	**1,905.5**
5106-8	8/3/2005	14 to 17 ft bml	Subtidal	11.78	**1,905.5**
SP-2	7/7/2006	23 to 26 ft bgs	Upland	11.78	**1,905.5**
65-50	8/12/2012	50 ft BGS	Upland	11.78	**1,905.5**
Dock2-8	8/22/2005	9 to 12 ft bml	Subtidal	11.77	**1,862.1**
PT-12A	10/24/2005	78.9 to 81.9 ft bml	Subtidal	11.77	**1,862.1**
CH-4	5/31/2006	9 to 13 ft bgs	Upland	11.77	**1,862.1**
SP-7	8/30/2006	117 to 121 ft bgs	Upland	11.77	**1,862.1**
5106-8	8/3/2005	19 to 22 ft bml	Subtidal	11.76	**1,819.7**
PT-13A	11/9/2005	61.9 to 64.9 ft bml	Subtidal	11.76	**1,819.7**
PT-13A	11/9/2005	71.9 to 74.9 ft bml	Subtidal	11.76	**1,819.7**
1-100R	11/7/2002	100 ft bgs	Upland	11.75	**1,778.3**
19-50R	2/4/2004	50 ft bgs	Upland	11.75	**1,778.3**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ (1)***
82-100	7/26/2010	90 to 95 ft BGS	Upland	11.75	**1,778.3**
T5-120	6/26/2013	120 ft BGS	Upland	11.74	**1,737.8**
T5-120	6/26/2013	120 ft BGS	Upland	11.74	**1,737.8**
1-100R	2/12/2003	100 ft bgs	Upland	11.74	**1,737.8**
EA-1	9/28/2005	96.5 to 99.5 ft bgs	Upland	11.74	**1,737.8**
5106-11	10/13/2005	32 to 35 ft bml	Subtidal	11.74	**1,737.8**
EA-2	10/18/2005	115 to 118 ft bgs	Upland	11.74	**1,737.8**
CH-1	7/20/2006	73 to 77 ft bgs	Upland	11.74	**1,737.8**
PS4-GP2A	12/14/2007	45 to 46 ft bgs	Upland	11.74	**1,737.8**
PT-12A	10/24/2005	88.9 to 91.9 ft bml	Subtidal	11.73	**1,698.2**
EA-3	11/1/2005	115 to 118 ft bgs	Upland	11.73	**1,698.2**
Pier25-18	12/9/2005	62 to 65 ft bml	Subtidal	11.73	**1,698.2**
1-100R	8/4/2002	100 ft bgs	Upland	11.72	**1,659.6**
Dock2-8	8/22/2005	14 to 17 ft bml	Subtidal	11.72	**1,659.6**
18-25	12/2/2008	25 ft bgs	Upland	11.71	**1,621.8**
1-100R	1/26/2002	100 ft bgs	Upland	11.70	**1,584.9**
ESI-2-17	11/18/2002	15 ft bgs	Upland	11.70	**1,584.9**
ESI-2-10	11/25/2002	25 ft bgs	Upland	11.70	**1,584.9**
ESI-2-22	11/26/2002	15 ft bgs	Upland	11.70	**1,584.9**
ESI-2-50	1/26/2004	15 ft bgs	Upland	11.70	**1,584.9**
ESI-2-37	1/28/2004	15 ft bgs	Upland	11.70	**1,584.9**
ESI-2-29	1/29/2004	25 ft bgs	Upland	11.70	**1,584.9**
ESI-2-51	2/5/2004	15 ft bgs	Upland	11.70	**1,584.9**
ESI-2-53	2/6/2004	50 ft bgs	Upland	11.70	**1,584.9**
EA-3	10/26/2005	60 to 63 ft bgs	Upland	11.70	**1,584.9**
PT-13A	11/10/2005	81.9 to 84.9 ft bml	Subtidal	11.70	**1,584.9**
SP-6	6/7/2006	88 to 91 ft bgs	Upland	11.70	**1,584.9**
PS3-GP5A	6/29/2007	21 to 24 ft bgs	Upland	11.70	**1,584.9**
PS4-GP2A	12/14/2007	40 to 41 ft bgs	Upland	11.70	**1,584.9**
Dock2-8	8/22/2005	19 to 22 ft bml	Subtidal	11.69	**1,548.8**
SP-5	6/13/2006	98 to 101 ft bgs	Upland	11.69	**1,548.8**
SP-1	6/26/2006	68 to 71 ft bgs	Upland	11.69	**1,548.8**
15-120	8/11/2006	120 ft bgs	Upland	11.69	**1,548.8**
MW-EXT-9-DEEP	7/16/2013	162 to 164 ft BGS	Upland	11.68	**1,513.6**
SB-B-DEEP	8/8/2013	152 to 154 ft BGS	Upland	11.68	**1,513.6**
EA-2	10/13/2005	85 to 88 ft bgs	Upland	11.68	**1,513.6**
PS2-GP7A	3/22/2007	22 to 23 ft bgs	Upland	11.68	**1,513.6**
NL-15	12/16/2005	9 to 12 ft bml	Intertidal	11.67	**1,479.1**
SP-6	6/7/2006	68 to 71 ft bgs	Upland	11.67	**1,479.1**
SP-2	7/11/2006	78 to 81 ft bgs	Upland	11.67	**1,479.1**
709-MW2-15	7/21/2012	15 ft BGS	Upland	11.67	**1,479.1**
1-100R	8/16/2003	100 ft bgs	Upland	11.66	**1,445.4**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
SP-6	8/23/2006	117 to 121 ft bgs	Upland	11.66	**1,445.4**
15-120	11/16/2004	120 ft bgs	Upland	11.65	**1,412.5**
5106-5	9/9/2005	14 to 17 ft bml	Subtidal	11.65	**1,412.5**
T5-120	8/11/2006	120 ft bgs	Upland	11.65	**1,412.5**
5106-1	9/27/2005	30 to 33 ft bml	Subtidal	11.64	**1,380.4**
19-50R	4/6/2006	50 ft bgs	Upland	11.64	**1,380.4**
PS4-GP2A	12/14/2007	50 to 51 ft bgs	Upland	11.64	**1,380.4**
5106-2	1/31/2006	54 to 57 ft bml	Subtidal	11.63	**1,349.0**
5106-2	1/30/2006	44 to 47 ft bml	Subtidal	11.62	**1,318.3**
SP-7	7/5/2006	58 to 61 ft bgs	Upland	11.62	**1,318.3**
Dock2-11	10/20/2005	12 to 15 ft bml	Subtidal	11.61	**1,288.2**
19-50R	1/23/2002	50 ft bgs	Upland	11.60	**1,258.9**
ESI-2-15	11/18/2002	50 ft bgs	Upland	11.60	**1,258.9**
ESI-1-5	12/4/2002	79 ft bgs	Upland	11.60	**1,258.9**
ESI-2-30	1/28/2004	25 ft bgs	Upland	11.60	**1,258.9**
ESI-2-53	2/6/2004	15 ft bgs	Upland	11.60	**1,258.9**
5106-9	11/1/2005	52 to 55 ft bml	Subtidal	11.59	**1,230.3**
Pier25-18	12/9/2005	72 to 75 ft bml	Subtidal	11.59	**1,230.3**
SP-6	6/7/2006	58 to 61 ft bgs	Upland	11.59	**1,230.3**
CH-4	7/25/2006	73 to 77 ft bgs	Upland	11.59	**1,230.3**
15-120	5/13/2003	120 ft bgs	Upland	11.58	**1,202.3**
5106-5	9/9/2005	34 to 37 ft bml	Subtidal	11.58	**1,202.3**
CH-3	5/30/2006	21 to 24 ft bgs	Upland	11.58	**1,202.3**
SP-3	9/26/2006	118 to 122 ft bgs	Upland	11.58	**1,202.3**
14-50R	2/8/2005	50 ft bgs	Upland	11.57	**1,174.9**
5106-2	1/30/2006	34 to 37 ft bml	Subtidal	11.57	**1,174.9**
EA-2	10/13/2005	80 to 83 ft bgs	Upland	11.56	**1,148.2**
PT-15B	12/21/2006	38 to 40 ft bml	Subtidal	11.56	**1,148.2**
69-25	4/11/2006	25 ft bgs	Upland	11.55	**1,122.0**
19-50R	7/10/2006	50 ft bgs	Upland	11.55	**1,122.0**
68-50	7/14/2004	50 ft bgs	Upland	11.54	**1,096.5**
NL-17	3/30/2006	3 to 6 ft bml	Intertidal	11.54	**1,096.5**
709-MW16-50	7/28/2012	50 ft BGS	Upland	11.54	**1,096.5**
18-50R	8/15/2012	50 ft BGS	Upland	11.54	**1,096.5**
5-50	12/2/2008	50 ft bgs	Upland	11.53	**1,071.5**
67-50	7/15/2004	50 ft bgs	Upland	11.51	**1,023.3**
EA-3	10/26/2005	45 to 48 ft bgs	Upland	11.51	**1,023.3**
21C-100	7/25/2012	100 ft BGS	Upland	11.51	**1,023.3**
ESI-1-4	11/12/2002	27 ft bgs	Upland	11.50	**1,000.0**
ESI-2-1	11/13/2002	33 ft bgs	Upland	11.50	**1,000.0**
ESI-2-5	11/15/2002	27 ft bgs	Upland	11.50	**1,000.0**
ESI-2-6	11/16/2002	25 ft bgs	Upland	11.50	**1,000.0**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
ESI-2-15	11/18/2002	75 ft bgs	Upland	11.50	**1,000.0**
ESI-2-17	11/19/2002	50 ft bgs	Upland	11.50	**1,000.0**
ESI-2-42	1/24/2004	25 ft bgs	Upland	11.50	**1,000.0**
ESI-2-45	1/24/2004	15 ft bgs	Upland	11.50	**1,000.0**
ESI-1-10	2/2/2004	25 ft bgs	Upland	11.50	**1,000.0**
ESI-2-51	2/5/2004	25 ft bgs	Upland	11.50	**1,000.0**
SP-7	7/6/2006	88 to 91 ft bgs	Upland	11.50	**1,000.0**
SP-1	9/6/2006	118 to 122 ft bgs	Upland	11.50	**1,000.0**
NL-15	12/16/2005	6 to 9 ft bml	Intertidal	11.49	**977.2**
SP-3	6/15/2006	43 to 46 ft bgs	Upland	11.49	**977.2**
SP-7	6/28/2006	23 to 26 ft bgs	Upland	11.49	**977.2**
69-50	7/11/2006	50 ft bgs	Upland	11.49	**977.2**
CH-3	7/27/2006	73 to 77 ft bgs	Upland	11.49	**977.2**
SP-3	9/27/2006	128 to 132 ft bgs	Upland	11.49	**977.2**
PS3-GP2A	7/5/2007	21 to 24 ft bgs	Upland	11.49	**977.2**
9-25	4/14/2006	25 ft bgs	Upland	11.48	**955.0**
BH-65	7/24/2006	23 to 26 ft bgs	Upland	11.48	**955.0**
PS2-002	3/21/2007	21 to 26 ft bgs	Upland	11.47	**933.3**
80-25	7/27/2012	25 ft BGS	Upland	11.47	**933.3**
19-50R	2/7/2003	50 ft bgs	Upland	11.46	**912.0**
19-50R	8/14/2003	50 ft bgs	Upland	11.45	**891.3**
EA-1	10/5/2005	131.5 to 134.5 ft bgs	Upland	11.45	**891.3**
5106-9	11/1/2005	57 to 60 ft bml	Subtidal	11.45	**891.3**
5106-8	8/4/2005	24 to 27 ft bml	Subtidal	11.44	**871.0**
5106-12	10/11/2005	22 to 25 ft bml	Subtidal	11.44	**871.0**
5106-2	1/31/2006	64 to 67 ft bml	Subtidal	11.44	**871.0**
Pier25-12	2/1/2006	80 to 83 ft bml	Subtidal	11.44	**871.0**
Pier25-13	2/2/2006	60 to 63 ft bml	Subtidal	11.44	**871.0**
T5-120	4/11/2006	120 ft bgs	Upland	11.44	**871.0**
2-50	1/27/2002	50 ft bgs	Upland	11.43	**851.1**
EA-1	10/4/2005	126.5 to 129.5 ft bgs	Upland	11.42	**831.8**
EA-2	10/19/2005	130 to 133 ft bgs	Upland	11.42	**831.8**
5106-10	11/3/2005	57 to 60 ft bml	Subtidal	11.42	**831.8**
SP-8	10/4/2006	124 to 128 ft bgs	Upland	11.42	**831.8**
PS3-GP2A-1	6/28/2007	19 to 20 ft bgs	Upland	11.42	**831.8**
WW-B1	3/13/2006	38.5 to 40.5 ft bml	Subtidal	11.41	**812.8**
2-50	4/24/2006	50 ft bgs	Upland	11.41	**812.8**
ESI-2-18	11/20/2002	15 ft bgs	Upland	11.40	**794.3**
ESI-2-11	11/27/2002	25 ft bgs	Upland	11.40	**794.3**
ESI-2-25	11/30/2002	25 ft bgs	Upland	11.40	**794.3**
ESI-3-10	12/10/2002	15 ft bgs	Upland	11.40	**794.3**
ESI-2-47	1/23/2004	25 ft bgs	Upland	11.40	**794.3**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
ESI-2-49	1/23/2004	24 ft bgs	Upland	11.40	**794.3**
15-120	2/3/2004	120 ft bgs	Upland	11.40	**794.3**
16-50	8/14/2004	50 ft bgs	Upland	11.40	**794.3**
PS4-GP2A	12/14/2007	35 to 36 ft bgs	Upland	11.40	**794.3**
19-50R	7/31/2002	50 ft bgs	Upland	11.39	**776.2**
EA-2	10/12/2005	60 to 63 ft bgs	Upland	11.39	**776.2**
PT-12A	10/24/2005	68.9 to 71.9 ft bml	Subtidal	11.39	**776.2**
SP-1	9/6/2006	128 to 132 ft bgs	Upland	11.39	**776.2**
75-50	8/9/2012	50 ft BGS	Upland	11.38	**758.6**
5106-2	1/31/2006	74 to 77 ft bml	Subtidal	11.37	**741.3**
15-120	5/13/2004	120 ft bgs	Upland	11.36	**724.4**
Pier25-17	11/17/2005	73.7 to 76.7 ft bml	Subtidal	11.36	**724.4**
SP-6	6/8/2006	98 to 101 ft bgs	Upland	11.36	**724.4**
9-25	7/15/2006	25 ft bgs	Upland	11.36	**724.4**
4-115R	8/20/2003	115 ft bgs	Upland	11.35	**707.9**
5106-8	8/4/2005	29 to 32 ft bml	Subtidal	11.35	**707.9**
5106-7	8/10/2005	21 to 24 ft bml	Subtidal	11.35	**707.9**
SP-2	7/11/2006	68 to 71 ft bgs	Upland	11.35	**707.9**
15-120	11/19/2003	120 ft bgs	Upland	11.34	**691.8**
16-50	2/4/2004	50 ft bgs	Upland	11.34	**691.8**
5106-9	11/1/2005	62 to 65 ft bml	Subtidal	11.34	**691.8**
16-50	4/4/2006	50 ft bgs	Upland	11.34	**691.8**
CH-4	7/25/2006	98 to 102 ft bgs	Upland	11.34	**691.8**
18-25	12/1/2011	25 ft BGS	Upland	11.34	**691.8**
18-25	8/13/2012	25 ft BGS	Upland	11.34	**691.8**
75-50	8/4/2006	50 ft bgs	Upland	11.33	**676.1**
MW-H-01	6/25/2013	162 to 164 ft BGS	Upland	11.32	**660.7**
Dock2-1	7/20/2005	4.5 to 7.5 ft bml	Subtidal	11.32	**660.7**
5106-8	8/4/2005	39 to 42 ft bml	Subtidal	11.32	**660.7**
EA-1	10/4/2005	121.5 to 124.5 ft bgs	Upland	11.32	**660.7**
5106-12	10/11/2005	7 to 10 ft bml	Subtidal	11.32	**660.7**
SP-3	6/19/2006	87 to 90 ft bgs	Upland	11.32	**660.7**
5106-8	8/4/2005	34 to 37 ft bml	Subtidal	11.31	**645.7**
22-50	4/13/2006	50 ft bgs	Upland	11.31	**645.7**
ESI-1-1	11/11/2002	25 ft bgs	Upland	11.30	**631.0**
ESI-2-44	1/23/2004	25 ft bgs	Upland	11.30	**631.0**
ESI-2-45	1/24/2004	25 ft bgs	Upland	11.30	**631.0**
ESI-2-32	1/27/2004	15 ft bgs	Upland	11.30	**631.0**
PS3-GP2A-1	6/28/2007	14 to 15 ft bgs	Upland	11.30	**631.0**
5106-10	11/3/2005	37 to 40 ft bml	Subtidal	11.29	**616.6**
22-50	11/7/2002	50 ft bgs	Upland	11.28	**602.6**
5-50	11/6/2002	50 ft bgs	Upland	11.27	**588.8**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
14-50R	11/12/2004	50 ft bgs	Upland	11.27	**588.8**
SP-5	6/12/2006	58 to 61 ft bgs	Upland	11.27	**588.8**
82-30	7/26/2010	29 to 34 ft BGS	Upland	11.27	**588.8**
75-50	4/14/2006	50 ft bgs	Upland	11.26	**575.4**
67-50	4/17/2006	50 ft bgs	Upland	11.26	**575.4**
SP-3	6/14/2006	18 to 21 ft bgs	Upland	11.26	**575.4**
5106-7	8/10/2005	6 to 9 ft bml	Subtidal	11.25	**562.3**
5106-7	8/10/2005	16 to 19 ft bml	Subtidal	11.25	**562.3**
PS3-GP4A	7/5/2007	21 to 24 ft bgs	Upland	11.25	**562.3**
709-MW8-15	8/9/2012	15 ft BGS	Upland	11.25	**562.3**
55-25	8/24/2012	25 ft BGS	Upland	11.25	**562.3**
15-120	5/6/2002	120 ft bgs	Upland	11.24	**549.5**
5-50	2/10/2005	50 ft bgs	Upland	11.24	**549.5**
5106-6	10/17/2005	23 to 26 ft bml	Subtidal	11.24	**549.5**
5106-10	11/3/2005	42 to 45 ft bml	Subtidal	11.24	**549.5**
5106-10	11/3/2005	52 to 55 ft bml	Subtidal	11.24	**549.5**
SP-7	7/5/2006	78 to 81 ft bgs	Upland	11.24	**549.5**
Dock2-1	7/20/2005	8 to 11 ft bml	Subtidal	11.23	**537.0**
EA-3	10/25/2005	25 to 28 ft bgs	Upland	11.23	**537.0**
EA-3	10/25/2005	30 to 33 ft bgs	Upland	11.23	**537.0**
NL-13	12/20/2005	9 to 12 ft bml	Intertidal	11.23	**537.0**
CH-2	8/3/2006	73 to 77 ft bgs	Upland	11.23	**537.0**
PS3-GP3A	6/29/2007	21 to 24 ft bgs	Upland	11.23	**537.0**
22-50	2/17/2004	50 ft bgs	Upland	11.22	**524.8**
EA-2	10/19/2005	125 to 128 ft bgs	Upland	11.22	**524.8**
4-115R	1/28/2002	115 ft bgs	Upland	11.21	**512.9**
ESI-1-1	11/11/2002	25 ft bgs	Upland	11.20	**501.2**
ESI-2-17	11/19/2002	25 ft bgs	Upland	11.20	**501.2**
ESI-2-16	11/20/2002	50 ft bgs	Upland	11.20	**501.2**
ESI-2-19	11/21/2002	25 ft bgs	Upland	11.20	**501.2**
ESI-2-36	1/29/2004	15 ft bgs	Upland	11.20	**501.2**
ESI-1-7	2/3/2004	50 ft bgs	Upland	11.20	**501.2**
ESI-2-52	2/5/2004	50 ft bgs	Upland	11.20	**501.2**
Dock2-11	10/19/2005	7 to 10 ft bml	Subtidal	11.20	**501.2**
15-120	8/20/2003	120 ft bgs	Upland	11.19	**489.8**
16-50	7/5/2004	50 ft bgs	Upland	11.18	**478.6**
69-50	7/14/2004	50 ft bgs	Upland	11.18	**478.6**
5-50	11/9/2004	50 ft bgs	Upland	11.18	**478.6**
HYD-4	9/22/2005	6 to 9 ft bml	Subtidal	11.18	**478.6**
EA-2	10/12/2005	55 to 58 ft bgs	Upland	11.18	**478.6**
SP-6	6/7/2006	78 to 81 ft bgs	Upland	11.18	**478.6**
WW-A1R	8/23/2012	75 to 75 ft BML	Subtidal	11.18	**478.6**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
Dock2-9	9/8/2005	9 to 12 ft bml	Subtidal	11.17	**467.7**
5-25	12/2/2008	25 ft bgs	Upland	11.17	**467.7**
5-25	8/8/2012	25 ft BGS	Upland	11.17	**467.7**
14-50R	8/17/2004	50 ft bgs	Upland	11.16	**457.1**
16-25	2/10/2005	25 ft bgs	Upland	11.16	**457.1**
SP-3	6/19/2006	78 to 81 ft bgs	Upland	11.16	**457.1**
SP-4	6/20/2006	23 to 26 ft bgs	Upland	11.16	**457.1**
PZ-SHI-2-75	8/25/2012	75 ft BGS	Intertidal	11.16	**457.1**
16-50	8/14/2003	50 ft bgs	Upland	11.15	**446.7**
SP-3	6/15/2006	48 to 51 ft bgs	Upland	11.15	**446.7**
55-25	12/5/2008	25 ft bgs	Upland	11.15	**446.7**
90C-75	7/23/2012	75 ft BGS	Upland	11.15	**446.7**
2-100	2/1/2003	100 ft bgs	Upland	11.14	**436.5**
16-25	11/9/2004	25 ft bgs	Upland	11.14	**436.5**
18-50R	2/10/2005	50 ft bgs	Upland	11.14	**436.5**
16-50	1/23/2002	50 ft bgs	Upland	11.13	**426.6**
SP-5	6/13/2006	88 to 91 ft bgs	Upland	11.13	**426.6**
PS4-GP3A	12/13/2007	10 to 11 ft bgs	Upland	11.13	**426.6**
4-115R	2/4/2003	115 ft bgs	Upland	11.12	**416.9**
EA-1	9/28/2005	91.5 to 94.5 ft bgs	Upland	11.12	**416.9**
5106-10	11/3/2005	32 to 35 ft bml	Subtidal	11.12	**416.9**
SP-4	6/22/2006	78 to 81 ft bgs	Upland	11.12	**416.9**
NTD-2	12/13/2006	43 to 45 ft bgs	Upland	11.12	**416.9**
83C-100	7/25/2012	100 ft BGS	Upland	11.12	**416.9**
4-115R	8/4/2002	115 ft bgs	Upland	11.11	**407.4**
5106-8	8/5/2005	49 to 52 ft bml	Subtidal	11.11	**407.4**
SP-5	6/2/2006	23 to 26 ft bgs	Upland	11.11	**407.4**
SP-3	6/15/2006	33 to 36 ft bgs	Upland	11.11	**407.4**
22-50	1/28/2002	50 ft bgs	Upland	11.10	**398.1**
ESI-2-16	11/19/2002	25 ft bgs	Upland	11.10	**398.1**
ESI-2-8	11/21/2002	15 ft bgs	Upland	11.10	**398.1**
5-50	5/12/2003	50 ft bgs	Upland	11.10	**398.1**
ESI-1-6	2/4/2004	83 ft bgs	Upland	11.10	**398.1**
ESI-2-52	2/5/2004	15 ft bgs	Upland	11.10	**398.1**
5106-8	8/5/2005	44 to 47 ft bml	Subtidal	11.10	**398.1**
5106-8	8/8/2005	74 to 77 ft bml	Subtidal	11.10	**398.1**
5106-8	8/5/2005	54 to 57 ft bml	Subtidal	11.09	**389.0**
5106-1	9/27/2005	25 to 28 ft bml	Subtidal	11.09	**389.0**
5-50	1/24/2002	50 ft bgs	Upland	11.07	**371.5**
15-120	2/12/2003	120 ft bgs	Upland	11.07	**371.5**
5106-8	8/8/2005	69 to 72 ft bml	Subtidal	11.07	**371.5**
68-50	4/11/2006	50 ft bgs	Upland	11.07	**371.5**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
9-25	8/8/2012	25 ft BGS	Upland	11.07	**371.5**
22-50	8/17/2012	50 ft BGS	Upland	11.07	**371.5**
WW-D1	5/1/2006	45 to 47 ft bml	Subtidal	11.06	**363.1**
5-50	7/10/2006	50 ft bgs	Upland	11.06	**363.1**
75-130	8/9/2012	130 ft BGS	Upland	11.06	**363.1**
65-50	7/10/2004	50 ft bgs	Upland	11.05	**354.8**
9-25	3/16/2004	25 ft bgs	Upland	11.03	**338.8**
NL-14	12/14/2005	4 to 7 ft bml	Subtidal	11.03	**338.8**
65-50	5/6/2009	50 ft bgs	Upland	11.03	**338.8**
9-25	12/1/2011	25 ft BGS	Upland	11.03	**338.8**
15-120	1/29/2002	120 ft bgs	Upland	11.02	**331.1**
16-50	2/7/2003	50 ft bgs	Upland	11.02	**331.1**
EA-2	10/12/2005	65 to 68 ft bgs	Upland	11.02	**331.1**
EA-2	10/12/2005	70 to 73 ft bgs	Upland	11.02	**331.1**
14-50R	7/11/2006	50 ft bgs	Upland	11.02	**331.1**
4-83R	2/1/2003	83 ft bgs	Upland	11.01	**323.6**
EA-2	10/11/2005	50 to 53 ft bgs	Upland	11.01	**323.6**
PT-13A	11/9/2005	11.8 to 14.8 ft bml	Subtidal	11.01	**323.6**
65-50	7/17/2006	50 ft bgs	Upland	11.01	**323.6**
75-50	7/26/2006	50 ft bgs	Upland	11.01	**323.6**
75-50	12/2/2008	50 ft bgs	Upland	11.01	**323.6**
ESI-2-4	11/14/2002	30 ft bgs	Upland	11.00	**316.2**
ESI-2-28	12/3/2002	25 ft bgs	Upland	11.00	**316.2**
ESI-2-42	1/24/2004	15 ft bgs	Upland	11.00	**316.2**
ESI-1-9	2/3/2004	50 ft bgs	Upland	11.00	**316.2**
5-50	5/10/2005	50 ft bgs	Upland	11.00	**316.2**
CH-3	5/30/2006	10 to 14 ft bgs	Upland	11.00	**316.2**
CH-1	7/20/2006	98 to 102 ft bgs	Upland	11.00	**316.2**
22-50	2/11/2003	50 ft bgs	Upland	10.99	**309.0**
18-50R	11/9/2004	50 ft bgs	Upland	10.99	**309.0**
18-50R	5/11/2005	50 ft bgs	Upland	10.99	**309.0**
17-50R	4/4/2006	50 ft bgs	Upland	10.99	**309.0**
16-25	5/10/2005	25 ft bgs	Upland	10.98	**302.0**
Pier25-13	2/3/2006	70 to 73 ft bml	Subtidal	10.98	**302.0**
PS3-GP2A-1	6/28/2007	27 to 28 ft bgs	Upland	10.98	**302.0**
5-50	12/5/2008	50 ft bgs	Upland	10.98	**302.0**
5-50	8/8/2012	50 ft BGS	Upland	10.98	**302.0**
53-100	2/1/2003	100 ft bgs	Upland	10.97	**295.1**
PS2-001	3/21/2007	21 to 26 ft bgs	Upland	10.97	**295.1**
16-50	7/31/2002	50 ft bgs	Upland	10.96	**288.4**
5-50	2/5/2004	50 ft bgs	Upland	10.96	**288.4**
5-50	8/16/2004	50 ft bgs	Upland	10.96	**288.4**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
14-50R	8/13/2012	50 ft BGS	Upland	10.95	**281.8**
18-50R	11/6/2002	50 ft bgs	Upland	10.94	**275.4**
2-100	2/10/2004	100 ft bgs	Upland	10.94	**275.4**
14-50R	2/10/2004	50 ft bgs	Upland	10.94	**275.4**
EA-1	9/23/2005	46.5 to 49.5 ft bgs	Upland	10.94	**275.4**
HYD-1	9/1/2005	74 to 77 ft bml	Subtidal	10.93	**269.2**
EA-1	9/27/2005	76.5 to 79.5 ft bgs	Upland	10.93	**269.2**
SP-3	6/15/2006	58 to 61 ft bgs	Upland	10.93	**269.2**
5-25	7/10/2006	25 ft bgs	Upland	10.92	**263.0**
55-25	7/17/2006	25 ft bgs	Upland	10.92	**263.0**
NL-24	1/15/2007	6.5 to 9.5 ft bml	Subtidal	10.92	**263.0**
5-50	8/14/2003	50 ft bgs	Upland	10.91	**257.0**
PT-15A	11/9/2005	56 to 57 ft bml	Subtidal	10.91	**257.0**
NL-17	3/31/2006	9 to 12 ft bml	Intertidal	10.91	**257.0**
16-25	5/12/2003	25 ft bgs	Upland	10.89	**245.5**
14-50R	6/1/2004	50 ft bgs	Upland	10.89	**245.5**
EA-2	10/11/2005	45 to 48 ft bgs	Upland	10.89	**245.5**
14-50R	4/19/2006	50 ft bgs	Upland	10.89	**245.5**
20-50	7/24/2013	50 ft BGS	Upland	10.88	**239.9**
Pier25-13	2/2/2006	50 to 53 ft bml	Subtidal	10.88	**239.9**
5-25	5/10/2005	25 ft bgs	Upland	10.87	**234.4**
5106-9	11/1/2005	47 to 50 ft bml	Subtidal	10.87	**234.4**
16-25	1/23/2002	25 ft bgs	Upland	10.86	**229.1**
4-83R	8/1/2006	83 ft bgs	Upland	10.86	**229.1**
PS3-GP2A	7/5/2007	17 to 20 ft bgs	Upland	10.86	**229.1**
5-50	4/30/2002	50 ft bgs	Upland	10.85	**223.9**
5106-9	11/1/2005	67 to 70 ft bml	Subtidal	10.85	**223.9**
SP-4	9/20/2006	108 to 112 ft bgs	Upland	10.85	**223.9**
5-50	7/31/2002	50 ft bgs	Upland	10.84	**218.8**
5-50	2/7/2003	50 ft bgs	Upland	10.84	**218.8**
18-50R	2/4/2004	50 ft bgs	Upland	10.84	**218.8**
14-50R	5/12/2004	50 ft bgs	Upland	10.84	**218.8**
5106-10	11/3/2005	47 to 50 ft bml	Subtidal	10.84	**218.8**
5-25	4/7/2006	25 ft bgs	Upland	10.84	**218.8**
SP-3	6/15/2006	68 to 71 ft bgs	Upland	10.84	**218.8**
5-50	5/11/2004	50 ft bgs	Upland	10.83	**213.8**
16-25	8/14/2004	25 ft bgs	Upland	10.83	**213.8**
16-25	11/6/2002	25 ft bgs	Upland	10.82	**208.9**
4-83R	2/9/2004	83 ft bgs	Upland	10.82	**208.9**
5-25	2/17/2005	25 ft bgs	Upland	10.82	**208.9**
Dock2-9	9/8/2005	14 to 17 ft bml	Subtidal	10.82	**208.9**
PS2-003	3/21/2007	21 to 26 ft bgs	Upland	10.82	**208.9**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ [(1)]***
22-50	8/16/2003	50 ft bgs	Upland	10.81	**204.2**
53-100	2/12/2004	100 ft bgs	Upland	10.81	**204.2**
NL-13	12/20/2005	12 to 15 ft bml	Intertidal	10.81	**204.2**
SP-7	6/29/2006	43 to 46 ft bgs	Upland	10.81	**204.2**
2-100	7/17/2006	100 ft bgs	Upland	10.81	**204.2**
SP-3	9/27/2006	148 to 152 ft bgs	Upland	10.81	**204.2**
ESI-1-4	11/12/2002	50 ft bgs	Upland	10.80	**199.5**
ESI-2-16	11/20/2002	71 ft bgs	Upland	10.80	**199.5**
ESI-3-8	12/10/2002	15 ft bgs	Upland	10.80	**199.5**
ESI-2-40	1/22/2004	25 ft bgs	Upland	10.80	**199.5**
ESI-2-41	1/22/2004	27 ft bgs	Upland	10.80	**199.5**
17-50R	2/3/2004	50 ft bgs	Upland	10.80	**199.5**
17-50R	6/1/2004	50 ft bgs	Upland	10.80	**199.5**
SP-7	6/29/2006	33 to 36 ft bgs	Upland	10.80	**199.5**
5106-13	11/29/2005	52 to 55 ft bml	Subtidal	10.79	**195.0**
NL-17	3/31/2006	18 to 21 ft bml	Intertidal	10.79	**195.0**
17-50R	7/5/2004	50 ft bgs	Upland	10.78	**190.5**
59-50	4/12/2006	50 ft bgs	Upland	10.78	**190.5**
721-MW5-25	8/25/2012	25 ft BGS	Upland	10.77	**186.2**
18-50	5/12/2003	50 ft bgs	Upland	10.76	**182.0**
5106-2	1/30/2006	24 to 27 ft bml	Subtidal	10.76	**182.0**
4-83R	4/4/2006	83 ft bgs	Upland	10.76	**182.0**
SP-7	6/30/2006	48 to 51 ft bgs	Upland	10.76	**182.0**
16-25	2/4/2004	25 ft bgs	Upland	10.75	**177.8**
EA-2	10/11/2005	40 to 43 ft bgs	Upland	10.75	**177.8**
SP-8	10/4/2006	134 to 138 ft bgs	Upland	10.75	**177.8**
69-50	4/11/2006	50 ft bgs	Upland	10.74	**173.8**
SP-2	7/7/2006	33 to 36 ft bgs	Upland	10.74	**173.8**
67-50	7/26/2012	50 ft BGS	Upland	10.73	**169.8**
4-45R	4/18/2006	45 ft bgs	Upland	10.72	**166.0**
ESI-2-2	11/14/2002	50 ft bgs	Upland	10.70	**158.5**
ESI-2-15	11/18/2002	15 ft bgs	Upland	10.70	**158.5**
ESI-4-2	12/13/2002	15 ft bgs	Upland	10.70	**158.5**
16-25	8/14/2003	25 ft bgs	Upland	10.70	**158.5**
PS3-GP3A	6/29/2007	17 to 20 ft bgs	Upland	10.70	**158.5**
14-50R	5/4/2002	50 ft bgs	Upland	10.69	**154.9**
18-25	2/1/2003	25 ft bgs	Upland	10.69	**154.9**
NL-17	3/31/2006	6 to 9 ft bml	Intertidal	10.69	**154.9**
PS3-GP4A	7/5/2007	17 to 20 ft bgs	Upland	10.69	**154.9**
50-15	8/11/2012	15 ft BGS	Upland	10.69	**154.9**
53-100	8/19/2003	100 ft bgs	Upland	10.68	**151.4**
16-25	5/13/2004	25 ft bgs	Upland	10.67	**147.9**

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SUMMARY OF SCREENING OF pH IN GROUNDWATER
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TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
16-25	11/19/2003	25 ft bgs	Upland	10.66	**144.5**
5106-10	11/3/2005	62 to 65 ft bml	Subtidal	10.66	**144.5**
53-100	2/5/2003	100 ft bgs	Upland	10.65	**141.3**
WW-B1	3/13/2006	13.5 to 15.5 ft bml	Subtidal	10.65	**141.3**
16-25	7/5/2004	25 ft bgs	Upland	10.64	**138.0**
14-50R	5/11/2005	50 ft bgs	Upland	10.64	**138.0**
75-100	8/9/2012	100 ft BGS	Upland	10.64	**138.0**
60-50	8/15/2012	50 ft BGS	Upland	10.64	**138.0**
5106-12	10/11/2005	32 to 35 ft bml	Subtidal	10.63	**134.9**
NL-13	12/20/2005	6 to 9 ft bml	Intertidal	10.63	**134.9**
22-50	8/4/2002	50 ft bgs	Upland	10.62	**131.8**
14-50R	8/13/2002	50 ft bgs	Upland	10.62	**131.8**
HYD-7	9/1/2005	30 to 33 ft bml	Subtidal	10.62	**131.8**
PT-15B	12/21/2006	28 to 30 ft bml	Subtidal	10.62	**131.8**
16-25	2/7/2003	25 ft bgs	Upland	10.61	**128.8**
18-50R	2/7/2003	50 ft bgs	Upland	10.61	**128.8**
ESI-1-5	12/4/2002	15 ft bgs	Upland	10.60	**125.9**
ESI-4-3	12/16/2002	15 ft bgs	Upland	10.60	**125.9**
ESI-2-51	2/5/2004	50 ft bgs	Upland	10.60	**125.9**
18-50R	8/14/2004	50 ft bgs	Upland	10.60	**125.9**
PS4-GP5A	12/12/2007	10 to 11 ft bgs	Upland	10.60	**125.9**
14-50R	2/4/2003	50 ft bgs	Upland	10.59	**123.0**
14-50R	11/19/2003	50 ft bgs	Upland	10.59	**123.0**
SP-1	6/23/2006	9 to 12 ft bgs	Upland	10.59	**123.0**
23-25R	8/17/2012	25 ft BGS	Upland	10.57	**117.5**
EA-1	9/22/2005	24.5 to 27.5 ft bgs	Upland	10.56	**114.8**
55-25	4/17/2006	25 ft bgs	Upland	10.56	**114.8**
SB-B-DEEP	8/8/2013	132 to 134 ft BGS	Upland	10.55	**112.2**
Dock2-11	10/20/2005	17 to 20 ft bml	Subtidal	10.55	**112.2**
EA-3	11/3/2005	135 to 138 ft bgs	Upland	10.55	**112.2**
2-100	1/26/2002	100 ft bgs	Upland	10.54	**109.6**
EA-3	10/25/2005	35 to 38 ft bgs	Upland	10.54	**109.6**
EA-3	10/25/2005	40 to 43 ft bgs	Upland	10.54	**109.6**
Pier25-12	2/1/2006	70 to 73 ft bml	Subtidal	10.54	**109.6**
83C-160	7/25/2012	160 ft BGS	Upland	10.54	**109.6**
94C-130	9/24/2013	130 ft BGS	Upland	10.53	**107.2**
15-50R	5/6/2003	50 ft bgs	Upland	10.53	**107.2**
EA-2	10/13/2005	75 to 78 ft bgs	Upland	10.53	**107.2**
PT-15A	11/9/2005	66 to 67 ft bml	Subtidal	10.53	**107.2**
PT-15A	11/10/2005	66 to 67 ft bml	Subtidal	10.53	**107.2**
SP-7	7/5/2006	68 to 71 ft bgs	Upland	10.53	**107.2**
53-100	8/7/2002	100 ft bgs	Upland	10.52	**104.7**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
14-50R	11/7/2002	50 ft bgs	Upland	10.52	**104.7**
5-25	5/12/2003	25 ft bgs	Upland	10.52	**104.7**
17-50R	2/1/2003	50 ft bgs	Upland	10.51	**102.3**
ESI-1-1	11/11/2002	50 ft bgs	Upland	10.50	**100.0**
ESI-2-48	1/21/2004	50 ft bgs	Upland	10.50	**100.0**
18-50R	5/13/2004	50 ft bgs	Upland	10.49	**97.7**
5106-11	10/13/2005	42 to 45 ft bml	Subtidal	10.49	**97.7**
18-50R	1/23/2002	50 ft bgs	Upland	10.48	**95.5**
5106-3	9/19/2005	19 to 22 ft bml	Subtidal	10.48	**95.5**
14-50R	8/15/2003	50 ft bgs	Upland	10.47	**93.3**
4-83R	8/20/2003	83 ft bgs	Upland	10.47	**93.3**
5-50	11/13/2003	50 ft bgs	Upland	10.47	**93.3**
5106-3	9/19/2005	14 to 17 ft bml	Subtidal	10.47	**93.3**
18-50R	11/14/2003	50 ft bgs	Upland	10.46	**91.2**
65-25	4/10/2006	25 ft bgs	Upland	10.46	**91.2**
SP-3	6/14/2006	23 to 26 ft bgs	Upland	10.46	**91.2**
5-25	11/9/2004	25 ft bgs	Upland	10.45	**89.1**
EA-1	9/23/2005	51.5 to 54.5 ft bgs	Upland	10.45	**89.1**
65-50	4/10/2006	50 ft bgs	Upland	10.45	**89.1**
PZ-SHI-2-75	4/28/2006	54.5 to 59.5 ft bml	Intertidal	10.45	**89.1**
5106-7	8/10/2005	31 to 34 ft bml	Subtidal	10.44	**87.1**
5106-5	9/9/2005	4 to 7 ft bml	Subtidal	10.43	**85.1**
SP-5	6/5/2006	33 to 36 ft bgs	Upland	10.42	**83.2**
14-50R	1/29/2002	50 ft bgs	Upland	10.41	**81.3**
59-50	5/6/2003	50 ft bgs	Upland	10.41	**81.3**
NL-14	12/15/2005	16 to 19 ft bml	Subtidal	10.41	**81.3**
ESI-1-1	11/12/2002	50 ft bgs	Upland	10.40	**79.4**
59-50	8/19/2003	50 ft bgs	Upland	10.40	**79.4**
ESI-2-38	1/21/2004	25 ft bgs	Upland	10.40	**79.4**
ESI-2-29	1/29/2004	50 ft bgs	Upland	10.40	**79.4**
ESI-1-9	2/3/2004	25 ft bgs	Upland	10.40	**79.4**
5106-1	9/27/2005	35 to 38 ft bml	Subtidal	10.40	**79.4**
4-83R	2/4/2003	83 ft bgs	Upland	10.39	**77.6**
5106-12	10/11/2005	27 to 30 ft bml	Subtidal	10.39	**77.6**
65-25	8/2/2006	25 ft bgs	Upland	10.39	**77.6**
17-50R	1/23/2002	50 ft bgs	Upland	10.37	**74.1**
16-25	7/31/2002	25 ft bgs	Upland	10.37	**74.1**
18-50R	8/14/2003	50 ft bgs	Upland	10.36	**72.4**
5106-5	9/9/2005	29 to 32 ft bml	Subtidal	10.36	**72.4**
PS3-GP4A	7/5/2007	13 to 16 ft bgs	Upland	10.36	**72.4**
4-83R	1/28/2002	83 ft bgs	Upland	10.34	**69.2**
16-25	4/30/2002	25 ft bgs	Upland	10.34	**69.2**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* $^{(1)}$
Dock2-8	8/22/2005	24 to 27 ft bml	Subtidal	10.34	**69.2**
17C-50	8/6/2012	50 ft BGS	Upland	10.34	**69.2**
16-25	4/4/2006	25 ft bgs	Upland	10.33	**67.6**
18-25	1/23/2002	25 ft bgs	Upland	10.32	**66.1**
5-25	5/11/2004	25 ft bgs	Upland	10.32	**66.1**
5106-6	10/18/2005	33 to 36 ft bml	Subtidal	10.32	**66.1**
53-100	1/27/2002	100 ft bgs	Upland	10.31	**64.6**
ESI-2-26	11/29/2002	25 ft bgs	Upland	10.30	**63.1**
SP-7	8/30/2006	127 to 131 ft bgs	Upland	10.30	**63.1**
4-83R	8/4/2002	83 ft bgs	Upland	10.29	**61.7**
5-25	2/5/2004	25 ft bgs	Upland	10.29	**61.7**
19-25	2/9/2005	25 ft bgs	Upland	10.29	**61.7**
5-25	2/7/2003	25 ft bgs	Upland	10.28	**60.3**
SP-2	7/10/2006	43 to 46 ft bgs	Upland	10.28	**60.3**
5-50	4/6/2006	50 ft bgs	Upland	10.27	**58.9**
SP-1	6/23/2006	34 to 37 ft bgs	Upland	10.27	**58.9**
5-25	11/6/2002	25 ft bgs	Upland	10.26	**57.5**
6A-24.5	4/20/2006	24.5 ft bgs	Upland	10.26	**57.5**
NTD-2	12/14/2006	73 to 75 ft bgs	Upland	10.26	**57.5**
Dock2-8	8/20/2005	4 to 7 ft bml	Subtidal	10.25	**56.2**
5-25	8/16/2004	25 ft bgs	Upland	10.24	**55.0**
HYD-5	10/5/2005	54 to 57 ft bml	Subtidal	10.24	**55.0**
HYD-1	9/1/2005	84 to 87 ft bml	Subtidal	10.23	**53.7**
4-83R	11/9/2002	83 ft bgs	Upland	10.22	**52.5**
Dock2-9	9/8/2005	19 to 22 ft bml	Subtidal	10.22	**52.5**
NL-15	12/16/2005	3 to 6 ft bml	Intertidal	10.22	**52.5**
SP-1	6/23/2006	23 to 26 ft bgs	Upland	10.21	**51.3**
MW-H-01	9/27/2013	181.2 ft BGS	Upland	10.20	**50.1**
59-25	11/26/2002	25 ft bgs	Upland	10.20	**50.1**
ESI-3-7	12/9/2002	15 ft bgs	Upland	10.20	**50.1**
5106-7	8/10/2005	26 to 29 ft bml	Subtidal	10.20	**50.1**
5106-5	9/9/2005	9 to 12 ft bml	Subtidal	10.19	**49.0**
HYD-6	10/3/2005	72.3 to 75.3 ft bml	Subtidal	10.19	**49.0**
5106-13	11/29/2005	57 to 60 ft bml	Subtidal	10.19	**49.0**
PZ-SHI-3-42	7/8/2006	14.5 to 15.5 ft bml	Subtidal	10.19	**49.0**
5-25	1/24/2002	25 ft bgs	Upland	10.17	**46.8**
18-50R	8/1/2002	50 ft bgs	Upland	10.17	**46.8**
60-50	5/1/2006	50 ft bgs	Upland	10.16	**45.7**
23-25R	4/10/2006	25 ft bgs	Upland	10.14	**43.7**
SP-2	9/13/2006	138 to 142 ft bgs	Upland	10.14	**43.7**
HYD-3	8/17/2005	111 to 114 ft bml	Subtidal	10.13	**42.7**
91C-160	7/18/2012	160 ft BGS	Upland	10.11	**40.7**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
60-50	11/26/2002	50 ft bgs	Upland	10.10	**39.8**
ESI-1-6	2/4/2004	25 ft bgs	Upland	10.10	**39.8**
PZ-SHI-3-42	4/27/2006	14.5 to 15.5 ft bml	Subtidal	10.10	**39.8**
5-25	8/14/2003	25 ft bgs	Upland	10.09	**38.9**
NL-23	8/14/2006	15 to 18 ft bml	Subtidal	10.09	**38.9**
5106-5	9/9/2005	44 to 47 ft bml	Subtidal	10.08	**38.0**
SP-8	10/4/2006	144 to 148 ft bgs	Upland	10.08	**38.0**
5106-11	10/13/2005	27 to 30 ft bml	Subtidal	10.07	**37.2**
5106-3	9/20/2005	59 to 62 ft bml	Subtidal	10.06	**36.3**
75-130	7/26/2006	130 ft bgs	Upland	10.06	**36.3**
Pier25-12	2/1/2006	60 to 63 ft bml	Subtidal	10.05	**35.5**
5106-15	11/15/2005	22 to 25 ft bml	Subtidal	10.04	**34.7**
NL-14	12/14/2005	10 to 13 ft bml	Subtidal	10.04	**34.7**
HYD-2	8/30/2005	88 to 91 ft bml	Subtidal	10.02	**33.1**
4-45R	7/31/2006	45 ft bgs	Upland	10.02	**33.1**
4-45R	2/1/2003	45 ft bgs	Upland	10.01	**32.4**
721-GP6	6/28/2004	15 ft bgs	Upland	10.01	**32.4**
Dock2-1	7/20/2005	13 to 16 ft bml	Subtidal	10.01	**32.4**
SP-5	6/2/2006	18 to 21 ft bgs	Upland	10.01	**32.4**
721-MW9-25	7/22/2012	25 ft BGS	Upland	10.01	**32.4**
18-50R	4/30/2002	50 ft bgs	Upland	10.00	**31.6**
ESI-1-3	11/13/2002	50 ft bgs	Upland	10.00	**31.6**
ESI-2-2	11/14/2002	15 ft bgs	Upland	10.00	**31.6**
NL-15	12/19/2005	27 to 30 ft bml	Intertidal	10.00	**31.6**
5106-11	10/13/2005	47 to 50 ft bml	Subtidal	9.98	**30.2**
5-25	4/30/2002	25 ft bgs	Upland	9.97	**29.5**
Dock2-11	10/20/2005	27 to 30 ft bml	Subtidal	9.97	**29.5**
5106-14	12/2/2005	47 to 50 ft bml	Subtidal	9.97	**29.5**
75-130	8/4/2006	130 ft bgs	Upland	9.94	**27.5**
NTD-1	1/10/2007	23 to 25 ft bgs	Upland	9.94	**27.5**
8-23	12/2/2008	23 ft bgs	Upland	9.94	**27.5**
15-25R	2/9/2005	25 ft bgs	Upland	9.93	**26.9**
5106-3	9/19/2005	9 to 12 ft bml	Subtidal	9.93	**26.9**
NL-13	12/20/2005	3 to 6 ft bml	Intertidal	9.93	**26.9**
NL-15	12/16/2005	12 to 15 ft bml	Intertidal	9.92	**26.3**
WW-D1	5/15/2006	75 to 77 ft bml	Subtidal	9.92	**26.3**
5-25	7/31/2002	25 ft bgs	Upland	9.91	**25.7**
NL-23	8/15/2006	18 to 21 ft bml	Subtidal	9.91	**25.7**
ESI-2-41	1/22/2004	15 ft bgs	Upland	9.90	**25.1**
PZ-SHI-2-75	7/14/2006	54.5 to 59.5 ft bml	Intertidal	9.90	**25.1**
91C-130	7/18/2012	130 ft BGS	Upland	9.90	**25.1**
HYD-5	10/5/2005	64 to 67 ft bml	Subtidal	9.89	**24.5**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
Pier25-25	1/20/2006	50 to 52 ft bml	Subtidal	9.89	**24.5**
65-25	7/18/2004	25 ft bgs	Upland	9.88	**24.0**
15-50R	2/9/2005	50 ft bgs	Upland	9.88	**24.0**
5106-1	9/28/2005	80 to 83 ft bml	Subtidal	9.88	**24.0**
HYD-5	10/4/2005	14 to 17 ft bml	Subtidal	9.88	**24.0**
HYD-5	10/5/2005	44 to 47 ft bml	Subtidal	9.88	**24.0**
5106-12	10/11/2005	17 to 20 ft bml	Subtidal	9.88	**24.0**
5-25	11/13/2003	25 ft bgs	Upland	9.87	**23.4**
8-23	5/19/2005	23 ft bgs	Upland	9.87	**23.4**
EA-1	9/26/2005	66.5 to 69.5 ft bgs	Upland	9.86	**22.9**
5106-9	11/1/2005	72 to 75 ft bml	Subtidal	9.86	**22.9**
5106-10	11/3/2005	27 to 30 ft bml	Subtidal	9.86	**22.9**
CH-1	7/20/2006	23 to 27 ft bgs	Upland	9.86	**22.9**
SP-2	9/12/2006	108 to 112 ft bgs	Upland	9.86	**22.9**
NTD-1	1/10/2007	43 to 45 ft bgs	Upland	9.86	**22.9**
53C-50	7/24/2012	50 ft BGS	Upland	9.86	**22.9**
23-50	2/18/2005	50 ft bgs	Upland	9.85	**22.4**
75-130	4/14/2006	130 ft bgs	Upland	9.85	**22.4**
25-25	12/5/2008	25 ft bgs	Upland	9.85	**22.4**
90C-50	7/23/2012	50 ft BGS	Upland	9.85	**22.4**
12-160	2/8/2005	160 ft bgs	Upland	9.84	**21.9**
721-GP8	6/24/2004	15 ft bgs	Upland	9.83	**21.4**
5106-3	9/19/2005	4 to 7 ft bml	Subtidal	9.83	**21.4**
HYD-6	10/4/2005	82.3 to 85.3 ft bml	Subtidal	9.82	**20.9**
NL-14	12/15/2005	25 to 28 ft bml	Subtidal	9.82	**20.9**
CH-2	8/2/2006	23 to 27 ft bgs	Upland	9.82	**20.9**
ESI-2-1	11/13/2002	25 ft bgs	Upland	9.80	**20.0**
ESI-2-11	11/27/2002	50 ft bgs	Upland	9.80	**20.0**
5106-3	9/21/2005	89 to 92 ft bml	Subtidal	9.80	**20.0**
SP-1	6/26/2006	58 to 61 ft bgs	Upland	9.80	**20.0**
709-MW7-15	3/10/2004	15 ft bgs	Upland	9.79	**19.5**
15-50R	8/13/2012	50 ft BGS	Upland	9.79	**19.5**
5106-14	12/1/2005	27 to 30 ft bml	Subtidal	9.78	**19.1**
CH-1	6/1/2006	7 to 10 ft bgs	Upland	9.78	**19.1**
SP-2	7/10/2006	48 to 51 ft bgs	Upland	9.78	**19.1**
5106-5	9/9/2005	19 to 22 ft bml	Subtidal	9.77	**18.6**
PS4-GP1A	12/11/2007	10 to 11 ft bgs	Upland	9.77	**18.6**
5106-3	9/21/2005	74 to 77 ft bml	Subtidal	9.75	**17.8**
5106-1	9/28/2005	75 to 78 ft bml	Subtidal	9.75	**17.8**
41-138	2/16/2005	138 ft bgs	Upland	9.74	**17.4**
Dock2-8	8/22/2005	34 to 37 ft bml	Subtidal	9.74	**17.4**
PS4-GP4A	12/12/2007	10 to 11 ft bgs	Upland	9.74	**17.4**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
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TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ (1)***
NL-17	3/31/2006	12 to 15 ft bml	Intertidal	9.73	**17.0**
2-100	4/24/2006	100 ft bgs	Upland	9.73	**17.0**
9-50	8/7/2012	50 ft BGS	Upland	9.73	**17.0**
12-100	12/4/2008	100 ft bgs	Upland	9.72	**16.6**
HYD-6	10/4/2005	102.3 to 105.3 ft bml	Subtidal	9.71	**16.2**
9-50	4/14/2006	50 ft bgs	Upland	9.71	**16.2**
PZ-SHI-1-126	4/27/2006	96 to 101 ft bml	Subtidal	9.71	**16.2**
SP-4	6/21/2006	48 to 51 ft bgs	Upland	9.71	**16.2**
ESI-2-25	12/3/2002	25 ft bgs	Upland	9.70	**15.8**
ESI-1-5	12/4/2002	50 ft bgs	Upland	9.70	**15.8**
ESI-2-54	2/6/2004	10 ft bgs	Upland	9.70	**15.8**
HYD-7	9/1/2005	40 to 43 ft bml	Subtidal	9.70	**15.8**
EA-1	9/23/2005	41.5 to 44.5 ft bgs	Upland	9.69	**15.5**
HYD-5	10/5/2005	24 to 27 ft bml	Subtidal	9.69	**15.5**
5106-13	11/29/2005	67 to 70 ft bml	Subtidal	9.69	**15.5**
15-50R	7/11/2006	50 ft bgs	Upland	9.69	**15.5**
8-23	2/5/2003	23 ft bgs	Upland	9.68	**15.1**
8-23	2/17/2004	23 ft bgs	Upland	9.68	**15.1**
HYD-6	10/3/2005	62.3 to 65.3 ft bml	Subtidal	9.67	**14.8**
5106-14	12/2/2005	52 to 55 ft bml	Subtidal	9.67	**14.8**
SP-2	7/10/2006	58 to 61 ft bgs	Upland	9.67	**14.8**
4-45R	2/4/2003	45 ft bgs	Upland	9.66	**14.5**
5106-3	9/19/2005	25 to 28 ft bml	Subtidal	9.66	**14.5**
Dock2-5	8/1/2005	12 to 15 ft bml	Subtidal	9.65	**14.1**
Dock2-8	8/22/2005	44 to 47 ft bml	Subtidal	9.65	**14.1**
23-50	5/17/2005	50 ft bgs	Upland	9.64	**13.8**
Dock2-8	8/22/2005	39 to 42 ft bml	Subtidal	9.64	**13.8**
SP-6	6/6/2006	33 to 36 ft bgs	Upland	9.64	**13.8**
15-50R	11/7/2002	50 ft bgs	Upland	9.63	**13.5**
3-50	4/22/2006	50 ft bgs	Upland	9.63	**13.5**
SP-6	6/6/2006	48 to 51 ft bgs	Upland	9.63	**13.5**
709-MW1-15	3/9/2004	15 ft bgs	Upland	9.62	**13.2**
5106-14	12/2/2005	57 to 60 ft bml	Subtidal	9.62	**13.2**
83C-75	7/25/2012	75 ft BGS	Upland	9.62	**13.2**
T6-60	8/24/2012	60 ft BGS	Upland	9.61	**12.9**
ESI-2-24	11/25/2002	15 ft bgs	Upland	9.60	**12.6**
ESI-3-11	12/11/2002	25 ft bgs	Upland	9.60	**12.6**
ESI-2-39	1/22/2004	25 ft bgs	Upland	9.60	**12.6**
23-50	11/12/2004	50 ft bgs	Upland	9.60	**12.6**
5106-7	8/10/2005	11 to 14 ft bml	Subtidal	9.59	**12.3**
T6-25	4/12/2006	25 ft bgs	Upland	9.59	**12.3**
8-23	2/16/2005	23 ft bgs	Upland	9.58	**12.0**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
NL-14	12/14/2005	7 to 10 ft bml	Subtidal	9.58	**12.0**
60-50	5/6/2003	50 ft bgs	Upland	9.57	**11.7**
30-15	3/17/2004	15 ft bgs	Upland	9.57	**11.7**
5106-6	10/18/2005	28 to 31 ft bml	Subtidal	9.57	**11.7**
21-48	5/1/2006	48 ft bgs	Upland	9.57	**11.7**
SP-7	6/28/2006	8 to 11 ft bgs	Upland	9.57	**11.7**
4-45R	8/20/2003	45 ft bgs	Upland	9.56	**11.5**
EA-1	9/22/2005	36.5 to 39.5 ft bgs	Upland	9.56	**11.5**
5106-1	9/29/2005	110 to 113 ft bml	Subtidal	9.56	**11.5**
Dock2-11	10/20/2005	22 to 25 ft bml	Subtidal	9.56	**11.5**
5106-10	11/4/2005	67 to 70 ft bml	Subtidal	9.56	**11.5**
PT-15B	12/20/2006	13 to 15 ft bml	Subtidal	9.56	**11.5**
19-25	12/5/2008	25 ft bgs	Upland	9.56	**11.5**
C-7	8/14/2003	68.5 ft bgs	Upland	9.55	**11.2**
35-50	7/19/2006	50 ft bgs	Upland	9.55	**11.2**
5106-6	10/18/2005	43 to 46 ft bml	Subtidal	9.54	**11.0**
SP-4	6/21/2006	43 to 46 ft bgs	Upland	9.54	**11.0**
90C-160	7/23/2012	160 ft BGS	Upland	9.54	**11.0**
WW-B1	3/12/2006	11 to 13 ft bml	Subtidal	9.53	**10.7**
Dock2-9	9/8/2005	4 to 7 ft bml	Subtidal	9.52	**10.5**
Pier25-17	11/17/2005	63.7 to 66.7 ft bml	Subtidal	9.52	**10.5**
87C-50	7/24/2012	50 ft BGS	Upland	9.52	**10.5**
8-23	5/11/2004	23 ft bgs	Upland	9.51	**10.2**
35-50	5/12/2004	50 ft bgs	Upland	9.51	**10.2**
ESI-2-1	11/13/2002	15 ft bgs	Upland	9.50	**10.0**
ESI-2-24	11/25/2002	50 ft bgs	Upland	9.50	**10.0**
ESI-3-7	12/9/2002	30 ft bgs	Upland	9.50	**10.0**
91C-50	7/18/2012	50 ft BGS	Upland	9.50	**10.0**
23-25R	1/23/2002	25 ft bgs	Upland	9.49	**9.8**
15-50R	5/12/2005	50 ft bgs	Upland	9.49	**9.8**
5106-5	9/9/2005	39 to 42 ft bml	Subtidal	9.49	**9.8**
5106-11	10/13/2005	22 to 25 ft bml	Subtidal	9.49	**9.8**
91C-100	7/18/2012	100 ft BGS	Upland	9.49	**9.8**
8-23	11/6/2002	23 ft bgs	Upland	9.48	**9.5**
4-45R	2/9/2004	45 ft bgs	Upland	9.47	**9.3**
5106-13	11/29/2005	77 to 80 ft bml	Subtidal	9.47	**9.3**
46C-25	8/22/2012	25 ft BGS	Upland	9.47	**9.3**
709-MW2-15	3/9/2004	14 ft bgs	Upland	9.46	**9.1**
HYD-6	10/4/2005	112.3 to 115.3 ft bml	Subtidal	9.46	**9.1**
PS3-GP3A-1	6/29/2007	15 to 18 ft bgs	Upland	9.46	**9.1**
709-MW6-15	8/9/2012	15 ft BGS	Upland	9.46	**9.1**
HYD-4	9/26/2005	86 to 89 ft bml	Subtidal	9.45	**8.9**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** [(1)]
NL-23	8/11/2006	6 to 9 ft bml	Subtidal	9.45	**8.9**
5106-6	10/19/2005	78 to 81 ft bml	Subtidal	9.44	**8.7**
721-MW7-15	8/9/2012	15 ft BGS	Upland	9.44	**8.7**
721-GP5	6/23/2004	25 ft bgs	Upland	9.43	**8.5**
41-138	8/18/2004	138 ft bgs	Upland	9.43	**8.5**
23-50	8/20/2004	50 ft bgs	Upland	9.43	**8.5**
PT-13A	11/9/2005	21.8 to 24.8 ft bml	Subtidal	9.43	**8.5**
PS3-GP2A	7/5/2007	13 to 16 ft bgs	Upland	9.43	**8.5**
21C-160	7/25/2012	160 ft BGS	Upland	9.43	**8.5**
21-48	11/7/2002	48 ft bgs	Upland	9.42	**8.3**
21-48	2/17/2004	48 ft bgs	Upland	9.42	**8.3**
5106-1	9/29/2005	95 to 98 ft bml	Subtidal	9.42	**8.3**
PZ-SHI-3-75	7/8/2006	44.5 to 49.5 ft bml	Subtidal	9.42	**8.3**
15-25R	7/11/2006	25 ft bgs	Upland	9.42	**8.3**
6A-100	7/16/2006	100 ft bgs	Upland	9.42	**8.3**
WMUA-15	8/7/2006	14.5 to 15.5 ft bgs	Upland	9.42	**8.3**
90C-75	9/25/2013	75 ft BGS	Upland	9.41	**8.1**
MW-H-01	6/27/2013	182 to 184 ft BGS	Upland	9.41	**8.1**
15-25R	8/17/2004	25 ft bgs	Upland	9.41	**8.1**
5106-2	1/31/2006	84 to 87 ft bml	Subtidal	9.41	**8.1**
9-50	7/15/2006	50 ft bgs	Upland	9.41	**8.1**
53C-75	7/24/2012	75 ft BGS	Upland	9.41	**8.1**
ESI-4-7	12/13/2002	15 ft bgs	Upland	9.40	**7.9**
ESI-2-48	1/21/2004	25 ft bgs	Upland	9.40	**7.9**
ESI-1-10	2/2/2004	48 ft bgs	Upland	9.40	**7.9**
ESI-2-54	2/6/2004	25 ft bgs	Upland	9.40	**7.9**
35-50	8/18/2004	50 ft bgs	Upland	9.40	**7.9**
EA-3	11/4/2005	145 to 148 ft bgs	Upland	9.40	**7.9**
NL-14	12/15/2005	22 to 25 ft bml	Subtidal	9.40	**7.9**
EA-1	9/27/2005	81.5 to 84.5 ft bgs	Upland	9.39	**7.8**
5106-13	11/29/2005	82 to 85 ft bml	Subtidal	9.39	**7.8**
5106-20	1/5/2006	53.5 to 56.5 ft bml	Subtidal	9.39	**7.8**
Dock2-8	8/22/2005	69 to 72 ft bml	Subtidal	9.38	**7.6**
19-25	7/10/2006	25 ft bgs	Upland	9.38	**7.6**
6A-24.5	7/16/2006	24.5 ft bgs	Upland	9.38	**7.6**
MW-H-01	6/26/2013	172 to 174 ft BGS	Upland	9.37	**7.4**
65-15	7/18/2004	15 ft bgs	Upland	9.37	**7.4**
PT-13A	11/10/2005	91.9 to 94.9 ft bml	Subtidal	9.37	**7.4**
15-25R	4/11/2006	25 ft bgs	Upland	9.37	**7.4**
SP-1	9/7/2006	138 to 142 ft bgs	Upland	9.37	**7.4**
53C-25	7/24/2012	25 ft BGS	Upland	9.37	**7.4**
5106-11	10/13/2005	17 to 20 ft bml	Subtidal	9.36	**7.2**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
5106-13	11/29/2005	47 to 50 ft bml	Subtidal	9.36	**7.2**
NL-24	1/15/2007	11.5 to 14.5 ft bml	Subtidal	9.36	**7.2**
8-23	11/12/2004	23 ft bgs	Upland	9.35	**7.1**
721-MW9-25	4/20/2006	25 ft bgs	Upland	9.35	**7.1**
PZ-SHI-3-75	4/27/2006	44.5 to 49.5 ft bml	Subtidal	9.35	**7.1**
721-MW9-25	7/24/2006	25 ft bgs	Upland	9.35	**7.1**
NL-23	8/14/2006	9 to 12 ft bml	Subtidal	9.35	**7.1**
12-160	8/24/2012	160 ft BGS	Upland	9.35	**7.1**
50-15	3/16/2004	15 ft bgs	Upland	9.34	**6.9**
15-25R	5/12/2005	25 ft bgs	Upland	9.34	**6.9**
HYD-1	9/1/2005	94 to 97 ft bml	Subtidal	9.34	**6.9**
2-25	4/17/2006	25 ft bgs	Upland	9.34	**6.9**
SP-4	9/21/2006	148 to 152 ft bgs	Upland	9.34	**6.9**
PT-15B	12/20/2006	18 to 20 ft bml	Subtidal	9.34	**6.9**
15-25R	11/7/2002	25 ft bgs	Upland	9.33	**6.8**
75-100	7/26/2006	100 ft bgs	Upland	9.33	**6.8**
28-15	3/23/2004	15 ft bgs	Upland	9.32	**6.6**
76-100	12/5/2008	100 ft bgs	Upland	9.32	**6.6**
23-50	2/7/2003	50 ft bgs	Upland	9.31	**6.5**
19-25	2/4/2004	25 ft bgs	Upland	9.31	**6.5**
15-50R	8/17/2004	50 ft bgs	Upland	9.31	**6.5**
15-25R	11/12/2004	25 ft bgs	Upland	9.31	**6.5**
Dock2-8	8/22/2005	29 to 32 ft bml	Subtidal	9.31	**6.5**
HYD-5	10/5/2005	34 to 37 ft bml	Subtidal	9.31	**6.5**
NL-14	12/14/2005	13 to 16 ft bml	Subtidal	9.31	**6.5**
6A-100	4/21/2006	100 ft bgs	Upland	9.31	**6.5**
25A-50	5/1/2006	50 ft bgs	Upland	9.31	**6.5**
ESI-2-6	11/16/2002	15 ft bgs	Upland	9.30	**6.3**
ESI-3-13	12/11/2002	15 ft bgs	Upland	9.30	**6.3**
23-50	5/12/2003	50 ft bgs	Upland	9.30	**6.3**
15-50R	2/3/2004	50 ft bgs	Upland	9.30	**6.3**
17C-130	8/6/2012	130 ft BGS	Upland	9.30	**6.3**
5106-14	12/2/2005	42 to 45 ft bml	Subtidal	9.29	**6.2**
721-GP5	6/23/2004	15 ft bgs	Upland	9.28	**6.0**
NL-14	12/15/2005	19 to 22 ft bml	Subtidal	9.28	**6.0**
5106-2	1/31/2006	94 to 97 ft bml	Subtidal	9.28	**6.0**
38-55	5/2/2006	55 ft bgs	Upland	9.28	**6.0**
8-23	7/15/2006	23 ft bgs	Upland	9.28	**6.0**
3-50	7/27/2006	50 ft bgs	Upland	9.28	**6.0**
45-50	8/10/2012	50 ft BGS	Upland	9.28	**6.0**
Dock2-3	7/22/2005	8 to 11 ft bml	Subtidal	9.27	**5.9**
5106-7	8/10/2005	36 to 39 ft bml	Subtidal	9.27	**5.9**

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SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* $^{(1)}$
5106-5	9/9/2005	24 to 27 ft bml	Subtidal	9.27	**5.9**
5106-1	9/28/2005	85 to 88 ft bml	Subtidal	9.27	**5.9**
14-25R	8/13/2012	25 ft BGS	Upland	9.27	**5.9**
35-50	5/7/2003	50 ft bgs	Upland	9.26	**5.8**
34-50	2/7/2004	50 ft bgs	Upland	9.26	**5.8**
41-138	2/13/2004	138 ft bgs	Upland	9.26	**5.8**
51-15	3/17/2004	15 ft bgs	Upland	9.26	**5.8**
15-50R	11/12/2004	50 ft bgs	Upland	9.26	**5.8**
35-50	5/18/2005	50 ft bgs	Upland	9.26	**5.8**
Pier25-13	2/3/2006	80 to 83 ft bml	Subtidal	9.26	**5.8**
C-7	5/24/2006	68.5 ft bgs	Upland	9.26	**5.8**
4-45R	1/28/2002	45 ft bgs	Upland	9.25	**5.6**
45-50	7/13/2006	50 ft bgs	Upland	9.25	**5.6**
67-25	7/27/2010	25 ft BGS	Upland	9.25	**5.6**
86C-50	7/24/2012	50 ft BGS	Upland	9.25	**5.6**
709-MW18-25	7/26/2012	25 ft BGS	Upland	9.25	**5.6**
709-MW18-50	7/26/2012	50 ft BGS	Upland	9.25	**5.6**
23-50	2/4/2004	50 ft bgs	Upland	9.24	**5.5**
4-45R	11/11/2002	45 ft bgs	Upland	9.23	**5.4**
23-50	5/12/2004	50 ft bgs	Upland	9.23	**5.4**
5106-5	9/9/2005	54 to 57 ft bml	Subtidal	9.23	**5.4**
5106-1	9/29/2005	90 to 93 ft bml	Subtidal	9.23	**5.4**
HW-4	1/23/2007	20 to 22 ft bml	Subtidal	9.23	**5.4**
WW-C3	4/5/2006	48 to 51 ft bgs	Upland	9.22	**5.2**
15-50R	4/11/2006	50 ft bgs	Upland	9.22	**5.2**
8-99R	11/6/2002	99 ft bgs	Upland	9.21	**5.1**
19-25	8/14/2003	25 ft bgs	Upland	9.21	**5.1**
15-25R	5/12/2004	25 ft bgs	Upland	9.21	**5.1**
8-99R	11/12/2004	99 ft bgs	Upland	9.21	**5.1**
T6-60	4/12/2006	60 ft bgs	Upland	9.21	**5.1**
94C-100	7/24/2012	100 ft BGS	Upland	9.21	**5.1**
ESI-2-23	11/24/2002	15 ft bgs	Upland	9.20	**5.0**
ESI-2-12	11/27/2002	15 ft bgs	Upland	9.20	**5.0**
ESI-4-4	12/15/2002	15 ft bgs	Upland	9.20	**5.0**
ESI-4-1	12/16/2002	15 ft bgs	Upland	9.20	**5.0**
ESI-2-40	1/22/2004	50 ft bgs	Upland	9.20	**5.0**
8-54	5/18/2005	54 ft bgs	Upland	9.20	**5.0**
WMUL-01	6/7/2012	15 to 15 ft BGS	Upland	9.20	**5.0**
15-25R	2/3/2004	25 ft bgs	Upland	9.19	**4.9**
15-25R	5/6/2003	25 ft bgs	Upland	9.19	**4.9**
SP-2	9/13/2006	148 to 152 ft bgs	Upland	9.19	**4.9**
19-25	2/1/2003	25 ft bgs	Upland	9.18	**4.8**

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SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
12-160	5/11/2005	160 ft bgs	Upland	9.18	**4.8**
EA-1	9/27/2005	71.5 to 74.5 ft bgs	Upland	9.18	**4.8**
21-48	7/11/2006	48 ft bgs	Upland	9.18	**4.8**
23-50	1/23/2002	50 ft bgs	Upland	9.17	**4.7**
5106-12	10/12/2005	92 to 95 ft bml	Subtidal	9.17	**4.7**
15-50R	8/13/2002	50 ft bgs	Upland	9.15	**4.5**
5106-1	9/30/2005	115 to 118 ft bml	Subtidal	9.15	**4.5**
5106-13	11/29/2005	72 to 75 ft bml	Subtidal	9.15	**4.5**
PZ-SHI-3-75	8/25/2012	75 ft BGS	Subtidal	9.15	**4.5**
85C-160	8/5/2013	160 ft BGS	Upland	9.14	**4.4**
15-25R	8/16/2003	25 ft bgs	Upland	9.14	**4.4**
8-23	11/17/2003	23 ft bgs	Upland	9.14	**4.4**
65-130	8/12/2012	130 ft BGS	Upland	9.14	**4.4**
WW-A1R	8/24/2012	85 to 85 ft BML	Subtidal	9.14	**4.4**
15-25R	2/4/2003	25 ft bgs	Upland	9.13	**4.3**
5106-3	9/21/2005	84 to 87 ft bml	Subtidal	9.13	**4.3**
5106-13	11/29/2005	87 to 90 ft bml	Subtidal	9.13	**4.3**
NL-23	8/15/2006	21 to 24 ft bml	Subtidal	9.13	**4.3**
25-50	2/17/2005	50 ft bgs	Upland	9.12	**4.2**
15-50R	5/12/2004	50 ft bgs	Upland	9.11	**4.1**
ESI-2-25	11/30/2002	50 ft bgs	Upland	9.10	**4.0**
ESI-2-28	12/4/2002	50 ft bgs	Upland	9.10	**4.0**
46-50	2/1/2003	50 ft bgs	Upland	9.10	**4.0**
25-50	8/17/2003	50 ft bgs	Upland	9.10	**4.0**
34-50	8/18/2003	50 ft bgs	Upland	9.10	**4.0**
5106-5	9/9/2005	49 to 52 ft bml	Subtidal	9.10	**4.0**
CH-2	6/1/2006	7 to 10 ft bgs	Upland	9.10	**4.0**
PZ-SHI-1-75	7/20/2006	41 to 46 ft bml	Subtidal	9.10	**4.0**
90C-25	7/23/2012	25 ft BGS	Upland	9.10	**4.0**
21-48	8/16/2003	48 ft bgs	Upland	9.09	**3.9**
HYD-6	10/4/2005	92.3 to 95.3 ft bml	Subtidal	9.09	**3.9**
NL-23	8/15/2006	24 to 27 ft bml	Subtidal	9.09	**3.9**
C-9	2/1/2003	68.5 ft bgs	Upland	9.08	**3.8**
5106-5	9/10/2005	59 to 61 ft bml	Subtidal	9.08	**3.8**
25A-50	7/19/2006	50 ft bgs	Upland	9.08	**3.8**
WMUA-19	8/3/2006	18.5 to 19.5 ft bgs	Upland	9.08	**3.8**
36-50	12/5/2008	50 ft bgs	Upland	9.08	**3.8**
91C-75	7/18/2012	75 ft BGS	Upland	9.08	**3.8**
5106-10	11/3/2005	17 to 20 ft bml	Subtidal	9.07	**3.7**
SP-5	6/12/2006	68 to 71 ft bgs	Upland	9.07	**3.7**
61C-160	7/17/2012	160 ft BGS	Upland	9.07	**3.7**
8-23	8/11/2012	23 ft BGS	Upland	9.07	**3.7**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
60-50	8/19/2003	50 ft bgs	Upland	9.06	**3.6**
5106-23	2/13/2006	72 to 75 ft bml	Intertidal	9.06	**3.6**
21-48	2/11/2003	48 ft bgs	Upland	9.05	**3.5**
6A-24.5	3/23/2004	24.5 ft bgs	Upland	9.05	**3.5**
66-25	7/10/2004	25 ft bgs	Upland	9.05	**3.5**
19-25	8/13/2004	25 ft bgs	Upland	9.05	**3.5**
8-54	11/12/2004	54 ft bgs	Upland	9.05	**3.5**
NL-14	12/15/2005	28 to 31 ft bml	Subtidal	9.05	**3.5**
WW-B1	3/12/2006	6 to 8 ft bml	Subtidal	9.05	**3.5**
9-50	3/16/2004	50 ft bgs	Upland	9.04	**3.5**
PT-15A	11/14/2005	151 to 154 ft bml	Subtidal	9.04	**3.5**
T6-120	4/12/2006	120 ft bgs	Upland	9.04	**3.5**
WMUA-11	8/2/2006	17.5 to 18.5 ft bgs	Upland	9.04	**3.5**
T5-60	11/8/2002	60 ft bgs	Upland	9.03	**3.4**
8-54	8/19/2004	54 ft bgs	Upland	9.03	**3.4**
5106-23	2/14/2006	92 to 95 ft bml	Intertidal	9.03	**3.4**
34-50	7/12/2006	50 ft bgs	Upland	9.03	**3.4**
NTD-1	1/11/2007	73 to 75 ft bgs	Upland	9.03	**3.4**
34-50	1/22/2002	50 ft bgs	Upland	9.02	**3.3**
23-50	7/31/2002	50 ft bgs	Upland	9.02	**3.3**
4-45R	8/4/2002	45 ft bgs	Upland	9.02	**3.3**
11-183	8/14/2003	183 ft bgs	Upland	9.01	**3.2**
5106-16	11/14/2005	21 to 24 ft bml	Subtidal	9.01	**3.2**
14-25R	7/11/2006	25 ft bgs	Upland	9.01	**3.2**
42-50	8/10/2012	50 ft BGS	Upland	9.01	**3.2**
ESI-1-3	11/12/2002	15 ft bgs	Upland	9.00	**3.2**
ESI-2-26	11/30/2002	50 ft bgs	Upland	9.00	**3.2**
ESI-2-40	1/22/2004	15 ft bgs	Upland	9.00	**3.2**
11-183	2/12/2004	183 ft bgs	Upland	9.00	**3.2**
8-99R	8/19/2004	99 ft bgs	Upland	9.00	**3.2**
35-50	2/18/2005	50 ft bgs	Upland	9.00	**3.2**
721-MW5-25	4/20/2006	25 ft bgs	Upland	9.00	**3.2**
WW-A3	5/9/2006	127 to 132 ft bgs	Upland	9.00	**3.2**
36-50	7/20/2006	50 ft bgs	Upland	9.00	**3.2**
2-25	2/1/2003	25 ft bgs	Upland	8.99	**3.1**
23-50	11/14/2003	50 ft bgs	Upland	8.99	**3.1**
WW-B1	3/13/2006	68.5 to 70.5 ft bml	Subtidal	8.99	**3.1**
T5-25	4/27/2006	25 ft bgs	Upland	8.99	**3.1**
PZ-SHI-1-126	8/15/2006	96 to 101 ft bml	Subtidal	8.99	**3.1**
NL-28	1/17/2007	16.5 to 19.5 ft bml	Intertidal	8.99	**3.1**
89C-50	8/22/2012	50 ft BGS	Upland	8.99	**3.1**
15-50R	2/4/2003	50 ft bgs	Upland	8.98	**3.0**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** (1)
41-138	8/15/2003	138 ft bgs	Upland	8.98	**3.0**
36-50	2/9/2005	50 ft bgs	Upland	8.98	**3.0**
5106-1	9/27/2005	20 to 23 ft bml	Subtidal	8.98	**3.0**
C-8	5/24/2006	68.5 ft bgs	Upland	8.98	**3.0**
721-MW13-50	7/31/2012	50 ft BGS	Upland	8.98	**3.0**
36-50	8/1/2012	50 ft BGS	Upland	8.98	**3.0**
709-MW15-15	8/15/2012	15 ft bgs	Upland	8.98	**3.0**
15-25R	8/13/2002	25 ft bgs	Upland	8.97	**3.0**
25-50	2/10/2003	50 ft bgs	Upland	8.97	**3.0**
15-50R	11/19/2003	50 ft bgs	Upland	8.97	**3.0**
5106-8	8/8/2005	79 to 82 ft bml	Subtidal	8.97	**3.0**
5106-14	12/1/2005	37 to 40 ft bml	Subtidal	8.97	**3.0**
SP-4	6/21/2006	68 to 71 ft bgs	Upland	8.97	**3.0**
SP-3	9/28/2006	158 to 162 ft bgs	Upland	8.97	**3.0**
12-100	8/24/2012	100 ft BGS	Upland	8.97	**3.0**
5106-19	1/14/2006	30.5 to 33.5 ft bml	Subtidal	8.96	**2.9**
WW-B2	4/18/2006	76 to 78 ft bml	Subtidal	8.96	**2.9**
Pier25-31	5/10/2006	39 to 43 ft bgs	Upland	8.96	**2.9**
PS3-GP3A-1	6/29/2007	13 to 16 ft bgs	Upland	8.96	**2.9**
7-25	12/3/2008	25 ft bgs	Upland	8.96	**2.9**
23-50	11/6/2002	50 ft bgs	Upland	8.95	**2.8**
41-138	2/11/2003	138 ft bgs	Upland	8.95	**2.8**
45-50	2/11/2004	50 ft bgs	Upland	8.95	**2.8**
8-54	2/17/2005	54 ft bgs	Upland	8.95	**2.8**
74-50	12/10/2013	50 ft BGS	Upland	8.94	**2.8**
19-25	2/7/2003	25 ft bgs	Upland	8.94	**2.8**
23-50	8/14/2003	50 ft bgs	Upland	8.94	**2.8**
721-MW9-25	7/20/2004	25 ft bgs	Upland	8.94	**2.8**
5106-10	11/4/2005	77 to 80 ft bml	Subtidal	8.94	**2.8**
45-50	4/18/2006	50 ft bgs	Upland	8.94	**2.8**
91C-25	7/18/2012	25 ft BGS	Upland	8.94	**2.8**
21C-130	7/25/2012	130 ft BGS	Upland	8.94	**2.8**
709-MW19-15	7/28/2012	15 ft bgs	Upland	8.94	**2.8**
721-GP9	6/24/2004	15 ft bgs	Upland	8.93	**2.7**
8-99R	2/16/2005	99 ft bgs	Upland	8.93	**2.7**
5106-7	8/11/2005	41 to 44 ft bml	Subtidal	8.93	**2.7**
SP-8	7/14/2006	48 to 51 ft bgs	Upland	8.93	**2.7**
C-9	8/8/2002	68.5 ft bgs	Upland	8.92	**2.6**
32-100	2/12/2003	100 ft bgs	Upland	8.92	**2.6**
PT-15A	11/14/2005	141 to 144 ft bml	Subtidal	8.92	**2.6**
Pier25-16	11/22/2005	64.4 to 67.4 ft bml	Subtidal	8.92	**2.6**
6A-50	4/21/2006	50 ft bgs	Upland	8.92	**2.6**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
CH-1	7/21/2006	123 to 126 ft bgs	Upland	8.92	**2.6**
T5-25	11/8/2002	25 ft bgs	Upland	8.91	**2.6**
8-99R	5/19/2005	99 ft bgs	Upland	8.91	**2.6**
Dock2-1	7/20/2005	18 to 21 ft bml	Subtidal	8.91	**2.6**
Dock2-9	9/8/2005	24 to 27 ft bml	Subtidal	8.91	**2.6**
65-25	7/27/2010	25 ft BGS	Upland	8.91	**2.6**
85C-25	7/20/2012	25 ft BGS	Upland	8.91	**2.6**
8-99R	1/29/2002	99 ft bgs	Upland	8.90	**2.5**
23-50	4/30/2002	50 ft bgs	Upland	8.90	**2.5**
15-50R	5/4/2002	50 ft bgs	Upland	8.90	**2.5**
60-25	11/26/2002	25 ft bgs	Upland	8.90	**2.5**
ESI-2-28	12/3/2002	50 ft bgs	Upland	8.90	**2.5**
ESI-3-3	12/9/2002	25 ft bgs	Upland	8.90	**2.5**
ESI-4-6	12/13/2002	15 ft bgs	Upland	8.90	**2.5**
ESI-1-8	2/4/2004	50 ft bgs	Upland	8.90	**2.5**
25-50	11/13/2004	50 ft bgs	Upland	8.90	**2.5**
5106-14	12/3/2005	87 to 90 ft bml	Subtidal	8.90	**2.5**
Pier25-22	1/18/2006	90.1 to 93.1 ft bml	Subtidal	8.90	**2.5**
WW-A1	3/17/2006	75.2 to 77.2 ft bml	Subtidal	8.90	**2.5**
41-138	8/7/2002	138 ft bgs	Upland	8.89	**2.5**
12-160	11/15/2004	160 ft bgs	Upland	8.89	**2.5**
Dock2-10	9/12/2005	7.6 to 10.6 ft bml	Subtidal	8.89	**2.5**
PZ-SHI-1-75	4/27/2006	41 to 46 ft bml	Subtidal	8.89	**2.5**
6A-50	7/16/2006	50 ft bgs	Upland	8.89	**2.5**
8-23	5/6/2003	23 ft bgs	Upland	8.88	**2.4**
15-50R	8/16/2003	50 ft bgs	Upland	8.88	**2.4**
Pier25-18	12/9/2005	92 to 95 ft bml	Subtidal	8.88	**2.4**
12A-25	5/1/2006	25 ft bgs	Upland	8.88	**2.4**
SP-4	6/20/2006	33 to 36 ft bgs	Upland	8.88	**2.4**
25-50	2/14/2004	50 ft bgs	Upland	8.87	**2.3**
25-50	8/20/2004	50 ft bgs	Upland	8.87	**2.3**
HYD-4	9/26/2005	96 to 99 ft bml	Subtidal	8.87	**2.3**
5106-10	11/4/2005	87 to 90 ft bml	Subtidal	8.87	**2.3**
T5-60	4/11/2006	60 ft bgs	Upland	8.87	**2.3**
SP-3	9/27/2006	138 to 142 ft bgs	Upland	8.87	**2.3**
75-100	8/4/2006	100 ft bgs	Upland	8.86	**2.3**
NL-28	1/17/2007	11.5 to 14.5 ft bml	Intertidal	8.86	**2.3**
8-23	8/19/2003	23 ft bgs	Upland	8.85	**2.2**
8-99R	2/17/2004	99 ft bgs	Upland	8.85	**2.2**
Pier25-15	11/30/2005	49 to 52 ft bml	Subtidal	8.85	**2.2**
5106-21	1/10/2006	75.5 to 78.5 ft bml	Subtidal	8.85	**2.2**
94C-160	7/24/2012	160 ft BGS	Upland	8.85	**2.2**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
21C-25	7/25/2012	25 ft BGS	Upland	8.85	**2.2**
12-160	8/16/2004	160 ft bgs	Upland	8.84	**2.2**
35-25	2/18/2005	25 ft bgs	Upland	8.84	**2.2**
PT-13A	11/10/2005	121.9 to 124.9 ft bml	Subtidal	8.84	**2.2**
Pier25-21	1/4/2006	60.5 to 63.5 ft bml	Subtidal	8.84	**2.2**
Pier25-29	2/7/2006	72 to 75 ft bml	Subtidal	8.84	**2.2**
5106-25	4/18/2006	79 to 83 ft bml	Intertidal	8.84	**2.2**
14-25R	4/19/2006	25 ft bgs	Upland	8.84	**2.2**
75-130	3/30/2010	130 ft bgs	Upland	8.84	**2.2**
709-MW6-50	8/9/2012	50 ft BGS	Upland	8.84	**2.2**
Pier25-27	1/19/2006	60.5 to 63.5 ft bml	Subtidal	8.83	**2.1**
Pier25-25	1/20/2006	80 to 83 ft bml	Subtidal	8.83	**2.1**
74-50	4/14/2006	50 ft bgs	Upland	8.83	**2.1**
11-25	12/10/2013	25 ft BGS	Upland	8.82	**2.1**
25-50	5/7/2003	50 ft bgs	Upland	8.82	**2.1**
12-160	5/11/2004	160 ft bgs	Upland	8.82	**2.1**
721-MW7-15	7/19/2004	15 ft bgs	Upland	8.82	**2.1**
8-54	7/15/2006	54 ft bgs	Upland	8.82	**2.1**
WMUA-13	8/3/2006	15 to 16 ft bgs	Upland	8.82	**2.1**
8-23	8/6/2002	23 ft bgs	Upland	8.81	**2.0**
25-50	5/18/2005	50 ft bgs	Upland	8.81	**2.0**
SP-5	6/9/2006	43 to 46 ft bgs	Upland	8.81	**2.0**
NL-25	1/18/2007	11.5 to 14.5 ft bml	Subtidal	8.81	**2.0**
75-100	3/30/2010	100 ft bgs	Upland	8.81	**2.0**
21C-50	7/25/2012	50 ft BGS	Upland	8.81	**2.0**
721-MW14-50	8/9/2012	50 ft BGS	Upland	8.81	**2.0**
WW-A1R	8/25/2012	106 to 106 ft BML	Subtidal	8.81	**2.0**
8-54	11/6/2002	54 ft bgs	Upland	8.80	**2.0**
T6-60	11/8/2002	60 ft bgs	Upland	8.80	**2.0**
15-25R	11/19/2003	25 ft bgs	Upland	8.80	**2.0**
Dock2-3	7/22/2005	3 to 6 ft bml	Subtidal	8.80	**2.0**
8-99R	5/1/2006	99 ft bgs	Upland	8.80	**2.0**
74-75	8/17/2006	75 ft bgs	Upland	8.80	**2.0**
32-50R	2/12/2003	50 ft bgs	Upland	8.79	**1.9**
25-25	2/17/2005	25 ft bgs	Upland	8.79	**1.9**
5106-3	9/21/2005	69 to 72 ft bml	Subtidal	8.79	**1.9**
44-50	7/19/2006	50 ft bgs	Upland	8.79	**1.9**
SP-4	9/21/2006	138 to 142 ft bgs	Upland	8.79	**1.9**
8-54	8/19/2003	54 ft bgs	Upland	8.78	**1.9**
HYD-2	8/30/2005	68 to 71 ft bml	Subtidal	8.78	**1.9**
7-181	5/2/2006	181 ft bgs	Upland	8.78	**1.9**
3-175	7/17/2006	175 ft bgs	Upland	8.78	**1.9**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
87C-25	7/24/2012	25 ft BGS	Upland	8.78	**1.9**
12-160	2/13/2004	160 ft bgs	Upland	8.77	**1.9**
5106-6	10/18/2005	38 to 41 ft bml	Subtidal	8.77	**1.9**
46-50	4/12/2006	50 ft bgs	Upland	8.77	**1.9**
74-75	4/14/2006	75 ft bgs	Upland	8.77	**1.9**
NL-23	8/14/2006	12 to 15 ft bml	Subtidal	8.77	**1.9**
82-150	7/26/2010	145 to 150 ft BGS	Upland	8.77	**1.9**
67-25	7/26/2012	25 ft BGS	Upland	8.77	**1.9**
15-50R	1/29/2002	50 ft bgs	Upland	8.76	**1.8**
15-25R	5/4/2002	25 ft bgs	Upland	8.76	**1.8**
709-MW19-15	3/11/2004	15 ft bgs	Upland	8.76	**1.8**
Pier25-8	8/26/2005	94 to 97 ft bml	Subtidal	8.76	**1.8**
MW-G-INT	12/3/2013		Upland	8.75	**1.8**
25-50	1/26/2002	50 ft bgs	Upland	8.75	**1.8**
8-99R	5/11/2004	99 ft bgs	Upland	8.75	**1.8**
25-50	5/13/2004	50 ft bgs	Upland	8.75	**1.8**
25-25	11/13/2004	25 ft bgs	Upland	8.75	**1.8**
PT-15A	11/15/2005	161 to 164 ft bml	Subtidal	8.75	**1.8**
7-181	7/18/2006	181 ft bgs	Upland	8.75	**1.8**
709-MW6-15	12/1/2011	15 ft BGS	Upland	8.75	**1.8**
42-25	2/21/2005	25 ft bgs	Upland	8.74	**1.7**
Pier25-13	2/3/2006	100 to 103 ft bml	Subtidal	8.74	**1.7**
SP-2	9/14/2006	178 to 182 ft bgs	Upland	8.74	**1.7**
75-100	7/27/2010	100 ft BGS	Upland	8.74	**1.7**
12A-25	8/21/2012	25 ft BGS	Upland	8.74	**1.7**
Dock2-8	8/23/2005	74 to 77 ft bml	Subtidal	8.73	**1.7**
5106-3	9/21/2005	94 to 97 ft bml	Subtidal	8.73	**1.7**
SP-3	9/28/2006	168 to 172 ft bgs	Upland	8.73	**1.7**
5106-6	10/18/2005	73 to 76 ft bml	Subtidal	8.72	**1.7**
Pier25-31	5/12/2006	111 to 112 ft bgs	Upland	8.72	**1.7**
50-15	12/1/2011	15 ft BGS	Upland	8.72	**1.7**
87C-75	7/24/2012	75 ft BGS	Upland	8.72	**1.7**
11-75	8/7/2012	75 ft BGS	Upland	8.72	**1.7**
MW-EXT-9-DEEP	7/17/2013	182 to 184 ft BGS	Upland	8.71	**1.6**
1-45	1/24/2002	45 ft bgs	Upland	8.71	**1.6**
14-25R	5/6/2003	25 ft bgs	Upland	8.71	**1.6**
8-23	8/19/2004	23 ft bgs	Upland	8.71	**1.6**
5106-9	11/1/2005	42 to 45 ft bml	Subtidal	8.71	**1.6**
5106-10	11/4/2005	92 to 95 ft bml	Subtidal	8.71	**1.6**
MW-EXT-9-DEEP	7/17/2013	192 to 194 ft BGS	Upland	8.70	**1.6**
ESI-3-2	12/6/2002	50 ft bgs	Upland	8.70	**1.6**
ESI-2-49	1/23/2004	15 ft bgs	Upland	8.70	**1.6**

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ (1)***
ESI-2-36	2/2/2004	49 ft bgs	Upland	8.70	**1.6**
32-50R	2/14/2004	50 ft bgs	Upland	8.70	**1.6**
78C-130	7/19/2012	130 ft BGS	Upland	8.70	**1.6**
10-50	8/20/2012	50 ft BGS	Upland	8.70	**1.6**
35-50	2/6/2003	50 ft bgs	Upland	8.69	**1.5**
8-54	5/11/2004	54 ft bgs	Upland	8.69	**1.5**
721-GP7	6/28/2004	15 ft bgs	Upland	8.69	**1.5**
36-25	2/9/2005	25 ft bgs	Upland	8.69	**1.5**
5106-14	12/1/2005	32 to 35 ft bml	Subtidal	8.69	**1.5**
23-50	4/10/2006	50 ft bgs	Upland	8.69	**1.5**
Pier25-33	5/8/2006	29 to 33 ft bgs	Upland	8.69	**1.5**
Pier25-31	5/10/2006	49 to 53 ft bgs	Upland	8.69	**1.5**
SP-2	7/7/2006	8 to 11 ft bgs	Upland	8.69	**1.5**
25-50	7/19/2006	50 ft bgs	Upland	8.69	**1.5**
32-100	12/4/2008	100 ft bgs	Upland	8.69	**1.5**
75-75	8/9/2012	75 ft BGS	Upland	8.69	**1.5**
34-50	2/9/2003	50 ft bgs	Upland	8.68	**1.5**
5106-20	1/5/2006	48.5 to 51.5 ft bml	Subtidal	8.68	**1.5**
68-25	4/17/2006	25 ft bgs	Upland	8.68	**1.5**
36-25	7/20/2006	25 ft bgs	Upland	8.68	**1.5**
36-25	12/5/2008	25 ft bgs	Upland	8.68	**1.5**
42-50	1/22/2002	50 ft bgs	Upland	8.67	1.5
8-23	5/5/2002	23 ft bgs	Upland	8.67	1.5
GP-5	4/5/2004	50 ft bgs	Upland	8.67	1.5
5106-9	11/2/2005	87 to 90 ft bml	Subtidal	8.67	1.5
5106-2	1/30/2006	14 to 17 ft bml	Subtidal	8.67	1.5
25A-25	7/19/2006	25 ft bgs	Upland	8.67	1.5
WMUA-12	8/2/2006	17.5 to 19.5 ft bgs	Upland	8.67	1.5
11-45	12/3/2008	45 ft bgs	Upland	8.67	1.5
65-25	8/12/2012	25 ft BGS	Upland	8.67	1.5
19-25	1/23/2002	25 ft bgs	Upland	8.66	1.4
22-70	8/1/2002	70 ft bgs	Upland	8.66	1.4
8-99R	2/1/2003	99 ft bgs	Upland	8.66	1.4
8-54	5/6/2003	54 ft bgs	Upland	8.66	1.4
WW-A3	4/24/2006	49 to 52 ft bgs	Upland	8.66	1.4
Pier25-22	1/18/2006	100.1 to 103.1 ft bml	Subtidal	8.65	1.4
Pier25-27	1/19/2006	70.5 to 73.5 ft bml	Subtidal	8.65	1.4
Pier25-25	1/20/2006	70 to 73 ft bml	Subtidal	8.65	1.4
75-100	4/14/2006	100 ft bgs	Upland	8.65	1.4
8-54	4/25/2006	54 ft bgs	Upland	8.65	1.4
SP-8	7/17/2006	58 to 61 ft bgs	Upland	8.65	1.4
14-25R	8/13/2002	25 ft bgs	Upland	8.64	1.4

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ [(1)]***
25-50	11/18/2003	50 ft bgs	Upland	8.64	1.4
EA-2	10/20/2005	140 to 143 ft bgs	Upland	8.64	1.4
5106-9	11/2/2005	92 to 95 ft bml	Subtidal	8.64	1.4
5106-13	11/29/2005	42 to 45 ft bml	Subtidal	8.64	1.4
Pier25-22	1/18/2006	110.1 to 113.1 ft bml	Subtidal	8.64	1.4
93C-50	7/17/2012	50 ft BGS	Upland	8.64	1.4
24-35	8/15/2012	35 ft BGS	Upland	8.64	1.4
12-160	8/19/2003	160 ft bgs	Upland	8.63	1.3
12-45	2/8/2005	45 ft bgs	Upland	8.63	1.3
5106-3	9/21/2005	79 to 82 ft bml	Subtidal	8.63	1.3
HYD-6	9/30/2005	12.3 to 15.3 ft bml	Subtidal	8.63	1.3
74-50	7/19/2006	50 ft bgs	Upland	8.63	1.3
74-50	8/17/2006	50 ft bgs	Upland	8.63	1.3
NL-25	1/18/2007	6.5 to 9.5 ft bml	Subtidal	8.63	1.3
19-25	7/27/2010	25 ft BGS	Upland	8.63	1.3
86C-25	7/24/2012	25 ft BGS	Upland	8.63	1.3
46C-100	8/22/2012	100 ft BGS	Upland	8.63	1.3
WW-A1D	8/29/2012	87 to 87 ft BML	Subtidal	8.63	1.3
15-25R	1/29/2002	25 ft bgs	Upland	8.62	1.3
25-50	11/8/2002	50 ft bgs	Upland	8.62	1.3
C-9	11/12/2003	68.5 ft bgs	Upland	8.62	1.3
29-14	3/23/2004	14 ft bgs	Upland	8.62	1.3
HYD-6	9/30/2005	22.3 to 25.3 ft bml	Subtidal	8.62	1.3
PZ-SHI-3-100	4/27/2006	70 to 75 ft bml	Subtidal	8.62	1.3
MW-G-DEEP	7/31/2013	222 to 224 ft BGS	Upland	8.61	1.3
25-25	11/8/2002	25 ft bgs	Upland	8.61	1.3
8-54	2/5/2003	54 ft bgs	Upland	8.61	1.3
Pier25-11	10/7/2005	65 to 68 ft bml	Subtidal	8.61	1.3
5106-20	1/5/2006	38.5 to 41.5 ft bml	Subtidal	8.61	1.3
5106-22	1/26/2006	90 to 93 ft bml	Subtidal	8.61	1.3
22-70	4/13/2006	70 ft bgs	Upland	8.61	1.3
ESI-2-11	11/27/2002	15 ft bgs	Upland	8.60	1.3
ESI-3-7	12/10/2002	50 ft bgs	Upland	8.60	1.3
14-25R	2/4/2003	25 ft bgs	Upland	8.60	1.3
ESI-2-50	1/26/2004	50 ft bgs	Upland	8.60	1.3
25-25	2/14/2004	25 ft bgs	Upland	8.60	1.3
5106-6	10/19/2005	83 to 86 ft bml	Subtidal	8.60	1.3
5106-10	11/4/2005	82 to 85 ft bml	Subtidal	8.60	1.3
PZ-SHI-2-25	4/28/2006	3.75 to 4.75 ft bml	Intertidal	8.60	1.3
NL-28	1/17/2007	6.5 to 9.5 ft bml	Intertidal	8.60	1.3
NL-28	1/17/2007	21.5 to 24.5 ft bml	Intertidal	8.60	1.3
94C-75	7/24/2012	75 ft BGS	Upland	8.60	1.3

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** [(1)]
17C-75	8/6/2012	75 ft BGS	Upland	8.60	1.3
7-181	8/8/2012	181 ft BGS	Upland	8.60	1.3
61-50	8/20/2003	50 ft bgs	Upland	8.59	1.2
25-25	5/18/2005	25 ft bgs	Upland	8.59	1.2
NL-15	12/16/2005	15 to 18 ft bml	Intertidal	8.59	1.2
Pier25-13	2/3/2006	90 to 93 ft bml	Subtidal	8.59	1.2
78C-160	7/19/2012	160 ft BGS	Upland	8.59	1.2
25-25	8/20/2004	25 ft bgs	Upland	8.58	1.2
Pier25-19	12/7/2005	62.6 to 65.6 ft bml	Subtidal	8.58	1.2
SP-6	6/6/2006	23 to 26 ft bgs	Upland	8.58	1.2
SP-3	10/2/2006	198 to 202 ft bgs	Upland	8.58	1.2
46C-50	8/22/2012	50 ft BGS	Upland	8.58	1.2
45-50	1/26/2002	50 ft bgs	Upland	8.57	1.2
36-50	11/13/2004	50 ft bgs	Upland	8.57	1.2
56-50	2/9/2005	50 ft bgs	Upland	8.57	1.2
HYD-2	8/30/2005	98 to 101 ft bml	Subtidal	8.57	1.2
PT-13A	11/10/2005	101.9 to 104.9 ft bml	Subtidal	8.57	1.2
Pier25-29	2/6/2006	32 to 35 ft bml	Subtidal	8.57	1.2
Pier25-33	5/8/2006	39 to 43 ft bgs	Upland	8.57	1.2
11-25	12/3/2008	25 ft bgs	Upland	8.57	1.2
MW-G-DEEP	7/29/2013	162 to 164 ft BGS	Upland	8.56	1.1
2-25	1/27/2002	25 ft bgs	Upland	8.56	1.1
67-25	4/11/2006	25 ft bgs	Upland	8.56	1.1
78C-50	7/19/2012	50 ft BGS	Upland	8.56	1.1
53C-100	7/24/2012	100 ft BGS	Upland	8.56	1.1
87C-130	7/24/2012	130 ft BGS	Upland	8.56	1.1
12-160	11/17/2003	160 ft bgs	Upland	8.55	1.1
35-25	11/13/2004	25 ft bgs	Upland	8.55	1.1
36-50	5/12/2005	50 ft bgs	Upland	8.55	1.1
5106-11	10/13/2005	12 to 15 ft bml	Subtidal	8.55	1.1
NL-13	12/21/2005	15 to 18 ft bml	Intertidal	8.55	1.1
Pier25-13	2/2/2006	40 to 43 ft bml	Subtidal	8.55	1.1
Pier25-31	5/11/2006	59 to 63 ft bgs	Upland	8.55	1.1
NL-16	5/19/2006	17 to 20 ft bml	Subtidal	8.55	1.1
SP-6	8/28/2006	167 to 171 ft bgs	Upland	8.55	1.1
NL-29	1/18/2007	21.5 to 24.5 ft bml	Subtidal	8.55	1.1
721-MW6-50	7/25/2012	50 ft BGS	Upland	8.55	1.1
MW-G-DEEP	7/29/2013	172 to 174 ft BGS	Upland	8.54	1.1
22-70	2/8/2003	70 ft bgs	Upland	8.54	1.1
11-183	2/11/2003	183 ft bgs	Upland	8.54	1.1
8-99R	11/17/2003	99 ft bgs	Upland	8.54	1.1
8-54	2/17/2004	54 ft bgs	Upland	8.54	1.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** (1)
Dock2-8	8/22/2005	49 to 52 ft bml	Subtidal	8.54	1.1
Dock2-8	8/22/2005	64 to 67 ft bml	Subtidal	8.54	1.1
11-183	4/25/2006	183 ft bgs	Upland	8.54	1.1
SP-4	6/20/2006	18 to 21 ft bgs	Upland	8.54	1.1
75-130	7/27/2010	130 ft BGS	Upland	8.54	1.1
MW-G-DEEP	7/31/2013	212 to 214 ft BGS	Upland	8.53	1.1
12-160	5/7/2003	160 ft bgs	Upland	8.53	1.1
25-25	8/17/2003	25 ft bgs	Upland	8.53	1.1
35-50	4/17/2006	50 ft bgs	Upland	8.53	1.1
74-75	7/19/2006	75 ft bgs	Upland	8.53	1.1
709-MW16-25	7/27/2012	25 ft BGS	Upland	8.53	1.1
8-99R	5/5/2002	99 ft bgs	Upland	8.52	1.0
8-99R	8/6/2002	99 ft bgs	Upland	8.52	1.0
8-99R	2/5/2003	99 ft bgs	Upland	8.52	1.0
709-MW15A-25	3/10/2004	30 ft bgs	Upland	8.52	1.0
HYD-10	9/16/2005	15.3 to 18.3 ft bml	Subtidal	8.52	1.0
WW-A4	4/26/2006	71 to 76 ft bgs	Upland	8.52	1.0
NL-16	5/19/2006	14 to 17 ft bml	Subtidal	8.52	1.0
NL-25	1/18/2007	16.5 to 19.5 ft bml	Subtidal	8.52	1.0
55-100	12/5/2008	100 ft bgs	Upland	8.52	1.0
MW-H-01	12/3/2013		Upland	8.51	1.0
22-70	1/28/2002	70 ft bgs	Upland	8.51	1.0
42-50	2/14/2004	50 ft bgs	Upland	8.51	1.0
38-55	3/17/2004	55 ft bgs	Upland	8.51	1.0
HYD-4	9/24/2005	76 to 79 ft bml	Subtidal	8.51	1.0
Pier25-11	10/7/2005	95 to 98 ft bml	Subtidal	8.51	1.0
1-25	5/1/2006	25 ft bgs	Upland	8.51	1.0
SP-5	6/12/2006	48 to 51 ft bgs	Upland	8.51	1.0
12A-25	12/4/2008	25 ft bgs	Upland	8.51	1.0
87C-100	7/24/2012	100 ft BGS	Upland	8.51	1.0
ESI-2-7	11/22/2002	50 ft bgs	Upland	8.50	1.0
ESI-2-20	11/27/2002	50 ft bgs	Upland	8.50	1.0
ESI-2-25	11/30/2002	15 ft bgs	Upland	8.50	1.0
ESI-2-13	12/2/2002	50 ft bgs	Upland	8.50	1.0
ESI-2-25	12/3/2002	50 ft bgs	Upland	8.50	1.0
ESI-3-4	12/9/2002	50 ft bgs	Upland	8.50	1.0
ESI-3-6	12/9/2002	50 ft bgs	Upland	8.50	1.0
ESI-3-8	12/11/2002	47 ft bgs	Upland	8.50	1.0
ESI-3-14	12/12/2002	15 ft bgs	Upland	8.50	1.0
5106-22	1/26/2006	80 to 83 ft bml	Subtidal	8.50	1.0
11-25	8/6/2012	25 ft BGS	Upland	8.50	1.0
SB-B-DEEP	8/12/2013	192 to 194 ft BGS	Upland	8.49	1.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
SB-B-DEEP	8/12/2013	192 to 194 ft BGS	Upland	8.49	1.0
32-50R	1/26/2002	50 ft bgs	Upland	8.49	1.0
709-MW20-50	7/21/2004	50 ft bgs	Upland	8.49	1.0
Dock2-8	8/22/2005	59 to 62 ft bml	Subtidal	8.49	1.0
5106-23	2/13/2006	67 to 70 ft bml	Intertidal	8.49	1.0
19-25	4/6/2006	25 ft bgs	Upland	8.49	1.0
NL-29	1/18/2007	6.5 to 9.5 ft bml	Subtidal	8.49	1.0
44-50	8/11/2012	50 ft BGS	Upland	8.49	1.0
35-50	2/9/2004	50 ft bgs	Upland	8.48	1.0
14-25R	11/12/2004	25 ft bgs	Upland	8.48	1.0
5106-8	8/9/2005	104 to 107 ft bml	Subtidal	8.48	1.0
HYD-1	8/31/2005	14 to 17 ft bml	Subtidal	8.48	1.0
HYD-1	9/1/2005	114 to 117 ft bml	Subtidal	8.48	1.0
5106-6	10/19/2005	103 to 106 ft bml	Subtidal	8.48	1.0
21-25R	4/19/2006	25 ft bgs	Upland	8.48	1.0
NL-25	1/19/2007	21.5 to 24.5 ft bml	Subtidal	8.48	1.0
41-100	12/8/2008	100 ft bgs	Upland	8.48	1.0
82-230	6/17/2010	165 to 170 ft BGS	Upland	8.48	1.0
24-50	8/15/2012	50 ft BGS	Upland	8.48	1.0
HYD-6	10/1/2005	52.3 to 55.3 ft bml	Subtidal	8.47	0.9
Pier25-9	10/25/2005	51.5 to 54.5 ft bml	Subtidal	8.47	0.9
5106-9	11/2/2005	82 to 85 ft bml	Subtidal	8.47	0.9
5106-10	11/7/2005	122 to 125 ft bml	Subtidal	8.47	0.9
Pier25-15	11/30/2005	59 to 62 ft bml	Subtidal	8.47	0.9
Pier25-15	12/1/2005	69 to 72 ft bml	Subtidal	8.47	0.9
25-25	7/19/2006	25 ft bgs	Upland	8.47	0.9
11-183	7/20/2006	183 ft bgs	Upland	8.47	0.9
12-160	5/5/2002	160 ft bgs	Upland	8.46	0.9
42-50	2/1/2003	50 ft bgs	Upland	8.46	0.9
C-10	8/1/2003	68 ft bgs	Upland	8.46	0.9
GP-12	4/2/2004	50 ft bgs	Upland	8.46	0.9
Dock2-4	7/28/2005	14 to 17 ft bml	Subtidal	8.46	0.9
Pier25-11	10/7/2005	105 to 108 ft bml	Subtidal	8.46	0.9
EA-2	10/10/2005	20 to 23 ft bgs	Upland	8.46	0.9
5106-23	2/13/2006	87 to 90 ft bml	Intertidal	8.46	0.9
5106-27	4/11/2006	19 to 23 ft bml	Intertidal	8.46	0.9
T1-50	4/12/2006	50 ft bgs	Upland	8.46	0.9
8-23	4/14/2006	23 ft bgs	Upland	8.46	0.9
32-50R	12/4/2008	50 ft bgs	Upland	8.46	0.9
25-50	12/5/2008	50 ft bgs	Upland	8.46	0.9
88C-25	8/16/2012	25 ft BGS	Upland	8.46	0.9
14-25R	5/4/2002	25 ft bgs	Upland	8.45	0.9

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
12-160	8/5/2002	160 ft bgs	Upland	8.45	0.9
60-25	5/6/2003	25 ft bgs	Upland	8.45	0.9
25-25	5/7/2003	25 ft bgs	Upland	8.45	0.9
GP-16	7/8/2004	50 ft bgs	Upland	8.45	0.9
36-50	8/17/2004	50 ft bgs	Upland	8.45	0.9
Pier25-7	8/24/2005	69.3 to 72.3 ft bml	Subtidal	8.45	0.9
5106-3	9/22/2005	109 to 112 ft bml	Subtidal	8.45	0.9
5106-6	10/19/2005	88 to 91 ft bml	Subtidal	8.45	0.9
1-45	4/13/2006	45 ft bgs	Upland	8.45	0.9
C-10	5/24/2006	68 ft bgs	Upland	8.45	0.9
12-160	7/18/2006	160 ft bgs	Upland	8.45	0.9
NL-24	1/15/2007	16.5 to 19.5 ft bml	Subtidal	8.45	0.9
55-50	8/24/2012	50 ft BGS	Upland	8.45	0.9
42-50	2/11/2003	50 ft bgs	Upland	8.44	0.9
35-25	2/9/2004	25 ft bgs	Upland	8.44	0.9
5106-5	9/12/2005	74 to 77 ft bml	Subtidal	8.44	0.9
Dock2-10	9/13/2005	27.6 to 30.6 ft bml	Subtidal	8.44	0.9
5106-1	9/29/2005	100 to 103 ft bml	Subtidal	8.44	0.9
Pier25-11	10/6/2005	45 to 48 ft bml	Subtidal	8.44	0.9
SP-8	7/14/2006	43 to 46 ft bgs	Upland	8.44	0.9
HW-4	1/23/2007	9 to 11 ft bml	Subtidal	8.44	0.9
709-MW15A-50	8/14/2012	50 ft BGS	Upland	8.44	0.9
WW-A1R	8/25/2012	95 to 95 ft BML	Subtidal	8.44	0.9
Pier25-16	11/22/2005	74.4 to 77.4 ft bml	Subtidal	8.43	0.9
Pier25-31	5/10/2006	29 to 33 ft bgs	Upland	8.43	0.9
83C-50	7/25/2012	50 ft BGS	Upland	8.43	0.9
14-25R	2/8/2005	25 ft bgs	Upland	8.42	0.8
5106-12	10/12/2005	82 to 85 ft bml	Subtidal	8.42	0.8
Pier25-18	12/9/2005	102 to 105 ft bml	Subtidal	8.42	0.8
5106-21	1/10/2006	35.5 to 38.5 ft bml	Subtidal	8.42	0.8
5106-2	1/31/2006	104 to 107 ft bml	Subtidal	8.42	0.8
SP-5	8/1/2006	128 to 132 ft bgs	Upland	8.42	0.8
8-54	12/2/2008	54 ft bgs	Upland	8.42	0.8
5-75	8/24/2012	75 ft BGS	Upland	8.42	0.8
41-138	1/29/2002	138 ft bgs	Upland	8.41	0.8
25-50	8/5/2002	50 ft bgs	Upland	8.41	0.8
25-25	5/13/2004	25 ft bgs	Upland	8.41	0.8
Dock2-10	9/13/2005	12.6 to 15.6 ft bml	Subtidal	8.41	0.8
HYD-7	9/14/2005	60 to 63 ft bml	Subtidal	8.41	0.8
5106-13	11/30/2005	92 to 95 ft bml	Subtidal	8.41	0.8
Pier25-25	1/20/2006	90 to 93 ft bml	Subtidal	8.41	0.8
41-50	4/15/2006	50 ft bgs	Upland	8.41	0.8

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
41-138	4/22/2006	138 ft bgs	Upland	8.41	0.8
SP-2	9/13/2006	158 to 162 ft bgs	Upland	8.41	0.8
8-54	5/5/2002	54 ft bgs	Upland	8.40	0.8
ESI-2-2	11/14/2002	25 ft bgs	Upland	8.40	0.8
ESI-2-4	11/15/2002	85 ft bgs	Upland	8.40	0.8
ESI-2-20	11/27/2002	85 ft bgs	Upland	8.40	0.8
ESI-2-13	12/2/2002	25 ft bgs	Upland	8.40	0.8
ESI-2-14	12/2/2002	50 ft bgs	Upland	8.40	0.8
ESI-3-1	12/5/2002	50 ft bgs	Upland	8.40	0.8
ESI-3-3	12/9/2002	15 ft bgs	Upland	8.40	0.8
ESI-3-3	12/9/2002	50 ft bgs	Upland	8.40	0.8
ESI-3-12	12/11/2002	47 ft bgs	Upland	8.40	0.8
ESI-3-13	12/12/2002	47 ft bgs	Upland	8.40	0.8
ESI-4-8	12/16/2002	50 ft bgs	Upland	8.40	0.8
61-50	11/14/2003	50 ft bgs	Upland	8.40	0.8
ESI-2-46	1/26/2004	25 ft bgs	Upland	8.40	0.8
ESI-1-10	2/2/2004	15 ft bgs	Upland	8.40	0.8
44-50	2/9/2004	50 ft bgs	Upland	8.40	0.8
721-MW10-25	7/21/2004	25 ft bgs	Upland	8.40	0.8
35-25	8/18/2004	25 ft bgs	Upland	8.40	0.8
35-50	11/13/2004	50 ft bgs	Upland	8.40	0.8
Dock2-10	9/13/2005	22.6 to 25.6 ft bml	Subtidal	8.40	0.8
HYD-10	9/16/2005	5.3 to 8.3 ft bml	Subtidal	8.40	0.8
8-99R	8/16/2006	99 ft bgs	Upland	8.40	0.8
85C-75	7/20/2012	75 ft BGS	Upland	8.40	0.8
WW-A1R	8/21/2012	6 to 6 ft BML	Subtidal	8.40	0.8
32-50R	8/18/2003	50 ft bgs	Upland	8.39	0.8
36-25	11/9/2004	25 ft bgs	Upland	8.39	0.8
Dock2-5	8/1/2005	7 to 10 ft bml	Subtidal	8.39	0.8
PT-13A	11/11/2005	141.9 to 144.9 ft bml	Subtidal	8.39	0.8
Pier25-15	12/1/2005	82 to 85 ft bml	Subtidal	8.39	0.8
5106-27	4/11/2006	15 to 19 ft bml	Intertidal	8.39	0.8
75-130	7/24/2013	130 ft BGS	Upland	8.38	0.8
MW-G-DEEP	7/25/2013	122 to 124 ft BGS	Upland	8.38	0.8
25-50	5/4/2002	50 ft bgs	Upland	8.38	0.8
C-10	8/8/2002	68 ft bgs	Upland	8.38	0.8
8-54	11/17/2003	54 ft bgs	Upland	8.38	0.8
57-50	2/9/2005	50 ft bgs	Upland	8.38	0.8
HYD-3	8/12/2005	51 to 54 ft bml	Subtidal	8.38	0.8
HYD-2	8/29/2005	8 to 11 ft bml	Subtidal	8.38	0.8
Dock2-9	9/8/2005	29 to 32 ft bml	Subtidal	8.38	0.8
EA-2	10/11/2005	30 to 33 ft bgs	Upland	8.38	0.8

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ (1)***
5106-13	11/29/2005	62 to 65 ft bml	Subtidal	8.38	0.8
721-MW10-25	8/7/2012	25 ft BGS	Upland	8.38	0.8
34-50R	8/20/2012	50 ft BGS	Upland	8.38	0.8
41C-130	8/29/2012	130 ft BGS	Upland	8.38	0.8
35-25	5/12/2004	25 ft bgs	Upland	8.37	0.7
HYD-6	10/1/2005	42.3 to 45.4 ft bml	Subtidal	8.37	0.7
BH-65	7/24/2006	48 to 51 ft bgs	Upland	8.37	0.7
61-50	12/4/2008	50 ft bgs	Upland	8.37	0.7
34-100	12/5/2008	100 ft bgs	Upland	8.37	0.7
25-25	8/5/2002	25 ft bgs	Upland	8.36	0.7
10-100	2/1/2003	100 ft bgs	Upland	8.36	0.7
721-GP2	6/21/2004	25 ft bgs	Upland	8.36	0.7
721-GP1	6/22/2004	50 ft bgs	Upland	8.36	0.7
721-GP3	6/22/2004	50 ft bgs	Upland	8.36	0.7
Dock2-4	7/29/2005	24 to 27 ft bml	Subtidal	8.36	0.7
5106-10	11/7/2005	97 to 100 ft bml	Subtidal	8.36	0.7
NL-15	12/19/2005	24 to 27 ft bml	Intertidal	8.36	0.7
Pier25-25	1/20/2006	60 to 63 ft bml	Subtidal	8.36	0.7
Pier25-32	4/4/2006	30 to 34 ft bgs	Upland	8.36	0.7
9-100	4/14/2006	100 ft bgs	Upland	8.36	0.7
PZ-SHI-3-100	7/8/2006	70 to 75 ft bml	Subtidal	8.36	0.7
SP-4	9/21/2006	118 to 122 ft bgs	Upland	8.36	0.7
NL-29	1/18/2007	11.5 to 14.5 ft bml	Subtidal	8.36	0.7
46C-75	8/22/2012	75 ft BGS	Upland	8.36	0.7
61C-160	6/22/2013	160 ft BGS	Upland	8.35	0.7
36-25	1/22/2002	25 ft bgs	Upland	8.35	0.7
C-10	2/1/2003	68 ft bgs	Upland	8.35	0.7
36-25	8/17/2004	25 ft bgs	Upland	8.35	0.7
Dock2-9	9/8/2005	34 to 37 ft bml	Subtidal	8.35	0.7
5106-6	10/19/2005	98 to 101 ft bml	Subtidal	8.35	0.7
5106-26	2/15/2006	52 to 55 ft bml	Intertidal	8.35	0.7
46-50	1/25/2002	50 ft bgs	Upland	8.34	0.7
14-25R	1/29/2002	25 ft bgs	Upland	8.34	0.7
59-25	5/6/2003	25 ft bgs	Upland	8.34	0.7
68-25	7/14/2004	25 ft bgs	Upland	8.34	0.7
5106-11	10/14/2005	77 to 80 ft bml	Subtidal	8.34	0.7
PT-13A	11/10/2005	111.9 to 114.9 ft bml	Subtidal	8.34	0.7
Pier25-20	12/6/2005	70 to 73 ft bml	Subtidal	8.34	0.7
Pier25-18	12/9/2005	82 to 85 ft bml	Subtidal	8.34	0.7
Pier25-18	12/9/2005	112 to 115 ft bml	Subtidal	8.34	0.7
75-75	4/14/2006	75 ft bgs	Upland	8.34	0.7
BH-72	8/9/2006	98 to 101 ft bgs	Upland	8.34	0.7

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
NL-29	1/18/2007	16.5 to 19.5 ft bml	Subtidal	8.34	0.7
709-MW21-50	7/27/2012	50 ft BGS	Upland	8.34	0.7
721-MW11-50	8/1/2012	50 ft BGS	Upland	8.34	0.7
12-160	1/30/2002	160 ft bgs	Upland	8.33	0.7
34-50	8/1/2002	50 ft bgs	Upland	8.33	0.7
14-25R	11/7/2002	25 ft bgs	Upland	8.33	0.7
35-50	8/18/2003	50 ft bgs	Upland	8.33	0.7
8-99R	8/19/2003	99 ft bgs	Upland	8.33	0.7
14-25R	8/17/2004	25 ft bgs	Upland	8.33	0.7
5106-15	11/15/2005	32 to 35 ft bml	Subtidal	8.33	0.7
Pier25-28	1/25/2006	40 to 43 ft bml	Subtidal	8.33	0.7
36-50	4/6/2006	50 ft bgs	Upland	8.33	0.7
721-MW6-50	4/20/2006	50 ft bgs	Upland	8.33	0.7
12-160	4/26/2006	160 ft bgs	Upland	8.33	0.7
82-230	6/21/2010	185 to 190 ft BGS	Upland	8.33	0.7
MW-EXT-9-DEEP	12/4/2013		Upland	8.32	0.7
25-25	11/18/2003	25 ft bgs	Upland	8.32	0.7
36-50	2/12/2004	50 ft bgs	Upland	8.32	0.7
5106-1	9/29/2005	105 to 108 ft bml	Subtidal	8.32	0.7
EA-2	10/10/2005	15 to 18 ft bgs	Upland	8.32	0.7
5106-6	10/18/2005	68 to 71 ft bml	Subtidal	8.32	0.7
Dock2-11	10/20/2005	32 to 35 ft bml	Subtidal	8.32	0.7
Dock2-11	10/20/2005	77 to 80 ft bml	Subtidal	8.32	0.7
Pier25-14	11/16/2005	64.1 to 67.1 ft bml	Subtidal	8.32	0.7
Pier25-29	2/7/2006	102 to 105 ft bml	Subtidal	8.32	0.7
WMUA-12	8/3/2006	21.5 to 22.5 ft bgs	Upland	8.32	0.7
WW-A1D	8/29/2012	67 to 67 ft BML	Subtidal	8.32	0.7
12-160	2/6/2003	160 ft bgs	Upland	8.31	0.6
EA-1	9/22/2005	31.5 to 34.5 ft bgs	Upland	8.31	0.6
5106-10	11/7/2005	117 to 120 ft bml	Subtidal	8.31	0.6
Pier25-17	11/17/2005	93.7 to 96.7 ft bml	Subtidal	8.31	0.6
Pier25-24	1/13/2006	64.1 to 67.1 ft bml	Subtidal	8.31	0.6
56-50	4/6/2006	50 ft bgs	Upland	8.31	0.6
25-50	4/13/2006	50 ft bgs	Upland	8.31	0.6
SP-8	7/18/2006	88 to 91 ft bgs	Upland	8.31	0.6
75-75	7/27/2010	75 ft BGS	Upland	8.31	0.6
34C-160	8/1/2013	160 ft BGS	Upland	8.30	0.6
MW-G-DEEP	12/3/2013		Upland	8.30	0.6
T6-25	11/8/2002	25 ft bgs	Upland	8.30	0.6
ESI-2-8	11/21/2002	97 ft bgs	Upland	8.30	0.6
ESI-2-10	11/25/2002	100 ft bgs	Upland	8.30	0.6
ESI-3-5	12/6/2002	50 ft bgs	Upland	8.30	0.6

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SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
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Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
ESI-3-8	12/10/2002	25 ft bgs	Upland	8.30	0.6
ESI-3-11	12/11/2002	50 ft bgs	Upland	8.30	0.6
ESI-4-7	12/13/2002	25 ft bgs	Upland	8.30	0.6
ESI-4-5	12/15/2002	49 ft bgs	Upland	8.30	0.6
ESI-3-15	12/17/2002	50 ft bgs	Upland	8.30	0.6
25-25	2/10/2003	25 ft bgs	Upland	8.30	0.6
ESI-2-39	1/22/2004	15 ft bgs	Upland	8.30	0.6
ESI-2-44	1/23/2004	15 ft bgs	Upland	8.30	0.6
ESI-1-9	2/2/2004	15 ft bgs	Upland	8.30	0.6
721-GP8	6/24/2004	25 ft bgs	Upland	8.30	0.6
EA-1	9/22/2005	19.5 to 22.5 ft bgs	Upland	8.30	0.6
3-175	4/10/2006	175 ft bgs	Upland	8.30	0.6
75-75	8/4/2006	75 ft bgs	Upland	8.30	0.6
SP-1	9/7/2006	148 to 152 ft bgs	Upland	8.30	0.6
53-50	12/8/2008	50 ft bgs	Upland	8.30	0.6
92C-25	7/18/2012	25 ft BGS	Upland	8.30	0.6
42-25	1/22/2002	25 ft bgs	Upland	8.29	0.6
36-50	5/13/2003	50 ft bgs	Upland	8.29	0.6
36-50	5/12/2004	50 ft bgs	Upland	8.29	0.6
HYD-6	9/30/2005	32.3 to 35.4 ft bml	Subtidal	8.29	0.6
61C-50	11/12/2013	50 ft BGS	Upland	8.28	0.6
12-160	11/8/2002	160 ft bgs	Upland	8.28	0.6
35-50	11/8/2002	50 ft bgs	Upland	8.28	0.6
22-70	8/14/2003	70 ft bgs	Upland	8.28	0.6
5106-7	8/12/2005	76 to 79 ft bml	Subtidal	8.28	0.6
Dock2-10	9/13/2005	17.9 to 20.6 ft bml	Subtidal	8.28	0.6
HYD-8	9/13/2005	22 to 25 ft bml	Subtidal	8.28	0.6
HYD-4	9/26/2005	106 to 109 ft bml	Subtidal	8.28	0.6
Dock2-11	10/20/2005	67 to 70 ft bml	Subtidal	8.28	0.6
Pier25-19	12/7/2005	72.6 to 75.6 ft bml	Subtidal	8.28	0.6
NL-13	12/21/2005	24 to 27 ft bml	Intertidal	8.28	0.6
C-5	5/23/2006	68.5 ft bgs	Upland	8.28	0.6
75-75	8/17/2006	75 ft bgs	Upland	8.28	0.6
36-25	2/7/2004	25 ft bgs	Upland	8.27	0.6
709-MW6-15	3/10/2004	15 ft bgs	Upland	8.27	0.6
Dock2-4	7/28/2005	19 to 22 ft bml	Subtidal	8.27	0.6
5106-12	10/12/2005	87 to 90 ft bml	Subtidal	8.27	0.6
Pier25-9	10/25/2005	41.5 to 44.5 ft bml	Subtidal	8.27	0.6
Pier25-9	10/25/2005	91.5 to 94.5 ft bml	Subtidal	8.27	0.6
5106-10	11/3/2005	22 to 25 ft bml	Subtidal	8.27	0.6
Dock2-12	11/9/2005	67 to 70 ft bml	Subtidal	8.27	0.6
SP-5	6/12/2006	78 to 81 ft bgs	Upland	8.27	0.6

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
21C-75	7/25/2012	75 ft BGS	Upland	8.27	0.6
11-45	8/7/2012	45 ft BGS	Upland	8.27	0.6
36-50	1/22/2002	50 ft bgs	Upland	8.26	0.6
EA-3	11/3/2005	140 to 143 ft bgs	Upland	8.26	0.6
Pier25-17	11/17/2005	53.7 to 56.7 ft bml	Subtidal	8.26	0.6
PZ-SHI-2-25	7/14/2006	3.75 to 4.75 ft bml	Intertidal	8.26	0.6
7-25	8/8/2012	25 ft BGS	Upland	8.26	0.6
88C-50	8/16/2012	50 ft BGS	Upland	8.26	0.6
34-25R	8/20/2012	25 ft BGS	Upland	8.26	0.6
46-100	2/1/2003	100 ft bgs	Upland	8.25	0.6
8-99R	5/6/2003	99 ft bgs	Upland	8.25	0.6
36-50	8/17/2003	50 ft bgs	Upland	8.25	0.6
Dock2-9	9/8/2005	59 to 62 ft bml	Subtidal	8.25	0.6
5106-6	10/19/2005	93 to 96 ft bml	Subtidal	8.25	0.6
5106-20	1/5/2006	63.5 to 66.5 ft bml	Subtidal	8.25	0.6
17-24	4/7/2006	24 ft bgs	Upland	8.25	0.6
5106-27	4/12/2006	59 to 63 ft bml	Intertidal	8.25	0.6
5106-32	5/3/2006	19 to 23 ft bml	Subtidal	8.25	0.6
A-2	5/23/2006	68.5 ft bgs	Upland	8.25	0.6
9-100	7/15/2006	100 ft bgs	Upland	8.25	0.6
53-100	12/8/2008	100 ft bgs	Upland	8.25	0.6
721-MW10-50	8/6/2012	50 ft BGS	Upland	8.25	0.6
SB-B-DEEP	8/8/2013	122 to 124 ft BGS	Upland	8.24	0.5
35-25	5/7/2003	25 ft bgs	Upland	8.24	0.5
53-50	2/12/2004	50 ft bgs	Upland	8.24	0.5
14-25R	5/12/2004	25 ft bgs	Upland	8.24	0.5
14-25R	6/1/2004	25 ft bgs	Upland	8.24	0.5
14-25R	5/11/2005	25 ft bgs	Upland	8.24	0.5
EA-1	9/23/2005	56.5 to 59.5 ft bgs	Upland	8.24	0.5
Pier25-9	10/25/2005	61.5 to 64.5 ft bml	Subtidal	8.24	0.5
Dock2-12	11/8/2005	37 to 40 ft bml	Subtidal	8.24	0.5
Dock2-13	11/11/2005	64 to 67 ft bml	Subtidal	8.24	0.5
12-45	4/6/2006	45 ft bgs	Upland	8.24	0.5
C-4	5/23/2006	68.5 ft bgs	Upland	8.24	0.5
74-100	12/9/2008	100 ft bgs	Upland	8.24	0.5
89C-25	8/22/2012	25 ft BGS	Upland	8.24	0.5
5106-11	10/14/2005	87 to 90 ft bml	Subtidal	8.23	0.5
Dock2-12	11/9/2005	72 to 75 ft bml	Subtidal	8.23	0.5
NL-13	12/21/2005	18 to 21 ft bml	Intertidal	8.23	0.5
53-100	4/17/2006	100 ft bgs	Upland	8.23	0.5
SP-8	7/14/2006	33 to 36 ft bgs	Upland	8.23	0.5
SP-6	8/28/2006	157 to 161 ft bgs	Upland	8.23	0.5

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
NL-24	1/15/2007	21.5 to 24.5 ft bml	Subtidal	8.23	0.5
74-75	12/11/2013	75 ft BGS	Upland	8.22	0.5
13-49	1/24/2002	49 ft bgs	Upland	8.22	0.5
8-54	8/6/2002	54 ft bgs	Upland	8.22	0.5
14-25R	2/10/2004	25 ft bgs	Upland	8.22	0.5
12-45	5/11/2004	45 ft bgs	Upland	8.22	0.5
721-GP3	6/22/2004	25 ft bgs	Upland	8.22	0.5
Pier25-5	8/16/2005	60.5 to 63.5 ft bml	Subtidal	8.22	0.5
5106-1	9/27/2005	10 to 13 ft bml	Subtidal	8.22	0.5
Pier25-9	10/26/2005	111.5 to 114.5 ft bml	Subtidal	8.22	0.5
Dock2-13	11/11/2005	74 to 77 ft bml	Subtidal	8.22	0.5
5106-20	1/5/2006	68.5 to 71.5 ft bml	Subtidal	8.22	0.5
5106-20	1/6/2006	78.5 to 81.5 ft bml	Subtidal	8.22	0.5
42-50	4/5/2006	50 ft bgs	Upland	8.22	0.5
46-100	4/12/2006	100 ft bgs	Upland	8.22	0.5
20-50	4/19/2006	50 ft bgs	Upland	8.22	0.5
NL-26	1/17/2007	6.5 to 9.5 ft bml	Subtidal	8.22	0.5
94C-50	7/24/2012	50 ft BGS	Upland	8.22	0.5
36-25	8/1/2012	25 ft BGS	Upland	8.22	0.5
MW-EXT-9-DEEP	7/17/2013	172 to 174 ft BGS	Upland	8.21	0.5
721-GP4	6/29/2004	15 ft bgs	Upland	8.21	0.5
Pier25-13	2/3/2006	110 to 113 ft bml	Subtidal	8.21	0.5
5106-25	4/18/2006	69 to 73 ft bml	Intertidal	8.21	0.5
53-50	4/27/2006	50 ft bgs	Upland	8.21	0.5
35-25	7/19/2006	25 ft bgs	Upland	8.21	0.5
65-100	8/12/2012	100 ft BGS	Upland	8.21	0.5
ESI-2-6	11/16/2002	89 ft bgs	Upland	8.20	0.5
ESI-2-23	11/24/2002	50 ft bgs	Upland	8.20	0.5
ESI-3-10	12/10/2002	50 ft bgs	Upland	8.20	0.5
ESI-3-14	12/12/2002	50 ft bgs	Upland	8.20	0.5
ESI-4-2	12/13/2002	25 ft bgs	Upland	8.20	0.5
ESI-4-4	12/15/2002	50 ft bgs	Upland	8.20	0.5
14-25R	11/19/2003	25 ft bgs	Upland	8.20	0.5
ESI-2-46	1/24/2004	15 ft bgs	Upland	8.20	0.5
721-MW6-50	7/19/2004	50 ft bgs	Upland	8.20	0.5
HYD-1	9/1/2005	124 to 127 ft bml	Subtidal	8.20	0.5
EA-2	10/21/2005	150 to 153 ft bgs	Upland	8.20	0.5
21-25R	7/15/2006	25 ft bgs	Upland	8.20	0.5
92C-100	7/18/2012	100 ft BGS	Upland	8.20	0.5
61-50	12/9/2013	50 ft BGS	Upland	8.19	0.5
74-100	12/11/2013	100 ft BGS	Upland	8.19	0.5
GP-9	3/24/2004	50 ft bgs	Upland	8.19	0.5

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** ***(1)***
5106-11	10/13/2005	7 to 10 ft bml	Subtidal	8.19	0.5
5106-14	12/2/2005	82 to 85 ft bml	Subtidal	8.19	0.5
WW-B1	3/13/2006	98.5 to 100.5 ft bml	Subtidal	8.19	0.5
721-MW10-50	4/19/2006	50 ft bgs	Upland	8.19	0.5
SP-6	6/5/2006	18 to 21 ft bgs	Upland	8.19	0.5
SP-7	8/31/2006	137 to 141 ft bgs	Upland	8.19	0.5
NL-30	1/19/2007	6.5 to 9.5 ft bml	Subtidal	8.19	0.5
35-50	12/15/2008	50 ft bgs	Upland	8.19	0.5
709-MW7-15	7/28/2012	15 ft BGS	Upland	8.19	0.5
14-25R	8/15/2003	25 ft bgs	Upland	8.18	0.5
721-GP8	6/24/2004	50 ft bgs	Upland	8.18	0.5
41-100	8/18/2004	100 ft bgs	Upland	8.18	0.5
12-45	11/15/2004	45 ft bgs	Upland	8.18	0.5
35-25	5/18/2005	25 ft bgs	Upland	8.18	0.5
Dock2-4	7/28/2005	4 to 7 ft bml	Subtidal	8.18	0.5
HYD-1	8/31/2005	24 to 27 ft bml	Subtidal	8.18	0.5
Pier25-11	10/6/2005	25 to 28 ft bml	Subtidal	8.18	0.5
Pier25-11	10/7/2005	75 to 78 ft bml	Subtidal	8.18	0.5
NL-13	12/21/2005	21 to 24 ft bml	Intertidal	8.18	0.5
5106-19	1/16/2006	90.5 to 93.5 ft bml	Subtidal	8.18	0.5
5106-26	2/14/2006	7 to 10 ft bml	Intertidal	8.18	0.5
55-50	12/5/2008	50 ft bgs	Upland	8.18	0.5
46C-130	8/22/2012	130 ft BGS	Upland	8.18	0.5
MW-H-01	6/24/2013	142 to 144 ft BGS	Upland	8.17	0.5
36-25	5/12/2004	25 ft bgs	Upland	8.17	0.5
721-MW5-50	7/19/2004	50 ft bgs	Upland	8.17	0.5
5106-11	10/14/2005	82 to 85 ft bml	Subtidal	8.17	0.5
Pier25-9	10/25/2005	71.5 to 74.5 ft bml	Subtidal	8.17	0.5
Pier25-10	10/27/2005	96 to 99 ft bml	Subtidal	8.17	0.5
WW-A1R	8/21/2012	11 to 11 ft BML	Subtidal	8.17	0.5
MW-EXT-9-DEEP	9/27/2013	205 ft BGS	Upland	8.16	0.5
C-9	11/5/2002	68.5 ft bgs	Upland	8.16	0.5
36-50	2/10/2003	50 ft bgs	Upland	8.16	0.5
721-GP9	6/24/2004	25 ft bgs	Upland	8.16	0.5
Dock2-4	7/28/2005	9 to 12 ft bml	Subtidal	8.16	0.5
5106-5	9/12/2005	79 to 82 ft bml	Subtidal	8.16	0.5
5106-9	11/1/2005	32 to 35 ft bml	Subtidal	8.16	0.5
5106-9	11/1/2005	37 to 40 ft bml	Subtidal	8.16	0.5
Pier25-16	11/22/2005	84.4 to 87.4 ft bml	Subtidal	8.16	0.5
34-50	4/10/2006	50 ft bgs	Upland	8.16	0.5
59-25	4/12/2006	25 ft bgs	Upland	8.16	0.5
721-MW5-50	4/20/2006	50 ft bgs	Upland	8.16	0.5

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
721-MW6-50	7/24/2006	50 ft bgs	Upland	8.16	0.5
85C-160	7/20/2012	160 ft BGS	Upland	8.16	0.5
19-25	7/31/2002	25 ft bgs	Upland	8.15	0.4
21-48	8/4/2002	48 ft bgs	Upland	8.15	0.4
35-25	8/18/2003	25 ft bgs	Upland	8.15	0.4
44-25	2/9/2004	25 ft bgs	Upland	8.15	0.4
721-GP7	6/28/2004	50 ft bgs	Upland	8.15	0.4
36-25	5/10/2005	25 ft bgs	Upland	8.15	0.4
12-45	5/11/2005	45 ft bgs	Upland	8.15	0.4
Dock2-7	9/7/2005	33 to 36 ft bml	Subtidal	8.15	0.4
HYD-10	9/16/2005	55.3 to 58.3 ft bml	Subtidal	8.15	0.4
5106-10	11/2/2005	7 to 10 ft bml	Subtidal	8.15	0.4
Dock2-12	11/8/2005	12 to 15 ft bml	Subtidal	8.15	0.4
5106-16	11/14/2005	11 to 14 ft bml	Subtidal	8.15	0.4
5106-22	1/26/2006	70 to 73 ft bml	Subtidal	8.15	0.4
NL-16	5/19/2006	20 to 23 ft bml	Subtidal	8.15	0.4
T1-50	8/1/2006	50 ft bgs	Upland	8.15	0.4
12-45	12/3/2008	45 ft bgs	Upland	8.15	0.4
WW-A1R	8/23/2012	65 to 65 ft BML	Subtidal	8.15	0.4
721-MW5-50	8/25/2012	50 ft BGS	Upland	8.15	0.4
1-25	2/1/2003	25 ft bgs	Upland	8.14	0.4
59-25	8/19/2003	25 ft bgs	Upland	8.14	0.4
56-50	8/17/2004	50 ft bgs	Upland	8.14	0.4
EA-3	11/4/2005	150 to 153 ft bgs	Upland	8.14	0.4
Dock2-13	11/11/2005	84 to 87 ft bml	Subtidal	8.14	0.4
11-25	7/7/2006	25 ft bgs	Upland	8.14	0.4
721-MW5-25	7/24/2006	25 ft bgs	Upland	8.14	0.4
93C-25	7/17/2012	25 ft BGS	Upland	8.14	0.4
60-25	8/19/2003	25 ft bgs	Upland	8.13	0.4
22-70	2/5/2004	70 ft bgs	Upland	8.13	0.4
5106-21	1/10/2006	80.5 to 83.5 ft bml	Subtidal	8.13	0.4
5106-25	4/27/2006	9 to 13 ft bml	Intertidal	8.13	0.4
Pier25-31	5/10/2006	19 to 23 ft bgs	Upland	8.13	0.4
B-2	5/23/2006	68.5 ft bgs	Upland	8.13	0.4
C-9	5/24/2006	68.5 ft bgs	Upland	8.13	0.4
SP-2	9/14/2006	188 to 192 ft bgs	Upland	8.13	0.4
85C-50	7/20/2012	50 ft BGS	Upland	8.13	0.4
MW-G-DEEP	7/24/2013	82 to 84 ft BGS	Upland	8.12	0.4
25-25	1/26/2002	25 ft bgs	Upland	8.12	0.4
32-50R	11/9/2002	50 ft bgs	Upland	8.12	0.4
C-10	5/11/2003	68 ft bgs	Upland	8.12	0.4
55-100	2/18/2005	100 ft bgs	Upland	8.12	0.4

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
HYD-3	8/18/2005	131 to 134 ft bml	Subtidal	8.12	0.4
HYD-10	9/16/2005	65.3 to 68.3 ft bml	Subtidal	8.12	0.4
5106-12	10/12/2005	97 to 100 ft bml	Subtidal	8.12	0.4
Dock2-12	11/8/2005	22 to 25 ft bml	Subtidal	8.12	0.4
5106-16	11/15/2005	71 to 74 ft bml	Subtidal	8.12	0.4
5106-14	12/2/2005	77 to 80 ft bml	Subtidal	8.12	0.4
5106-14	12/3/2005	92 to 95 ft bml	Subtidal	8.12	0.4
5106-26	2/14/2006	12 to 15 ft bml	Intertidal	8.12	0.4
721-MW10-25	7/25/2006	25 ft bgs	Upland	8.12	0.4
42-25	8/10/2012	25 ft BGS	Upland	8.12	0.4
45-100	8/10/2012	100 ft BGS	Upland	8.12	0.4
C-6	8/2/2002	68.5 ft bgs	Upland	8.11	0.4
53-50	8/19/2003	50 ft bgs	Upland	8.11	0.4
721-GP4	6/29/2004	50 ft bgs	Upland	8.11	0.4
Pier25-11	10/7/2005	85 to 88 ft bml	Subtidal	8.11	0.4
5106-11	10/14/2005	92 to 95 ft bml	Subtidal	8.11	0.4
5106-2	1/30/2006	4 to 7 ft bml	Subtidal	8.11	0.4
NL-16	5/18/2006	5 to 8 ft bml	Subtidal	8.11	0.4
41-138	7/27/2006	138 ft bgs	Upland	8.11	0.4
NL-30	1/19/2007	11.5 to 14.5 ft bml	Subtidal	8.11	0.4
17C-25	8/6/2012	25 ft BGS	Upland	8.11	0.4
21C-130	6/21/2013	130 ft BGS	Upland	8.10	0.4
35-50	5/4/2002	50 ft bgs	Upland	8.10	0.4
ESI-2-6	11/16/2002	50 ft bgs	Upland	8.10	0.4
ESI-2-7	11/22/2002	100 ft bgs	Upland	8.10	0.4
ESI-2-25	12/3/2002	15 ft bgs	Upland	8.10	0.4
ESI-3-2	12/6/2002	100 ft bgs	Upland	8.10	0.4
ESI-3-9	12/10/2002	27 ft bgs	Upland	8.10	0.4
ESI-3-9	12/10/2002	50 ft bgs	Upland	8.10	0.4
ESI-4-2	12/13/2002	50 ft bgs	Upland	8.10	0.4
ESI-4-3	12/16/2002	50 ft bgs	Upland	8.10	0.4
ESI-4-8	12/16/2002	15 ft bgs	Upland	8.10	0.4
ESI-4-10	12/17/2002	50 ft bgs	Upland	8.10	0.4
T1-100	2/1/2003	100 ft bgs	Upland	8.10	0.4
T1-100	2/10/2003	100 ft bgs	Upland	8.10	0.4
ESI-2-38	1/21/2004	15 ft bgs	Upland	8.10	0.4
ESI-2-48	1/21/2004	15 ft bgs	Upland	8.10	0.4
ESI-1-7	2/3/2004	15 ft bgs	Upland	8.10	0.4
Dock2-12	11/8/2005	7 to 10 ft bml	Subtidal	8.10	0.4
WW-A3	4/21/2006	24 to 27 ft bgs	Upland	8.10	0.4
32-100	5/1/2006	100 ft bgs	Upland	8.10	0.4
T1-25	8/1/2006	25 ft bgs	Upland	8.10	0.4

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
82-230	6/21/2010	205 to 210 ft BGS	Upland	8.10	0.4
77C-75	7/16/2012	75 ft BGS	Upland	8.10	0.4
9-100	8/7/2012	100 ft BGS	Upland	8.10	0.4
Pier25-2	7/15/2005	66 to 69 ft bml	Subtidal	8.09	0.4
Pier25-7	8/24/2005	79.3 to 82.3 ft bml	Subtidal	8.09	0.4
Pier25-8	8/26/2005	84 to 87 ft bml	Subtidal	8.09	0.4
Dock2-7	9/7/2005	23 to 26 ft bml	Subtidal	8.09	0.4
Dock2-10	9/13/2005	32.6 to 35.6 ft bml	Subtidal	8.09	0.4
Pier25-16	11/22/2005	104.4 to 107.4 ft bml	Subtidal	8.09	0.4
Pier25-23	1/12/2006	93 to 96 ft bml	Subtidal	8.09	0.4
WW-A1	3/16/2006	6 to 8 ft bml	Subtidal	8.09	0.4
5106-27	4/10/2006	5 to 9 ft bml	Intertidal	8.09	0.4
SP-5	6/2/2006	9 to 12 ft bgs	Upland	8.09	0.4
12A-50	12/4/2008	50 ft bgs	Upland	8.09	0.4
53C-160	7/24/2012	160 ft BGS	Upland	8.09	0.4
44-25	8/10/2012	25 ft BGS	Upland	8.09	0.4
56-50	1/22/2002	50 ft bgs	Upland	8.08	0.4
GP-6	4/5/2004	50 ft bgs	Upland	8.08	0.4
56-50	5/12/2005	50 ft bgs	Upland	8.08	0.4
5106-15	11/16/2005	72 to 75 ft bml	Subtidal	8.08	0.4
Pier25-22	1/17/2006	20.1 to 23.1 ft bml	Subtidal	8.08	0.4
WW-A1	3/16/2006	11 to 14 ft bml	Subtidal	8.08	0.4
55-50	4/13/2006	50 ft bgs	Upland	8.08	0.4
WW-A4	4/27/2006	156 to 161 ft bgs	Upland	8.08	0.4
SP-6	6/5/2006	7 to 10 ft bgs	Upland	8.08	0.4
SP-4	9/22/2006	168 to 172 ft bgs	Upland	8.08	0.4
NTD-2	12/12/2006	23 to 25 ft bgs	Upland	8.08	0.4
44-50	12/15/2008	50 ft bgs	Upland	8.08	0.4
40A-50	12/5/2013	50 ft BGS	Upland	8.07	0.4
36-25	8/17/2003	25 ft bgs	Upland	8.07	0.4
721-MW5-15	7/19/2004	15 ft bgs	Upland	8.07	0.4
Pier25-3	8/17/2005	106.7 to 109.7 ft bml	Subtidal	8.07	0.4
Dock2-9	9/8/2005	39 to 42 ft bml	Subtidal	8.07	0.4
5106-3	9/22/2005	114 to 117 ft bml	Subtidal	8.07	0.4
5106-21	1/10/2006	70.5 to 73.5 ft bml	Subtidal	8.07	0.4
Pier25-26	1/23/2006	11.5 to 14.5 ft bml	Subtidal	8.07	0.4
WW-C3	4/4/2006	23 to 26 ft bgs	Upland	8.07	0.4
WW-C4	4/25/2006	11 to 13 ft bml	Subtidal	8.07	0.4
WW-C4	4/25/2006	37.6 to 39.6 ft bml	Subtidal	8.07	0.4
SP-3	6/14/2006	7 to 10 ft bgs	Upland	8.07	0.4
34-100	7/12/2006	100 ft bgs	Upland	8.07	0.4
61C-160	11/12/2013	160 ft BGS	Upland	8.06	0.4

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
35-50	8/6/2002	50 ft bgs	Upland	8.06	0.4
C-7	8/8/2002	68.5 ft bgs	Upland	8.06	0.4
56-50	5/13/2003	50 ft bgs	Upland	8.06	0.4
71-50	2/10/2004	50 ft bgs	Upland	8.06	0.4
721-MW10-50	7/21/2004	50 ft bgs	Upland	8.06	0.4
43-25	2/8/2005	25 ft bgs	Upland	8.06	0.4
Pier25-3	8/16/2005	86.7 to 89.7 ft bml	Subtidal	8.06	0.4
5106-12	10/12/2005	77 to 80 ft bml	Subtidal	8.06	0.4
5106-11	10/14/2005	47 to 50 ft bml	Subtidal	8.06	0.4
5106-21	1/11/2006	85.5 to 88.5 ft bml	Subtidal	8.06	0.4
5106-23	2/13/2006	77 to 80 ft bml	Intertidal	8.06	0.4
5106-27	4/12/2006	79 to 83 ft bml	Intertidal	8.06	0.4
11-25	4/15/2006	25 ft bgs	Upland	8.06	0.4
WW-C4	4/26/2006	123.6 to 125.6 ft bml	Subtidal	8.06	0.4
41C-160	7/17/2012	160 ft BGS	Upland	8.06	0.4
78C-75	7/19/2012	75 ft BGS	Upland	8.06	0.4
17C-160	8/7/2012	160 ft BGS	Upland	8.06	0.4
MW-F-DEEP	7/2/2013	117 to 119 ft BGS	Upland	8.05	0.4
36-25	5/13/2003	25 ft bgs	Upland	8.05	0.4
C-10	11/12/2003	68 ft bgs	Upland	8.05	0.4
56-50	5/12/2004	50 ft bgs	Upland	8.05	0.4
721-GP5	6/23/2004	50 ft bgs	Upland	8.05	0.4
Pier25-8	8/26/2005	74 to 77 ft bml	Subtidal	8.05	0.4
Dock2-11	10/20/2005	82 to 85 ft bml	Subtidal	8.05	0.4
EA-2	10/20/2005	145 to 148 ft bgs	Upland	8.05	0.4
25A-25	4/10/2006	25 ft bgs	Upland	8.05	0.4
35-25	12/8/2008	25 ft bgs	Upland	8.05	0.4
12-45	5/7/2003	45 ft bgs	Upland	8.04	0.3
Pier25-5	8/16/2005	66.5 to 69.5 ft bml	Subtidal	8.04	0.3
5106-20	1/5/2006	73.5 to 76.5 ft bml	Subtidal	8.04	0.3
Pier25-27	1/19/2006	50.5 to 53.5 ft bml	Subtidal	8.04	0.3
5106-22	1/26/2006	60 to 63 ft bml	Subtidal	8.04	0.3
5106-27	4/11/2006	49 to 53 ft bml	Intertidal	8.04	0.3
5106-25	4/18/2006	59 to 63 ft bml	Intertidal	8.04	0.3
NL-16	5/18/2006	8 to 11 ft bml	Subtidal	8.04	0.3
10-100	8/20/2012	100 ft BGS	Upland	8.04	0.3
11-183	8/7/2002	183 ft bgs	Upland	8.03	0.3
36-50	11/11/2002	50 ft bgs	Upland	8.03	0.3
35-25	2/6/2003	25 ft bgs	Upland	8.03	0.3
721-GP2	6/21/2004	50 ft bgs	Upland	8.03	0.3
56-50	11/15/2004	50 ft bgs	Upland	8.03	0.3
71-50	2/19/2005	50 ft bgs	Upland	8.03	0.3

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
5106-1	9/27/2005	6 to 9 ft bml	Subtidal	8.03	0.3
Pier25-21	1/3/2006	30.5 to 33.5 ft bml	Subtidal	8.03	0.3
Pier25-29	2/7/2006	82 to 85 ft bml	Subtidal	8.03	0.3
709-MW20-50	7/21/2006	50 ft bgs	Upland	8.03	0.3
74-75	8/20/2012	75 ft BGS	Upland	8.03	0.3
46C-160	8/22/2012	160 ft BGS	Upland	8.03	0.3
61C-160	12/19/2013	160 ft BGS	Upland	8.02	0.3
MW-G-DEEP	7/24/2013	92 to 94 ft BGS	Upland	8.02	0.3
53-50	1/27/2002	50 ft bgs	Upland	8.02	0.3
36-50	8/5/2002	50 ft bgs	Upland	8.02	0.3
C-10	11/5/2002	68 ft bgs	Upland	8.02	0.3
5106-7	8/11/2005	71 to 74 ft bml	Subtidal	8.02	0.3
HYD-4	9/26/2005	116 to 119 ft bml	Subtidal	8.02	0.3
5106-9	11/2/2005	77 to 80 ft bml	Subtidal	8.02	0.3
5106-9	11/2/2005	97 to 100 ft bml	Subtidal	8.02	0.3
5106-16	11/15/2005	81 to 84 ft bml	Subtidal	8.02	0.3
5106-16	11/15/2005	91 to 94 ft bml	Subtidal	8.02	0.3
Pier25-23	1/12/2006	103 to 106 ft bml	Subtidal	8.02	0.3
Pier25-24	1/13/2006	94.1 to 97.1 ft bml	Subtidal	8.02	0.3
WW-A1	3/16/2006	20.2 to 22.2 ft bml	Subtidal	8.02	0.3
76-100	4/22/2006	100 ft bgs	Upland	8.02	0.3
SP-7	6/28/2006	18 to 21 ft bgs	Upland	8.02	0.3
NL-30	1/19/2007	16.5 to 19.5 ft bml	Subtidal	8.02	0.3
53-50	11/9/2002	50 ft bgs	Upland	8.01	0.3
53-50	2/1/2003	50 ft bgs	Upland	8.01	0.3
56-50	8/17/2003	50 ft bgs	Upland	8.01	0.3
56-50	11/18/2003	50 ft bgs	Upland	8.01	0.3
56-50	2/11/2004	50 ft bgs	Upland	8.01	0.3
12-45	2/13/2004	45 ft bgs	Upland	8.01	0.3
HYD-3	8/12/2005	61 to 64 ft bml	Subtidal	8.01	0.3
Pier25-3	8/16/2005	66.7 to 69.7 ft bml	Subtidal	8.01	0.3
HYD-2	8/30/2005	48 to 51 ft bml	Subtidal	8.01	0.3
Pier25-10	10/27/2005	86 to 89 ft bml	Subtidal	8.01	0.3
Pier25-17	11/21/2005	103.7 to 106.7 ft bml	Subtidal	8.01	0.3
Pier25-19	12/8/2005	92.6 to 95.6 ft bml	Subtidal	8.01	0.3
Pier25-18	12/9/2005	42 to 45 ft bml	Subtidal	8.01	0.3
NL-13	12/21/2005	27 to 30 ft bml	Intertidal	8.01	0.3
65-130	7/27/2010	130 ft BGS	Upland	8.01	0.3
11-45	12/10/2013	45 ft BGS	Upland	8.00	0.3
ESI-2-13	11/30/2002	15 ft bgs	Upland	8.00	0.3
ESI-2-13	12/2/2002	99 ft bgs	Upland	8.00	0.3
ESI-3-12	12/11/2002	25 ft bgs	Upland	8.00	0.3

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
ESI-4-9	12/15/2002	15 ft bgs	Upland	8.00	0.3
ESI-3-16	12/17/2002	50 ft bgs	Upland	8.00	0.3
36-25	2/9/2003	25 ft bgs	Upland	8.00	0.3
ESI-2-45	1/24/2004	50 ft bgs	Upland	8.00	0.3
ESI-1-6	2/4/2004	15 ft bgs	Upland	8.00	0.3
67-25	7/15/2004	25 ft bgs	Upland	8.00	0.3
12-45	8/16/2004	45 ft bgs	Upland	8.00	0.3
EA-1	9/27/2005	86.5 to 89.5 ft bgs	Upland	8.00	0.3
WW-C2	3/30/2006	78.9 to 81.9 ft bml	Subtidal	8.00	0.3
WMUA-14	8/8/2006	21.5 to 22.5 ft bgs	Upland	8.00	0.3
SP-3	9/29/2006	178 to 182 ft bgs	Upland	8.00	0.3
721-MW9-50	7/22/2012	50 ft BGS	Upland	8.00	0.3
87C-160	7/24/2012	160 ft BGS	Upland	8.00	0.3
C-9	5/11/2003	68.5 ft bgs	Upland	7.99	0.3
42-25	5/10/2005	25 ft bgs	Upland	7.99	0.3
Pier25-3	8/16/2005	56.7 to 59.7 ft bml	Subtidal	7.99	0.3
HYD-8	9/13/2005	12 to 15 ft bml	Subtidal	7.99	0.3
HYD-8	9/14/2005	42 to 45 ft bml	Subtidal	7.99	0.3
5106-3	9/22/2005	99 to 102 ft bml	Subtidal	7.99	0.3
PT-13A	11/10/2005	131.9 to 134.9 ft bml	Subtidal	7.99	0.3
NL-15	12/19/2005	21 to 24 ft bml	Intertidal	7.99	0.3
Pier25-29	2/6/2006	12 to 15 ft bml	Subtidal	7.99	0.3
25-25	4/13/2006	25 ft bgs	Upland	7.99	0.3
34-100	5/1/2006	100 ft bgs	Upland	7.99	0.3
SP-8	7/13/2006	23 to 26 ft bgs	Upland	7.99	0.3
61C-50	7/17/2012	50 ft BGS	Upland	7.99	0.3
44-25	1/26/2002	25 ft bgs	Upland	7.98	0.3
C-5	8/2/2002	68.5 ft bgs	Upland	7.98	0.3
53-50	8/7/2002	50 ft bgs	Upland	7.98	0.3
Dock2-7	9/7/2005	28 to 31 ft bml	Subtidal	7.98	0.3
HYD-8	9/14/2005	52 to 55 ft bml	Subtidal	7.98	0.3
5106-19	1/16/2006	80.5 to 83.5 ft bml	Subtidal	7.98	0.3
Pier25-13	2/3/2006	120 to 123 ft bml	Subtidal	7.98	0.3
Pier25-29	2/7/2006	62 to 65 ft bml	Subtidal	7.98	0.3
721-MW10-25	4/19/2006	25 ft bgs	Upland	7.98	0.3
721-MW5-50	7/24/2006	50 ft bgs	Upland	7.98	0.3
T1-100	12/3/2008	100 ft bgs	Upland	7.98	0.3
53-25	12/8/2008	25 ft bgs	Upland	7.98	0.3
63-50	8/17/2003	50 ft bgs	Upland	7.97	0.3
43-25	2/7/2004	25 ft bgs	Upland	7.97	0.3
GP-9	3/24/2004	25 ft bgs	Upland	7.97	0.3
Dock2-14	10/31/2005	82 to 85 ft bml	Subtidal	7.97	0.3

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
Pier25-16	11/22/2005	94.4 to 97.4 ft bml	Subtidal	7.97	0.3
5106-27	4/10/2006	10 to 14 ft bml	Intertidal	7.97	0.3
T1-25	4/12/2006	25 ft bgs	Upland	7.97	0.3
5106-32	5/4/2006	29 to 33 ft bml	Subtidal	7.97	0.3
12-45	7/18/2006	45 ft bgs	Upland	7.97	0.3
NL-26	1/18/2007	21.5 to 24.5 ft bml	Subtidal	7.97	0.3
709-MW20-50	8/21/2012	50 ft BGS	Upland	7.97	0.3
1-25	1/24/2002	25 ft bgs	Upland	7.96	0.3
B-2	8/2/2002	68.5 ft bgs	Upland	7.96	0.3
36-50	11/18/2003	50 ft bgs	Upland	7.96	0.3
Dock2-8	8/23/2005	79 to 82 ft bml	Subtidal	7.96	0.3
HYD-2	8/29/2005	18 to 21 ft bml	Subtidal	7.96	0.3
HYD-1	8/31/2005	34 to 37 ft bml	Subtidal	7.96	0.3
HYD-8	9/14/2005	82 to 85 ft bml	Subtidal	7.96	0.3
5106-1	9/27/2005	15 to 18 ft bml	Subtidal	7.96	0.3
5106-9	11/2/2005	107 to 110 ft bml	Subtidal	7.96	0.3
Pier25-24	1/13/2006	74.1 to 77.1 ft bml	Subtidal	7.96	0.3
CH-3	7/28/2006	123 to 127 ft bgs	Upland	7.96	0.3
721-MW10-75	8/7/2012	75 ft BGS	Upland	7.96	0.3
12-160	6/27/2013	160 ft BGS	Upland	7.95	0.3
12-160	6/27/2013	160 ft BGS	Upland	7.95	0.3
53-50	2/5/2003	50 ft bgs	Upland	7.95	0.3
12-45	11/17/2003	45 ft bgs	Upland	7.95	0.3
721-GP6	6/28/2004	50 ft bgs	Upland	7.95	0.3
Pier25-1	7/26/2005	64.5 to 66.5 ft bml	Subtidal	7.95	0.3
Dock2-5	8/2/2005	27 to 30 ft bml	Subtidal	7.95	0.3
Pier25-4	8/13/2005	87.1 to 90.1 ft bml	Subtidal	7.95	0.3
Pier25-3	8/16/2005	76.7 to 79.7 ft bml	Subtidal	7.95	0.3
EA-2	10/11/2005	35 to 38 ft bgs	Upland	7.95	0.3
Pier25-9	10/25/2005	81.5 to 84.5 ft bml	Subtidal	7.95	0.3
Dock2-14	10/28/2005	22 to 25 ft bml	Subtidal	7.95	0.3
Pier25-27	1/19/2006	80.5 to 83.5 ft bml	Subtidal	7.95	0.3
Pier25-25	1/20/2006	10 to 13 ft bml	Subtidal	7.95	0.3
Pier25-30	1/27/2006	80 to 83 ft bml	Subtidal	7.95	0.3
Pier25-29	2/6/2006	22 to 25 ft bml	Subtidal	7.95	0.3
5106-32	5/3/2006	9 to 13 ft bml	Subtidal	7.95	0.3
11-45	7/20/2006	45 ft bgs	Upland	7.95	0.3
92C-130	7/18/2012	130 ft BGS	Upland	7.95	0.3
78C-100	7/19/2012	100 ft BGS	Upland	7.95	0.3
MW-G-DEEP	7/24/2013	72 to 74 ft BGS	Upland	7.94	0.3
32-50R	8/6/2002	50 ft bgs	Upland	7.94	0.3
5-100	11/6/2002	100 ft bgs	Upland	7.94	0.3

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
Dock2-5	8/2/2005	32 to 35 ft bml	Subtidal	7.94	0.3
Pier25-8	8/25/2005	14 to 17 ft bml	Subtidal	7.94	0.3
HYD-9	9/15/2005	92 to 95 ft bml	Subtidal	7.94	0.3
Pier25-21	1/4/2006	50.5 to 53.5 ft bml	Subtidal	7.94	0.3
5106-19	1/16/2006	70.5 to 73.5 ft bml	Subtidal	7.94	0.3
WW-A2	4/6/2006	74.4 to 76.4 ft bml	Subtidal	7.94	0.3
SP-6	8/24/2006	137 to 141 ft bgs	Upland	7.94	0.3
SP-7	8/31/2006	157 to 161 ft bgs	Upland	7.94	0.3
11-100	12/3/2008	100 ft bgs	Upland	7.94	0.3
77C-100	7/16/2012	100 ft BGS	Upland	7.94	0.3
WW-A1D	8/27/2012	22 to 22 ft BML	Subtidal	7.94	0.3
73-25	2/19/2005	25 ft bgs	Upland	7.93	0.3
57-50	5/12/2005	50 ft bgs	Upland	7.93	0.3
Pier25-3	8/17/2005	96.7 to 99.7 ft bml	Subtidal	7.93	0.3
Pier25-3	8/17/2005	126.7 to 129.7 ft bml	Subtidal	7.93	0.3
Pier25-11	10/8/2005	115 to 118 ft bml	Subtidal	7.93	0.3
Dock2-14	10/29/2005	62 to 65 ft bml	Subtidal	7.93	0.3
5106-9	11/2/2005	102 to 105 ft bml	Subtidal	7.93	0.3
Pier25-20	12/6/2005	12 to 15 ft bml	Subtidal	7.93	0.3
5106-30	4/25/2006	19 to 23 ft bml	Intertidal	7.93	0.3
709-MW21-25	7/27/2012	25 ft BGS	Upland	7.93	0.3
709-MW9-25	8/14/2012	25 ft BGS	Upland	7.93	0.3
74-100	8/20/2012	100 ft BGS	Upland	7.93	0.3
Dock2-3	7/25/2005	23 to 26 ft bml	Subtidal	7.92	0.3
Pier25-6	8/18/2005	85.9 to 88.9 ft bml	Subtidal	7.92	0.3
Dock2-8	8/22/2005	54 to 57 ft bml	Subtidal	7.92	0.3
5106-11	10/14/2005	67 to 70 ft bml	Subtidal	7.92	0.3
5106-9	11/1/2005	27 to 30 ft bml	Subtidal	7.92	0.3
Dock2-13	11/12/2005	94 to 97 ft bml	Subtidal	7.92	0.3
Pier25-21	1/4/2006	80.5 to 83.5 ft bml	Subtidal	7.92	0.3
5106-19	1/14/2006	20.5 to 23.5 ft bml	Subtidal	7.92	0.3
36-50	5/4/2002	50 ft bgs	Upland	7.91	0.3
C-6	8/1/2003	68.5 ft bgs	Upland	7.91	0.3
12-45	8/19/2003	45 ft bgs	Upland	7.91	0.3
53-25	8/19/2003	25 ft bgs	Upland	7.91	0.3
HYD-2	8/30/2005	58 to 61 ft bml	Subtidal	7.91	0.3
Dock2-7	9/7/2005	18 to 21 ft bml	Subtidal	7.91	0.3
Dock2-14	10/31/2005	72 to 75 ft bml	Subtidal	7.91	0.3
Pier25-20	12/6/2005	90 to 93 ft bml	Subtidal	7.91	0.3
5106-23	2/13/2006	82 to 85 ft bml	Intertidal	7.91	0.3
53-50	7/31/2006	50 ft bgs	Upland	7.91	0.3
T1-50	12/2/2008	50 ft bgs	Upland	7.91	0.3

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** $^{(1)}$
C-6	11/4/2002	68.5 ft bgs	Upland	7.90	0.3
ESI-2-26	11/30/2002	94 ft bgs	Upland	7.90	0.3
ESI-3-4	12/9/2002	15 ft bgs	Upland	7.90	0.3
ESI-3-10	12/10/2002	25 ft bgs	Upland	7.90	0.3
ESI-4-6	12/13/2002	25 ft bgs	Upland	7.90	0.3
ESI-4-6	12/13/2002	50 ft bgs	Upland	7.90	0.3
ESI-4-7	12/13/2002	50 ft bgs	Upland	7.90	0.3
ESI-4-9	12/15/2002	50 ft bgs	Upland	7.90	0.3
ESI-4-8	12/16/2002	25 ft bgs	Upland	7.90	0.3
ESI-2-46	1/26/2004	50 ft bgs	Upland	7.90	0.3
17-24	2/3/2004	24 ft bgs	Upland	7.90	0.3
ESI-1-8	2/3/2004	15 ft bgs	Upland	7.90	0.3
57-50	5/12/2004	50 ft bgs	Upland	7.90	0.3
41-100	2/16/2005	100 ft bgs	Upland	7.90	0.3
Pier25-2	7/14/2005	16 to 19 ft bml	Subtidal	7.90	0.3
Pier25-6	8/18/2005	75.9 to 78.9 ft bml	Subtidal	7.90	0.3
Dock2-7	9/7/2005	8 to 11 ft bml	Subtidal	7.90	0.3
Dock2-7	9/7/2005	13 to 16 ft bml	Subtidal	7.90	0.3
HYD-10	9/16/2005	45.3 to 48.3 ft bml	Subtidal	7.90	0.3
Dock2-14	10/29/2005	32 to 35 ft bml	Subtidal	7.90	0.3
5106-15	11/15/2005	101 to 104 ft bml	Subtidal	7.90	0.3
Pier25-20	12/6/2005	60 to 63 ft bml	Subtidal	7.90	0.3
5106-20	1/6/2006	83.5 to 86.5 ft bml	Subtidal	7.90	0.3
5106-28	4/20/2006	44 to 48 ft bml	Intertidal	7.90	0.3
721-MW10-50	7/25/2006	50 ft bgs	Upland	7.90	0.3
NL-26	1/17/2007	11.5 to 14.5 ft bml	Subtidal	7.90	0.3
65-100	7/27/2010	100 ft BGS	Upland	7.90	0.3
93C-75	7/17/2012	75 ft BGS	Upland	7.90	0.3
C-4	8/2/2002	68.5 ft bgs	Upland	7.89	0.2
12-45	2/6/2003	45 ft bgs	Upland	7.89	0.2
Dock2-12	11/8/2005	32 to 35 ft bml	Subtidal	7.89	0.2
Pier25-15	11/30/2005	39 to 42 ft bml	Subtidal	7.89	0.2
5106-23	2/10/2006	22 to 25 ft bml	Intertidal	7.89	0.2
12-100	4/26/2006	100 ft bgs	Upland	7.89	0.2
CH-2	8/4/2006	123 to 127 ft bgs	Upland	7.89	0.2
88C-130	7/30/2013	130 ft BGS	Upland	7.88	0.2
MW-G-DEEP	7/23/2013	62 to 64 ft BGS	Upland	7.88	0.2
B-2	2/1/2003	68.5 ft bgs	Upland	7.88	0.2
5106-12	10/12/2005	72 to 75 ft bml	Subtidal	7.88	0.2
Pier25-10	10/26/2005	26 to 29 ft bml	Subtidal	7.88	0.2
Dock2-14	10/29/2005	42 to 45 ft bml	Subtidal	7.88	0.2
Dock2-12	11/9/2005	62 to 65 ft bml	Subtidal	7.88	0.2
Pier25-30	1/26/2006	10 to 13 ft bml	Subtidal	7.88	0.2
NL-30	1/19/2007	21.5 to 24.5 ft bml	Subtidal	7.88	0.2
95C-100	7/19/2012	100 ft BGS	Upland	7.88	0.2
25-25	5/4/2002	25 ft bgs	Upland	7.87	0.2
35-25	5/4/2002	25 ft bgs	Upland	7.87	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ [(1)]***
GP-3	3/29/2004	25 ft bgs	Upland	7.87	0.2
5106-7	8/12/2005	81 to 84 ft bml	Subtidal	7.87	0.2
HYD-9	9/15/2005	72 to 75 ft bml	Subtidal	7.87	0.2
HYD-10	9/16/2005	75.3 to 78.3 ft bml	Subtidal	7.87	0.2
5106-3	9/22/2005	104 to 107 ft bml	Subtidal	7.87	0.2
Pier25-19	12/7/2005	52.6 to 55.6 ft bml	Subtidal	7.87	0.2
Pier25-18	12/9/2005	122 to 125 ft bml	Subtidal	7.87	0.2
5106-20	1/6/2006	88.5 to 91.5 ft bml	Subtidal	7.87	0.2
Pier25-29	2/6/2006	42 to 45 ft bml	Subtidal	7.87	0.2
5106-26	2/15/2006	57 to 60 ft bml	Intertidal	7.87	0.2
WW-B3	5/9/2006	11 to 13 ft bml	Intertidal	7.87	0.2
32-100	7/7/2006	100 ft bgs	Upland	7.87	0.2
SP-8	10/5/2006	164 to 168 ft bgs	Upland	7.87	0.2
11-183	2/1/2002	183 ft bgs	Upland	7.86	0.2
56-50	8/5/2002	50 ft bgs	Upland	7.86	0.2
56-50	2/12/2003	50 ft bgs	Upland	7.86	0.2
C-5	11/12/2003	68.5 ft bgs	Upland	7.86	0.2
C-6	11/12/2003	68.5 ft bgs	Upland	7.86	0.2
36-25	11/14/2003	25 ft bgs	Upland	7.86	0.2
53-25	2/12/2004	25 ft bgs	Upland	7.86	0.2
57-50	8/17/2004	50 ft bgs	Upland	7.86	0.2
HYD-3	8/10/2005	11 to 14 ft bml	Subtidal	7.86	0.2
Pier25-9	10/26/2005	121.5 to 124.5 ft bml	Subtidal	7.86	0.2
5106-9	11/1/2005	7 to 10 ft bml	Subtidal	7.86	0.2
5106-15	11/15/2005	52 to 55 ft bml	Subtidal	7.86	0.2
5106-13	11/30/2005	107 to 110 ft bml	Subtidal	7.86	0.2
Pier25-22	1/17/2006	10.1 to 13.1 ft bml	Subtidal	7.86	0.2
5106-23	2/10/2006	27 to 30 ft bml	Intertidal	7.86	0.2
WW-C2	3/30/2006	23.9 to 26.9 ft bml	Subtidal	7.86	0.2
5106-25	4/17/2006	49 to 53 ft bml	Intertidal	7.86	0.2
Pier25-33	5/9/2006	89 to 93 ft bgs	Upland	7.86	0.2
SP-5	8/1/2006	138 to 142 ft bgs	Upland	7.86	0.2
41C-75	7/16/2012	75 ft BGS	Upland	7.86	0.2
88C-75	8/16/2012	75 ft BGS	Upland	7.86	0.2
SB-B-DEEP	8/6/2013	72 to 74 ft BGS	Upland	7.85	0.2
43-25	1/22/2002	25 ft bgs	Upland	7.85	0.2
D-4	11/13/2003	104.9 ft bgs	Upland	7.85	0.2
Dock2-3	7/25/2005	13 to 16 ft bml	Subtidal	7.85	0.2
Dock2-3	7/25/2005	28 to 31 ft bml	Subtidal	7.85	0.2
5106-15	11/15/2005	12 to 15 ft bml	Subtidal	7.85	0.2
5106-13	11/28/2005	7 to 10 ft bml	Subtidal	7.85	0.2
Pier25-19	12/7/2005	82.6 to 85.6 ft bml	Subtidal	7.85	0.2
Pier25-16	12/12/2005	14.4 to 17.4 ft bml	Subtidal	7.85	0.2
5106-21	1/10/2006	65.5 to 68.5 ft bml	Subtidal	7.85	0.2
Pier25-24	1/13/2006	84.1 to 87.1 ft bml	Subtidal	7.85	0.2
5106-23	2/10/2006	12 to 15 ft bml	Intertidal	7.85	0.2
A-2A	5/23/2006	132.75 ft bgs	Upland	7.85	0.2
41-50	7/27/2006	50 ft bgs	Upland	7.85	0.2
Buffelen Production Wel	4/8/2010	450 ft bgs	Upland	7.85	0.2
17C-100	8/7/2012	100 ft BGS	Upland	7.85	0.2
12A-50	8/21/2012	50 ft BGS	Upland	7.85	0.2
40-75	12/5/2013	75 ft BGS	Upland	7.84	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
65-130	7/9/2013	130 ft BGS	Upland	7.84	0.2
65-130	7/9/2013	130 ft BGS	Upland	7.84	0.2
C-3	8/2/2002	68.5 ft bgs	Upland	7.84	0.2
57-50	2/12/2003	50 ft bgs	Upland	7.84	0.2
HYD-8	9/13/2005	32 to 35 ft bml	Subtidal	7.84	0.2
Dock2-12	11/8/2005	17 to 20 ft bml	Subtidal	7.84	0.2
Pier25-32	4/6/2006	54 to 58 ft bgs	Upland	7.84	0.2
34-25	7/12/2006	25 ft bgs	Upland	7.84	0.2
SP-2	9/13/2006	168 to 172 ft bgs	Upland	7.84	0.2
86C-100	7/25/2012	100 ft BGS	Upland	7.84	0.2
24-15	8/15/2012	15 ft BGS	Upland	7.84	0.2
MW-F-SHALLOW-NEW	12/4/2013		Upland	7.83	0.2
44-50	1/25/2002	50 ft bgs	Upland	7.83	0.2
B-2	11/4/2002	68.5 ft bgs	Upland	7.83	0.2
35-25	11/8/2002	25 ft bgs	Upland	7.83	0.2
57-50	2/11/2004	50 ft bgs	Upland	7.83	0.2
721-GP9	6/24/2004	50 ft bgs	Upland	7.83	0.2
HYD-3	8/10/2005	21 to 24 ft bml	Subtidal	7.83	0.2
Pier25-16	12/12/2005	7 to 10 ft bml	Subtidal	7.83	0.2
Pier25-25	1/20/2006	30 to 33 ft bml	Subtidal	7.83	0.2
5106-23	2/10/2006	17 to 20 ft bml	Intertidal	7.83	0.2
45-100	4/18/2006	100 ft bgs	Upland	7.83	0.2
78-50	4/25/2006	50 ft bgs	Upland	7.83	0.2
SP-8	7/13/2006	10 to 13 ft bgs	Upland	7.83	0.2
41-100	7/27/2006	100 ft bgs	Upland	7.83	0.2
NL-26	1/18/2007	16.5 to 19.5 ft bml	Subtidal	7.83	0.2
88C-100	8/16/2012	100 ft BGS	Upland	7.83	0.2
B-3	8/2/2002	68.5 ft bgs	Upland	7.82	0.2
56-50	11/11/2002	50 ft bgs	Upland	7.82	0.2
55-100	5/11/2005	100 ft bgs	Upland	7.82	0.2
Pier25-7	8/25/2005	119.3 to 122.3 ft bml	Subtidal	7.82	0.2
Dock2-7	9/7/2005	3 to 6 ft bml	Subtidal	7.82	0.2
HYD-9	9/15/2005	42 to 45 ft bml	Subtidal	7.82	0.2
5106-11	10/14/2005	72 to 75 ft bml	Subtidal	7.82	0.2
Dock2-11	10/21/2005	92 to 95 ft bml	Subtidal	7.82	0.2
Pier25-10	10/27/2005	76 to 79 ft bml	Subtidal	7.82	0.2
Dock2-14	10/31/2005	92 to 95 ft bml	Subtidal	7.82	0.2
5106-13	11/30/2005	102 to 105 ft bml	Subtidal	7.82	0.2
5106-22	1/26/2006	100 to 103 ft bml	Subtidal	7.82	0.2
Pier25-30	1/27/2006	30 to 33 ft bml	Subtidal	7.82	0.2
5106-32	5/4/2006	39 to 43 ft bml	Subtidal	7.82	0.2
T3-50	7/29/2012	50 ft BGS	Upland	7.82	0.2
12-45	1/30/2002	45 ft bgs	Upland	7.81	0.2
GP-13	4/1/2004	48 ft bgs	Upland	7.81	0.2
721-GP6	6/28/2004	25 ft bgs	Upland	7.81	0.2
721-MW5-25	7/19/2004	25 ft bgs	Upland	7.81	0.2
Dock2-8	8/23/2005	89 to 92 ft bml	Subtidal	7.81	0.2
Dock2-11	10/21/2005	102 to 105 ft bml	Subtidal	7.81	0.2
Pier25-14	11/16/2005	44.1 to 47.1 ft bml	Subtidal	7.81	0.2
Pier25-25	1/20/2006	20 to 23 ft bml	Subtidal	7.81	0.2
44-50	4/18/2006	50 ft bgs	Upland	7.81	0.2
SP-4	6/20/2006	9 to 12 ft bgs	Upland	7.81	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
SP-8	7/13/2006	18 to 21 ft bgs	Upland	7.81	0.2
WW-A1D	8/30/2012	97 to 97 ft BML	Subtidal	7.81	0.2
78C-130	8/3/2013	130 ft BGS	Upland	7.80	0.2
MW-H-01	6/20/2013	92 to 94 ft BGS	Upland	7.80	0.2
MW-H-01	6/20/2013	92 to 94 ft BGS	Upland	7.80	0.2
36-25	8/5/2002	25 ft bgs	Upland	7.80	0.2
ESI-2-24	11/25/2002	95 ft bgs	Upland	7.80	0.2
ESI-2-14	12/2/2002	100 ft bgs	Upland	7.80	0.2
ESI-3-2	12/5/2002	15 ft bgs	Upland	7.80	0.2
ESI-4-4	12/15/2002	25 ft bgs	Upland	7.80	0.2
ESI-4-5	12/15/2002	15 ft bgs	Upland	7.80	0.2
ESI-4-3	12/16/2002	23 ft bgs	Upland	7.80	0.2
B-2	11/12/2003	68.5 ft bgs	Upland	7.80	0.2
721-GP1	6/22/2004	15 ft bgs	Upland	7.80	0.2
721-GP7	6/28/2004	25 ft bgs	Upland	7.80	0.2
Dock2-2	7/12/2005	17.5 to 20.5 ft bml	Subtidal	7.80	0.2
HYD-1	9/1/2005	54 to 57 ft bml	Subtidal	7.80	0.2
Dock2-13	11/11/2005	4 to 7 ft bml	Subtidal	7.80	0.2
Pier25-21	1/4/2006	90.5 to 93.5 ft bml	Subtidal	7.80	0.2
SP-8	7/17/2006	78 to 81 ft bgs	Upland	7.80	0.2
SP-7	8/31/2006	147 to 151 ft bgs	Upland	7.80	0.2
SP-8	10/5/2006	154 to 158 ft bgs	Upland	7.80	0.2
74-50	8/20/2012	50 ft BGS	Upland	7.80	0.2
46-100	1/25/2002	100 ft bgs	Upland	7.79	0.2
11-45	1/27/2002	45 ft bgs	Upland	7.79	0.2
56-50	5/4/2002	50 ft bgs	Upland	7.79	0.2
T1-50	8/6/2002	50 ft bgs	Upland	7.79	0.2
C-7	11/13/2003	68.5 ft bgs	Upland	7.79	0.2
Pier25-2	7/15/2005	46 to 49 ft bml	Subtidal	7.79	0.2
Pier25-3	8/16/2005	46.7 to 49.7 ft bml	Subtidal	7.79	0.2
HYD-2	8/31/2005	108 to 111 ft bml	Subtidal	7.79	0.2
HYD-4	9/24/2005	66 to 69 ft bml	Subtidal	7.79	0.2
EA-1	10/7/2005	151.5 to 154.5 ft bgs	Upland	7.79	0.2
Pier25-24	1/12/2006	4.1 to 7.1 ft bml	Subtidal	7.79	0.2
Pier25-12	2/1/2006	20 to 23 ft bml	Subtidal	7.79	0.2
5106-26	2/14/2006	17 to 20 ft bml	Intertidal	7.79	0.2
WW-C2	3/30/2006	48.9 to 51.9 ft bml	Subtidal	7.79	0.2
WW-C2	3/31/2006	108.9 to 111.9 ft bml	Subtidal	7.79	0.2
3-100	4/22/2006	100 ft bgs	Upland	7.79	0.2
721-MW6-25	7/25/2012	25 ft BGS	Upland	7.79	0.2
MW-F-DEEP	7/1/2013	87 to 89 ft BGS	Upland	7.78	0.2
53-25	1/27/2002	25 ft bgs	Upland	7.78	0.2
T1-50	2/1/2003	50 ft bgs	Upland	7.78	0.2
C-7	2/9/2003	68.5 ft bgs	Upland	7.78	0.2
T1-50	2/10/2003	50 ft bgs	Upland	7.78	0.2
B-2	8/1/2003	68.5 ft bgs	Upland	7.78	0.2
C-9	8/1/2003	68.5 ft bgs	Upland	7.78	0.2
D-4	8/1/2003	104.9 ft bgs	Upland	7.78	0.2
Pier25-1	7/27/2005	74.5 to 76.5 ft bml	Subtidal	7.78	0.2
Pier25-2	8/19/2005	106 to 109 ft bml	Subtidal	7.78	0.2
HYD-2	8/29/2005	28 to 31 ft bml	Subtidal	7.78	0.2
HYD-9	9/15/2005	32 to 35 ft bml	Subtidal	7.78	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** $^{(1)}$
5106-12	10/12/2005	102 to 105 ft bml	Subtidal	7.78	0.2
5106-11	10/14/2005	57 to 60 ft bml	Subtidal	7.78	0.2
EA-3	10/24/2005	12 to 15 ft bgs	Upland	7.78	0.2
5106-10	11/4/2005	72 to 75 ft bml	Subtidal	7.78	0.2
5106-10	11/7/2005	102 to 105 ft bml	Subtidal	7.78	0.2
5106-19	1/17/2006	100.5 to 103.5 ft bml	Subtidal	7.78	0.2
5106-27	4/11/2006	30 to 34 ft bml	Intertidal	7.78	0.2
11-45	4/25/2006	45 ft bgs	Upland	7.78	0.2
A-6	5/23/2006	68.2 ft bgs	Upland	7.78	0.2
86C-130	7/25/2012	130 ft BGS	Upland	7.78	0.2
C-2	8/2/2002	68.5 ft bgs	Upland	7.77	0.2
Pier25-8	8/26/2005	34 to 47 ft bml	Subtidal	7.77	0.2
Pier25-17	12/12/2005	6.1 to 9.1 ft bml	Subtidal	7.77	0.2
Pier25-23	1/11/2006	13 to 16 ft bml	Subtidal	7.77	0.2
Pier25-26	1/24/2006	101.5 to 104.5 ft bml	Subtidal	7.77	0.2
Pier25-30	1/27/2006	60 to 63 ft bml	Subtidal	7.77	0.2
WW-C2	3/30/2006	12 to 15 ft bml	Subtidal	7.77	0.2
709-MW20-25	8/23/2012	25 ft BGS	Upland	7.77	0.2
721-MW5-75	8/25/2012	75 ft BGS	Upland	7.77	0.2
WW-A1D	8/28/2012	47 to 47 ft BML	Subtidal	7.77	0.2
B-2	5/11/2003	68.5 ft bgs	Upland	7.76	0.2
GP-11	3/25/2004	25 ft bgs	Upland	7.76	0.2
43-25	11/9/2004	25 ft bgs	Upland	7.76	0.2
57-50	11/15/2004	50 ft bgs	Upland	7.76	0.2
Pier25-6	8/18/2005	95.9 to 98.9 ft bml	Subtidal	7.76	0.2
Pier25-8	8/26/2005	24 to 27 ft bml	Subtidal	7.76	0.2
5106-10	11/3/2005	12 to 15 ft bml	Subtidal	7.76	0.2
5106-10	11/7/2005	112 to 115 ft bml	Subtidal	7.76	0.2
5106-20	1/4/2006	3.5 to 6.5 ft bml	Subtidal	7.76	0.2
WW-A4	4/27/2006	126 to 131 ft bgs	Upland	7.76	0.2
WW-B4	5/2/2006	90 to 92 ft bml	Intertidal	7.76	0.2
78-50	12/3/2008	50 ft bgs	Upland	7.76	0.2
7-100	8/8/2012	100 ft BGS	Upland	7.76	0.2
12-45	5/5/2002	45 ft bgs	Upland	7.75	0.2
C-5	8/1/2003	68.5 ft bgs	Upland	7.75	0.2
57-50	11/18/2003	50 ft bgs	Upland	7.75	0.2
Pier25-2	7/15/2005	56 to 59 ft bml	Subtidal	7.75	0.2
Pier25-3	8/17/2005	116.7 to 119.7 ft bml	Subtidal	7.75	0.2
Dock2-8	8/23/2005	94 to 97 ft bml	Subtidal	7.75	0.2
Pier25-7	8/24/2005	59.3 to 62.3 ft bml	Subtidal	7.75	0.2
HYD-7	9/16/2005	110 to 113 ft bml	Subtidal	7.75	0.2
Dock2-14	10/29/2005	52 to 55 ft bml	Subtidal	7.75	0.2
EA-3	11/7/2005	155 to 158 ft bgs	Upland	7.75	0.2
WW-C2	3/30/2006	7 to 10 ft bml	Subtidal	7.75	0.2
57-50	4/6/2006	50 ft bgs	Upland	7.75	0.2
Pier25-33	5/9/2006	49 to 53 ft bgs	Upland	7.75	0.2
Pier25-31	5/11/2006	79 to 83 ft bgs	Upland	7.75	0.2
77C-25	7/16/2012	25 ft BGS	Upland	7.75	0.2
86C-75	7/25/2012	75 ft BGS	Upland	7.75	0.2
709-MW20-75	8/22/2012	75 ft BGS	Upland	7.75	0.2
89C-75	8/23/2012	75 ft BGS	Upland	7.75	0.2
WW-A1D	8/26/2012	11 to 11 ft BML	Subtidal	7.75	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
B-3	8/1/2003	68.5 ft bgs	Upland	7.74	0.2
C-8	11/13/2003	68.5 ft bgs	Upland	7.74	0.2
11-45	2/12/2004	45 ft bgs	Upland	7.74	0.2
Pier25-7	8/25/2005	129.3 to 132.3 ft bml	Subtidal	7.74	0.2
Dock2-14	10/28/2005	12 to 15 ft bml	Subtidal	7.74	0.2
5-100	8/8/2012	100 ft BGS	Upland	7.74	0.2
35-25	8/15/2012	25 ft BGS	Upland	7.74	0.2
34C-130	8/1/2013	130 ft BGS	Upland	7.73	0.2
34C-130	8/1/2013	130 ft BGS	Upland	7.73	0.2
C-6	2/1/2003	68.5 ft bgs	Upland	7.73	0.2
53-25	2/5/2003	25 ft bgs	Upland	7.73	0.2
43-25	5/7/2003	25 ft bgs	Upland	7.73	0.2
5-100	5/13/2003	100 ft bgs	Upland	7.73	0.2
721-GP4	6/29/2004	25 ft bgs	Upland	7.73	0.2
Pier25-2	8/19/2005	116 to 119 ft bml	Subtidal	7.73	0.2
Dock2-8	8/23/2005	84 to 87 ft bml	Subtidal	7.73	0.2
Dock2-13	11/11/2005	14 to 17 ft bml	Subtidal	7.73	0.2
5106-16	11/14/2005	31 to 34 ft bml	Subtidal	7.73	0.2
Pier25-14	11/16/2005	54.1 to 57.1 ft bml	Subtidal	7.73	0.2
Pier25-20	12/6/2005	80 to 82 ft bml	Subtidal	7.73	0.2
5106-20	1/4/2006	13.5 to 16.5 ft bml	Subtidal	7.73	0.2
5106-20	1/5/2006	58.5 to 61.5 ft bml	Subtidal	7.73	0.2
5106-19	1/17/2006	110.5 to 113.5 ft bml	Subtidal	7.73	0.2
Pier25-29	2/6/2006	52 to 55 ft bml	Subtidal	7.73	0.2
5106-26	2/15/2006	62 to 65 ft bml	Intertidal	7.73	0.2
T1-100	4/12/2006	100 ft bgs	Upland	7.73	0.2
21-48	1/22/2002	48 ft bgs	Upland	7.72	0.2
C-8	8/8/2002	68.5 ft bgs	Upland	7.72	0.2
12-45	11/8/2002	45 ft bgs	Upland	7.72	0.2
17-24	2/1/2003	24 ft bgs	Upland	7.72	0.2
T1-100	2/10/2004	100 ft bgs	Upland	7.72	0.2
Pier25-5	8/15/2005	40.5 to 43.5 ft bml	Subtidal	7.72	0.2
HYD-2	8/29/2005	38 to 41 ft bml	Subtidal	7.72	0.2
EA-1	10/5/2005	136.5 to 139.5 ft bgs	Upland	7.72	0.2
Pier25-10	10/28/2005	106 to 109 ft bml	Subtidal	7.72	0.2
Pier25-28	1/24/2006	30 to 33 ft bml	Subtidal	7.72	0.2
5106-24	2/8/2006	12 to 15 ft bml	Intertidal	7.72	0.2
721-MW9-50	4/20/2006	50 ft bgs	Upland	7.72	0.2
SP-4	6/21/2006	58 to 61 ft bgs	Upland	7.72	0.2
HW-3	1/22/2007	9 to 11 ft bml	Subtidal	7.72	0.2
10-100	1/25/2002	100 ft bgs	Upland	7.71	0.2
Pier25-5	8/15/2005	50.5 to 53.5 ft bml	Subtidal	7.71	0.2
Pier25-7	8/24/2005	109.3 to 112.3 ft bml	Subtidal	7.71	0.2
HYD-10	9/16/2005	25.3 to 28.3 ft bml	Subtidal	7.71	0.2
Dock2-11	10/20/2005	42 to 45 ft bml	Subtidal	7.71	0.2
Pier25-20	12/6/2005	100 to 103 ft bml	Subtidal	7.71	0.2
5106-20	1/6/2006	93.5 to 96.5 ft bml	Subtidal	7.71	0.2
Pier25-23	1/11/2006	83 to 86 ft bml	Subtidal	7.71	0.2
Pier25-22	1/18/2006	70.1 to 73.1 ft bml	Subtidal	7.71	0.2
5106-22	1/26/2006	50 to 53 ft bml	Subtidal	7.71	0.2
35-100	4/27/2006	100 ft bgs	Upland	7.71	0.2
76-100	7/7/2006	100 ft bgs	Upland	7.71	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
17-24	1/23/2002	24 ft bgs	Upland	7.70	0.2
ESI-2-5	11/15/2002	97 ft bgs	Upland	7.70	0.2
ESI-2-22	11/26/2002	50 ft bgs	Upland	7.70	0.2
ESI-3-1	12/5/2002	25 ft bgs	Upland	7.70	0.2
ESI-3-1	12/5/2002	100 ft bgs	Upland	7.70	0.2
ESI-3-14	12/12/2002	25 ft bgs	Upland	7.70	0.2
ESI-4-1	12/16/2002	50 ft bgs	Upland	7.70	0.2
4-175R	8/20/2003	175 ft bgs	Upland	7.70	0.2
ESI-1-6	2/4/2004	50 ft bgs	Upland	7.70	0.2
GP-11	3/25/2004	50 ft bgs	Upland	7.70	0.2
Pier25-8	8/26/2005	104 to 107 ft bml	Subtidal	7.70	0.2
Dock2-14	10/31/2005	112 to 115 ft bml	Subtidal	7.70	0.2
Dock2-12	11/8/2005	52 to 55 ft bml	Subtidal	7.70	0.2
Pier25-30	1/27/2006	100 to 103 ft bml	Subtidal	7.70	0.2
Pier25-32	4/5/2006	44 to 47 ft bgs	Upland	7.70	0.2
12-100	4/27/2006	100 ft bgs	Upland	7.70	0.2
5106-32	5/4/2006	49 to 53 ft bml	Subtidal	7.70	0.2
43-25	12/9/2008	25 ft bgs	Upland	7.70	0.2
32-50R	8/24/2012	50 ft BGS	Upland	7.70	0.2
43-25	2/9/2003	25 ft bgs	Upland	7.69	0.2
36-100R	2/9/2005	100 ft bgs	Upland	7.69	0.2
Pier25-2	7/14/2005	6 to 9 ft bml	Subtidal	7.69	0.2
HYD-3	8/11/2005	41 to 44 ft bml	Subtidal	7.69	0.2
Pier25-4	8/12/2005	77.1 to 80.1 ft bml	Subtidal	7.69	0.2
Pier25-2	8/19/2005	146 to 149 ft bml	Subtidal	7.69	0.2
Dock2-6	9/6/2005	10.7 to 13.7 ft bml	Subtidal	7.69	0.2
HYD-7	9/16/2005	120 to 123 ft bml	Subtidal	7.69	0.2
5106-3	9/21/2005	64 to 67 ft bml	Subtidal	7.69	0.2
Pier25-18	12/9/2005	52 to 55 ft bml	Subtidal	7.69	0.2
Pier25-12	2/1/2006	10 to 13 ft bml	Subtidal	7.69	0.2
Pier25-32	4/4/2006	20 to 23 ft bgs	Upland	7.69	0.2
5106-25	4/14/2006	19 to 23 ft bml	Intertidal	7.69	0.2
65-130	4/17/2006	130 ft bgs	Upland	7.69	0.2
WW-B2	4/19/2006	106 to 108 ft bml	Subtidal	7.69	0.2
WW-A4	4/25/2006	46 to 51 ft bgs	Upland	7.69	0.2
CH-2	8/3/2006	98 to 102 ft bgs	Upland	7.69	0.2
61C-75	7/17/2012	75 ft BGS	Upland	7.69	0.2
84C-75	7/18/2012	75 ft BGS	Upland	7.69	0.2
WW-A1D	8/26/2012	6 to 6 ft BML	Subtidal	7.69	0.2
40-100R	12/5/2013	100 ft BGS	Upland	7.68	0.2
MW-H-01	6/21/2013	122 to 124 ft BGS	Upland	7.68	0.2
35-25	8/6/2002	25 ft bgs	Upland	7.68	0.2
36-25	11/11/2002	25 ft bgs	Upland	7.68	0.2
Pier25-3	8/17/2005	136.7 to 139.7 ft bml	Subtidal	7.68	0.2
Pier25-11	10/6/2005	35 to 38 ft bml	Subtidal	7.68	0.2
5106-6	10/18/2005	48 to 51 ft bml	Subtidal	7.68	0.2
5106-14	12/2/2005	72 to 75 ft bml	Subtidal	7.68	0.2
5106-14	12/5/2005	97 to 100 ft bml	Subtidal	7.68	0.2
Pier25-17	12/12/2005	15.5 to 18.5 ft bml	Subtidal	7.68	0.2
Pier25-15	12/22/2005	14.4 to 17.4 ft bml	Subtidal	7.68	0.2
5106-19	1/16/2006	50.5 to 53.5 ft bml	Subtidal	7.68	0.2
5106-24	2/9/2006	87 to 90 ft bml	Intertidal	7.68	0.2

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
5106-25	4/17/2006	39 to 43 ft bml	Intertidal	7.68	0.2
71-50	4/22/2006	50 ft bgs	Upland	7.68	0.2
T1-25	12/2/2008	25 ft bgs	Upland	7.68	0.2
85C-100	7/20/2012	100 ft BGS	Upland	7.68	0.2
MW-H-01	6/20/2013	102 to 104 ft BGS	Upland	7.67	0.1
T1-100	8/6/2002	100 ft bgs	Upland	7.67	0.1
Dock2-2	7/12/2005	22.5 to 25.5 ft bml	Subtidal	7.67	0.1
5106-8	8/9/2005	99 to 102 ft bml	Subtidal	7.67	0.1
HYD-3	8/11/2005	31 to 34 ft bml	Subtidal	7.67	0.1
Dock2-10	9/13/2005	37.6 to 40.6 ft bml	Subtidal	7.67	0.1
HYD-8	9/14/2005	72 to 75 ft bml	Subtidal	7.67	0.1
Dock2-11	10/21/2005	97 to 100 ft bml	Subtidal	7.67	0.1
5106-13	11/28/2005	12 to 15 ft bml	Subtidal	7.67	0.1
Pier25-21	1/3/2006	10.5 to 13.5 ft bml	Subtidal	7.67	0.1
Pier25-23	1/12/2006	113 to 116 ft bml	Subtidal	7.67	0.1
Pier25-6	2/4/2006	11 to 14 ft bml	Subtidal	7.67	0.1
Pier25-6	2/4/2006	21 to 24 ft bml	Subtidal	7.67	0.1
SP-2	9/18/2006	228 to 232 ft bgs	Upland	7.67	0.1
90C-160	6/26/2013	160 ft BGS	Upland	7.66	0.1
MW-F-DEEP	12/3/2013		Upland	7.66	0.1
MW-G-DEEP	7/25/2013	112 to 114 ft BGS	Upland	7.66	0.1
B-3	11/4/2002	68.5 ft bgs	Upland	7.66	0.1
B-3	5/12/2003	68.5 ft bgs	Upland	7.66	0.1
GP-5	4/5/2004	25 ft bgs	Upland	7.66	0.1
71-50	5/19/2005	50 ft bgs	Upland	7.66	0.1
5106-12	10/11/2005	52 to 55 ft bml	Subtidal	7.66	0.1
5106-10	11/7/2005	107 to 110 ft bml	Subtidal	7.66	0.1
Pier25-6	2/4/2006	41 to 44 ft bml	Subtidal	7.66	0.1
5106-26	2/15/2006	47 to 50 ft bml	Intertidal	7.66	0.1
40-50	4/13/2006	50 ft bgs	Upland	7.66	0.1
C-2	5/24/2006	68.5 ft bgs	Upland	7.66	0.1
78-25	12/3/2008	25 ft bgs	Upland	7.66	0.1
36-100R	12/5/2008	100 ft bgs	Upland	7.66	0.1
53-100	7/12/2013	100 ft BGS	Upland	7.65	0.1
42-25	2/1/2003	25 ft bgs	Upland	7.65	0.1
C-5	5/11/2003	68.5 ft bgs	Upland	7.65	0.1
43-25	5/11/2004	25 ft bgs	Upland	7.65	0.1
5106-8	8/9/2005	94 to 97 ft bml	Subtidal	7.65	0.1
Pier25-2	8/19/2005	126 to 129 ft bml	Subtidal	7.65	0.1
5106-12	10/12/2005	57 to 60 ft bml	Subtidal	7.65	0.1
Dock2-11	10/21/2005	87 to 90 ft bml	Subtidal	7.65	0.1
Pier25-9	10/25/2005	31.5 to 34.5 ft bml	Subtidal	7.65	0.1
EA-3	11/2/2005	125 to 128 ft bgs	Upland	7.65	0.1
Pier25-18	12/8/2005	12 to 15 ft bml	Subtidal	7.65	0.1
Pier25-23	1/11/2006	23 to 26 ft bml	Subtidal	7.65	0.1
Pier25-27	1/19/2006	10.5 to 13.5 ft bml	Subtidal	7.65	0.1
WW-C3	4/12/2006	128 to 131 ft bgs	Upland	7.65	0.1
MW-G-DEEP	7/23/2013	52 to 54 ft BGS	Upland	7.64	0.1
D-2	8/2/2002	68.5 ft bgs	Upland	7.64	0.1
57-50	8/17/2003	50 ft bgs	Upland	7.64	0.1
EA-1	10/6/2005	141.5 to 144.5 ft bgs	Upland	7.64	0.1
5106-16	11/14/2005	51 to 54 ft bml	Subtidal	7.64	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ*** [(1)]
5106-14	12/5/2005	107 to 110 ft bml	Subtidal	7.64	0.1
5106-20	1/4/2006	18.5 to 21.5 ft bml	Subtidal	7.64	0.1
Pier25-23	1/11/2006	63 to 66 ft bml	Subtidal	7.64	0.1
Pier25-27	1/19/2006	90.5 to 93.5 ft bml	Subtidal	7.64	0.1
WW-A1	3/20/2006	105.2 to 108.2 ft bml	Subtidal	7.64	0.1
5-100	4/6/2006	100 ft bgs	Upland	7.64	0.1
5106-27	4/11/2006	39 to 43 ft bml	Intertidal	7.64	0.1
WW-A3	4/26/2006	99 to 102 ft bgs	Upland	7.64	0.1
721-MW11-75	7/31/2012	75 ft BGS	Upland	7.64	0.1
T1-50	1/28/2002	50 ft bgs	Upland	7.63	0.1
B-1	8/2/2002	68.5 ft bgs	Upland	7.63	0.1
11-45	8/7/2002	45 ft bgs	Upland	7.63	0.1
C-5	2/1/2003	68.5 ft bgs	Upland	7.63	0.1
11-45	8/18/2003	45 ft bgs	Upland	7.63	0.1
C-4	11/12/2003	68.5 ft bgs	Upland	7.63	0.1
Pier25-6	8/19/2005	115.9 to 118.9 ft bml	Subtidal	7.63	0.1
Pier25-8	8/26/2005	124 to 127 ft bml	Subtidal	7.63	0.1
Dock2-9	9/8/2005	54 to 57 ft bml	Subtidal	7.63	0.1
EA-1	10/6/2005	146.5 to 149.5 ft bgs	Upland	7.63	0.1
Pier25-19	12/7/2005	12.6 to 15.6 ft bml	Subtidal	7.63	0.1
WW-B3	5/9/2006	59 to 61 ft bml	Intertidal	7.63	0.1
5-100	7/10/2006	100 ft bgs	Upland	7.63	0.1
SP-1	9/7/2006	158 to 162 ft bgs	Upland	7.63	0.1
SP-3	9/30/2006	188 to 192 ft bgs	Upland	7.63	0.1
21-25R	2/5/2004	25 ft bgs	Upland	7.62	0.1
GP-7	3/30/2004	50 ft bgs	Upland	7.62	0.1
43-25	5/10/2005	25 ft bgs	Upland	7.62	0.1
Pier25-5	8/15/2005	32 to 35 ft bml	Subtidal	7.62	0.1
Pier25-7	8/24/2005	29.3 to 32.3 ft bml	Subtidal	7.62	0.1
HYD-9	9/15/2005	82 to 85 ft bml	Subtidal	7.62	0.1
5106-12	10/11/2005	47 to 50 ft bml	Subtidal	7.62	0.1
Dock2-13	11/11/2005	54 to 57 ft bml	Subtidal	7.62	0.1
5106-22	1/26/2006	110 to 113 ft bml	Subtidal	7.62	0.1
5106-24	2/9/2006	92 to 95 ft bml	Intertidal	7.62	0.1
5106-26	2/15/2006	67 to 70 ft bml	Intertidal	7.62	0.1
4-175R	4/4/2006	175 ft bgs	Upland	7.62	0.1
11-100	4/24/2006	100 ft bgs	Upland	7.62	0.1
C-3	5/23/2006	68.5 ft bgs	Upland	7.62	0.1
41C-100	7/16/2012	100 ft BGS	Upland	7.62	0.1
92C-75	7/18/2012	75 ft BGS	Upland	7.62	0.1
D-3	8/2/2002	68.5 ft bgs	Upland	7.61	0.1
53-25	8/7/2002	25 ft bgs	Upland	7.61	0.1
T1-50	8/15/2003	50 ft bgs	Upland	7.61	0.1
4-175R	2/9/2004	175 ft bgs	Upland	7.61	0.1
721-MW9-15	7/20/2004	15 ft bgs	Upland	7.61	0.1
Pier25-1	7/1/2005	24.5 to 26.5 ft bml	Subtidal	7.61	0.1
Dock2-14	10/31/2005	102 to 105 ft bml	Subtidal	7.61	0.1
5106-14	12/2/2005	62 to 65 ft bml	Subtidal	7.61	0.1
Pier25-21	1/3/2006	20.5 to 23.5 ft bml	Subtidal	7.61	0.1
60-25	4/11/2006	25 ft bgs	Upland	7.61	0.1
55-100	4/13/2006	100 ft bgs	Upland	7.61	0.1
4-25R	4/19/2006	25 ft bgs	Upland	7.61	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
64-170	7/20/2006	170 ft bgs	Upland	7.61	0.1
12-25	12/3/2008	25 ft bgs	Upland	7.61	0.1
ESI-2-18	11/20/2002	100 ft bgs	Upland	7.60	0.1
ESI-2-21	11/24/2002	50 ft bgs	Upland	7.60	0.1
ESI-2-10	11/25/2002	50 ft bgs	Upland	7.60	0.1
ESI-2-14	12/2/2002	25 ft bgs	Upland	7.60	0.1
ESI-3-1	12/5/2002	15 ft bgs	Upland	7.60	0.1
ESI-3-16	12/17/2002	15 ft bgs	Upland	7.60	0.1
ESI-3-16	12/17/2002	25 ft bgs	Upland	7.60	0.1
C-4	2/1/2003	68.5 ft bgs	Upland	7.60	0.1
36-100R	2/10/2003	100 ft bgs	Upland	7.60	0.1
C-3	11/12/2003	68.5 ft bgs	Upland	7.60	0.1
41-100	2/13/2004	100 ft bgs	Upland	7.60	0.1
GP-6	4/2/2004	25 ft bgs	Upland	7.60	0.1
GP-14	7/7/2004	50 ft bgs	Upland	7.60	0.1
Dock2-2	7/12/2005	12.5 to 15.5 ft bml	Subtidal	7.60	0.1
Pier25-2	7/14/2005	36 to 39 ft bml	Subtidal	7.60	0.1
5106-5	9/12/2005	69 to 72 ft bml	Subtidal	7.60	0.1
HYD-7	9/16/2005	100 to 103 ft bml	Subtidal	7.60	0.1
Dock2-12	11/8/2005	27 to 30 ft bml	Subtidal	7.60	0.1
5106-15	11/15/2005	42 to 45 ft bml	Subtidal	7.60	0.1
Pier25-24	1/13/2006	104.1 to 107.1 ft bml	Subtidal	7.60	0.1
5106-26	2/14/2006	27 to 30 ft bml	Intertidal	7.60	0.1
65-100	4/11/2006	100 ft bgs	Upland	7.60	0.1
WMUA-15	8/7/2006	23.5 to 24.5 ft bgs	Upland	7.60	0.1
WMUL-02	6/12/2012	15 to 15 ft BGS	Upland	7.60	0.1
C-1	8/2/2002	68.5 ft bgs	Upland	7.59	0.1
GP-15	7/7/2004	50 ft bgs	Upland	7.59	0.1
66-15	7/10/2004	15 ft bgs	Upland	7.59	0.1
12-25	2/8/2005	25 ft bgs	Upland	7.59	0.1
Pier25-4	8/12/2005	37.1 to 40.1 ft bml	Subtidal	7.59	0.1
Pier25-7	8/24/2005	89.3 to 92.3 ft bml	Subtidal	7.59	0.1
HYD-1	9/1/2005	64 to 67 ft bml	Subtidal	7.59	0.1
5106-13	11/30/2005	97 to 100 ft bml	Subtidal	7.59	0.1
5106-26	2/14/2006	22 to 25 ft bml	Intertidal	7.59	0.1
WW-C1	3/7/2006	38.6 to 41.6 ft bml	Subtidal	7.59	0.1
WW-A2	4/5/2006	6 to 8 ft bml	Subtidal	7.59	0.1
WMUA-18	8/4/2006	38.5 to 39.5 ft bgs	Upland	7.59	0.1
12-45	8/5/2002	45 ft bgs	Upland	7.58	0.1
B-1	11/4/2002	68.5 ft bgs	Upland	7.58	0.1
13-49	2/1/2003	49 ft bgs	Upland	7.58	0.1
11-45	2/11/2003	45 ft bgs	Upland	7.58	0.1
C-6	5/11/2003	68.5 ft bgs	Upland	7.58	0.1
5106-19	1/16/2006	40.5 to 43.5 ft bml	Subtidal	7.58	0.1
Pier25-22	1/18/2006	80.1 to 83.1 ft bml	Subtidal	7.58	0.1
5106-24	2/8/2006	7 to 10 ft bml	Intertidal	7.58	0.1
5106-25	4/14/2006	29 to 33 ft bml	Intertidal	7.58	0.1
CH-4	7/26/2006	148 to 152 ft bgs	Upland	7.58	0.1
HW-3	1/22/2007	20 to 22 ft bml	Subtidal	7.58	0.1
43-50	8/28/2012	50 ft BGS	Upland	7.58	0.1
SB-B-DEEP	8/7/2013	92 to 94 ft BGS	Upland	7.57	0.1
Dock2-11	10/20/2005	37 to 40 ft bml	Subtidal	7.57	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
13-49	4/26/2006	49 ft bgs	Upland	7.57	0.1
3-100	7/17/2006	100 ft bgs	Upland	7.57	0.1
65-130	7/18/2006	130 ft bgs	Upland	7.57	0.1
72-50	12/4/2008	50 ft bgs	Upland	7.57	0.1
85C-130	7/20/2012	130 ft BGS	Upland	7.57	0.1
45-100	2/11/2004	100 ft bgs	Upland	7.56	0.1
5106-12	10/12/2005	112 to 115 ft bml	Subtidal	7.56	0.1
Pier25-14	11/16/2005	24.1 to 27.1 ft bml	Subtidal	7.56	0.1
5106-27	4/12/2006	69 to 73 ft bml	Intertidal	7.56	0.1
A-1	5/23/2006	68.3 ft bgs	Upland	7.56	0.1
95C-130	7/19/2012	130 ft BGS	Upland	7.56	0.1
34C-100	8/21/2012	100 ft BGS	Upland	7.56	0.1
36-25	4/30/2002	25 ft bgs	Upland	7.55	0.1
C-8	2/1/2003	68.5 ft bgs	Upland	7.55	0.1
GP-7	3/30/2004	25 ft bgs	Upland	7.55	0.1
66-50	7/10/2004	50 ft bgs	Upland	7.55	0.1
Pier25-1	7/27/2005	84.5 to 86.5 ft bml	Subtidal	7.55	0.1
Pier25-19	12/7/2005	22.6 to 25.6 ft bml	Subtidal	7.55	0.1
5106-20	1/4/2006	8.5 to 11.5 ft bml	Subtidal	7.55	0.1
5106-21	1/10/2006	60.5 to 63.5 ft bml	Subtidal	7.55	0.1
Pier25-26	1/24/2006	71.5 to 74.5 ft bml	Subtidal	7.55	0.1
Pier25-6	2/4/2006	31 to 34 ft bml	Subtidal	7.55	0.1
WW-B2	4/17/2006	20 to 22 ft bml	Subtidal	7.55	0.1
WW-A3	4/25/2006	74 to 77 ft bgs	Upland	7.55	0.1
WW-D1	4/28/2006	6 to 8 ft bml	Subtidal	7.55	0.1
SP-8	7/17/2006	68 to 71 ft bgs	Upland	7.55	0.1
53-100	7/31/2006	100 ft bgs	Upland	7.55	0.1
92C-160	7/18/2012	160 ft BGS	Upland	7.55	0.1
95-15	8/25/2012	15 ft BGS	Upland	7.55	0.1
MW-F-SHALLOW-NEW	10/11/2013	100.5 ft BGS	Upland	7.54	0.1
SB-B-DEEP	8/6/2013	82 to 84 ft BGS	Upland	7.54	0.1
7-100	2/1/2003	100 ft bgs	Upland	7.54	0.1
36-100R	5/13/2003	100 ft bgs	Upland	7.54	0.1
50-100	5/13/2003	100 ft bgs	Upland	7.54	0.1
5-100	5/11/2004	100 ft bgs	Upland	7.54	0.1
709-MW20-15	7/21/2004	15 ft bgs	Upland	7.54	0.1
43-25	8/14/2004	25 ft bgs	Upland	7.54	0.1
5-100	2/10/2005	100 ft bgs	Upland	7.54	0.1
Dock2-6	9/7/2005	35.7 to 38.7 ft bml	Subtidal	7.54	0.1
5106-12	10/12/2005	62 to 65 ft bml	Subtidal	7.54	0.1
5106-15	11/16/2005	62 to 65 ft bml	Subtidal	7.54	0.1
5106-13	11/28/2005	27 to 30 ft bml	Subtidal	7.54	0.1
4-25R	8/1/2006	25 ft bgs	Upland	7.54	0.1
WW-A1D	8/29/2012	77 to 77 ft BML	Subtidal	7.54	0.1
C-3	11/4/2002	68.5 ft bgs	Upland	7.53	0.1
721-MW6-25	7/19/2004	25 ft bgs	Upland	7.53	0.1
41-50	2/16/2005	50 ft bgs	Upland	7.53	0.1
HYD-3	8/17/2005	121 to 124 ft bml	Subtidal	7.53	0.1
Pier25-7	8/24/2005	99.3 to 102.3 ft bml	Subtidal	7.53	0.1
HYD-10	9/16/2005	35.3 to 38.3 ft bml	Subtidal	7.53	0.1
HYD-10	9/17/2005	105.3 to 108.3 ft bml	Subtidal	7.53	0.1
Dock2-11	10/20/2005	47 to 50 ft bml	Subtidal	7.53	0.1

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SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
Pier25-10	10/27/2005	36 to 39 ft bml	Subtidal	7.53	0.1
Pier25-30	1/27/2006	50 to 53 ft bml	Subtidal	7.53	0.1
5106-24	2/9/2006	82 to 85 ft bml	Intertidal	7.53	0.1
36-25	4/21/2006	25 ft bgs	Upland	7.53	0.1
B-1	5/23/2006	68.5 ft bgs	Upland	7.53	0.1
64-50	7/20/2006	50 ft bgs	Upland	7.53	0.1
MW-G-DEEP	7/25/2013	132 to 134 ft BGS	Upland	7.52	0.1
MW-G-DEEP	7/25/2013	132 to 134 ft BGS	Upland	7.52	0.1
MW-G-DEEP	7/29/2013	152 to 154 ft BGS	Upland	7.52	0.1
36-100R	8/5/2002	100 ft bgs	Upland	7.52	0.1
T1-25	2/1/2003	25 ft bgs	Upland	7.52	0.1
5-100	2/10/2003	100 ft bgs	Upland	7.52	0.1
T1-25	2/10/2003	25 ft bgs	Upland	7.52	0.1
C-4	8/1/2003	68.5 ft bgs	Upland	7.52	0.1
43-25	8/18/2003	25 ft bgs	Upland	7.52	0.1
721-MW9-50	7/20/2004	50 ft bgs	Upland	7.52	0.1
Dock2-2	7/11/2005	7.5 to 10.5 ft bml	Subtidal	7.52	0.1
Dock2-5	8/2/2005	17 to 20 ft bml	Subtidal	7.52	0.1
Pier25-8	8/26/2005	64 to 67 ft bml	Subtidal	7.52	0.1
5106-12	10/11/2005	42 to 45 ft bml	Subtidal	7.52	0.1
Dock2-11	10/20/2005	57 to 60 ft bml	Subtidal	7.52	0.1
5106-14	12/5/2005	102 to 105 ft bml	Subtidal	7.52	0.1
Pier25-20	12/6/2005	50 to 53 ft bml	Subtidal	7.52	0.1
Pier25-26	1/24/2006	81.5 to 84.5 ft bml	Subtidal	7.52	0.1
5106-24	2/8/2006	27 to 30 ft bml	Intertidal	7.52	0.1
5106-23	2/10/2006	7 to 10 ft bml	Intertidal	7.52	0.1
5106-26	2/16/2006	92 to 95 ft bml	Intertidal	7.52	0.1
12A-50	5/1/2006	50 ft bgs	Upland	7.52	0.1
WW-B4	5/1/2006	36 to 38 ft bml	Intertidal	7.52	0.1
71-50	7/20/2006	50 ft bgs	Upland	7.52	0.1
78C-25	7/19/2012	25 ft BGS	Upland	7.52	0.1
709-MW20-15	8/21/2012	15 ft BGS	Upland	7.52	0.1
721-MW5-15	8/25/2012	15 ft BGS	Upland	7.52	0.1
36-100R	7/23/2013	100 ft BGS	Upland	7.51	0.1
T1-25	1/28/2002	25 ft bgs	Upland	7.51	0.1
B-1	11/12/2003	68.5 ft bgs	Upland	7.51	0.1
40-50	2/15/2005	50 ft bgs	Upland	7.51	0.1
Dock2-2	7/12/2005	27.5 to 30.5 ft bml	Subtidal	7.51	0.1
5106-9	11/1/2005	22 to 25 ft bml	Subtidal	7.51	0.1
Pier25-19	12/8/2005	112.6 to 115.6 ft bml	Subtidal	7.51	0.1
Pier25-13	2/2/2006	20 to 23 ft bml	Subtidal	7.51	0.1
B-3	5/23/2006	68.5 ft bgs	Upland	7.51	0.1
BH-75	7/21/2006	23 to 26 ft bgs	Upland	7.51	0.1
BH-65	7/24/2006	97 to 100 ft bgs	Upland	7.51	0.1
84C-160	7/18/2012	160 ft BGS	Upland	7.51	0.1
4-175R	1/28/2002	175 ft bgs	Upland	7.50	0.1
A-4	8/2/2002	68.5 ft bgs	Upland	7.50	0.1
ESI-2-2	11/14/2002	100 ft bgs	Upland	7.50	0.1
ESI-2-10	11/24/2002	15 ft bgs	Upland	7.50	0.1
ESI-2-9	11/24/2002	50 ft bgs	Upland	7.50	0.1
ESI-4-9	12/15/2002	25 ft bgs	Upland	7.50	0.1
ESI-4-1	12/16/2002	25 ft bgs	Upland	7.50	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
ESI-3-15	12/17/2002	15 ft bgs	Upland	7.50	0.1
ESI-4-10	12/17/2002	25 ft bgs	Upland	7.50	0.1
D-3	2/1/2003	68.5 ft bgs	Upland	7.50	0.1
Pier25-7	8/24/2005	39.3 to 42.3 ft bml	Subtidal	7.50	0.1
Dock2-6	9/6/2005	25.7 to 28.7 ft bml	Subtidal	7.50	0.1
HYD-9	9/15/2005	22 to 25 ft bml	Subtidal	7.50	0.1
Dock2-11	10/20/2005	62 to 65 ft bml	Subtidal	7.50	0.1
Pier25-14	11/16/2005	34.1 to 37.1 ft bml	Subtidal	7.50	0.1
Pier25-17	11/17/2005	83.7 to 86.7 ft bml	Subtidal	7.50	0.1
5106-21	1/10/2006	55.5 to 58.5 ft bml	Subtidal	7.50	0.1
Pier25-22	1/17/2006	30.1 to 33.1 ft bml	Subtidal	7.50	0.1
5106-23	2/10/2006	32 to 35 ft bml	Intertidal	7.50	0.1
721-MW6-25	4/20/2006	25 ft bgs	Upland	7.50	0.1
WW-B3	5/10/2006	143 to 145 ft bml	Intertidal	7.50	0.1
NL-16	5/19/2006	11 to 14 ft bml	Subtidal	7.50	0.1
32-50R	7/12/2006	50 ft bgs	Upland	7.50	0.1
721-MW9-50	7/24/2006	50 ft bgs	Upland	7.50	0.1
4-175R	7/25/2006	175 ft bgs	Upland	7.50	0.1
SP-2	9/14/2006	208 to 212 ft bgs	Upland	7.50	0.1
709-MW20-25	12/1/2011	25 ft BGS	Upland	7.50	0.1
92C-50	7/18/2012	50 ft BGS	Upland	7.50	0.1
MW-H-01	6/20/2013	112 to 114 ft BGS	Upland	7.49	0.1
GP-10	3/26/2004	25 ft bgs	Upland	7.49	0.1
71-50	7/13/2004	50 ft bgs	Upland	7.49	0.1
Dock2-6	9/7/2005	30.7 to 33.7 ft bml	Subtidal	7.49	0.1
5106-13	11/28/2005	32 to 35 ft bml	Subtidal	7.49	0.1
Pier25-30	1/27/2006	90 to 93 ft bml	Subtidal	7.49	0.1
40A-50	4/13/2006	50 ft bgs	Upland	7.49	0.1
WW-B4	5/2/2006	80 to 82 ft bml	Intertidal	7.49	0.1
D-5	5/23/2006	116.55 ft bgs	Upland	7.49	0.1
SP-6	8/29/2006	177 to 181 ft bgs	Upland	7.49	0.1
64-25	12/4/2008	25 ft bgs	Upland	7.49	0.1
41C-25	7/16/2012	25 ft BGS	Upland	7.49	0.1
40A-100	12/10/2013	100 ft BGS	Upland	7.48	0.1
MW-EXT-9-DEEP	7/11/2013	82 to 84 ft BGS	Upland	7.48	0.1
45-100	2/1/2003	100 ft bgs	Upland	7.48	0.1
C-4	5/11/2003	68.5 ft bgs	Upland	7.48	0.1
C-8	8/1/2003	68.5 ft bgs	Upland	7.48	0.1
36-100R	2/12/2004	100 ft bgs	Upland	7.48	0.1
GP-8	3/31/2004	25 ft bgs	Upland	7.48	0.1
36-100R	8/17/2004	100 ft bgs	Upland	7.48	0.1
36-100R	11/13/2004	100 ft bgs	Upland	7.48	0.1
35-100	2/18/2005	100 ft bgs	Upland	7.48	0.1
73-25	5/19/2005	25 ft bgs	Upland	7.48	0.1
Pier25-2	7/14/2005	26 to 29 ft bml	Subtidal	7.48	0.1
HYD-9	9/14/2005	12 to 15 ft bml	Subtidal	7.48	0.1
Pier25-14	11/16/2005	74.1 to 77.1 ft bml	Subtidal	7.48	0.1
Pier25-27	1/19/2006	40.5 to 43.5 ft bml	Subtidal	7.48	0.1
Pier25-26	1/24/2006	91.5 to 94.5 ft bml	Subtidal	7.48	0.1
35-25	4/14/2006	25 ft bgs	Upland	7.48	0.1
WW-B2	4/17/2006	46 to 48 ft bml	Subtidal	7.48	0.1
WW-C4	4/25/2006	92.6 to 94.6 ft bml	Subtidal	7.48	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
WW-B3	5/9/2006	34 to 36 ft bml	Intertidal	7.48	0.1
D-3	5/24/2006	68.5 ft bgs	Upland	7.48	0.1
44-25	7/19/2006	25 ft bgs	Upland	7.48	0.1
WMUA-18	8/7/2006	26.5 to 27.5 ft bgs	Upland	7.48	0.1
64-50	8/15/2003	50 ft bgs	Upland	7.47	0.1
36-100R	8/17/2003	100 ft bgs	Upland	7.47	0.1
B-3	11/12/2003	68.5 ft bgs	Upland	7.47	0.1
721-MW8-15	7/20/2004	15 ft bgs	Upland	7.47	0.1
Dock2-2	7/13/2005	32.5 to 35.5 ft bml	Subtidal	7.47	0.1
Pier25-7	8/24/2005	19.3 to 22.3 ft bml	Subtidal	7.47	0.1
5106-5	9/10/2005	64 to 67 ft bml	Subtidal	7.47	0.1
5106-12	10/11/2005	37 to 40 ft bml	Subtidal	7.47	0.1
Dock2-13	11/11/2005	44 to 47 ft bml	Subtidal	7.47	0.1
Pier25-26	1/23/2006	21.5 to 24.5 ft bml	Subtidal	7.47	0.1
Pier25-30	1/27/2006	40 to 43 ft bml	Subtidal	7.47	0.1
A-4	5/23/2006	68.5 ft bgs	Upland	7.47	0.1
45-100	7/13/2006	100 ft bgs	Upland	7.47	0.1
88C-130	8/16/2012	130 ft BGS	Upland	7.47	0.1
61C-75	11/13/2013	75 ft BGS	Upland	7.46	0.1
94C-75	9/24/2013	75 ft BGS	Upland	7.46	0.1
4-25R	2/1/2003	25 ft bgs	Upland	7.46	0.1
C-3	2/1/2003	68.5 ft bgs	Upland	7.46	0.1
GP-15	7/7/2004	25 ft bgs	Upland	7.46	0.1
Pier25-1	7/1/2005	14.5 to 16.5 ft bml	Subtidal	7.46	0.1
Pier25-8	8/26/2005	114 to 117 ft bml	Subtidal	7.46	0.1
5106-12	10/12/2005	67 to 70 ft bml	Subtidal	7.46	0.1
5106-12	10/12/2005	107 to 110 ft bml	Subtidal	7.46	0.1
5106-24	2/9/2006	77 to 80 ft bml	Intertidal	7.46	0.1
SP-7	8/31/2006	167 to 171 ft bgs	Upland	7.46	0.1
45-100	1/26/2002	100 ft bgs	Upland	7.45	0.1
57-50	1/26/2002	50 ft bgs	Upland	7.45	0.1
D-4	8/8/2002	104.9 ft bgs	Upland	7.45	0.1
D-4	11/5/2002	104.9 ft bgs	Upland	7.45	0.1
12-25	11/15/2004	25 ft bgs	Upland	7.45	0.1
5106-6	10/18/2005	53 to 56 ft bml	Subtidal	7.45	0.1
Dock2-11	10/20/2005	52 to 55 ft bml	Subtidal	7.45	0.1
5106-9	11/1/2005	17 to 20 ft bml	Subtidal	7.45	0.1
Dock2-12	11/8/2005	47 to 50 ft bml	Subtidal	7.45	0.1
5106-19	1/13/2006	10.5 to 13.5 ft bml	Subtidal	7.45	0.1
Pier25-33	5/9/2006	59 to 63 ft bgs	Upland	7.45	0.1
A-3	5/23/2006	68.4 ft bgs	Upland	7.45	0.1
SP-6	6/6/2006	43 to 46 ft bgs	Upland	7.45	0.1
709-MW11-25	7/29/2012	25 ft BGS	Upland	7.45	0.1
94C-100	9/24/2013	100 ft BGS	Upland	7.44	0.1
MW-G-DEEP	7/25/2013	102 to 104 ft BGS	Upland	7.44	0.1
A-5	8/2/2002	69.3 ft bgs	Upland	7.44	0.1
64-50	11/15/2003	50 ft bgs	Upland	7.44	0.1
43-50	2/8/2005	50 ft bgs	Upland	7.44	0.1
Pier25-1	7/5/2005	44.5 to 46.5 ft bml	Subtidal	7.44	0.1
5106-7	8/11/2005	46 to 49 ft bml	Subtidal	7.44	0.1
Pier25-6	8/18/2005	105.9 to 108.9 ft bml	Subtidal	7.44	0.1
5106-11	10/14/2005	62 to 65 ft bml	Subtidal	7.44	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	***Sample Date***	***Depth (ft BML)***	***Tidal Zone***	***pH, field s.u.***	***pH SQ (1)***
Dock2-13	11/11/2005	24 to 27 ft bml	Subtidal	7.44	0.1
Pier25-19	12/8/2005	102.6 to 105.6 ft bml	Subtidal	7.44	0.1
Pier25-26	1/23/2006	41.5 to 44.5 ft bml	Subtidal	7.44	0.1
WW-C1	3/6/2006	13.6 to 16.6 ft bml	Subtidal	7.44	0.1
78-50	7/21/2006	50 ft bgs	Upland	7.44	0.1
SP-4	9/22/2006	158 to 162 ft bgs	Upland	7.44	0.1
93C-100	7/17/2012	100 ft BGS	Upland	7.44	0.1
95C-50	7/19/2012	50 ft BGS	Upland	7.44	0.1
83C-25	7/25/2012	25 ft BGS	Upland	7.44	0.1
34-75	8/20/2012	75 ft BGS	Upland	7.44	0.1
5106-8	8/8/2005	84 to 87 ft bml	Subtidal	7.43	0.1
Pier25-8	8/26/2005	54 to 57 ft bml	Subtidal	7.43	0.1
HYD-5	10/5/2005	74 to 84 ft bml	Subtidal	7.43	0.1
5106-9	11/1/2005	12 to 15 ft bml	Subtidal	7.43	0.1
5106-24	2/9/2006	62 to 65 ft bml	Intertidal	7.43	0.1
A-5	5/23/2006	69.3 ft bgs	Upland	7.43	0.1
D-2	5/24/2006	68.5 ft bgs	Upland	7.43	0.1
84C-160	6/20/2013	160 ft BGS	Upland	7.42	0.1
7-100	1/24/2002	100 ft bgs	Upland	7.42	0.1
4-175R	8/4/2002	175 ft bgs	Upland	7.42	0.1
4-175R	2/4/2003	175 ft bgs	Upland	7.42	0.1
GP-16	7/8/2004	25 ft bgs	Upland	7.42	0.1
Dock2-6	9/7/2005	40.7 to 43.7 ft bml	Subtidal	7.42	0.1
Pier25-9	10/26/2005	101.5 to 104.5 ft bml	Subtidal	7.42	0.1
PT-15A	11/11/2005	131 to 134 ft bml	Subtidal	7.42	0.1
Pier25-15	12/22/2005	4.4 to 7.4 ft bml	Subtidal	7.42	0.1
D-4	2/1/2003	104.9 ft bgs	Upland	7.41	0.1
4-25R	8/20/2003	25 ft bgs	Upland	7.41	0.1
D-3	11/13/2003	68.5 ft bgs	Upland	7.41	0.1
4-25R	2/9/2004	25 ft bgs	Upland	7.41	0.1
GP-1	4/1/2004	25 ft bgs	Upland	7.41	0.1
36-100R	5/12/2004	100 ft bgs	Upland	7.41	0.1
12-25	5/11/2005	25 ft bgs	Upland	7.41	0.1
5106-13	11/28/2005	17 to 20 ft bml	Subtidal	7.41	0.1
Pier25-26	1/23/2006	51.5 to 54.5 ft bml	Subtidal	7.41	0.1
5106-24	2/9/2006	57 to 60 ft bml	Intertidal	7.41	0.1
5106-23	2/13/2006	57 to 60 ft bml	Intertidal	7.41	0.1
5106-26	2/16/2006	87 to 90 ft bml	Intertidal	7.41	0.1
WW-B2	4/17/2006	12 to 14 ft bml	Subtidal	7.41	0.1
Pier25-31	5/12/2006	99 to 103 ft bgs	Upland	7.41	0.1
C-1	5/24/2006	68.5 ft bgs	Upland	7.41	0.1
MW-EXT-9-DEEP	7/12/2013	92 to 94 ft BGS	Upland	7.40	0.1
3-50	11/8/2002	50 ft bgs	Upland	7.40	0.1
ESI-2-8	11/21/2002	50 ft bgs	Upland	7.40	0.1
ESI-3-5	12/6/2002	25 ft bgs	Upland	7.40	0.1
ESI-4-5	12/15/2002	24 ft bgs	Upland	7.40	0.1
ESI-3-15	12/17/2002	25 ft bgs	Upland	7.40	0.1
4-175R	2/1/2003	175 ft bgs	Upland	7.40	0.1
B-1	2/1/2003	68.5 ft bgs	Upland	7.40	0.1
C-7	5/11/2003	68.5 ft bgs	Upland	7.40	0.1
5-100	11/12/2004	100 ft bgs	Upland	7.40	0.1
Dock2-3	7/25/2005	18 to 21 ft bml	Subtidal	7.40	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* $^{(1)}$
5106-13	11/28/2005	37 to 40 ft bml	Subtidal	7.40	0.1
5106-14	12/1/2005	22 to 25 ft bml	Subtidal	7.40	0.1
5106-23	2/13/2006	52 to 55 ft bml	Intertidal	7.40	0.1
5106-26	2/14/2006	32 to 35 ft bml	Intertidal	7.40	0.1
93C-160	6/24/2013	160 ft BGS	Upland	7.39	0.1
36-100R	1/26/2002	100 ft bgs	Upland	7.39	0.1
5-100	8/4/2002	100 ft bgs	Upland	7.39	0.1
C-3	5/11/2003	68.5 ft bgs	Upland	7.39	0.1
C-3	8/1/2003	68.5 ft bgs	Upland	7.39	0.1
21-25R	8/14/2003	25 ft bgs	Upland	7.39	0.1
62-50	8/18/2003	50 ft bgs	Upland	7.39	0.1
5-100	8/16/2004	100 ft bgs	Upland	7.39	0.1
Pier25-2	7/19/2005	96 to 99 ft bml	Subtidal	7.39	0.1
Dock2-6	9/6/2005	15.7 to 18.7 ft bml	Subtidal	7.39	0.1
Dock2-12	11/8/2005	42 to 45 ft bml	Subtidal	7.39	0.1
Pier25-25	1/20/2006	40 to 43 ft bml	Subtidal	7.39	0.1
5106-23	2/13/2006	47 to 50 ft bml	Intertidal	7.39	0.1
41C-50	7/16/2012	50 ft BGS	Upland	7.39	0.1
61C-100	7/17/2012	100 ft BGS	Upland	7.39	0.1
84C-100	7/18/2012	100 ft BGS	Upland	7.39	0.1
71-50	7/27/2012	50 ft BGS	Upland	7.39	0.1
T1-100	2/1/2002	100 ft bgs	Upland	7.38	0.1
35-100	8/6/2002	100 ft bgs	Upland	7.38	0.1
43-25	11/14/2003	25 ft bgs	Upland	7.38	0.1
5106-20	1/5/2006	43.5 to 46.5 ft bml	Subtidal	7.38	0.1
5106-24	2/9/2006	67 to 70 ft bml	Intertidal	7.38	0.1
5106-23	2/10/2006	37 to 40 ft bml	Intertidal	7.38	0.1
WW-C1	3/6/2006	11 to 13 ft bml	Subtidal	7.38	0.1
WW-A2	4/5/2006	11 to 13 ft bml	Subtidal	7.38	0.1
41-100	1/29/2002	100 ft bgs	Upland	7.37	0.1
71-25	2/10/2004	25 ft bgs	Upland	7.37	0.1
43-50	5/11/2005	50 ft bgs	Upland	7.37	0.1
Dock2-1	7/21/2005	23 to 26 ft bml	Subtidal	7.37	0.1
Pier25-4	8/12/2005	47.1 to 50.1 ft bml	Subtidal	7.37	0.1
Pier25-3	8/16/2005	36.7 to 39.7 ft bml	Subtidal	7.37	0.1
Dock2-9	9/8/2005	44 to 47 ft bml	Subtidal	7.37	0.1
Dock2-13	11/11/2005	34 to 37 ft bml	Subtidal	7.37	0.1
5106-13	11/28/2005	22 to 25 ft bml	Subtidal	7.37	0.1
5106-14	12/2/2005	67 to 70 ft bml	Subtidal	7.37	0.1
Pier25-20	12/6/2005	20 to 23 ft bml	Subtidal	7.37	0.1
5106-20	1/5/2006	23.5 to 26.5 ft bml	Subtidal	7.37	0.1
Pier25-27	1/19/2006	30.5 to 33.5 ft bml	Subtidal	7.37	0.1
41-100	4/15/2006	100 ft bgs	Upland	7.37	0.1
WW-B3	5/9/2006	6 to 8 ft bml	Intertidal	7.37	0.1
CH-1	7/21/2006	148 to 152 ft bgs	Upland	7.37	0.1
40-50	12/5/2013	50 ft BGS	Upland	7.36	0.1
MW-EXT-9-DEEP	7/15/2013	132 to 134 ft BGS	Upland	7.36	0.1
5-100	1/26/2002	100 ft bgs	Upland	7.36	0.1
B-4	8/2/2002	68.5 ft bgs	Upland	7.36	0.1
C-1	8/1/2003	68.5 ft bgs	Upland	7.36	0.1
12-25	11/17/2003	25 ft bgs	Upland	7.36	0.1
5-100	2/10/2004	100 ft bgs	Upland	7.36	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ (1)*
709-MW15-15	3/10/2004	15 ft bgs	Upland	7.36	0.1
GP-10	3/26/2004	46 ft bgs	Upland	7.36	0.1
GP-4	4/6/2004	56 ft bgs	Upland	7.36	0.1
72-50	7/12/2004	50 ft bgs	Upland	7.36	0.1
40-25	2/15/2005	25 ft bgs	Upland	7.36	0.1
36-100R	5/12/2005	100 ft bgs	Upland	7.36	0.1
Pier25-1	6/30/2005	3 to 5 ft bml	Subtidal	7.36	0.1
Pier25-23	1/11/2006	73 to 76 ft bml	Subtidal	7.36	0.1
Pier25-26	1/23/2006	31.5 to 34.5 ft bml	Subtidal	7.36	0.1
82-230	6/22/2010	225 to 230 ft BGS	Upland	7.36	0.1
WMUM-02	6/14/2012	15 to 15 ft BGS	Upland	7.36	0.1
84C-50	7/18/2012	50 ft BGS	Upland	7.36	0.1
709-MW18-15	7/26/2012	15 ft bgs	Upland	7.36	0.1
43-25	11/8/2002	25 ft bgs	Upland	7.35	0.1
B-1	5/12/2003	68.5 ft bgs	Upland	7.35	0.1
D-3	8/1/2003	68.5 ft bgs	Upland	7.35	0.1
Pier25-1	7/5/2005	34.5 to 36.5 ft bml	Subtidal	7.35	0.1
5106-8	8/9/2005	109 to 112 ft bml	Subtidal	7.35	0.1
HYD-9	9/15/2005	62 to 65 ft bml	Subtidal	7.35	0.1
Pier25-10	10/28/2005	116 to 119 ft bml	Subtidal	7.35	0.1
5106-16	11/15/2005	61 to 64 ft bml	Subtidal	7.35	0.1
Pier25-30	1/27/2006	20 to 23 ft bml	Subtidal	7.35	0.1
5106-24	2/8/2006	17 to 20 ft bml	Intertidal	7.35	0.1
5106-24	2/9/2006	72 to 75 ft bml	Intertidal	7.35	0.1
5106-26	2/15/2006	77 to 80 ft bml	Intertidal	7.35	0.1
78-25	4/25/2006	25 ft bgs	Upland	7.35	0.1
SP-1	6/23/2006	18 to 21 ft bgs	Upland	7.35	0.1
40A-50	12/3/2008	50 ft bgs	Upland	7.35	0.1
34C-130	8/20/2012	130 ft BGS	Upland	7.35	0.1
12-75	8/24/2012	75 ft BGS	Upland	7.35	0.1
MW-EXT-9-SHALLOW	9/27/2013	123 ft BGS	Upland	7.34	0.1
7-100	5/5/2002	100 ft bgs	Upland	7.34	0.1
21-25R	7/31/2002	25 ft bgs	Upland	7.34	0.1
A-6	8/2/2002	68.2 ft bgs	Upland	7.34	0.1
C-2	11/5/2002	68.5 ft bgs	Upland	7.34	0.1
Pier25-4	8/12/2005	67.1 to 70.1 ft bml	Subtidal	7.34	0.1
Pier25-7	8/24/2005	49.3 to 52.3 ft bml	Subtidal	7.34	0.1
EA-3	11/3/2005	130 to 133 ft bgs	Upland	7.34	0.1
Dock2-12	11/8/2005	57 to 60 ft bml	Subtidal	7.34	0.1
Pier25-16	11/21/2005	24.4 to 27.4 ft bml	Subtidal	7.34	0.1
36-100R	7/20/2006	100 ft bgs	Upland	7.34	0.1
95C-25	7/19/2012	25 ft BGS	Upland	7.34	0.1
61C-100	11/13/2013	100 ft BGS	Upland	7.33	0.1
MW-F-DEEP	7/2/2013	107 to 109 ft BGS	Upland	7.33	0.1
SB-B-DEEP	8/7/2013	112 to 114 ft BGS	Upland	7.33	0.1
4-25R	11/11/2002	25 ft bgs	Upland	7.33	0.1
A-5	2/1/2003	69.3 ft bgs	Upland	7.33	0.1
C-2	2/1/2003	68.5 ft bgs	Upland	7.33	0.1
45-100	2/12/2003	100 ft bgs	Upland	7.33	0.1
GP-8	3/31/2004	50 ft bgs	Upland	7.33	0.1
5106-21	1/6/2006	5.5 to 8.5 ft bml	Subtidal	7.33	0.1
5106-23	2/13/2006	62 to 65 ft bml	Intertidal	7.33	0.1

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SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
Pier25-31	5/11/2006	69 to 73 ft bgs	Upland	7.33	0.1
40A-50	7/21/2006	50 ft bgs	Upland	7.33	0.1
82-230	7/26/2010	227 to 232 ft BGS	Upland	7.33	0.1
77C-50	7/16/2012	50 ft BGS	Upland	7.33	0.1
721-MW11-25	7/31/2012	25 ft BGS	Upland	7.33	0.1
MW-EXT-9-DEEP	7/15/2013	142 to 144 ft BGS	Upland	7.32	0.1
36-100R	11/11/2002	100 ft bgs	Upland	7.32	0.1
36-100R	11/18/2003	100 ft bgs	Upland	7.32	0.1
Dock2-6	9/6/2005	20.7 to 23.7 ft bml	Subtidal	7.32	0.1
5106-6	10/18/2005	58 to 61 ft bml	Subtidal	7.32	0.1
EA-2	10/20/2005	135 to 138 ft bgs	Upland	7.32	0.1
Pier25-24	1/13/2006	114.1 to 117.1 ft bml	Subtidal	7.32	0.1
5106-26	2/14/2006	37 to 40 ft bml	Intertidal	7.32	0.1
73-25	4/21/2006	25 ft bgs	Upland	7.32	0.1
Pier25-33	5/8/2006	19 to 23 ft bgs	Upland	7.32	0.1
61C-25	7/17/2012	25 ft BGS	Upland	7.32	0.1
86C-160	7/25/2012	160 ft BGS	Upland	7.32	0.1
40-100R	7/25/2013	100 ft BGS	Upland	7.31	0.1
36-100R	5/4/2002	100 ft bgs	Upland	7.31	0.1
43-50	8/18/2003	50 ft bgs	Upland	7.31	0.1
40A-25	5/18/2005	25 ft bgs	Upland	7.31	0.1
64-170	4/28/2006	170 ft bgs	Upland	7.31	0.1
WW-B4	5/3/2006	145 to 147 ft bml	Intertidal	7.31	0.1
BH-71	8/10/2006	98 to 101 ft bgs	Upland	7.31	0.1
SP-1	9/8/2006	178 to 182 ft bgs	Upland	7.31	0.1
64-170	7/26/2012	170 ft BGS	Upland	7.31	0.1
MW-G-DEEP	9/25/2013	225 ft BGS	Upland	7.30	0.1
57-50	11/11/2002	50 ft bgs	Upland	7.30	0.1
ESI-2-17	11/19/2002	100 ft bgs	Upland	7.30	0.1
ESI-3-6	12/6/2002	25 ft bgs	Upland	7.30	0.1
D-2	2/1/2003	68.5 ft bgs	Upland	7.30	0.1
C-2	8/1/2003	68.5 ft bgs	Upland	7.30	0.1
A-6	11/12/2003	68.2 ft bgs	Upland	7.30	0.1
GP-12	4/2/2004	25 ft bgs	Upland	7.30	0.1
Pier25-2	7/18/2005	86 to 89 ft bml	Subtidal	7.30	0.1
5106-7	8/11/2005	66 to 69 ft bml	Subtidal	7.30	0.1
HYD-8	9/14/2005	62 to 65 ft bml	Subtidal	7.30	0.1
5106-16	11/14/2005	41 to 44 ft bml	Subtidal	7.30	0.1
5106-21	1/6/2006	10.5 to 13.5 ft bml	Subtidal	7.30	0.1
Pier25-26	1/24/2006	61.5 to 64.5 ft bml	Subtidal	7.30	0.1
WW-C1	3/6/2006	6 to 8 ft bml	Subtidal	7.30	0.1
WW-B4	5/2/2006	60 to 62 ft bml	Intertidal	7.30	0.1
5-100	12/2/2008	100 ft bgs	Upland	7.30	0.1
40-100R	8/21/2012	100 ft BGS	Upland	7.30	0.1
A-3	8/2/2002	68.4 ft bgs	Upland	7.29	0.1
64-25	8/15/2003	25 ft bgs	Upland	7.29	0.1
35-25	11/18/2003	25 ft bgs	Upland	7.29	0.1
Pier25-29	2/7/2006	92 to 95 ft bml	Subtidal	7.29	0.1
74-100	4/26/2006	100 ft bgs	Upland	7.29	0.1
WW-A4	4/26/2006	96 to 101 ft bgs	Upland	7.29	0.1
12-100	7/18/2006	100 ft bgs	Upland	7.29	0.1
61C-130	7/17/2012	130 ft BGS	Upland	7.29	0.1

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OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
34C-160	8/20/2012	160 ft BGS	Upland	7.29	0.1
SB-B-DEEP	8/7/2013	102 to 104 ft BGS	Upland	7.28	0.1
C-8	5/11/2003	68.5 ft bgs	Upland	7.28	0.1
B-1	8/1/2003	68.5 ft bgs	Upland	7.28	0.1
Dock2-6	9/6/2005	5.7 to 8.7 ft bml	Subtidal	7.28	0.1
Pier25-16	11/22/2005	114.4 to 117.4 ft bml	Subtidal	7.28	0.1
5106-20	1/5/2006	28.5 to 31.5 ft bml	Subtidal	7.28	0.1
5106-23	2/10/2006	42 to 45 ft bml	Intertidal	7.28	0.1
WW-B2	4/17/2006	7 to 9 ft bml	Subtidal	7.28	0.1
WW-D1	5/1/2006	20 to 22 ft bml	Subtidal	7.28	0.1
Pier25-33	5/9/2006	79 to 83 ft bgs	Upland	7.28	0.1
84C-130	7/18/2012	130 ft BGS	Upland	7.28	0.1
36-100R	8/1/2012	100 ft BGS	Upland	7.28	0.1
D-3	11/5/2002	68.5 ft bgs	Upland	7.27	0.1
C-1	2/1/2003	68.5 ft bgs	Upland	7.27	0.1
64-170	11/15/2003	170 ft bgs	Upland	7.27	0.1
73-25	7/12/2004	25 ft bgs	Upland	7.27	0.1
43-50	11/13/2004	50 ft bgs	Upland	7.27	0.1
HYD-3	8/15/2005	71 to 74 ft bml	Subtidal	7.27	0.1
HYD-1	9/1/2005	104 to 107 ft bml	Subtidal	7.27	0.1
5106-11	10/15/2005	102 to 105 ft bml	Subtidal	7.27	0.1
5106-24	2/9/2006	52 to 55 ft bml	Intertidal	7.27	0.1
5106-26	2/15/2006	42 to 45 ft bml	Intertidal	7.27	0.1
36-100R	4/6/2006	100 ft bgs	Upland	7.27	0.1
72-50	4/15/2006	50 ft bgs	Upland	7.27	0.1
5106-31	4/29/2006	59 to 63 ft bml	Intertidal	7.27	0.1
WW-B4	5/3/2006	115 to 117 ft bml	Intertidal	7.27	0.1
721-MW6-25	7/24/2006	25 ft bgs	Upland	7.27	0.1
34-25	12/8/2008	25 ft bgs	Upland	7.27	0.1
10-24	8/21/2012	24 ft BGS	Upland	7.27	0.1
MW-EXT-9-DEEP	7/12/2013	102 to 104 ft BGS	Upland	7.26	0.1
MW-H-01	6/21/2013	132 to 134 ft BGS	Upland	7.26	0.1
D-2	11/5/2002	68.5 ft bgs	Upland	7.26	0.1
B-4	5/12/2003	68.5 ft bgs	Upland	7.26	0.1
64-170	8/15/2003	170 ft bgs	Upland	7.26	0.1
40-50	5/18/2005	50 ft bgs	Upland	7.26	0.1
Pier25-21	1/4/2006	70.5 to 73.5 ft bml	Subtidal	7.26	0.1
43-50	7/20/2006	50 ft bgs	Upland	7.26	0.1
T1-25	8/6/2002	25 ft bgs	Upland	7.25	0.1
A-5	11/12/2003	69.3 ft bgs	Upland	7.25	0.1
Pier25-1	7/26/2005	54.5 to 56.5 ft bml	Subtidal	7.25	0.1
HYD-9	9/15/2005	52 to 55 ft bml	Subtidal	7.25	0.1
NL-15	12/19/2005	18 to 21 ft bml	Intertidal	7.25	0.1
5106-20	1/5/2006	33.5 to 36.5 ft bml	Subtidal	7.25	0.1
5106-21	1/10/2006	50.5 to 53.5 ft bml	Subtidal	7.25	0.1
5106-22	1/25/2006	10 to 13 ft bml	Subtidal	7.25	0.1
34-25	4/10/2006	25 ft bgs	Upland	7.25	0.1
WW-B4	5/1/2006	11 to 13 ft bml	Intertidal	7.25	0.1
64-25	7/20/2006	25 ft bgs	Upland	7.25	0.1
4-175R	7/27/2010	175 ft BGS	Upland	7.25	0.1
MW-F-INT	12/3/2013		Upland	7.24	0.1
21-25R	1/22/2002	25 ft bgs	Upland	7.24	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
41-50	8/7/2002	50 ft bgs	Upland	7.24	0.1
D-3	5/11/2003	68.5 ft bgs	Upland	7.24	0.1
64-25	11/15/2003	25 ft bgs	Upland	7.24	0.1
43-50	2/14/2004	50 ft bgs	Upland	7.24	0.1
Dock2-5	8/2/2005	22 to 25 ft bml	Subtidal	7.24	0.1
Pier25-8	8/26/2005	44 to 47 ft bml	Subtidal	7.24	0.1
5106-26	2/16/2006	82 to 85 ft bml	Intertidal	7.24	0.1
73-50	4/21/2006	50 ft bgs	Upland	7.24	0.1
SP-1	9/8/2006	188 to 192 ft bgs	Upland	7.24	0.1
95C-160	7/19/2012	160 ft BGS	Upland	7.24	0.1
WW-A1R	8/22/2012	30 to 30 ft BML	Subtidal	7.24	0.1
MW-F-DEEP	7/3/2013	137 to 139 ft BGS	Upland	7.23	0.1
A-2	8/2/2002	68.5 ft bgs	Upland	7.23	0.1
Dock2-1	7/21/2005	28 to 31 ft bml	Subtidal	7.23	0.1
HYD-10	9/16/2005	95.3 to 98.3 ft bml	Subtidal	7.23	0.1
Pier25-19	12/7/2005	42.6 to 45.6 ft bml	Subtidal	7.23	0.1
Pier25-24	1/12/2006	14.1 to 17.1 ft bml	Subtidal	7.23	0.1
5106-19	1/16/2006	60.5 to 63.5 ft bml	Subtidal	7.23	0.1
5106-24	2/8/2006	22 to 25 ft bml	Intertidal	7.23	0.1
WW-C4	4/24/2006	6 to 8 ft bml	Subtidal	7.23	0.1
35-100	7/19/2006	100 ft bgs	Upland	7.23	0.1
77C-130	7/16/2012	130 ft BGS	Upland	7.23	0.1
5-100	4/30/2002	100 ft bgs	Upland	7.22	0.1
C-2	5/11/2003	68.5 ft bgs	Upland	7.22	0.1
70-25	7/13/2004	25 ft bgs	Upland	7.22	0.1
40-25	5/18/2005	25 ft bgs	Upland	7.22	0.1
5106-21	1/9/2006	15.5 to 18.5 ft bml	Subtidal	7.22	0.1
5106-22	1/25/2006	20 to 23 ft bml	Subtidal	7.22	0.1
72-25	4/15/2006	25 ft bgs	Upland	7.22	0.1
WW-D1	4/30/2006	11 to 13 ft bml	Subtidal	7.22	0.1
B-4	5/23/2006	68.5 ft bgs	Upland	7.22	0.1
77-100	8/9/2006	100 ft bgs	Upland	7.22	0.1
43-50	12/8/2008	50 ft bgs	Upland	7.22	0.1
40-25	12/5/2013	25 ft BGS	Upland	7.21	0.1
40A-25	12/5/2013	25 ft BGS	Upland	7.21	0.1
A-5	11/4/2002	69.3 ft bgs	Upland	7.21	0.1
41-50	2/13/2004	50 ft bgs	Upland	7.21	0.1
12-25	5/11/2004	25 ft bgs	Upland	7.21	0.1
5106-7	8/11/2005	61 to 64 ft bml	Subtidal	7.21	0.1
HYD-1	8/31/2005	4 to 7 ft bml	Subtidal	7.21	0.1
5106-6	10/18/2005	63 to 66 ft bml	Subtidal	7.21	0.1
5106-14	12/1/2005	17 to 20 ft bml	Subtidal	7.21	0.1
5106-21	1/9/2006	30.5 to 33.5 ft bml	Subtidal	7.21	0.1
5106-21	1/10/2006	40.5 to 43.5 ft bml	Subtidal	7.21	0.1
Pier25-24	1/12/2006	44.1 to 47.1 ft bml	Subtidal	7.21	0.1
Pier25-13	2/2/2006	10 to 13 ft bml	Subtidal	7.21	0.1
WW-A2	4/7/2006	104.6 to 106.6 ft bml	Subtidal	7.21	0.1
WMUA-18	8/4/2006	13.5 to 14.5 ft bgs	Upland	7.21	0.1
40A-25	12/3/2008	25 ft bgs	Upland	7.21	0.1
721-MW9-15	7/22/2012	15 ft BGS	Upland	7.21	0.1
MW-G-INT	9/26/2013	171 ft BGS	Upland	7.20	0.1
40-50	11/12/2002	50 ft bgs	Upland	7.20	0.1

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
ESI-2-26	11/29/2002	15 ft bgs	Upland	7.20	0.1
ESI-2-14	12/2/2002	15 ft bgs	Upland	7.20	0.1
ESI-3-6	12/6/2002	15 ft bgs	Upland	7.20	0.1
ESI-3-13	12/11/2002	25 ft bgs	Upland	7.20	0.1
B-4	2/1/2003	68.5 ft bgs	Upland	7.20	0.1
D-4	5/11/2003	104.9 ft bgs	Upland	7.20	0.1
B-4	11/12/2003	68.5 ft bgs	Upland	7.20	0.1
Dock2-1	7/21/2005	38 to 41 ft bml	Subtidal	7.20	0.1
Pier25-24	1/12/2006	34.1 to 37.1 ft bml	Subtidal	7.20	0.1
5106-29	4/21/2006	9 to 13 ft bml	Intertidal	7.20	0.1
53-25	5/1/2006	25 ft bgs	Upland	7.20	0.1
T1-100	8/1/2006	100 ft bgs	Upland	7.20	0.1
T1-100	7/27/2010	100 ft BGS	Upland	7.20	0.1
84C-25	7/18/2012	25 ft BGS	Upland	7.20	0.1
WW-A1R	8/22/2012	55 to 55 ft BML	Subtidal	7.20	0.1
52-15	8/24/2012	15 ft BGS	Upland	7.20	0.1
88C-160	7/30/2013	160 ft BGS	Upland	7.19	0.0
93C-130	6/24/2013	130 ft BGS	Upland	7.19	0.0
MW-EXT-9-DEEP	7/11/2013	72 to 74 ft BGS	Upland	7.19	0.0
A-1	8/2/2002	68.3 ft bgs	Upland	7.19	0.0
A-4	11/4/2002	68.5 ft bgs	Upland	7.19	0.0
A-6	11/4/2002	68.2 ft bgs	Upland	7.19	0.0
53-25	2/1/2003	25 ft bgs	Upland	7.19	0.0
41-100	2/11/2003	100 ft bgs	Upland	7.19	0.0
57-50	5/13/2003	50 ft bgs	Upland	7.19	0.0
D-2	8/1/2003	68.5 ft bgs	Upland	7.19	0.0
709-MW5-15	3/9/2004	15 ft bgs	Upland	7.19	0.0
40A-25	2/16/2005	25 ft bgs	Upland	7.19	0.0
Pier25-17	11/17/2005	33.7 to 36.7 ft bml	Subtidal	7.19	0.0
Pier25-18	12/8/2005	22 to 25 ft bml	Subtidal	7.19	0.0
5106-21	1/10/2006	45.5 to 48.5 ft bml	Subtidal	7.19	0.0
Pier25-24	1/12/2006	24.1 to 27.1 ft bml	Subtidal	7.19	0.0
5106-30	4/26/2006	59 to 63 ft bml	Intertidal	7.19	0.0
77-100	12/3/2008	100 ft bgs	Upland	7.19	0.0
61-25	12/4/2008	25 ft bgs	Upland	7.19	0.0
44-25	12/17/2008	25 ft bgs	Upland	7.19	0.0
93C-160	7/17/2012	160 ft BGS	Upland	7.19	0.0
MW-F-DEEP	9/26/2013	180 ft BGS	Upland	7.18	0.0
21-25R	2/9/2003	25 ft bgs	Upland	7.18	0.0
GP-7	3/31/2004	100 ft bgs	Upland	7.18	0.0
HYD-10	9/16/2005	85.3 to 88.3 ft bml	Subtidal	7.18	0.0
Pier25-19	12/7/2005	32.6 to 35.6 ft bml	Subtidal	7.18	0.0
WW-C4	4/25/2006	62.6 to 64.6 ft bml	Subtidal	7.18	0.0
93C-130	7/17/2012	130 ft BGS	Upland	7.18	0.0
94C-25	7/24/2012	25 ft BGS	Upland	7.18	0.0
721-MW12-25	7/30/2012	25 ft BGS	Upland	7.18	0.0
88C-160	8/16/2012	160 ft BGS	Upland	7.18	0.0
4-25R	8/4/2002	25 ft bgs	Upland	7.17	0.0
43-50	5/11/2004	50 ft bgs	Upland	7.17	0.0
5106-11	10/14/2005	97 to 100 ft bml	Subtidal	7.17	0.0
Pier25-24	1/13/2006	54.1 to 57.1 ft bml	Subtidal	7.17	0.0
70-25	4/15/2006	25 ft bgs	Upland	7.17	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* $^{(1)}$
70-50	4/15/2006	50 ft bgs	Upland	7.17	0.0
Pier25-33	5/8/2006	9 to 13 ft bgs	Upland	7.17	0.0
Pier25-33	5/9/2006	69 to 73 ft bgs	Upland	7.17	0.0
709-MW5-15	12/1/2011	10 ft BGS	Upland	7.17	0.0
43-25	4/30/2002	25 ft bgs	Upland	7.16	0.0
12-25	8/16/2004	25 ft bgs	Upland	7.16	0.0
35-100	8/18/2004	100 ft bgs	Upland	7.16	0.0
Pier25-17	12/12/2005	25.5 to 28.5 ft bml	Subtidal	7.16	0.0
5106-21	1/9/2006	25.5 to 28.5 ft bml	Subtidal	7.16	0.0
Pier25-28	1/24/2006	10 to 13 ft bml	Subtidal	7.16	0.0
Pier25-12	2/1/2006	30 to 33 ft bml	Subtidal	7.16	0.0
5106-24	2/8/2006	32 to 35 ft bml	Intertidal	7.16	0.0
5106-24	2/9/2006	42 to 45 ft bml	Intertidal	7.16	0.0
SP-2	9/14/2006	218 to 222 ft bgs	Upland	7.16	0.0
35-100R	12/9/2008	100 ft bgs	Upland	7.16	0.0
MW-G-SHALLOW	12/2/2013		Upland	7.15	0.0
43-25	8/1/2002	25 ft bgs	Upland	7.15	0.0
C-1	11/13/2003	68.5 ft bgs	Upland	7.15	0.0
C-2	11/13/2003	68.5 ft bgs	Upland	7.15	0.0
5106-21	1/9/2006	20.5 to 23.5 ft bml	Subtidal	7.15	0.0
5106-24	2/8/2006	37 to 40 ft bml	Intertidal	7.15	0.0
43-50	4/5/2006	50 ft bgs	Upland	7.15	0.0
77-100	4/25/2006	100 ft bgs	Upland	7.15	0.0
74-100	8/22/2006	100 ft bgs	Upland	7.15	0.0
SP-2	9/14/2006	198 to 202 ft bgs	Upland	7.15	0.0
40-75	8/21/2012	75 ft BGS	Upland	7.15	0.0
MW-EXT-9-DEEP	7/15/2013	122 to 124 ft BGS	Upland	7.14	0.0
43-50	5/7/2003	50 ft bgs	Upland	7.14	0.0
40-50	2/16/2004	50 ft bgs	Upland	7.14	0.0
5106-7	8/11/2005	51 to 54 ft bml	Subtidal	7.14	0.0
5106-7	8/11/2005	56 to 59 ft bml	Subtidal	7.14	0.0
5106-26	2/15/2006	72 to 75 ft bml	Intertidal	7.14	0.0
40A-25	7/21/2006	25 ft bgs	Upland	7.14	0.0
40-50	8/21/2012	50 ft BGS	Upland	7.14	0.0
MW-EXT-9-DEEP	7/12/2013	112 to 114 ft BGS	Upland	7.13	0.0
43-50	2/11/2003	50 ft bgs	Upland	7.13	0.0
D-2	5/11/2003	68.5 ft bgs	Upland	7.13	0.0
GP-15	7/8/2004	100 ft bgs	Upland	7.13	0.0
43-50	8/14/2004	50 ft bgs	Upland	7.13	0.0
Dock2-4	7/29/2005	34 to 37 ft bml	Subtidal	7.13	0.0
40-50	5/5/2002	50 ft bgs	Upland	7.12	0.0
41-100	8/7/2002	100 ft bgs	Upland	7.12	0.0
A-4	2/1/2003	68.5 ft bgs	Upland	7.12	0.0
709-MW18-15	3/11/2004	15 ft bgs	Upland	7.12	0.0
GP-13	4/2/2004	96 ft bgs	Upland	7.12	0.0
GP-14	7/7/2004	25 ft bgs	Upland	7.12	0.0
5-100	5/17/2005	100 ft bgs	Upland	7.12	0.0
SP-4	9/25/2006	178 to 182 ft bgs	Upland	7.12	0.0
709-MW5-15	7/22/2012	15 ft BGS	Upland	7.12	0.0
61C-130	11/12/2013	130 ft BGS	Upland	7.11	0.0
57-50	5/4/2002	50 ft bgs	Upland	7.11	0.0
A-6	8/1/2003	68.2 ft bgs	Upland	7.11	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
D-2	11/13/2003	68.5 ft bgs	Upland	7.11	0.0
5-100	11/19/2003	100 ft bgs	Upland	7.11	0.0
Dock2-4	7/29/2005	29 to 32 ft bml	Subtidal	7.11	0.0
32-50R	4/5/2006	50 ft bgs	Upland	7.11	0.0
40A-100	4/7/2006	100 ft bgs	Upland	7.11	0.0
77C-160	7/16/2012	160 ft BGS	Upland	7.11	0.0
43-50	1/22/2002	50 ft bgs	Upland	7.10	0.0
70-50	7/13/2004	50 ft bgs	Upland	7.10	0.0
40-50	11/15/2004	50 ft bgs	Upland	7.10	0.0
5106-8	8/8/2005	89 to 92 ft bml	Subtidal	7.10	0.0
5106-14	12/1/2005	12 to 15 ft bml	Subtidal	7.10	0.0
Pier25-15	12/22/2005	24.4 to 27.4 ft bml	Subtidal	7.10	0.0
7-100	5/1/2006	100 ft bgs	Upland	7.10	0.0
721-MW13-25	7/31/2012	25 ft BGS	Upland	7.10	0.0
MW-F-DEEP	7/3/2013	127 to 129 ft BGS	Upland	7.09	0.0
35-100	1/26/2002	100 ft bgs	Upland	7.09	0.0
11-100	11/9/2002	100 ft bgs	Upland	7.09	0.0
5-100	8/16/2003	100 ft bgs	Upland	7.09	0.0
35-100	8/18/2003	100 ft bgs	Upland	7.09	0.0
GP-16	7/8/2004	100 ft bgs	Upland	7.09	0.0
41-50	8/18/2004	50 ft bgs	Upland	7.09	0.0
40-100R	4/7/2006	100 ft bgs	Upland	7.09	0.0
WW-A4	4/25/2006	23 to 26 ft bgs	Upland	7.09	0.0
3-25	8/28/2012	25 ft BGS	Upland	7.09	0.0
40-50	1/27/2002	50 ft bgs	Upland	7.08	0.0
4-25R	2/4/2003	25 ft bgs	Upland	7.08	0.0
C-1	5/11/2003	68.5 ft bgs	Upland	7.08	0.0
A-5	8/1/2003	69.3 ft bgs	Upland	7.08	0.0
GP-8	3/31/2004	100 ft bgs	Upland	7.08	0.0
GP-13	4/1/2004	25 ft bgs	Upland	7.08	0.0
GP-6	4/7/2004	100 ft bgs	Upland	7.08	0.0
709-MW20-25	7/21/2004	25 ft bgs	Upland	7.08	0.0
Dock2-5	8/2/2005	37 to 40 ft bml	Subtidal	7.08	0.0
5106-14	12/1/2005	7 to 10 ft bml	Subtidal	7.08	0.0
5106-24	2/9/2006	47 to 50 ft bml	Intertidal	7.08	0.0
WW-B3	5/10/2006	83 to 85 ft bml	Intertidal	7.08	0.0
40-50	2/6/2003	50 ft bgs	Upland	7.07	0.0
T1-25	8/15/2003	25 ft bgs	Upland	7.07	0.0
72-25	7/12/2004	25 ft bgs	Upland	7.07	0.0
Pier25-22	1/18/2006	50.1 to 53.1 ft bml	Subtidal	7.07	0.0
64-100	12/4/2008	100 ft bgs	Upland	7.07	0.0
95C-75	7/19/2012	75 ft BGS	Upland	7.07	0.0
D-5	8/2/2002	116.55 ft bgs	Upland	7.06	0.0
A-6	2/1/2003	68.2 ft bgs	Upland	7.06	0.0
40-50	5/7/2003	50 ft bgs	Upland	7.06	0.0
A-5	5/11/2003	69.3 ft bgs	Upland	7.06	0.0
A-6	5/11/2003	68.2 ft bgs	Upland	7.06	0.0
GP-2	3/30/2004	50 ft bgs	Upland	7.06	0.0
Dock2-1	7/21/2005	33 to 36 ft bml	Subtidal	7.06	0.0
HYD-1	9/1/2005	44 to 47 ft bml	Subtidal	7.06	0.0
Pier25-23	1/11/2006	43 to 46 ft bml	Subtidal	7.06	0.0
Pier25-12	2/1/2006	50 to 53 ft bml	Subtidal	7.06	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	Sample Date	Depth (ft BML)	Tidal Zone	pH, field s.u.	pH SQ (1)
64-25	4/25/2006	25 ft bgs	Upland	7.06	0.0
52-15	12/1/2011	15 ft BGS	Upland	7.06	0.0
WW-A1R	8/22/2012	20 to 20 ft BML	Subtidal	7.06	0.0
MW-F-DEEP	6/28/2013	57 to 59 ft BGS	Upland	7.05	0.0
Dock2-9	9/8/2005	49 to 52 ft bml	Subtidal	7.05	0.0
5106-22	1/25/2006	40 to 43 ft bml	Subtidal	7.05	0.0
WW-A2	4/5/2006	19.4 to 21.4 ft bml	Subtidal	7.05	0.0
Pier25-31	5/11/2006	89 to 93 ft bgs	Upland	7.05	0.0
74-130	8/23/2006	130 ft bgs	Upland	7.05	0.0
5-100	7/27/2010	100 ft BGS	Upland	7.05	0.0
721-MW14-25	8/9/2012	25 ft BGS	Upland	7.05	0.0
12-25	2/13/2004	25 ft bgs	Upland	7.04	0.0
40-50	5/13/2004	50 ft bgs	Upland	7.04	0.0
40A-25	11/15/2004	25 ft bgs	Upland	7.04	0.0
5106-22	1/25/2006	30 to 33 ft bml	Subtidal	7.04	0.0
5106-29	4/21/2006	19 to 23 ft bml	Intertidal	7.04	0.0
35-100	2/9/2004	100 ft bgs	Upland	7.03	0.0
Pier25-15	11/30/2005	29 to 32 ft bml	Subtidal	7.03	0.0
Pier25-27	1/19/2006	20.5 to 23.5 ft bml	Subtidal	7.03	0.0
5106-31	4/28/2006	29 to 33 ft bml	Intertidal	7.03	0.0
WW-B4	5/2/2006	85 to 87 ft bml	Intertidal	7.03	0.0
43-50	8/6/2002	50 ft bgs	Upland	7.02	0.0
11-100	8/7/2002	100 ft bgs	Upland	7.02	0.0
A-3	11/4/2002	68.4 ft bgs	Upland	7.02	0.0
43-50	11/8/2002	50 ft bgs	Upland	7.02	0.0
11-100	2/11/2003	100 ft bgs	Upland	7.02	0.0
B-4	8/1/2003	68.5 ft bgs	Upland	7.02	0.0
41-100	8/15/2003	100 ft bgs	Upland	7.02	0.0
43-50	11/17/2003	50 ft bgs	Upland	7.02	0.0
11-100	2/12/2004	100 ft bgs	Upland	7.02	0.0
40-50	8/18/2004	50 ft bgs	Upland	7.02	0.0
Pier25-16	11/22/2005	54.4 to 57.4 ft bml	Subtidal	7.02	0.0
Pier25-13	2/2/2006	30 to 33 ft bml	Subtidal	7.02	0.0
5106-31	4/29/2006	49 to 53 ft bml	Intertidal	7.02	0.0
12-25	5/5/2002	25 ft bgs	Upland	7.01	0.0
21-25R	2/1/2003	25 ft bgs	Upland	7.01	0.0
12-25	2/6/2003	25 ft bgs	Upland	7.01	0.0
A-2	8/1/2003	68.5 ft bgs	Upland	7.01	0.0
61-25	8/20/2003	25 ft bgs	Upland	7.01	0.0
A-4	11/12/2003	68.5 ft bgs	Upland	7.01	0.0
GP-10	3/26/2004	100 ft bgs	Upland	7.01	0.0
GP-1	4/1/2004	50 ft bgs	Upland	7.01	0.0
40A-100	2/16/2005	100 ft bgs	Upland	7.01	0.0
Pier25-16	11/22/2005	44.4 to 47.4 ft bml	Subtidal	7.01	0.0
Pier25-18	12/9/2005	32 to 35 ft bml	Subtidal	7.01	0.0
WW-A2	4/6/2006	44.4 to 46.4 ft bml	Subtidal	7.01	0.0
5106-29	4/24/2006	49 to 53 ft bml	Intertidal	7.01	0.0
64-100	4/25/2006	100 ft bgs	Upland	7.01	0.0
ESI-3-2	12/5/2002	25 ft bgs	Upland	7.00	0.0
12-25	5/7/2003	25 ft bgs	Upland	7.00	0.0
41-50	8/15/2003	50 ft bgs	Upland	7.00	0.0
11-100	8/18/2003	100 ft bgs	Upland	7.00	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
40-50	8/18/2003	50 ft bgs	Upland	7.00	0.0
GP-9	3/25/2004	100 ft bgs	Upland	7.00	0.0
GP-14	7/7/2004	100 ft bgs	Upland	7.00	0.0
HYD-7	9/15/2005	90 to 93 ft bml	Subtidal	7.00	0.0
Pier25-28	1/24/2006	20 to 23 ft bml	Subtidal	7.00	0.0
MW-F-DEEP	7/2/2013	97 to 99 ft BGS	Upland	6.99	0.0
MW-F-DEEP	7/2/2013	97 to 99 ft BGS	Upland	6.99	0.0
MW-G-DEEP	7/30/2013	202 to 204 ft BGS	Upland	6.99	0.0
A-2A	8/2/2002	132.75 ft bgs	Upland	6.99	0.0
40-50	8/8/2002	50 ft bgs	Upland	6.99	0.0
Pier25-20	12/6/2005	40 to 43 ft bml	Subtidal	6.99	0.0
Pier25-22	1/18/2006	40.1 to 43.1 ft bml	Subtidal	6.99	0.0
T6-120	8/10/2006	120 ft bgs	Upland	6.99	0.0
11-100	8/15/2006	100 ft bgs	Upland	6.99	0.0
HW-2	1/25/2007	20 to 22 ft bml	Subtidal	6.99	0.0
57-50	8/5/2002	50 ft bgs	Upland	6.98	0.0
A-2	2/1/2003	68.5 ft bgs	Upland	6.98	0.0
D-5	2/1/2003	116.55 ft bgs	Upland	6.98	0.0
77-140	4/25/2006	140 ft bgs	Upland	6.98	0.0
41-50	2/11/2003	50 ft bgs	Upland	6.97	0.0
D-5	11/12/2003	116.55 ft bgs	Upland	6.97	0.0
GP-1	4/1/2004	100 ft bgs	Upland	6.97	0.0
73-50	7/12/2004	50 ft bgs	Upland	6.97	0.0
20-25	4/19/2006	25 ft bgs	Upland	6.97	0.0
MW-H-01	6/19/2013	72 to 74 ft BGS	Upland	6.96	0.0
12-25	1/30/2002	25 ft bgs	Upland	6.96	0.0
A-1	11/4/2002	68.3 ft bgs	Upland	6.96	0.0
40A-25	5/7/2003	25 ft bgs	Upland	6.96	0.0
A-4	8/1/2003	68.5 ft bgs	Upland	6.96	0.0
40-100R	2/15/2005	100 ft bgs	Upland	6.96	0.0
12-25	4/6/2006	25 ft bgs	Upland	6.96	0.0
40A-100	12/3/2008	100 ft bgs	Upland	6.96	0.0
43-50	5/4/2002	50 ft bgs	Upland	6.95	0.0
A-4	5/11/2003	68.5 ft bgs	Upland	6.95	0.0
Pier25-6	8/18/2005	45.9 to 48.9 ft bml	Subtidal	6.95	0.0
40-25	4/17/2006	25 ft bgs	Upland	6.95	0.0
61-25	12/9/2013	25 ft BGS	Upland	6.94	0.0
MW-G-DEEP	7/30/2013	192 to 194 ft BGS	Upland	6.94	0.0
12-25	11/8/2002	25 ft bgs	Upland	6.94	0.0
A-3	2/1/2003	68.4 ft bgs	Upland	6.94	0.0
GP-3	3/29/2004	100 ft bgs	Upland	6.94	0.0
4-25R	1/28/2002	25 ft bgs	Upland	6.93	0.0
35-100	2/6/2003	100 ft bgs	Upland	6.92	0.0
A-2	5/11/2003	68.5 ft bgs	Upland	6.92	0.0
T1-100	8/15/2003	100 ft bgs	Upland	6.92	0.0
Pier25-23	1/11/2006	33 to 36 ft bml	Subtidal	6.92	0.0
WW-C3	4/10/2006	98 to 101 ft bgs	Upland	6.92	0.0
64-100	7/26/2012	100 ft BGS	Upland	6.92	0.0
12-25	8/24/2012	25 ft BGS	Upland	6.92	0.0
11-100	1/27/2002	100 ft bgs	Upland	6.91	0.0
A-2A	8/1/2003	132.75 ft bgs	Upland	6.91	0.0
42-25	4/5/2006	25 ft bgs	Upland	6.91	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* [(1)]
5106-31	4/28/2006	19 to 23 ft bml	Intertidal	6.91	0.0
ESI-4-10	12/17/2002	15 ft bgs	Upland	6.90	0.0
A-3	8/1/2003	68.4 ft bgs	Upland	6.90	0.0
40A-25	8/18/2003	25 ft bgs	Upland	6.90	0.0
GP-12	4/5/2004	100 ft bgs	Upland	6.90	0.0
Pier25-20	12/6/2005	30 to 33 ft bml	Subtidal	6.90	0.0
5106-31	4/28/2006	9 to 13 ft bml	Intertidal	6.90	0.0
64-100	7/20/2006	100 ft bgs	Upland	6.90	0.0
61-100	12/9/2013	100 ft BGS	Upland	6.89	0.0
GP-3	3/29/2004	50 ft bgs	Upland	6.89	0.0
Pier25-10	10/27/2005	66 to 69 ft bml	Subtidal	6.89	0.0
77C-160	6/23/2013	160 ft BGS	Upland	6.88	0.0
MW-EXT-9-SHALLOW	12/4/2013		Upland	6.88	0.0
MW-EXT-9-SHALLOW	12/4/2013		Upland	6.88	0.0
D-5	11/9/2002	116.55 ft bgs	Upland	6.88	0.0
A-3	5/11/2003	68.4 ft bgs	Upland	6.88	0.0
A-2	11/12/2003	68.5 ft bgs	Upland	6.88	0.0
GP-11	3/25/2004	100 ft bgs	Upland	6.88	0.0
61-100	12/4/2008	100 ft bgs	Upland	6.88	0.0
11-100	8/7/2012	100 ft BGS	Upland	6.88	0.0
A-1	2/1/2003	68.3 ft bgs	Upland	6.87	0.0
40A-100	8/18/2003	100 ft bgs	Upland	6.87	0.0
Pier25-23	1/11/2006	53 to 56 ft bml	Subtidal	6.87	0.0
WW-C3	4/6/2006	73 to 76 ft bgs	Upland	6.87	0.0
12-25	7/18/2006	25 ft bgs	Upland	6.87	0.0
53-25	7/18/2006	25 ft bgs	Upland	6.87	0.0
35-100R	8/15/2012	100 ft BGS	Upland	6.87	0.0
12-25	8/19/2003	25 ft bgs	Upland	6.86	0.0
A-1	11/12/2003	68.3 ft bgs	Upland	6.86	0.0
Pier25-12	2/1/2006	40 to 43 ft bml	Subtidal	6.86	0.0
71-25	4/22/2006	25 ft bgs	Upland	6.86	0.0
61C-130	6/22/2013	130 ft BGS	Upland	6.85	0.0
A-1	8/1/2003	68.3 ft bgs	Upland	6.85	0.0
40A-25	2/16/2004	25 ft bgs	Upland	6.85	0.0
721-MW15-50	7/30/2012	50 ft BGS	Upland	6.85	0.0
Pier25-10	10/27/2005	46 to 49 ft bml	Subtidal	6.84	0.0
WW-A1R	8/22/2012	45 to 45 ft BML	Subtidal	6.84	0.0
A-2	11/4/2002	68.5 ft bgs	Upland	6.83	0.0
5106-29	4/24/2006	39 to 43 ft bml	Intertidal	6.82	0.0
WW-A1D	8/31/2012	110 to 110 ft BML	Subtidal	6.82	0.0
40-50	11/17/2003	50 ft bgs	Upland	6.81	0.0
709-MW16-15	3/11/2004	15 ft bgs	Upland	6.81	0.0
40A-25	5/13/2004	25 ft bgs	Upland	6.81	0.0
71-25	7/13/2004	25 ft bgs	Upland	6.81	0.0
Pier25-16	11/22/2005	34.4 to 37.4 ft bml	Subtidal	6.81	0.0
78-25	7/21/2006	25 ft bgs	Upland	6.81	0.0
64-100	8/15/2003	100 ft bgs	Upland	6.80	0.0
HYD-3	8/15/2005	81 to 84 ft bml	Subtidal	6.80	0.0
40A-25	4/13/2006	25 ft bgs	Upland	6.80	0.0
71-25	12/4/2008	25 ft bgs	Upland	6.80	0.0
WMUM-01	6/13/2012	15 to 15 ft BGS	Upland	6.80	0.0
MW-G-DEEP	7/30/2013	182 to 184 ft BGS	Upland	6.79	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* $^{(1)}$
40A-25	2/1/2002	25 ft bgs	Upland	6.79	0.0
61-100	8/20/2003	100 ft bgs	Upland	6.79	0.0
41-50	1/29/2002	50 ft bgs	Upland	6.78	0.0
40-100R	2/16/2004	100 ft bgs	Upland	6.78	0.0
40-100R	5/18/2005	100 ft bgs	Upland	6.78	0.0
70-25	8/26/2012	25 ft BGS	Upland	6.78	0.0
MW-F-INT	9/26/2013	140 ft BGS	Upland	6.77	0.0
64-100	11/15/2003	100 ft bgs	Upland	6.77	0.0
40A-100	2/16/2004	100 ft bgs	Upland	6.77	0.0
40A-25	8/18/2004	25 ft bgs	Upland	6.77	0.0
74-100	7/19/2006	100 ft bgs	Upland	6.77	0.0
WMUA-18	8/4/2006	72.5 to 73.5 ft bgs	Upland	6.77	0.0
GP-2	3/29/2004	25 ft bgs	Upland	6.76	0.0
17-24	7/20/2004	24 ft bgs	Upland	6.76	0.0
Pier25-8	8/25/2005	4 to 7 ft bml	Subtidal	6.76	0.0
721-MW12-15	7/30/2012	15 ft BGS	Upland	6.76	0.0
40A-100	5/5/2002	100 ft bgs	Upland	6.75	0.0
GP-5	4/7/2004	100 ft bgs	Upland	6.75	0.0
A-3	11/14/2003	68.4 ft bgs	Upland	6.74	0.0
709-MW14-15	3/10/2004	14 ft bgs	Upland	6.74	0.0
Pier25-6	8/18/2005	65.9 to 68.9 ft bml	Subtidal	6.74	0.0
5106-29	4/24/2006	29 to 33 ft bml	Intertidal	6.74	0.0
74-130	4/26/2006	130 ft bgs	Upland	6.74	0.0
721-MW6-15	7/25/2012	15 ft BGS	Upland	6.74	0.0
A-2A	2/1/2003	132.75 ft bgs	Upland	6.73	0.0
40-100R	8/18/2003	100 ft bgs	Upland	6.73	0.0
A-2A	11/12/2003	132.75 ft bgs	Upland	6.73	0.0
GP-4	4/6/2004	100 ft bgs	Upland	6.73	0.0
Pier25-10	10/27/2005	56 to 59 ft bml	Subtidal	6.73	0.0
5106-30	4/26/2006	69 to 73 ft bml	Intertidal	6.73	0.0
721-MW10-15	8/8/2012	15 ft BGS	Upland	6.73	0.0
11-75	12/10/2013	75 ft BGS	Upland	6.72	0.0
40A-100	5/7/2003	100 ft bgs	Upland	6.72	0.0
40A-100	5/13/2004	100 ft bgs	Upland	6.72	0.0
Pier25-32	4/6/2006	67 to 71 ft bgs	Upland	6.72	0.0
709-MW20-25	7/21/2006	25 ft bgs	Upland	6.72	0.0
40-100R	1/27/2002	100 ft bgs	Upland	6.71	0.0
40A-100	1/27/2002	100 ft bgs	Upland	6.71	0.0
40A-100	11/9/2002	100 ft bgs	Upland	6.71	0.0
A-2A	11/9/2002	132.75 ft bgs	Upland	6.71	0.0
40A-100	2/6/2003	100 ft bgs	Upland	6.71	0.0
721-GP2	6/21/2004	15 ft bgs	Upland	6.71	0.0
WW-A1	3/17/2006	45.2 to 48.2 ft bml	Subtidal	6.71	0.0
ESI-2-47	1/23/2004	15 ft bgs	Upland	6.70	0.0
40-100R	5/13/2004	100 ft bgs	Upland	6.70	0.0
721-GP3	6/22/2004	15 ft bgs	Upland	6.70	0.0
40A-100	5/18/2005	100 ft bgs	Upland	6.70	0.0
40A-100	8/8/2002	100 ft bgs	Upland	6.69	0.0
65-100	8/2/2006	100 ft bgs	Upland	6.69	0.0
61C-25	11/12/2013	25 ft BGS	Upland	6.68	0.0
40-100R	5/5/2002	100 ft bgs	Upland	6.68	0.0
5106-28	4/20/2006	29 to 33 ft bml	Intertidal	6.68	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
74-130	8/10/2006	130 ft bgs	Upland	6.67	0.0
40-100R	11/11/2002	100 ft bgs	Upland	6.66	0.0
A-2A	5/11/2003	132.75 ft bgs	Upland	6.66	0.0
GP-2	3/30/2004	100 ft bgs	Upland	6.65	0.0
Pier25-6	8/18/2005	55.9 to 58.9 ft bml	Subtidal	6.65	0.0
SP-1	6/26/2006	48 to 51 ft bgs	Upland	6.65	0.0
721-MW11-15	7/31/2012	15 ft BGS	Upland	6.65	0.0
721-MW14-15	8/8/2012	15 ft BGS	Upland	6.65	0.0
77C-130	6/23/2013	130 ft BGS	Upland	6.64	0.0
40-100R	5/7/2003	100 ft bgs	Upland	6.64	0.0
40A-100	8/18/2004	100 ft bgs	Upland	6.64	0.0
MW-F-DEEP	7/1/2013	77 to 79 ft BGS	Upland	6.63	0.0
40A-25	2/6/2003	25 ft bgs	Upland	6.63	0.0
40A-100	11/15/2004	100 ft bgs	Upland	6.63	0.0
CH-4	7/26/2006	123 to 127 ft bgs	Upland	6.63	0.0
12-25	8/5/2002	25 ft bgs	Upland	6.62	0.0
40A-25	11/9/2002	25 ft bgs	Upland	6.62	0.0
A-1	5/11/2003	68.3 ft bgs	Upland	6.62	0.0
61-25	11/14/2003	25 ft bgs	Upland	6.62	0.0
40A-25	11/17/2003	25 ft bgs	Upland	6.62	0.0
43-25	4/5/2006	25 ft bgs	Upland	6.62	0.0
D-5	5/11/2003	116.55 ft bgs	Upland	6.61	0.0
D-5	8/1/2003	116.55 ft bgs	Upland	6.60	0.0
709-MW13-15	3/10/2004	13 ft bgs	Upland	6.60	0.0
HYD-3	8/15/2005	91 to 94 ft bml	Subtidal	6.60	0.0
40-100R	11/15/2004	100 ft bgs	Upland	6.59	0.0
11-100	12/10/2013	100 ft BGS	Upland	6.57	0.0
40-100R	8/8/2002	100 ft bgs	Upland	6.57	0.0
Pier25-2	7/18/2005	76 to 79 ft bml	Subtidal	6.57	0.0
40-100R	8/18/2004	100 ft bgs	Upland	6.56	0.0
40A-100	7/21/2006	100 ft bgs	Upland	6.56	0.0
49-15	11/30/2011	15 ft BGS	Upland	6.56	0.0
MW-EXT-9-DEEP	7/18/2013	202 to 204 ft BGS	Upland	6.55	0.0
MW-EXT-9-DEEP	7/18/2013	202 to 204 ft BGS	Upland	6.55	0.0
709-MW16-15	7/27/2012	15 ft bgs	Upland	6.55	0.0
HYD-7	9/15/2005	80 to 83 ft bml	Subtidal	6.54	0.0
40-25	8/21/2012	25 ft BGS	Upland	6.53	0.0
GP-4	4/6/2004	23 ft bgs	Upland	6.52	0.0
721-MW10-15	7/21/2004	15 ft bgs	Upland	6.52	0.0
5106-30	4/25/2006	29 to 33 ft bml	Intertidal	6.52	0.0
61-100	11/14/2003	100 ft bgs	Upland	6.51	0.0
89C-100	8/24/2012	100 ft BGS	Upland	6.51	0.0
89C-130	8/24/2012	130 ft BGS	Upland	6.51	0.0
40A-100	11/17/2003	100 ft bgs	Upland	6.49	0.0
71-25	7/20/2006	25 ft bgs	Upland	6.49	0.0
SP-1	6/26/2006	43 to 46 ft bgs	Upland	6.46	0.0
40A-25	8/8/2002	25 ft bgs	Upland	6.45	0.0
C-6	5/24/2006	68.5 ft bgs	Upland	6.45	0.0
77-140	8/9/2006	140 ft bgs	Upland	6.44	0.0
WW-B3	5/10/2006	113 to 115 ft bml	Intertidal	6.43	0.0
MW-F-DEEP	7/8/2013	167 to 169 ft BGS	Upland	6.41	0.0
40-100R	2/6/2003	100 ft bgs	Upland	6.40	0.0

TABLE 4.19

SUMMARY OF SCREENING OF pH IN GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft BML)*	*Tidal Zone*	*pH, field s.u.*	*pH SQ* (1)
709-MW17-15	3/11/2004	15 ft bgs	Upland	6.40	0.0
5106-30	4/25/2006	39 to 43 ft bml	Intertidal	6.40	0.0
5106-30	4/25/2006	49 to 53 ft bml	Intertidal	6.40	0.0
721-MW6-15	7/19/2004	15 ft bgs	Upland	6.39	0.0
721-MW13-15	7/31/2012	15 ft BGS	Upland	6.39	0.0
49-15	8/11/2012	15 ft BGS	Upland	6.39	0.0
40-100R	11/17/2003	100 ft bgs	Upland	6.37	0.0
709-MW9-15	3/10/2004	15 ft bgs	Upland	6.36	0.0
61C-130	12/19/2013	130 ft BGS	Upland	6.35	0.0
MW-G-DEEP	7/26/2013	142 to 144 ft BGS	Upland	6.34	0.0
HYD-7	9/15/2005	70 to 73 ft bml	Subtidal	6.33	0.0
5106-28	4/20/2006	19 to 23 ft bml	Intertidal	6.33	0.0
MW-F-DEEP	7/1/2013	67 to 69 ft BGS	Upland	6.32	0.0
ESI-2-28	12/3/2002	15 ft bgs	Upland	6.30	0.0
Pier25-32	4/4/2006	9 to 12 ft bgs	Upland	6.30	0.0
40A-25	5/6/2002	25 ft bgs	Upland	6.27	0.0
3-25	6/2/2004	25 ft bgs	Upland	6.27	0.0
5106-28	4/20/2006	9 to 13 ft bml	Intertidal	6.27	0.0
71-25	7/27/2012	25 ft BGS	Upland	6.23	0.0
MW-G-SHALLOW	9/25/2013	145 ft BGS	Upland	6.22	0.0
709-MW21-15	7/27/2012	15 ft BGS	Upland	6.20	0.0
709-MW11-15	7/29/2012	15 ft BGS	Upland	6.17	0.0
709-MW11-15	3/10/2004	15 ft bgs	Upland	6.08	0.0
709-MW17-15	7/21/2012	15 ft bgs	Upland	6.07	0.0
MW-F-DEEP	7/9/2013	177 to 179 ft BGS	Upland	6.02	0.0
22-25R	4/13/2006	25 ft bgs	Upland	6.00	0.0
5106-30	4/25/2006	9 to 13 ft bml	Intertidal	5.98	0.0
49-15	3/16/2004	15 ft bgs	Upland	5.97	0.0
721-MW15-15	7/30/2012	15 ft BGS	Upland	5.97	0.0
MW-F-DEEP	7/8/2013	157 to 159 ft BGS	Upland	5.94	0.0
721-MW15-25	7/30/2012	25 ft BGS	Upland	5.94	0.0
709-MW4-15	7/22/2012	15 ft BGS	Upland	5.91	0.0
3-25	11/8/2002	25 ft bgs	Upland	5.90	0.0
709-MW9-15	8/14/2012	15 ft BGS	Upland	5.90	0.0
MW-F-DEEP	7/8/2013	147 to 149 ft BGS	Upland	5.77	0.0
Pier25-31	5/10/2006	9 to 13 ft bgs	Upland	5.70	0.0
22-25R	1/28/2002	25 ft bgs	Upland	5.42	0.0
22-25R	2/18/2005	25 ft bgs	Upland	5.39	0.0
22-25R	8/14/2003	25 ft bgs	Upland	4.74	0.0
709-MW4-15	3/9/2004	15 ft bgs	Upland	4.12	0.0
ESI-3-5	12/6/2002	15 ft bgs	Upland	4.10	0.0
22-25R	2/5/2004	25 ft bgs	Upland	3.73	0.0
22-25R	8/14/2004	25 ft bgs	Upland	3.68	0.0
22-25R	8/1/2002	25 ft bgs	Upland	3.42	0.0
22-25R	2/8/2003	25 ft bgs	Upland	3.41	0.0

TABLE 4.20

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER IN NORTHERN WELLS PROXIMATE TO COMMENCEMENT BAY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*(1) All Organics*
MW-H-01	6/25/2013	162 to 164 ft BGS	Upland	0.0	**171.0**	**171.0**
MW-EXT-9-SHALLOW	9/27/2013	123 ft BGS	Upland	0.0	**155.9**	**155.9**
MW-EXT-9-DEEP	7/12/2013	112 to 114 ft BGS	Upland	0.0	**140.5**	**140.5**
77C-160	7/16/12	160 ft bgs	Upland	0.0	**120.2**	**120.2**
MW-H-01	6/25/2013	152 to 154 ft BGS	Upland	0.0	**77.3**	**77.3**
MW-EXT-9-DEEP	7/15/2013	142 to 144 ft BGS	Upland	0.0	**65.6**	**65.6**
MW-EXT-9-DEEP	7/15/2013	122 to 124 ft BGS	Upland	0.0	**64.1**	**64.1**
MW-EXT-9-DEEP	7/15/2013	132 to 134 ft BGS	Upland	0.0	**49.1**	**49.1**
MW-EXT-9-DEEP	7/16/2013	152 to 154 ft BGS	Upland	0.0	**47.9**	**47.9**
MW-EXT-9-DEEP	7/16/2013	162 to 164 ft BGS	Upland	0.0	**46.6**	**46.6**
MW-EXT-9-INT	9/27/2013	155 ft BGS	Upland	0.0	**32.2**	**32.2**
MW-H-01	6/24/2013	142 to 144 ft BGS	Upland	0.0	**28.3**	**28.3**
40-100R	5/5/02	100 ft bgs	Upland	0.0	**27.9**	**27.9**
40-100R	8/8/02	100 ft bgs	Upland	0.0	**25.6**	**25.6**
40-100R	2/6/03	100 ft bgs	Upland	0.0	**25.2**	**25.2**
61C-160	7/17/12	160 ft bgs	Upland	0.0	**24.4**	**24.4**
40-100R	5/7/03	100 ft bgs	Upland	0.0	**23.6**	**23.6**
40-100R	11/11/02	100 ft bgs	Upland	0.0	**23.6**	**23.6**
40-100R	8/18/03	100 ft bgs	Upland	0.0	**23.3**	**23.3**
MW-H-01	6/21/2013	132 to 134 ft BGS	Upland	0.0	**22.8**	**22.8**
40-100R	1/27/02	100 ft bgs	Upland	0.0	**22.0**	**22.0**
61C-130	7/17/12	130 ft bgs	Upland	0.0	**20.7**	**20.7**
40-100R	11/17/03	100 ft bgs	Upland	0.0	**18.8**	**18.8**
40-100R	5/13/04	100 ft bgs	Upland	0.0	**18.1**	**18.1**
40-100R	2/16/04	100 ft bgs	Upland	0.0	**16.7**	**16.7**
MW-H-01	6/21/2013	122 to 124 ft BGS	Upland	0.0	**16.2**	**16.2**
MW-G-DEEP	7/26/2013	142 to 144 ft BGS	Upland	0.0	**16.0**	**16.0**
40-100R	8/18/04	100 ft bgs	Upland	0.0	**15.7**	**15.7**
MW-EXT-9-DEEP	7/12/2013	102 to 104 ft BGS	Upland	0.0	**14.3**	**14.3**
40-100R	11/15/04	100 ft bgs	Upland	0.0	**13.2**	**13.2**
MW-G-SHALLOW	9/25/2013	145 ft BGS	Upland	0.0	**12.4**	**12.4**
40-100R	2/15/05	100 ft bgs	Upland	0.0	**10.6**	**10.6**
40-100R	5/18/05	100 ft bgs	Upland	0.0	**9.8**	**9.8**
40-100R	4/7/06	100 ft bgs	Upland	0.0	**6.9**	**6.9**
MW-G-DEEP	7/29/2013	152 to 154 ft BGS	Upland	0.0	**5.9**	**5.9**
40A-100	1/27/02	100 ft bgs	Upland	0.0	**5.2**	**5.2**
77C-130	7/16/12	130 ft bgs	Upland	0.0	**5.2**	**5.2**
MW-EXT-9-DEEP	7/17/2013	172 to 174 ft BGS	Upland	0.0	**4.1**	**4.1**
MW-H-01	6/27/2013	182 to 184 ft BGS	Upland	0.0	**3.2**	**3.2**
40A-100	11/9/02	100 ft bgs	Upland	0.0	**2.3**	**2.3**
MW-EXT-9-DEEP	7/17/2013	182 to 184 ft BGS	Upland	0.0	**1.9**	**1.9**
40A-100	2/6/03	100 ft bgs	Upland	0.0	**1.7**	**1.7**
MW-H-01	6/20/2013	112 to 114 ft BGS	Upland	0.0	**1.6**	**1.6**
40A-100	8/8/02	100 ft bgs	Upland	0.0	**1.5**	**1.5**
40A-100	5/5/02	100 ft bgs	Upland	0.0	**1.5**	**1.5**
40A-100	5/7/03	100 ft bgs	Upland	0.0	**1.5**	**1.5**
40A-100	8/18/03	100 ft bgs	Upland	0.0	1.4	1.4
40A-100	11/17/03	100 ft bgs	Upland	0.0	1.2	1.2
GP-5	4/7/04	100 ft bgs	Upland	0.0	1.2	1.2
40A-100	5/13/04	100 ft bgs	Upland	0.0	1.2	1.2

TABLE 4.20

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER IN NORTHERN WELLS PROXIMATE TO COMMENCEMENT BAY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*(1) All Organics*
40A-100	2/16/04	100 ft bgs	Upland	0.0	1.2	1.2
40-100R	8/21/12	100 ft bgs	Upland	0.0	1.1	1.1
40A-100	2/16/05	100 ft bgs	Upland	0.0	0.9	0.9
MW-EXT-9-DEEP	7/17/2013	192 to 194 ft BGS	Upland	0.0	0.9	0.9
MW-F-DEEP	7/3/2013	137 to 139 ft BGS	Upland	0.0	0.8	0.8
MW-F-DEEP	9/26/2013	180 ft BGS	Upland	0.0	0.8	0.8
MW-G-DEEP	7/29/2013	172 to 174 ft BGS	Upland	0.0	0.8	0.8
40A-100	4/7/06	100 ft bgs	Upland	0.0	0.7	0.7
41C-130	8/29/12	130 ft bgs	Upland	0.0	0.7	0.7
MW-F-DEEP	7/8/2013	167 to 169 ft BGS	Upland	0.0	0.7	0.7
40A-100	11/15/04	100 ft bgs	Upland	0.0	0.7	0.7
MW-EXT-9-DEEP	7/18/2013	202 to 204 ft BGS	Upland	0.0	0.6	0.6
40A-100	5/18/05	100 ft bgs	Upland	0.0	0.6	0.6
40A-100	8/18/04	100 ft bgs	Upland	0.0	0.6	0.6
61C-100	7/17/12	100 ft bgs	Upland	0.0	0.5	0.5
61-100	8/20/03	100 ft bgs	Upland	0.0	0.5	0.5
40A-100	12/3/08	100 ft bgs	Upland	0.0	0.5	0.5
MW-H-01	6/26/2013	172 to 174 ft BGS	Upland	0.0	0.4	0.4
89C-25	8/22/12	25 ft bgs	Upland	0.0	0.4	0.4
61-100	11/14/03	100 ft bgs	Upland	0.0	0.3	0.3
61-100	6/13/03	100 ft bgs	Upland	0.0	0.3	0.3
MW-F-DEEP	7/3/2013	127 to 129 ft BGS	Upland	0.0	0.3	0.3
MW-F-INT	9/26/2013	140 ft BGS	Upland	0.0	0.3	0.3
MW-G-DEEP	7/25/2013	132 to 134 ft BGS	Upland	0.0	0.2	0.2
MW-G-DEEP	7/25/2013	132 to 134 ft BGS	Upland	0.0	0.2	0.2
MW-EXT-9-DEEP	7/18/2013	202 to 204 ft BGS	Upland	0.0	0.2	0.2
77C-100	7/16/12	100 ft bgs	Upland	0.0	0.2	0.2
MW-G-DEEP	7/30/2013	192 to 194 ft BGS	Upland	0.0	0.2	0.2
77C-50	7/16/12	50 ft bgs	Upland	0.0	0.2	0.2
MW-G-DEEP	7/30/2013	202 to 204 ft BGS	Upland	0.0	0.2	0.2
41-138	4/22/06	138 ft bgs	Upland	0.0	0.1	0.1
77C-75	7/16/12	75 ft bgs	Upland	0.0	0.1	0.1
77-140	4/25/06	140 ft bgs	Upland	0.0	0.1	0.1
MW-G-DEEP	7/31/2013	222 to 224 ft BGS	Upland	0.0	0.1	0.1
MW-G-DEEP	7/30/2013	182 to 184 ft BGS	Upland	0.0	0.1	0.1
MW-EXT-9-DEEP	9/27/2013	205 ft BGS	Upland	0.0	0.0	0.0
MW-F-DEEP	7/8/2013	147 to 149 ft BGS	Upland	0.0	0.0	0.0
61-50	8/20/03	50 ft bgs	Upland	0.0	0.0	0.0
4-175R	8/20/03	175 ft bgs	Upland	0.0	0.0	0.0
61C-75	7/17/12	75 ft bgs	Upland	0.0	0.0	0.0
61C-50	7/17/12	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-INT	9/26/2013	171 ft BGS	Upland	0.0	0.0	0.0
61-100	12/4/08	100 ft bgs	Upland	0.0	0.0	0.0
MW-G-INT	9/26/2013	171 ft BGS	Upland	0.0	0.0	0.0
4-175R	1/28/02	175 ft bgs	Upland	0.0	0.0	0.0
MW-H-01	9/27/2013	181.2 ft BGS	Upland	0.0	0.0	0.0
4-175R	8/4/02	175 ft bgs	Upland	0.0	0.0	0.0
89C-100	8/24/12	100 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	9/25/2013	225 ft BGS	Upland	0.0	0.0	0.0
4-175R	2/9/04	175 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.20

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER IN NORTHERN WELLS PROXIMATE TO COMMENCEMENT BAY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*(1) All Organics*
4-175R	2/4/03	175 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/29/2013	162 to 164 ft BGS	Upland	0.0	0.0	0.0
MW-G-DEEP	7/24/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
MW-G-DEEP	7/31/2013	212 to 214 ft BGS	Upland	0.0	0.0	0.0
MW-F-DEEP	7/1/2013	67 to 69 ft BGS	Upland	0.0	0.0	0.0
MW-F-DEEP	7/8/2013	157 to 159 ft BGS	Upland	0.0	0.0	0.0
40-50	5/5/02	50 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/9/2013	177 to 179 ft BGS	Upland	0.0	0.0	0.0
40-50	8/8/02	50 ft bgs	Upland	0.0	0.0	0.0
41-138	1/29/02	138 ft bgs	Upland	0.0	0.0	0.0
89C-50	8/22/12	50 ft bgs	Upland	0.0	0.0	0.0
61-25	8/20/03	25 ft bgs	Upland	0.0	0.0	0.0
GP-11	3/25/04	50 ft bgs	Upland	0.0	0.0	0.0
40A-25	5/7/03	25 ft bgs	Upland	0.0	0.0	0.0
40-50	2/15/05	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/24/2013	82 to 84 ft BGS	Upland	0.0	0.0	0.0
41-138	8/7/02	138 ft bgs	Upland	0.0	0.0	0.0
41-138	8/15/03	138 ft bgs	Upland	0.0	0.0	0.0
61C-25	7/17/12	25 ft bgs	Upland	0.0	0.0	0.0
4-175R	4/4/06	175 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/1/2013	87 to 89 ft BGS	Upland	0.0	0.0	0.0
40-50	2/6/03	50 ft bgs	Upland	0.0	0.0	0.0
91C-160	7/18/12	160 ft bgs	Upland	0.0	0.0	0.0
40-50	5/13/04	50 ft bgs	Upland	0.0	0.0	0.0
40-50	11/15/04	50 ft bgs	Upland	0.0	0.0	0.0
41-138	8/18/04	138 ft bgs	Upland	0.0	0.0	0.0
MW-F-SHALLOW-NEW	10/11/2013	100.5 ft BGS	Upland	0.0	0.0	0.0
41-138	2/13/04	138 ft bgs	Upland	0.0	0.0	0.0
41-138	2/11/03	138 ft bgs	Upland	0.0	0.0	0.0
41-138	2/16/05	138 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/25/2013	112 to 114 ft BGS	Upland	0.0	0.0	0.0
40-50	11/12/02	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/23/2013	52 to 54 ft BGS	Upland	0.0	0.0	0.0
91C-130	7/18/12	130 ft bgs	Upland	0.0	0.0	0.0
40-50	5/18/05	50 ft bgs	Upland	0.0	0.0	0.0
40-50	4/13/06	50 ft bgs	Upland	0.0	0.0	0.0
40-50	8/18/04	50 ft bgs	Upland	0.0	0.0	0.0
GP-11	3/25/04	25 ft bgs	Upland	0.0	0.0	0.0
40-50	5/7/03	50 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/1/2013	77 to 79 ft BGS	Upland	0.0	0.0	0.0
77C-25	7/16/12	25 ft bgs	Upland	0.0	0.0	0.0
40-50	8/18/03	50 ft bgs	Upland	0.0	0.0	0.0
40-50	1/27/02	50 ft bgs	Upland	0.0	0.0	0.0
41-100	2/16/05	100 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/25/2013	122 to 124 ft BGS	Upland	0.0	0.0	0.0
40-50	2/16/04	50 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/23/2013	62 to 64 ft BGS	Upland	0.0	0.0	0.0
77-100	12/3/08	100 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	6/28/2013	57 to 59 ft BGS	Upland	0.0	0.0	0.0
41C-75	7/16/12	75 ft bgs	Upland	0.0	0.0	0.0

TABLE 4.20

SUMMARY OF SCREENING OF TOTAL ORGANICS
IN GROUNDWATER IN NORTHERN WELLS PROXIMATE TO COMMENCEMENT BAY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Location	*Sample Date*	*Depth (ft bml or bgs)*	*Tidal Zone*	*Summed SQ (1) SVOC*	*Summed SQ (1) VOC*	*(1) All Organics*
MW-H-01	6/20/2013	102 to 104 ft BGS	Upland	0.0	0.0	0.0
40A-25	2/16/05	25 ft bgs	Upland	0.0	0.0	0.0
40-25	2/15/05	25 ft bgs	Upland	0.0	0.0	0.0
MW-EXT-9-DEEP	7/11/2013	72 to 74 ft BGS	Upland	0.0	0.0	0.0
40A-25	11/15/04	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	5/18/05	25 ft bgs	Upland	0.0	0.0	0.0
41C-50	7/16/12	50 ft bgs	Upland	0.0	0.0	0.0
GP-6	4/7/04	100 ft bgs	Upland	0.0	0.0	0.0
MW-G-DEEP	7/25/2013	102 to 104 ft BGS	Upland	0.0	0.0	0.0
91C-75	7/18/12	75 ft bgs	Upland	0.0	0.0	0.0
91C-100	7/18/12	100 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	117 to 119 ft BGS	Upland	0.0	0.0	0.0
40A-25	2/1/02	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	12/3/08	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	8/18/03	25 ft bgs	Upland	0.0	0.0	0.0
41C-100	7/16/12	100 ft bgs	Upland	0.0	0.0	0.0
40-75	8/21/12	75 ft bgs	Upland	0.0	0.0	0.0
MW-EXT-9-DEEP	7/12/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
MW-G-DEEP	7/24/2013	72 to 74 ft BGS	Upland	0.0	0.0	0.0
89C-130	8/24/12	130 ft bgs	Upland	0.0	0.0	0.0
41-50	2/16/05	50 ft bgs	Upland	0.0	0.0	0.0
41C-160	7/17/12	160 ft bgs	Upland	0.0	0.0	0.0
76-100	12/5/08	100 ft bgs	Upland	0.0	0.0	0.0
91C-50	7/18/12	50 ft bgs	Upland	0.0	0.0	0.0
40-50	11/17/03	50 ft bgs	Upland	0.0	0.0	0.0
40-25	4/17/06	25 ft bgs	Upland	0.0	0.0	0.0
40A-25	11/9/02	25 ft bgs	Upland	0.0	0.0	0.0
GP-16	7/8/04	100 ft bgs	Upland	0.0	0.0	0.0
40A-50	12/3/08	50 ft bgs	Upland	0.0	0.0	0.0
MW-EXT-9-DEEP	7/11/2013	82 to 84 ft BGS	Upland	0.0	0.0	0.0
91C-25	7/18/12	25 ft bgs	Upland	0.0	0.0	0.0
41-50	8/18/04	50 ft bgs	Upland	0.0	0.0	0.0
GP-9	3/24/04	50 ft bgs	Upland	0.0	0.0	0.0
89C-75	8/23/12	75 ft bgs	Upland	0.0	0.0	0.0
77-100	4/25/06	100 ft bgs	Upland	0.0	0.0	0.0
61-50	12/4/08	50 ft bgs	Upland	0.0	0.0	0.0
76-100	4/22/06	100 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	107 to 109 ft BGS	Upland	0.0	0.0	0.0
41-100	12/8/08	100 ft bgs	Upland	0.0	0.0	0.0
40-25	8/21/12	25 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	97 to 99 ft BGS	Upland	0.0	0.0	0.0
41C-25	7/16/12	25 ft bgs	Upland	0.0	0.0	0.0
40A-50	4/13/06	50 ft bgs	Upland	0.0	0.0	0.0
MW-F-DEEP	7/2/2013	97 to 99 ft BGS	Upland	0.0	0.0	0.0
40A-25	4/13/06	25 ft bgs	Upland	0.0	0.0	0.0
MW-H-01	6/20/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0
MW-H-01	6/20/2013	92 to 94 ft BGS	Upland	0.0	0.0	0.0

TABLE 5.1

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR ON-OCC PROPERTY SOIL
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern (COC) SOIL (mg/kg)	*Calculated RBSs Per Exposure Pathway [1] (Table Reference) Human Health Based RBCs*			*Final RBS Value [2]*	*Maximum Detected Concentration [3]*	*Risk Management Measure Required (Yes/No)*	*Measure [4]*
	1 (Table 3.9)	*2 (Table 3.16)*	*3 (Table 3.19)*				
VOCs							
1,1,2,2-Tetrachloroethane	**1.09E-02**	1.51E+01	1.04E+00	0.011	**2.90E-01**	Yes	B
1,1,2-Trichloroethane	7.89E-03	2.80E+01	1.80E+00	0.008	ND	No	--
1,1-Dichloroethene	3.01E-01	2.88E+03	3.51E+02	0.301	8.00E-03	No	--
Benzene	**2.93E-03**	2.48E+01	**1.56E+00**	0.0029	**5.30E+00**	Yes	B
Carbon tetrachloride	**2.06E-03**	2.32E+01	1.48E+00	0.0021	**9.90E-01**	Yes	B
Chloroform (Trichloromethane)	**1.01E-03**	**9.03E+00**	**5.48E-01**	0.001	**1.10E+01**	Yes	B
cis-1,2-Dichloroethene	NV	6.40E+03	3.98E+03	3,975	4.50E-02	No	--
Ethylbenzene	**2.71E+01**	3.75E+04	5.13E+03	27	**3.60E+01**	Yes	B
Methylene chloride	**1.48E+00**	6.89E+03	7.71E+02	1.48	**5.00E+00**	Yes	B
Tetrachloroethene	**7.54E-02**	**8.73E+02**	**5.69E+01**	0.075	**6.20E+01**	Yes	B
trans-1,2-Dichloroethene	1.98E-01	1.20E+03	1.46E+02	0.198	3.00E-03	No	--
Trichloroethene	**8.12E-03**	4.28E+01	**2.81E+00**	0.008	**2.10E+01**	Yes	B
Vinyl chloride	**6.67E-04**	1.17E+01	9.81E-01	0.0007	**7.50E-03**	Yes	B
SVOCs							
1,2,4-Trichlorobenzene	**2.86E-01**	9.25E+02	1.18E+02	0.29	**2.30E+00**	Yes	B
bis(2-Ethylhexyl)phthalate	--	6.73E+02	1.79E+02	179	6.20E-01	No	--
Hexachlorobenzene	**4.05E-01**	5.32E+00	**1.06E+00**	0.40	**1.40E+00**	Yes	B
Hexachlorobutadiene	**7.88E-01**	8.51E+01	**1.13E+01**	0.79	**2.80E+01**	Yes	B
Pentachlorophenol		2.30E+01	6.10E+00	6.1	2.50E+00	No	--
Pesticides							
4,4'-DDD	--	3.92E+01	1.04E+01	10.4	ND	No	--
4,4'-DDE	1.43E+04	2.75E+01	7.16E+00	7.16	7.30E-03	No	--
4,4'-DDT	--	2.77E+01	7.35E+00	7.35	5.90E-03	No	--
PCBs							
Total PCBs	--	**4.71E+00**	**1.25E+00**	1.25	**1.56E+01**	Yes	A
Dioxins/Furans							
2,3,7,8-TCDD (TEQ)	--	**7.24E-05**	**1.92E-05**	0.0000192	**8.46E-04**	Yes	A
Metals							
Antimony	--	9.25E+02	5.33E+02	533	2.21E+01	No	--
Arsenic	--	**1.16E+01**	**3.33E+00**	3.33	**2.28E+02**	Yes	A
Cadmium	--	1.15E+03	6.58E+02	658	3.91E+01	No	--
Chromium	--	3.47E+06	2.00E+06	2,000,000	1.20E+03	No	--
Copper	--	9.25E+04	5.33E+04	53,333	7.07E+03	No	--
Lead	--	**2.07E+03 (a)**	**8.06E+02 (a)**	806	**2.80E+04**	Yes	A
Mercury	**1.61E-03**	1.43E+02	2.05E+01	0.0016	1.20E+00	Yes	B
Nickel	--	4.55E+04	2.39E+04	23,911	9.62E+02	No	--
Silver	--	1.16E+04	6.67E+03	6,667	1.95E+01	No	--
Thallium	--	NV	NV	NV	2.10E-01	Yes	--
Zinc	--	6.94E+05	4.00E+05	400,000	1.02E+04	No	--

Notes:

BOLD	Concentration exceeds minimum calculated RBC (Risk Based Concentration).
BOLD	Concentration exceeds final RBS for the various receptors.
NA	Not applicable.
NV	No value.
ND	Not detected.
TEQ	Toxic equivalency.

(1) Exposure Pathway

	Receptor	*Medium*
1	On-OCC Property Industrial/Commercial Worker	Soil to Indoor Air
2	On-OCC Property Trespasser	Soil
3	On-OCC Property Industrial/Commercial Worker	Soil

(a) RBCs for lead were based on the adult lead model, as presented in Table 3.28.

(2) Final RBS is the lowest calculated human health based RBC.

(3) For On-OCC Property maximum soil concentration, refer to Table 3.1.

(4) Risk Management Measure Description.

A. Soil Cover for ingestion and dermal exposure pathways

B. Remediation of soil for inhalation of vapor exposure pathway

"--", No Risk Management Measures are required.

TABLE 5.2

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR OFF-OCC PROPERTY SOIL
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern (COC) SOIL (mg/kg)	*Calculated RBSs Per Exposure Pathway (1) (Table Reference) Human Health Based RBCs*				*Final RBS (2)*	*Maximum Detected Concentration (3)*	*Risk Management Measure Required (Yes/No)*	*Measure (4)*
	1 (Table 3.9)	*2 (Table 3.16)*	*3 (Table 3.19)*	*4 (Table 3.22)*				
VOCs								
1,1,2,2-Tetrachloroethane	**1.09E-02**	1.51E+01	**1.04E+00**	6.34E+01	0.011	**3.10E+00**	Yes	A
1,1,2-Trichloroethane	--	2.80E+01	1.80E+00	1.16E+02	1.80	ND	No	--
1,1-Dichloroethene	--	2.88E+03	3.51E+02	7.45E+02	351	ND	No	--
Benzene	**2.93E-03**	**2.48E+01**	**1.56E+00**	1.05E+02	0.003	**3.00E+01**	Yes	A
Carbon tetrachloride	--	2.32E+01	1.48E+00	1.05E+02	1.48	ND	No	--
Chloroform (Trichloromethane)	--	9.03E+00	5.48E-01	3.63E+01	0.55	ND	No	--
cis-1,2-Dichloroethene	--	6.40E+03	3.98E+03	1.69E+03	1,694	ND	No	--
Ethylbenzene	**2.71E+01**	3.75E+04	5.13E+03	1.88E+04	27	**7.20E+01**	Yes	A
Methylene chloride	1.48E+00	6.89E+03	7.71E+02	2.67E+03	1.5	1.30E+00	No	--
Tetrachloroethene	**7.53E-02**	8.73E+02	5.69E+01	4.88E+02	0.075	**1.70E-01**	Yes	A
trans-1,2-Dichloroethene	--	1.20E+03	1.46E+02	4.72E+02	146	ND	No	--
Trichloroethene	8.11E-03	4.28E+01	2.81E+00	2.02E+01	0.008	2.70E-03	No	--
Vinyl chloride	--	1.17E+01	9.81E-01	4.11E+01	0.98	ND	No	--
SVOCs								
1,2,4-Trichlorobenzene	--	9.25E+02	1.18E+02	3.76E+02	118	ND	No	--
bis(2-Ethylhexyl)phthalate	--	6.73E+02	1.79E+02	2.84E+03	179	ND	No	--
Hexachlorobenzene	--	5.32E+00	1.06E+00	2.11E+01	1.06	ND	No	--
Hexachlorobutadiene	--	8.51E+01	1.13E+01	3.54E+02	11.3	ND	No	--
Pentachlorophenol	--	2.30E+01	6.10E+00	9.70E+01	6.10	ND	No	--
PCBs								
Total PCBs	--	4.71E+00	1.25E+00	1.98E+01	1.25	5.40E-03	No	--
Metals								
Antimony	--	9.25E+02	5.33E+02	2.95E+02	295	2.51E+00	No	--
Arsenic	--	1.16E+01	**3.33E+00**	3.55E+01	3.33	**6.38E+00**	Yes	B
Cadmium	--	1.15E+03	6.58E+02	2.75E+02	275	7.06E-01	No	--
Chromium	--	3.47E+06	2.00E+06	1.11E+06	1,106,719	1.64E+01	No	--
Copper	--	9.25E+04	5.33E+04	2.95E+04	29,513	2.83E+02	No	--
Lead	--	2.07E+03 (a)	**8.06E+02 (a)**	**1.22E+02 (a)**	122	**8.99E+02**	Yes	B
Mercury	**1.61E-03**	1.43E+02	2.05E+01	3.86E+01	0.002	**1.09E-01**	Yes	A
Nickel	--	4.55E+04	2.39E+04	3.67E+03	3,669	2.53E+01	No	--
Silver	--	1.16E+04	6.67E+03	3.69E+03	3,689	2.57E-01	No	--
Thallium	--	NV	NV	NV	NV	5.90E-02	No	--
Zinc	--	6.94E+05	4.00E+05	2.21E+05	221,344	4.38E+02	No	--

Notes:

BOLD	Concentration exceeds minimum calculated RBC (Risk Based Concentration).
BOLD	Concentration exceeds final RBS for the various receptors.
NA	Not applicable.
NV	No value.
ND	Not detected.

(1) Exposure Pathway

	Receptor	*Medium*
1	Off-OCC Property Industrial/Commercial Worker	Soil to Indoor Air
2	Off-OCC Property Trespasser	Soil
3	Off-OCC Property Industrial/Commercial Worker	Soil
4	Off-OCC Property Construction/Utility Worker	Soil

(a) RBCs for lead were based on the adult lead model, as presented in Table 3.28.

(2) Final RBS is the lowest calculated human health based RBC.

(3) For Off-OCC Property maximum soil concentration, refer to Table 3.4.

(4) Risk Management Measure Description.

A. Vapor Mitigation Systems for existing building or subslab/indoor air evaluations.

B. Soil Cover for ingestion and dermal exposure pathways

C. Remediation of soil for inhalation of vapor exposure pathway

"--", No Risk Management Measures are required.

TABLE 5.3

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR ON-OCC PROPERTY SEDIMENT
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern	*Calculated RBSs Per Exposure Pathway* (1) *(Table Reference)*		*Final RBS* (2)	*Maximum Detected Concentration* (3)	*Risk Management Measure Required (Yes/No)*	*Measure* (4)
(COC)	*Human Health Based RBCs*					
SEDIMENT (mg/kg)	*1*	*2*				
	(Table 3.29)	*(Table 3.30)*				
VOCs						
1,1,2,2-Tetrachloroethane	9.33E+01	2.73E+01	27.3	6.39E-02	No	--
1,1-Dichloroethene	1.60E+05	9.94E+04	99,379	9.32E-03	No	--
Carbon Tetrachloride	3.43E+02	1.06E+02	106	2.11E-01	No	--
Chloroform	7.74E+02	2.40E+02	240	4.82E+00	No	--
cis-1,2-Dichloroethene	3.20E+04	1.99E+04	19,876	2.17E-01	No	--
Tetrachloroethene	3.45E+01	1.01E+01	10.1	8.11E+00	No	--
trans-1,2-Dichloroethene	6.40E+04	3.98E+04	39,752	1.12E-02	No	--
Trichloroethene	3.16E+03	9.24E+02	924	4.94E-01	No	--
Vinyl chloride	3.33E+01	1.04E+01	10.4	1.45E-02	No	--
SVOCs						
1,2,4-Trichlorobenzene	1.26E+04	6.67E+03	6,667	8.60E-02	No	--
bis(2-Ethylhexyl)phthalate (DEHP)	6.73E+02	1.79E+02	179	1.80E+00	No	--
Hexachlorobenzene	5.89E+00	1.56E+00	1.56	7.70E-01	No	--
Hexachlorobutadiene	1.21E+02	3.21E+01	32.1	2.30E+00	No	--
Pentachlorophenol	7.85E+01	2.08E+01	20.8	2.90E-01	No	--
Pesticides						
4,4'-DDD	3.92E+01	1.04E+01	10.4	2.20E+00	No	--
4,4'-DDE	2.77E+01	7.35E+00	7.35	7.40E-01	No	--
4,4'-DDT	2.77E+01	7.35E+00	7.35	3.40E-03	No	--
PCBs						
Total PCBs	**4.71E+00**	**1.25E+00**	1.25	**6.25E+00**	Yes	A
Metals						
Antimony	9.25E+02	5.33E+02	533	5.00E+01	No	--
Arsenic	**1.16E+01**	**3.33E+00**	3.33	**1.40E+02**	Yes	A
Cadmium	1.16E+03	6.67E+02	667	3.60E+00	No	--
Chromium	3.47E+06	2.00E+06	2,000,000	1.60E+02	No	--
Copper	9.25E+04	5.33E+04	53,333	2.50E+03	No	--
Lead	**2.07E+03 (a)**	**8.06E+02 (a)**	806	**1.50E+05**	Yes	A
Mercury	3.70E+02	2.13E+02	213	1.40E+00	No	--
Nickel	4.62E+04	2.67E+04	26,667	4.50E+02	No	--
Silver	1.16E+04	6.67E+03	6,667	2.00E+00	No	--
Thallium	NV	NV	NV	4.15E-02	No	--
Zinc	6.94E+05	4.00E+05	400,000	1.50E+03	No	--

Notes:

BOLD Concentration exceeds minimum calculated RBC (Risk Based Concentrations).
BOLD Concentration exceeds final RBS for the various receptors.
NA Not applicable.
NV No value.
ND Not detected.

(1) Exposure Pathway

	Receptor	Medium
1	On-OCC Property Trespasser	Sediment
2	On-OCC Property Industrial/Commercial Worker	Sediment

(a) RBCs for lead were based on the adult lead model, as presented in Table 3.28.

(2) Final RBS is the lowest calculated human health based RBC.

(3) For On-OCC Property maximum sediment concentration, refer to Table 3.2.

(4) Risk Management Measure Description.
A. Sediment Cover for ingestion and dermal exposure pathways
"--", No Risk Management Measures are required.

TABLE 5.4

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR OFF-OCC PROPERTY SEDIMENT
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern (COC) SEDIMENT (mg/kg)	*Calculated RBSs Per Exposure Pathway (1) (Table Reference) Human Health Based RBCs* 1 (Table 3.29)	2 (Table 3.30)	*Final RBS (2)*	*Maximum Detected Concentration (3)*	*Risk Management Measure Required (Yes/No)*	*Measure (4)*
VOCs						
Tetrachloroethene	3.45E+01	1.01E+01	10.1	2.12E-03	No	--
Trichloroethene	3.16E+03	9.24E+02	924	1.30E-02	No	--
PCBs						
Total PCBs	**4.71E+00**	**1.25E+00**	1.25	**2.60E+01**	Yes	A
Dioxins/Furans						
2,3,7,8-TCDD (TEQ)	7.24E-05	**1.92E-05**	0.0000192	**5.70E-05**	Yes	A

Notes:

BOLD	Concentration exceeds minimum calculated RBC (Risk Based Concentrations).
BOLD	Concentration exceeds final RBS for the various receptors.
NA	Not applicable.
NV	No value.
ND	Not detected.
TEQ	Toxic equivalency.

(1) Exposure Pathway

	Receptor	*Medium*
1	Off-OCC Property Trespasser	Sediment
2	Off-OCC Property Industrial/Commercial Worker	Sediment

(2) Final RBS is the lowest calculated human health based RBC.

(3) For Off-OCC Property maximum sediment concentration, refer to Table 3.5.

(4) Risk Management Measure Description.

A. Sediment Cover for ingestion and dermal exposure pathways

"--", No Risk Management Measures are required.

TABLE 5.5

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR ON-OCC PROPERTY SHALLOW GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern (COC) GROUNDWATER (µg/L)	*Calculated RBSs Per Exposure Pathway (1) (Table Reference) Human Health Based RBCs*			*Final RBS (2)*	*Maximum Detected Concentration (3)*	*Risk Management Measure Required (Yes/No)*	*Measure (4)*
	1 (Table 3.10)	*2 (Table 3.13)*	*3 (Table 3.15)*				
VOCs							
1,1,2,2-Tetrachloroethane	**7.10E+01**	2.28E+05	9.70E+03	71	**5.48E+03**	Yes	A
1,1,2-Trichloroethane	**6.02E+01**	4.59E+05	1.95E+04	60	**1.66E+02**	Yes	A
1,1-Dichloroethene	1.83E+03	1.38E+07	1.17E+06	1,834	1.00E+03	No	--
Benzene	**2.38E+01**	3.04E+05	1.29E+04	24	**2.30E+03**	Yes	A
Carbon Tetrachloride	**6.04E+00**	9.46E+04	4.02E+03	6	**2.00E+02**	Yes	A
Chloroform	**1.04E+01**	1.21E+05	**5.13E+03**	10	**7.98E+04**	Yes	A
cis-1,2-Dichloroethene	NV	NV	NV	NV	3.20E+05	No	--
Ethylbenzene	4.54E+04	3.16E+08	2.69E+07	45,401	4.40E+02	No	--
Methylene Chloride	3.93E+04	3.02E+08	1.61E+07	39,330	8.46E+02	No	--
Tetrachloroethene	**2.78E+02**	4.27E+06	**1.81E+05**	278	**1.70E+05**	Yes	A
trans-1,2-Dichloroethene	**1.93E+03**	1.34E+07	1.14E+06	1,931	**3.10E+03**	Yes	A
Trichloroethene	2.73E+01	3.90E+05	**1.66E+04**	27	**1.90E+05**	Yes	A
Vinyl Chloride	6.08E+00	**8.72E+04**	**3.70E+03**	6	**4.90E+05**	Yes	A
SVOCs							
Hexachlorobutadiene	1.13E+01	1.62E+05	6.88E+03	11	1.08E+01	No	--
Metals							
Mercury	3.04E+01	2.01E+05	1.71E+04	30	5.40E-01	No	--

Notes:

BOLD	Concentration exceeds minimum calculated RBC (Risk Based Concentration).
BOLD	Concentration exceeds final RBS for the various receptors.
NA	Not applicable.
NV	No value.
ND	Not detected.
TEQ	Toxic equivalency.

(1) Exposure Pathway

	Receptor	***Medium***
1	On-OCC Property Industrial/Commercial Worker	Shallow Groundwater to Indoor Air
2	On-OCC Property Trespasser	Shallow Groundwater to Ambient Air
3	On-OCC Property Industrial/Commercial Worker	Shallow Groundwater to Ambient Air

(2) Final RBS is the lowest calculated human health based RBC.

(3) For On-OCC Property maximum shallow groundwater concentration, refer to Table 3.3.

(4) Risk Management Measure Description.
A. Remediation of groundwater for inhalation of vapor exposure pathway.
"--", No Risk Management Measures are required.

TABLE 5.6

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR OFF-OCC PROPERTY SHALLOW GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern (COC) GROUNDWATER (µg/L)	*Calculated RBSs Per Exposure Pathway (1) (Table Reference) Human Health Based RBCs*				*Final RBS (2)*	*Maximum Detected Concentration (3)*	*Risk Management Measure Required (Yes/No)*	*Measure (4)*
	1 (Table 3.10)	*2 (Table 3.13)*	*3 (Table 3.15)*	*4 (Table 3.25)*				
VOCs								
1,1-Dichloroethene	1.83E+03	1.38E+07	1.17E+06	9.42E+03	1,834	5.90E+02	No	--
Benzene	**2.38E+01**	3.04E+05	1.29E+04	**3.59E+02**	23.8	**2.40E+03**	Yes	A,B
Chloroform (Trichloromethane)	**1.04E+01**	1.21E+05	5.13E+03	**1.99E+02**	10.4	**4.40E+03**	Yes	A,B,C
cis-1,2-Dichloroethene	NV	NV	NV	**3.36E+03**	3,356	**1.40E+05**	Yes	B
Ethylbenzene	4.54E+04	3.16E+08	2.69E+07	2.05E+04	20,534	3.10E+02	No	--
Methylene chloride	3.93E+04	3.02E+08	1.61E+07	**1.23E+04**	12,254	9.50E+03	No	B
Tetrachloroethene	**2.78E+02**	4.27E+06	1.81E+05	**1.26E+03**	277.8	**1.70E+05**	Yes	B
trans-1,2-Dichloroethene	**1.93E+03**	1.34E+07	1.14E+06	**3.10E+03**	1,931	**7.60E+03**	Yes	B
Trichloroethene	**2.73E+01**	3.90E+05	1.66E+04	**1.06E+02**	27.3	**1.30E+04**	Yes	A,B
Vinyl chloride	**6.08E+00**	8.72E+04	**3.70E+03**	**1.83E+02**	6.08	**2.00E+04**	Yes	A,B,C
PCBs								
Total PCBs	NA	NA	NA	2.60E-01	0.26	9.40E-02	No	--
Dioxins/Furans								
2,3,7,8-TCDD (TEQ)	NA	NA	NA	4.23E-06	0.00000423	6.30E-08	No	--
Metals								
Antimony	NA	NA	NA	1.30E+03	1,302	2.33E+00	No	--
Arsenic	NA	NA	NA	1.63E+02	163	1.38E+02	No	--
Cadmium	NA	NA	NA	1.63E+03	1,628	6.50E-01	No	--
Chromium	NA	NA	NA	4.88E+06	4,883,721	6.35E+03	No	--
Copper	NA	NA	NA	1.30E+05	130,233	1.17E+02	No	--
Lead	NA	NA	NA	1.21E+03 (a)	1,206	9.04E+00	No	--
Mercury	3.04E+01	2.01E+05	1.71E+04	2.41E+01	24.1	8.90E-02	No	--
Nickel	NA	NA	NA	1.69E+05	168,675	1.16E+03	No	--
Silver	NA	NA	NA	2.35E+04	23,490	1.45E-01	No	--
Thallium	NA	NA	NA	NV	NV	7.70E-01	No	--
Zinc	NA	NA	NA	1.41E+06	1,409,396	1.18E+02	No	--

Notes:

BOLD	Concentration exceeds minimum calculated RBC (Risk Based Concentration).
BOLD	Concentration exceeds final RBS for the various receptors.
NA	Not applicable.
NV	No value.
ND	Not detected.

(1) Exposure Pathway

	Receptor	***Medium***
1	Off-OCC Property Industrial/Commercial Worker	Shallow Groundwater to Indoor Air
2	Off-OCC Property Trespasser	Shallow Groundwater to Ambient Air
3	Off-OCC Property Site Industrial/Commercial Worker	Shallow Groundwater to Ambient Air
4	Off-OCC Property Construction/Utility Worker	Shallow Groundwater

(a) RBC for lead was based on the adult lead model, as presented in Table 3.28.

(2) Final RBS is the lowest calculated human health based RBC.

(3) For Off-OCC Property maximum shallow groundwater concentration, refer to Table 3.6.

(4) Risk Management Measure Description.

A. Vapor Mitigation Systems for existing building or subslab/indoor air evaluations.

B. Remediation of groundwater for direct contact pathways.

C. Remediation of groundwater for inhalation of vapor exposure pathway.

"--", No Risk Management Measures are required.

TABLE 5.7

SUMMARY OF FINAL RISK-BASED STANDARDS (RBSs) FOR ON/OFF-OCC PROPERTY GROUNDWATER
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Contaminants of Concern (COC) GROUNDWATER (µg/L)	*Calculated RBSs Per Exposure Pathway (1) (Table Reference) Human Health Based RBCs 1 (Table 3.31)*	*Final RBS (2)*	*Maximum Concentration (3)*	*Risk Management Measure Required (Yes/No)*	*Measure (4)*
VOCs					
1,1,2,2-Tetrachloroethane	**4.00E+00**	4.00E+00	**5,480**	Yes	A
1,1,2-Trichloroethane	**1.60E+01**	1.60E+01	**166**	Yes	A
1,1-Dichloroethene	**3.20E+00**	3.20E+00	**1,000**	Yes	A
Benzene	**5.10E+01**	5.10E+01	**2,400**	Yes	A
Carbon Tetrachloride	**1.60E+00**	1.60E+00	**200**	Yes	A
Chloroform	**4.70E+02**	4.70E+02	**79,800**	Yes	A
cis-1,2-Dichloroethene	NV	NV	320,000	No	--
Ethylbenzene	2.10E+03	2.10E+03	440	No	--
Methylene Chloride	**5.90E+02**	5.90E+02	**9,500**	Yes	A
Tetrachloroethene	**3.30E+00**	3.30E+00	**170,000**	Yes	A
trans-1,2-Dichloroethene	1.00E+04	1.00E+04	7,600	No	--
Trichloroethene	**3.00E+01**	3.00E+01	**190,000**	Yes	A
Vinyl Chloride	**2.40E+00**	2.40E+00	**490,000**	Yes	A
SVOCs					
1,2,4-Trichlorobenzene	7.00E+01	7.00E+01	ND	No	--
bis(2-Ethylhexyl)phthalate	2.20E+00	2.20E+00	ND	No	--
Hexachlorobenzene	1.00E-02	1.00E-02	ND	No	--
Hexachlorobutadiene	1.80E+01	1.80E+01	10.8	No	--
Pentachlorophenol	**3.00E+00**	3.00E+00	**3.1**	Yes	A
PCBs					
Total PCBs	**2.00E-01**	2.00E-01	0.094	No	--
Dioxins/Furans					
2,3,7,8-TCDD (TEQ)	**1.00E-05**	1.00E-05	**0.000015**	Yes	A
Metals					
Antimony	6.40E+02	6.40E+02	19	No	--
Arsenic	**1.00E+00**	1.00E+00	**208**	Yes	A
Cadmium	8.80E+00	8.80E+00	1.6	No	--
Chromium	**5.00E+01**	5.00E+01	**6,350**	Yes	A
Copper	**2.40E+00**	2.40E+00	**286**	Yes	A
Lead	**8.10E+00**	8.10E+00	**968**	Yes	A
Mercury	**2.00E-01**	2.00E-01	**0.54**	Yes	A
Nickel	**8.20E+00**	8.20E+00	**1,160**	Yes	A
Silver	2.59E+04	2.59E+04	0.378	No	--
Thallium	**1.00E+00**	1.00E+00	**12**	Yes	A
Zinc	**8.10E+01**	8.10E+01	**310**	Yes	A

Notes:

BOLD Concentration exceeds minimum calculated RBC (Risk Based Concentrations).
BOLD Concentration exceeds final RBS for the various receptors.
NV No value.
ND Not detected.
TEQ Toxic equivalency.
(1) Exposure Pathway

	Receptor	***Medium***
1	Fisher	Surface Water

(2) Final RBS is the lowest calculated human health based RBC.
(3) For groundwater maximum concentrations, refer to Table 3.7.
(4) Risk Management Measure Description.
A. Remediation of groundwater and/or prevention of groundwater discharge into the Hylebos.
"--", No Risk Management Measures are required.

Appendix A

Draft Deed Restrictions

[This 3” Space Provided for Recorder’s Use]

WHEN RECORDED MAIL TO:

Glenn Springs Holdings, Inc.
Attn: Frank A. Parigi
5005 LBJ Freeway, Suite 1350
Dallas, TX 75244-6119

RESTRICTIVE COVENANT

The undersigned, Mariana Properties, Inc., is the fee owner of the real property in Tacoma, in the County of Pierce, State of Washington, for which a legal description is attached as Exhibit 1 and incorporated herein by reference into this Restrictive Covenant (hereinafter described as the “Property”). Mariana Properties, Inc. makes the following declaration as to limitations, restrictions and uses to which the groundwater and soil on the Property may be put, and specifies that such declarations shall constitute covenants to run with the land, as provided by law and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property, until amended or terminated by Mariana Properties, Inc., its corporate affiliates or parent, its corporate successors and corporate successors of its affiliates or parent.

<u>Section 1:</u> The owner of the Property shall prohibit the use of groundwater and the construction of any wells or other devices to extract groundwater for any use, except for wells and devices that are part of a corrective or remedial action activity on the Property. Short-term dewatering for construction purposes is permitted, provided the dewatering, including management and disposal of the groundwater, is conducted in accordance with all applicable local, state, and federal laws and regulations and does not cause or result in a new release, exacerbation of contamination, or violation of local, state, and federal laws or regulations.

<u>Section 2:</u> The Property may be used only for industrial uses which is defined by the Model Toxics Control Act, Rev. Code Wash. § 70.105D.020(14) as:

> [P]roperties that are or have been characterized by, or are to be committed to, traditional industrial uses such as processing or manufacturing of materials,

> marine terminal and transportation areas and facilities, fabrication, assembly, treatment, or distribution of manufactured products, or storage of bulk materials, that are either: (a) Zoned for industrial use by a city or county conducting land use planning under chapter 36.70A RCW; or (b) For counties not planning under chapter 36.70A RCW and the cities within them, zoned for industrial use and adjacent to properties currently used or designated for industrial purposes.

including those uses referred to in Sections 13.06.400 *et seq.* of the Tacoma City Code, as of the date of this Restrictive Covenant.

Section 3: The owner of the Property shall manage all soils, media and/or debris that are excavated or disturbed on the Property in accordance with all applicable local, state and federal laws or regulations. Relocation and reuse of soils on the Property will be consistent with the corrective measures at the Property and a soils management plan maintained by the owner of the Property will form part of the deed restrictions for the Property and address worker safety and soil handling issues.

Section 4: The owner of the Property shall prohibit all uses of the Property that do not adequately evaluate and address, if applicable, vapor intrusion pathways pertinent to structures that may be constructed on the Property.

Section 5: The owner of the Property shall prohibit any excavation or other intrusive activity that could impact the effectiveness of the surface cover system that may exist today or may be installed on the property as part of interim or final corrective measures for the property. . Should surface cover removal be required, the owner of the Property shall replace the original surface cover system with a new surface cover system that achieves equal or better performance standards as the original surface cover system. If the replacement cover system differs from the original surface cover system selected as part of the corrective measures for the Property, agency approval will be required, as applicable.

Section 6: Mariana Properties, Inc., its corporate affiliates or parent, its corporate successors and corporate successors of its affiliates or parent, reserve the right to record an instrument that provides this Restrictive Covenant shall be modified or no longer limit the use of the Property or be of any further force or effect.

Mariana Properties, Inc. agrees that this Restrictive Covenant shall be filed with the Pierce County Auditor.

MARIANA PROPERTIES, INC.

By: ______________________________
Name: ______________________________
Title: ______________________________
Date: ______________________________

Appendix B

Soil and Groundwater Management Plan

CONESTOGA-ROVERS
& ASSOCIATES

www.CRAworld.com

Draft Soil and Groundwater Management Plan

Mariana Properties, Inc.
Tacoma, Washington

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

March 2014 • 007843 (105)

Partners in
Sustainability

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(Following Text)

List of Appendices

Section 1.0 Introduction

This document presents the Soil and Groundwater Management Plan (SMP) for Mariana Properties, Inc. properties located at 605 and 709 Alexander Avenue in Tacoma, Washington (Property). This SMP will be followed to manage soil and/or groundwater during excavation activities on the Property and, more specifically, to:

- Provide the mechanism to assign the general Health, Safety, and Environment (HS&E) requirements for soil and groundwater monitoring during activities that may encounter soil and/or groundwater
- Set criteria for containing, handling, and backfilling, and placing excavated soil on the Property
- Set criteria for proper handling of groundwater collected during excavation activities
- Identify and manage excavated material, which will not be backfilled or placed on-Property, or collected groundwater that will be disposed of off-Property

This SMP provides guidelines for soil and groundwater management activities. Section 2.0 presents the soil and groundwater management system. Section 3.0 discusses soil disposal. Section 4.0 presents the record-keeping procedures associated with the SMP. Section 5.0 presents training requirements. Section 6.0 presents review protocols. Section 7.0 presents definitions of terms used in this document. Section 8.0 presents referenced documentation.

The SMP is an evolving document that may be updated periodically to reflect changes in regulations and any applicable requirements. This flexibility is necessary to accommodate future changes in Property operations as well as advances in treatment technologies, environmental data generation, and potential revisions to analytical protocols.

1.1 Overall Objective of the Soil and Groundwater Management Plan

The SMP provides guidance for addressing HS&E concerns for any activities that may result in contact with soil and/or groundwater at the Property. For the most part, the SMP deals with excavations as these are the activities that would be most common; however, all activities that may result in contact with soil and/or groundwater are covered by this plan. Excavations are defined here as maintenance, repairs, facility upgrades, and investigation or construction projects where soil is excavated and/or groundwater may potentially infiltrate the excavation or may be encountered.

An internal permit including an HS&E review is required prior to initiation. The HS&E review will ensure that the activities are performed in accordance with the Health and Safety Plan, Tacoma Area Sites (Revised October 2013) [HASP] (CRA, 2013) for the Property.

An example permit form is presented in Appendix A.

The overall objectives of the SMP are:

1) To prevent construction/utility worker ingestion, dermal, and inhalation exposure to contaminated surface soils, subsurface soils, and groundwater, which may occur during excavation activities at the Property
2) To prevent on-Property industrial/commercial worker ingestion, dermal, and inhalation exposure to contaminated subsurface soils, which may occur during excavation activities at the Property or from placement of excavated materials on the surface
3) To prevent off-Property inhalation exposure to contaminated surface soils and subsurface soils which may occur as a result of increased particulate emission during excavation activities at the Property
4) To protect the environment by ensuring that disturbed surface cover, that is a component of corrective measures for the Property, is replaced with a new cover system that achieves equal or better performance standards as the surface cover system installed as part of the corrective measures

The SMP sets forth the approach and decision-making criteria that will be used to contain, stockpile, backfill, redistribute, or dispose of excavated material. The SMP will not identify corrective measures to be utilized for management of soil excavated in response to release events**,** nor will it replace soil management plans for activities covered by other orders.

1.2 Regulatory Framework

Soil excavation, temporary containment, characterization, backfilling, redistribution, transportation and disposal; and groundwater collection and disposal will be performed in accordance with applicable Federal and State regulations.

Section 2.0 Soil and Groundwater Management System

2.1 Overview

The objective of establishing a soil and groundwater management system is to ensure that management of soil and groundwater handled during excavation activities is conducted in a way that is protective of human health and the environment. This will be accomplished through a management system that allows soil excavation and groundwater collection, characterization, and disposition in a controlled manner. Any groundwater that infiltrates the excavation must also be managed in a controlled and protective manner. The soil and groundwater management system consists of the submittal of an internal excavation permit request, issuance of an internal permit with specified soil and groundwater management conditions by the Owner, followed by tracking of the excavated soil and management of any soil backfilled or redistributed on the Property, or treated/disposed of off-Property. Any groundwater collected from the excavation will be pumped or transported to the on-Property treatment plant for treatment in accordance with the permit for the treatment plant, with the approval of the owner of the treatment plant. Otherwise, the collected groundwater will be treated off-Property in accordance with applicable regulations.

2.2 Permit Process

An internal soil excavation and groundwater removal permit process will be used to track excavated soils and groundwater managed at the Property. The soil excavation and groundwater removal permit is obtained through an internal process designed to ensure appropriate utility clearance, HS&E review, and management of excavated soil and collected groundwater.

Prior to initiating any excavation project, Property personnel must submit an internal soil excavation and groundwater removal permit request which includes specific information regarding the location and a description of the project, the volume of the excavation and any other plans that may be required. Available environmental and operational data in the immediate vicinity of the area to be excavated will be reviewed to determine the soil handling and groundwater collection requirements. Once a review of the permit request has been completed, an internal soil excavation and groundwater removal permit will be issued outlining the following applicable elements: HS&E requirements including personal protective equipment (PPE) and environmental monitoring in accordance with the HASP; and instructions for material handling and disposition. Each permit will set forth the conditions that will be used to manage soils backfilled or redistributed at the Property, and determine the method of disposal of any soils that will not be backfilled or redistributed on the Property. The permit will also set forth the conditions for collection and disposal of groundwater from the excavations.

2.3 Health and Safety Monitoring

Air monitoring at the Property will be performed in accordance with the methods, equipment, and frequencies in the HASP. The action levels and corresponding PPE for the Property are presented in the HASP. All work will be conducted in accordance with applicable Federal and State safety standards.

2.4 Soil Excavation Flowchart

The protocols for this SMP are presented in the flowchart on Figure 1. Soils will be characterized in accordance with 40 CFR 261 Subpart C and WAC 173-303 to determine whether the soils are a hazardous/dangerous waste.

For current (pre-corrective measures) excavation activities, soils may be:

1) Backfilled in the original excavation or placed in the same general area, if the excavated soils are non-hazardous/non-dangerous. Soils will be backfilled in a manner to ensure subsurface soils are placed below surface soils.
2) Placed in other areas of the Property, subject to Washington State Department of Ecology (Ecology) approval, if the soils are non-hazardous/non-dangerous. Soils will be backfilled in a manner to ensure subsurface soils are placed below surface soils.
3) Disposed of at an off-Property disposal facility, if the soils are hazardous/dangerous wastes or if the soils are not placed in the same general area or other areas of the Property. Soils that are disposed off-Property may require additional characterization depending on the permit requirements of the off-Property disposal facility.

For future (post-corrective measures) excavation activities, soils may be:

1) Backfilled in the original excavation or placed in the same general area, if the excavated soils are non-hazardous/non-dangerous. Where an engineered cover exists as part of the corrective measures, the cover will be replaced with the same cover over the backfilled soils. Otherwise soils will be backfilled in a manner to ensure subsurface soils are placed below surface soils.
2) Placed in other areas of the Property, subject to Ecology approval, if the soils are non-hazardous/non-dangerous. Soils will be backfilled under an equivalent cover or better where an engineered cover exists as part of the corrective measures, otherwise soils will be backfilled in a manner to ensure subsurface soils are placed below surface soils.
3) Disposed of at an off-Property disposal facility, if the soils are hazardous/dangerous wastes or if the soils are not placed in the same general area or other areas of the Property. Soils that are disposed off-Property may require additional characterization depending on the permit requirements of the off-Property disposal facility.

The sample frequency will be sufficient to representatively characterize the excavated soils. Soil may be placed in covered containers (e.g., drums, roll-off boxes, etc.), or within a building or temporary soil staging area (SSA), that is contained to prevent runoff and off-Property migration of soil particles, for the purposes of temporary storage while awaiting characterization results or disposition in accordance with appropriate Federal and State regulations.

Collected groundwater will be pumped or transported to the on-Property treatment plant for treatment in accordance with its permit, with the approval of the owner of the treatment plant. Otherwise, the collected groundwater will be treated off-Property in accordance with applicable regulations.

Section 3.0 Soil Disposal

Classification for off-Property management is based on soil analytical results and Owner's knowledge of processes or past practices. Soil will be handled as hazardous/dangerous waste if constituents contained in the soil originate from a known source of hazardous waste and/or if the soil exhibits hazardous/dangerous characteristics in accordance with 40 CFR 261 Subpart C and WAC 173-303. Soil will otherwise be classified as non-hazardous waste, if it does not meet the criteria for classification as a hazardous/dangerous waste and will be managed appropriately.

Soil that is classified as hazardous/dangerous waste or soil that will not be backfilled at the original excavation or redistributed on the Property (with Ecology approval) will be managed at a permitted treatment disposal facility.

Section 4.0 Record-Keeping and Document Control

Records generated during implementation of the SMP will be maintained by the Owner. If ownership changes, the successor in interest of ownership will maintain all records. A file will be maintained for each project which requires a permit. The files will be maintained now, and in the future in accordance with the final corrective measures at the Property. Each project will be designated a unique project identification.

The records may include:

- Project procedures, requirements, and specifications including sampling and analysis plans to evaluate soils
- Sampling collection log/chain-of-custody
- Analytical results including waste evaluation data used to determine if soil is hazardous/dangerous waste
- Field activity logs/testing data and results
- HS&E records
- Excavation, removal, and redistribution records including soil excavation permits
- Documentation of soil disposition

Section 5.0 Training

All affected employees, contractors/subcontractors, will receive training on the appropriate provisions of this SMP. Workers that may contact impacted soil and/or groundwater will have appropriate WISHA and OSHA training consistent with WAC 296-843, 29 CFR 1910.120, and 29 CFR 1926.65, respectively.

Section 6.0 Review

This procedure will be reviewed and amended.

1) As new information becomes available
2) Upon discovery of incomplete or inaccurate information in the procedure
3) When there are changes to the content or references in the procedure

All reviews of this procedure will be in writing. If the review results in a change to the procedure, then the change must be approved by the project/site manager for the Property.

Section 7.0 Definitions

CFR

Code of Federal Regulations.

Ecology

Washington State Department of Ecology.

Health and Safety Plan (HASP)

The Health and Safety Plan, Tacoma Area Sites (Revised October 2013).

Property

The properties at 605 and 709 Alexander Avenue in Tacoma, Washington.

OSHA

Occupational Safety and Health Administration.

Owner

Entity that owns the property at 605 and/or 709 Alexander Avenue in Tacoma, Washington.

Redistribution

Placement of soil from one area of the Property to a different area of the Property. Redistribution is subject to Ecology approval.

SMP

Soil and Groundwater Management Plan (SMP), as outlined in this document.

Surface Soil

Soil from existing surface grade to a depth of 2 feet below existing ground surface.

Subsurface Soil

Soil from a depth of 2 feet below existing ground surface to 10 feet below existing ground surface or to the saturated zone.

USEPA

United States Environmental Protection Agency.

WAC

Washington Administrative Code.

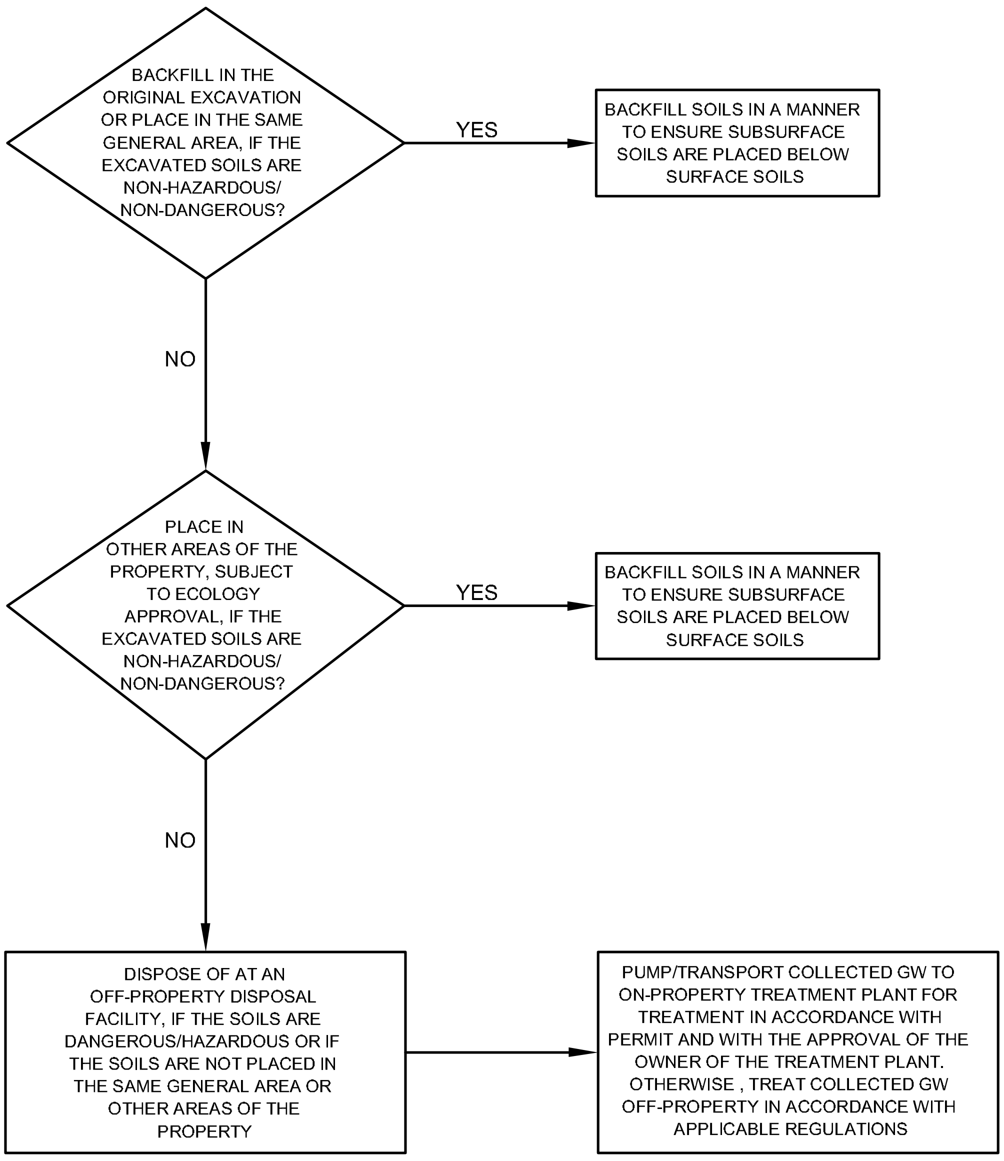
WISHA

Washington Industrial Safety and Health Act.

Section 8.0 References

CRA, 2013. Health and Safety Plan, Tacoma Area Sites (Revised October 2013). October 2013

PRE-CORRECTIVE MEASURES



POST-CORRECTIVE MEASURES

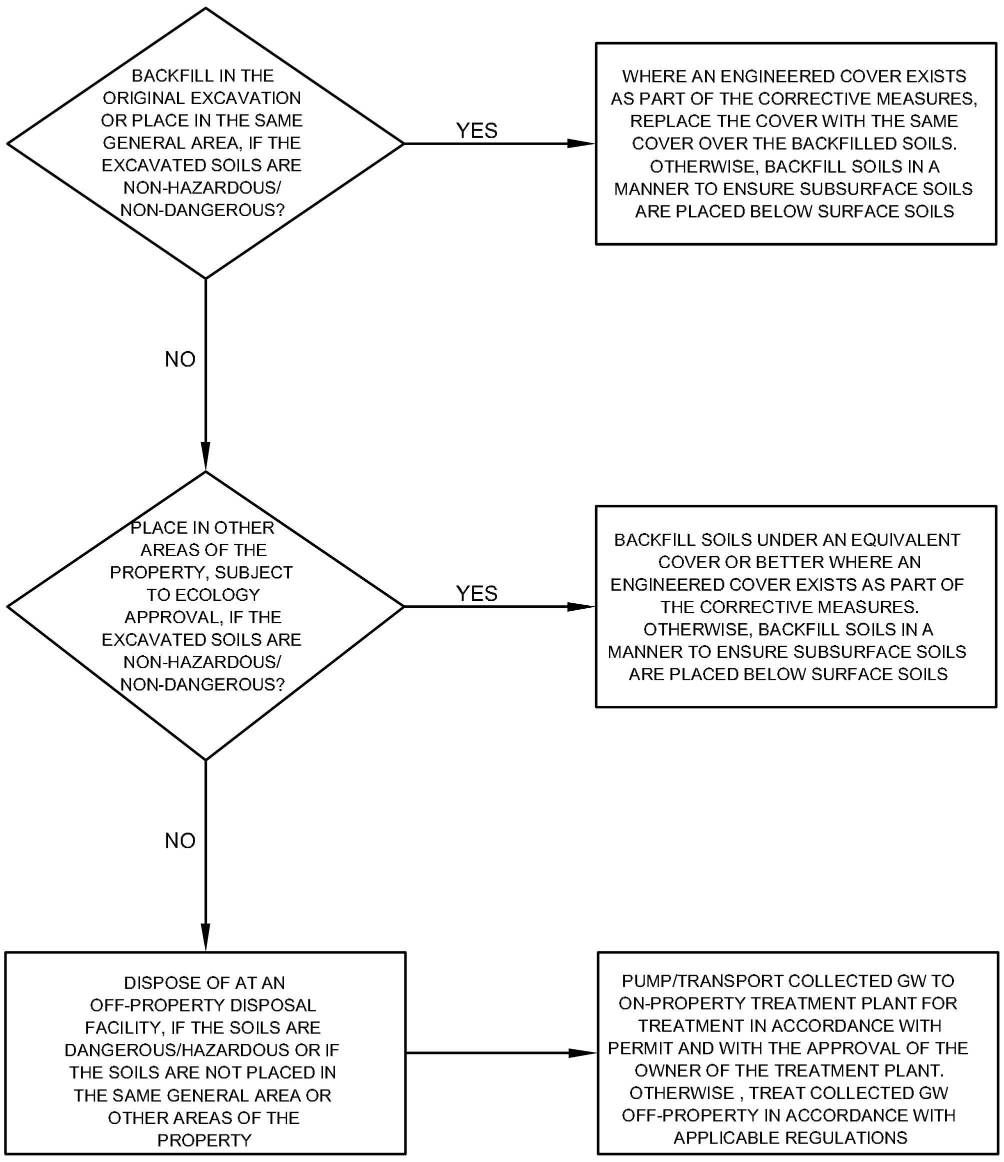


figure 1

SOIL EXCAVATION FLOWCHART
Mariana Properties, Inc., Tacoma, Washington

Appendix A

Soil Excavation and Groundwater Removal Permit - Example

SOIL EXCAVATION AND GROUNDWATER PLAN (SMP) PERMIT

MARIANA PROPERTIES, INC. (605 and/or 709 ALEXANDER AVENUE)
SOIL AND GROUNDWATER MANAGEMENT PLAN (SMP)
TACOMA, WASHINGTON

Project Identification Number:

Project Activity:

Project Location:

WISHA-/OSHA-trained Contractor:

Project Start Date:

Estimated Excavation Volume: cubic yards

Estimated Excavation Depth: feet below existing ground surface

Existing Surface Cover:
Is Cover Part of Corrective Measures? Y / N ?

Utilities Located:

Potential Contaminants:

Contaminant	*Concentration*	*Unit*	*Regulatory Exposure Limit*

☐ Additional information attached

HASP Requirements:

☐ HASP reviewed including PPE, monitoring and mitigation requirements

Completion Date of Field Activities:

SOIL EXCAVATION AND GROUNDWATER PLAN (SMP) PERMIT

MARIANA PROPERTIES, INC. (605 and/or 709 ALEXANDER AVENUE)
SOIL AND GROUNDWATER MANAGEMENT PLAN (SMP)
TACOMA, WASHINGTON

Waste Characterization and Disposition of Excavated Materials:

Soil

- ☐ Waste Characterization performed
  - ☐ Soil is hazardous/dangerous
  - ☐ Soil is non-hazardous/non-dangerous
- ☐ Owner Process Knowledge or Knowledge of Past Practices

- ☐ Pre-Corrective Measures
  - ☐ Soil backfilled at original excavation
  - ☐ Soil placed at other area at Site with Ecology approval
  - ☐ Soil disposed at permitted treatment disposal facility
- ☐ Post-Corrective Measures
  - ☐ Soil backfilled at original excavation under equivalent cover
  - ☐ Soil placed at other area at Site with Ecology approval
  - ☐ Soil disposed at permitted treatment disposal facility

Groundwater

- ☐ Treated at treatment plant with plant owner's approval
- ☐ Disposed at off-Property, permitted treatment disposal facility

Attached Documents:

- ☐ HSE Review
- ☐ Sampling and Analysis Plan
- ☐ Risk Management Plan
- ☐ Field Log
- ☐ Chain-of-custody Forms
- ☐ Analytical Results
- ☐ Field Data
- ☐ Waste manifest
- ☐ Other (specify) ______________________________

Appendix C

Port of Tacoma Restrictive Covenant

200305050452 3 PGS
05-05-2003 12:06pm $21.00
PIERCE COUNTY, WASHINGTON

AFTER RECORDING MAIL TO:

Port of Tacoma
Attn: Real Estate Services
P.O. Box 1837
Tacoma, WA 98401-1837

RESTRICTIVE COVENANT

The undersigned, Port of Tacoma, is the fee owner of the real property in Tacoma, in the County of Pierce, State of Washington, for which a legal description is attached as Exhibit 1 and incorporated by reference into this Restrictive Covenant (hereinafter referred to as the "Property"). The Port of Tacoma makes the following declaration as to limitations, restrictions, and uses to which the groundwater on the Property may be put, and specifies that such declarations shall constitute covenants to run with the land, as provided by law, and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property.

Section 1. Groundwater on the Property shall not be extracted, supplied or used for drinking or other human consumption or domestic use of any kind.

Section 2. The owner of the Property must notify and obtain approval from the Washington Department of Ecology, or from a successor agency, prior to any use of the groundwater on the Property that may be inconsistent with the terms of this Restrictive Covenant.

Section 3. The owner of the Property, and owner's assigns and successors in interest, reserve the right under WAC 173-340-730 and WAC 173-340-440 to record an instrument which provides that this Restrictive Covenant shall no longer limit the use of the groundwater on the Property or be of any further force or effect. However, such an instrument may be recorded only with the consent of the Washington Department of Ecology or of a successor agency.

The Port of Tacoma agrees that this Restrictive Covenant shall be filed with the Pierce County Auditor.

PORT OF TACOMA

By: Richard Marzano
Name: Richard Marzano
Its: President of Board of Commissioners
Date: 04-17-2003

By:
Name: R. Ted Bottiger
Its: Secretary of Board of Commissioners
Date: 04/17/03

H:s\l\leases\Restrictive Covenant - EBC.DOC; 09/13/2002

AUDITOR'S NOTE
LEGIBILITY FOR RECORDING AND COPYING UNSATISFACTORY IN A PORTION OF THIS INSTRUMENT WHEN RECEIVED

STATE OF WASHINGTON)
) ss.
County of Pierce)

On this 17th day of APRIL, 2003, personally appeared before me the undersigned, a Notary Public, in and for the State of Washington, duly commissioned and sworn, RICHARD MARZANO and R. TED BOTTIGER, to me known to be the President and Secretary of the PORT OF TACOMA, a municipal corporation, that executed the foregoing instrument and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they are authorized to execute the said instrument and that the seal affixed is the corporate seal of said municipal corporation.

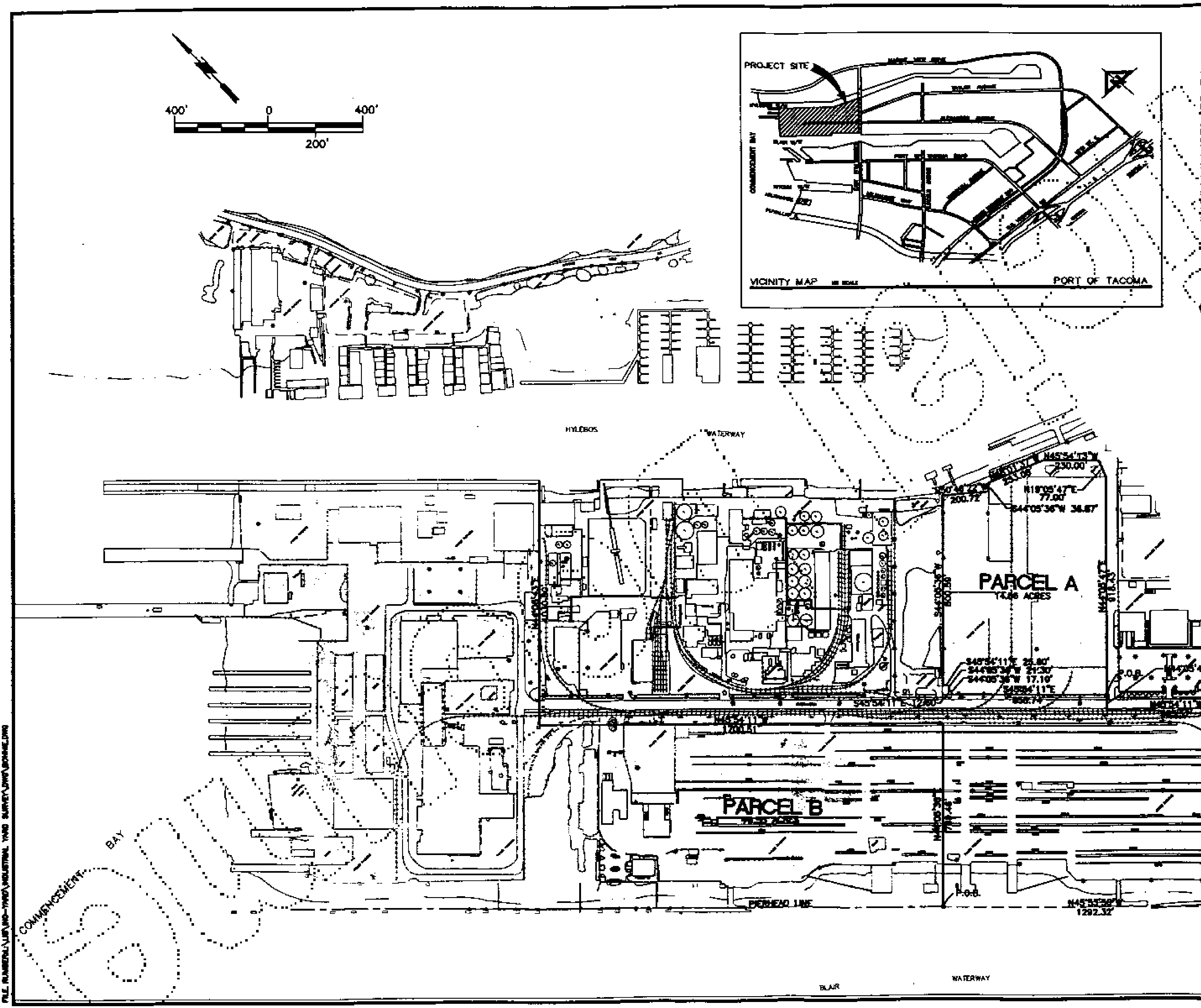
WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

R.A. MUNOZ
12-15-03

R. A. Munoz
NOTARY PUBLIC in and for the State of Washington, residing at Tacoma

APPROVED AS TO FORM:

Counsel for Port of Tacoma



LEGAL DESCRIPTION

PARCEL "A"

THAT PORTION OF PORT OF TACOMA LAND OF PARCEL "A" IS BEING DESCRIBED AS FOLLOWS:

COMMENCING AT THE MONUMENT AT THE CENTERLINE INTERSECTION OF ALEXANDER AVE. AND 11TH STREET E.; THENCE ALONG THE CENTERLINE EAST OF SAID ALEXANDER AVE N45°54'11"W A DISTANCE OF 882.52 FEET; THENCE ALONG A COURSE N44°05'47"E A DISTANCE OF 60.00 FEET TO THE POINT OF BEGINNING; THENCE THE FOLLOWING COURSES:

1. N44°05'47"E 918.43 FEET
2. N19°05'47"E 77.00 FEET
3. N45°54'13"W 230.00 FEET
4. N88°01'37"W 253.88 FEET
5. S44°0'36"W 36.87 FEET
6. N50°46'22"W 200.72 FEET
7. S44°05'36"W 800.00 FEET
8. S45°54'11"E 25.80 FEET
9. S44°05'36"W 21.30 FEET
10. S45°54'11"E 12.80 FEET.
11. S44°05'36"W 17.10 FEET

THENCE CONTINUING ALONG ALEXANDER AVE. S45°54'11"E 858.74 FEET TO THE POINT OF BEGINNING; CONTAINS 647,101 SQUARE FEET OR 14.86 ACRES, MORE OR LESS.

PARCEL B

THAT PORTION OF PORT OF TACOMA LAND OF PARCEL "B" IS BEING DESCRIBED AS FOLLOWS:

COMMENCING AT THE MONUMENT AT THE CENTERLINE INTERSECTION OF SAID ALEXANDER AVE. AND 11TH STREET E.; THENCE ALONG THE CENTERLINE SOUTH OF SAID 11TH STREET EAST S44°08'07"W A DISTANCE OF 829.41 FEET; THENCE FOLLOWING PIERHEAD LINE N45°53'30"W A DISTANCE OF 1292.32 FEET TO THE POINT OF BEGINNING; THENCE THE FOLLOWING COURSES;

1. N44°05'36"E 788.48 FEET
2. N45°54'11"W 1700.51 FEET

THENCE TO THE HYLEBOS WATERWAY PIERHEAD LINE N44°08'43"E A DISTANCE OF 1030.80 FEET. CONTAINS 3,465,002 SQUARE FEET OR 79.55 ACRES, MORE OR LESS.

PORT OF TACOMA P.O. BOX 1837
TACOMA, WA 98401 253-383-5841

CHECKED BY - DATE

PROJECT ENGR.- DATE

APPROVED

CHIEF ENGINEER - DATE

PORT OF TACOMA
EBC PROPERTY DESCRIPTION

BP-5573-12
G1
SHEET 1 OF 1

For reference only, not for re-sale.

Appendix D

Indoor Air Modeling

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Section 1.0 Introduction

This Appendix presents the estimation of Risk-Based Concentrations (RBCs) for constituents of concern (COCs) in soil and groundwater at the Alexander Avenue Site in Tacoma, Washington (Site). The RBCs are developed to be protective of human health from indoor air inhalation exposure to soil and groundwater COCs. The Site is currently used for various commercial and industrial land uses, and this land use is expected to continue into the future. As such, the RBCs are developed for an industrial/commercial worker receptor.

The methodology for developing the RBCs is presented in Section 2.0. Summaries of the Site-specific input parameters applied and the results are presented in Section 3.0. All references cited in this Appendix are listed in Section 4.0.

Section 2.0 Methodology

The RBCs for soil and groundwater based on the indoor air inhalation pathway were developed using the approach applied by the USEPA (2002), which is based on the J&E Model. Johnson and Ettinger (1991) present a heuristic model for estimating the degree of attenuation occurring as volatile contaminants in soil vapor migrate upward through the vadose zone, enter an overlying building, and mix with the indoor air of the building. The degree of attenuation is quantified through the calculation of an attenuation factor, α , after Johnson and Ettinger (1991; Equation 21).

The methodologies applied to estimate the RBCs for Site soil and groundwater using the J&E Model are described in Sections 2.1 and 2.2, respectively. A description of several conservative features inherent to the J&E Model is provided in Section 2.3.

2.1 Derivation of Estimated Soil RBCS

The RBCs for the volatile COCs identified in soil under an industrial/commercial land use scenario are calculated in a multi-step process. First, the allowable soil gas concentration at the location of the soil impact is determined from the allowable target indoor air concentrations (see Table 3.8 of the main report). The allowable soil gas concentrations are then used to determine the concentration sorbed to soil particles, and finally, the risk-based concentration for soil, RBC_{soil} , is determined using equilibrium partitioning, or phase relationships.

First, the target indoor air concentrations (see Table 3.8 of the main report) were applied to predict the Site-specific soil gas criteria beneath a site building, C_{sg}, as follows:

$$C_{sg} = RBC_{ia} \times \alpha$$

Where:

C_{sg}	-	The calculated Site-specific soil gas criteria (micrograms per cubic meter [µg/ m^3]).
RBC_{ia}	-	The calculated allowable risk-based target indoor air concentration (see Table 3.8 of the main report) (µg/m^3).
α	-	The Site-specific calculated soil gas attenuation factor, which relates the indoor air concentration to the concentration in soil gas directly above the source based on the heuristic model developed by Johnson and Ettinger (1991; Equation 21). The soil gas attenuation factor accounts for the advective-diffusive migration of contaminants in soil gas through the vadose zone soil and building foundation, and the subsequent mixing of contaminants with building indoor air.

Next, the Site-specific soil gas criteria were used to determine the concentration of each COC adsorbed to soil particles according to the following equation:

$$C_{sp} = C_{sg} \times CF \times \frac{K_{oc} \times f_{oc}}{H}$$

where:

C_{sp}	-	The calculated contaminant concentration adsorbed to soil particles (micrograms per gram [µg/g]).
K_{oc}	-	Compound-specific organic carbon partitioning coefficient (millilitres per gram [mL/g]).
f_{oc}	-	Fraction of organic carbon content for the vadose zone soil (unitless).
H	-	Compound-specific dimensionless Henry's Law constant equal to $H_L/(R \times T)$, where H_L is the dimensioned Henry's Law constant [atmospheres cubic metres per mole (atm m^3/mol)], R is the Universal Gas Law constant (8.206 × 10^{-3} atmospheres cubic metres per mole Kelvin [atm m^3/mol K]), and T is the vadose zone temperature in Kelvin.
CF	-	Units conversion factor of 10^{-6} cubic metres per millilitre (m^3/mL).

The calculated sorbed concentration C_{sp} was converted to a calculated risk-based soil concentration, $\mathrm{RBC}_{\mathrm{soil}}$, using equilibrium partitioning, or phase relationships (USEPA, 1996), along with conservative default vadose zone soil data for porosity, moisture content, and dry bulk soil density. The conversion of C_{sp} to $\mathrm{RBC}_{\mathrm{soil}}$ was obtained from:

$$\mathbf{RBC_{soil}} = \mathbf{C_{sp}} / \boldsymbol{\rho}_{\mathbf{db}} \times \left(\boldsymbol{\varepsilon}_{\mathbf{m}} / \mathbf{k_d} + H\varepsilon_v / \mathbf{k_d} + \boldsymbol{\rho}_{\mathbf{db}} \right)$$

where:

$\mathrm{RBC}_{\mathrm{soil}}$	-	The calculated risk-based soil concentration (µg/g).
$\mathbf{C_{sp}}$	-	The calculated contaminant concentration adsorbed to soil particles (µg/g).
ρ_{db}	-	The dry bulk soil density (grams per cubic centimeter [g/cm^3]).
ε_{m}	-	The moisture, or water, filled soil porosity.
ε_{v}	-	The vapor, or soil gas, filled soil porosity.
$\mathbf{k_d}$	-	The soil water partitioning coefficient equal to $K_{oc} \times f_{oc}$ (mL/g)

The derivation of the Property-specific soil gas attenuation factor for the soil to indoor air pathway was conducted through the application of the J&E Model for soil incorporated into a Microsoft Excel spreadsheet by the USEPA (USEPA, 2004; "SL-ADV-Feb04.xls, Version 3.1"). The compound, vadose zone soil, and building properties applied in the derivation of the soil gas attenuation factor, and thus the estimation of soil RBCs, at the Site are presented in Section 3.0.

2.2 Derivation of Estimated Groundwater RBCS

The RBCs for the volatile COCs identified in Site groundwater were derived according to the following equation:

$$RBC_{gw} = \frac{RBC_{ia}}{\alpha \times H \times CF2}$$

Where:

RBC_{gw}	-	The risk-based concentration for groundwater based on the protection of indoor air (micrograms per litre [µg/L]).
RBC_{ia}	-	The calculated allowable risk-based target indoor air concentration (see Table 3.8 of the main report for target indoor air concentrations based on the industrial/commercial worker receptor) (µg/m^3).
H	-	Compound-specific dimensionless Henry's Law constant equal to $H_L/(R \times T)$, where H_L is the dimensioned Henry's Law constant [atmospheres cubic metres

per mole (atm m^3/mol)], $\boldsymbol{R}$ is the Universal Gas Law constant (8.206×10^{-3} atmospheres cubic metres per mole Kelvin [atm m^3/mol K]), and $\boldsymbol{T}$ is the vadose zone temperature in Kelvin.

$\boldsymbol{CF2}$ - Units conversion factor of 1,000 litres per cubic metre (L/m^3).

The default vadose zone soil temperature applied in the derivation of the soil gas attenuation factor is presented in Section 3.0.

2.3 Conservative Features of J&E Model

It is important to note that the J&E Model used to develop the RBCs includes several conservative assumptions. The key conservative aspects incorporated into the development of the estimated RBCs are described below:

- The J&E Model assumes that all contaminant vapors below a building migrate vertically upward into the building and do not move laterally, or in three-dimensions, around the building to vent to the atmosphere.
- The J&E Model assumes that no contaminant vapors migrate around the sides of buildings through preferential pathways, such as granular foundation bedding material, to vent to the atmosphere.
- The J&E Model assumes there is a constant and continuous source of COCs in the subsurface. Source depletion due to naturally occurring biological or chemical degradation of contaminants is not considered.

The conservative aspects described above combine to produce more conservative RBCs.

Section 3.0 Calculation of Soil and Groundwater Risk-Based Concentrations (RBCS)

RBCs were calculated in accordance with the Johnson and Ettinger (1991) model using conservative default compound, vadose zone soil, and building properties. The compound-specific inputs applied in the J&E Model are described in Section 3.1. The details of the vadose zone conditions applied in the estimation of the RBCs are described in Section 3.2. The details of the building properties applied in the estimation of the RBCs are described in Section 3.3.

3.1 Compound Properties

The compound properties applied in the estimation of the RBCs for soil based on indoor air inhalation consist of a Henry's Law constant, a water diffusion coefficient, and an air diffusion coefficient obtained from USEPA (2004) and the Site-specific information presented in the comprehensive Site

Characterization Report (CRA, 2013). The compound properties applied in the estimation of the RBCs for groundwater based on indoor air inhalation consist of a Henry's Law constant. The Henry's Law constants and air diffusion coefficients were corrected to a soil temperature of 12.8 degrees Celsius (°C), average soil/groundwater temperature expected in Washington, as indicated in WCED (2009).

3.2 Vadose Zone Conditions

The RBCs for soil and groundwater based on the indoor air inhalation pathway were estimated using the J&E Model, and incorporated conservative default vadose zone soil properties. The vadose zone at the Site was conservatively assumed to consist of coarse-grained soil, and a sand soil type was therefore applied in the J&E Model to best represent the vadose zone soil, as incorporated into USEPA (2004). The vadose zone soil physical properties applied in the development of the soil and groundwater RBCs consist of the following:

- Dry bulk soil density, ρ_{db} :

  A dry bulk soil density of 1.61 g/cm3 was applied, consistent with the default bulk density for a sand soil type, as indicated in the MTCA Cleanup Regulation. Online at: https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx.

- Porosity, ε_T :

  A porosity value of 43 percent was applied, consistent with the site-specific porosity.

- Moisture-filled porosity, ε_m :

  A moisture-filled porosity value of 5.4 percent was applied, consistent with the default moisture-filled porosity for a sand soil type, as indicated in USEPA (2004).

- Thickness of soil stratum A, h_b :

  A distance of 0.23 meters (m) was applied, based on the midpoint of the screen interval of 0 to 1.5 feet BGS (0 to 0.46 m BGS), the minimum depth to volatile soil impacts at the Site, as indicated in Table 3.1 of the main report.

  For the groundwater modeling, a distance of 3.66 m was applied, based on the median depth to groundwater at the Site of 12 feet.

- Depth below grade to top of contamination, L_t :

  A distance of 0.23 m was applied, based on the midpoint of the screen interval of 0 to 1.5 feet BGS (0 to 0.46 m BGS), the minimum depth to volatile soil impacts at the Site, as indicated in Table 3.1 of the main report.

- Depth below grade to water table, L_{WT} :

  A distance of 3.66 m was applied, based on the median depth to groundwater at the Site of 12 feet.

- Fraction organic carbon, f_{oc} :

  A fraction of organic carbon of 0.00305 was applied, based on the default fraction of organic carbon indicated in the MTCA Cleanup Regulation (MTCA, 2011).

3.3 Building Properties

The building properties applied in the estimation of the soil RBCs under an industrial/commercial land use scenario consisted of the following:

- Enclosed space floor length, L_B :

  An enclosed floor space length of 1,000 centimeters (cm) was applied, based on the default building dimensions indicated in WDEC (2009).

- Enclosed space floor width, W_B :

  An enclosed floor space width of 1,000 cm was applied, based on the default building dimensions indicated in WDEC (2009).

- Enclosed space height, H_B :

  An enclosed space height of 250 cm was applied, based on the default ceiling height for a slab-on-grade building of 2.5 m, as indicated in WDEC (2009).

- Building indoor air exchange rate, ER :

  A building indoor air exchange rate value of 0.5 building volumes per hour was applied, consistent with the commercial indoor air exchange rate reported by WDEC (2009).

- Ratio of building crack area to building below-grade area, η :

  For the slab-on-grade scenario, a ratio of 0.00038 (0.038 percent) was applied, consistent with the default crack ratio value for slab-on-grade structures presented in USEPA (2002; Appendix G, Table G-3).

- Vadose zone/building pressure differential, ΔP :

  A pressure differential value of 4 Pascal (Pa) was applied consistent with the default pressure differential presented in USEPA (2002).

- Foundation thickness, L_{crack} :

  A foundation thickness of 10 cm was applied, consistent with the default value indicated in WDEC (2009).

- Depth below grade to bottom of enclosed space floor, L_F :

A depth below grade to the bottom of enclosed space floor of 10 cm was applied, consistent with the default depth below grade for a slab-on-grade commercial building , as indicated in WDEC (2009).

- Average vapor flow rate into building, Q_{soil} :

  An average vapor flow rate into the building of 5 L/min was applied, based on the default average flow rate into a building, as indicated in WDEC (2009).

3.4 Estimated Risk-Based Concentration (RBC) Results

The estimated soil RBCs based on the industrial/commercial worker receptor in a slab-on-grade building are presented in Table 3.9 of the main report. The estimated groundwater RBCs based on the industrial/commercial worker receptor in a slab-on-grade building are presented in Table 3.10 of the main report. The applied vadose zone soil and building properties (where applicable), and the applied chemical properties are summarized in the aforementioned tables. The estimated RBCs are protective of potential health risks/hazards posed by the indoor air inhalation exposure pathway.

Section 4.0 References

ASTM, 1995. Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM Designation: E1739-95, West Conshohocken, PA.

CRA, 2013. Comprehensive Site Characterization Report. Occidental Chemical Corporation, Tacoma, Washington, April 2013.

Johnson, P.C. and R.A. Ettinger, 1991. Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapours into Buildings, Environmental Science and Technology, 25(8), pp. 1445-1452.

MTCA, 2011. Model Toxics Control Act (MTCA) Cleanup Regulation. Online at: https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx. (access in February 2011)

USEPA, 1996. Soil Screening Guidance: Technical Background Document. EPA Report No. EPA/540/R-95/128, Office of Emergency and Remedial Response, Washington, DC, May.

USEPA, 2002. Draft Guidance for Evaluating the Vapour Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapour Intrusion Guidance), EPA Report No. EPA530-F-02-052, Office of Solid Waste and Emergency Response, November.

USEPA, 2004. User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings, Office of Emergency and Remedial Response, Washington, DC, February 22.

WDEC (2009). Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Washington State Department of Ecology Toxics Cleanup Program, draft. Publication No. 09-09-047, October 2009.

Appendix E

Comparison of Site-Specific RBCs with MTCA Method C RBCs

Table of Contents

List of Tables
(Following Text)

Section 1.0 Introduction

As part of the Exposure Pathway Assessment, a comparison was undertaken for industrial/commercial soil and air risk-based concentrations (RBCs) included in the Exposure Pathway Assessment with those developed by the Washington State Department of Ecology (Ecology) under the Model Toxics Control Act (MTCA) regulations. For this comparison, the RBCs presented in Tables 3.19 (soil) and 3.12 (air) were compared to MTCA Method C cleanup levels. The MTCA Method C cleanup levels presented in this appendix were taken from the Cleanup Levels and Risk Calculations (CLARC) (WAC, 2013) on the Ecology website.

For soils, the RBCs for the industrial/commercial worker were developed based on potential combined intakes from direct contact (incidental ingestion and dermal contact) and inhalation pathways (vapors and particulates) using exposure factors presented in WAC, 2007. The target risk level used for development of the RBCs was 1.0E-06 and the target hazard quotient was 1.0. In contrast, the MTCA Method C industrial soil cleanup levels, calculated using MTCA Equations 745-1 and 745-2 (WAC, 2007), are based on incidental ingestion only. Moreover, the target risk level used by Ecology for development of the MTCA Method C cleanup levels was 1.0E-05 and the target hazard quotient was 1.0. The RBCs and the MTCA Method C industrial soil cleanup levels for the industrial/commercial worker are presented in Table E.1.

For air, the RBCs for the industrial/commercial worker were based on inhalation exposure using exposure factors presented in WAC, 2007 and a target risk level of 1.0E-06 for carcinogens and a target hazard quotient was 1.0 for noncarcinogens. These RBCs are presented in Table 3.8. An exposure time of 8-hours/day was included consistent with the length of typical workdays. These RBCs are used to back-calculate RBCs for (a) soil-to-indoor air pathway (Table 3.9), (b) groundwater-to-indoor air pathway (Table 3.10), and (c) groundwater-to-ambient air pathway (Table 3.12).

The MTCA Method C air cleanup levels, calculated using MTCA Equations 750-1 and 750-2 (WAC, 2007), are based on a target risk level of 1.0E-05 for carcinogens and the target hazard quotient is 1.0 for noncarcinogens. The RBCs and the MTCA Method C air cleanup levels for the industrial/commercial worker are presented in Table E.2.

Section 2.0 Comparison of Calculations

Table E.1 shows that the soil RBCs are lower than the MTCA Method C industrial soil cleanup levels for all (100 percent) constituents of concern (COCs) with both values. There is no MTCA Method C industrial soil cleanup level for chromium, lead, or thallium and no soil RBC for thallium.

The lower soil RBCs are due to (a) inclusion of dermal contact and inhalation pathways, which are not included in MTCA equations, and (b) use of a target cancer risk level of 1.0E-06 compared to a level of 1.0E-05 used to derive the MTCA Method C industrial soil cleanup levels.

Table E.2 shows that the air RBCs are lower than MTCA Method C air cleanup levels for 5 of 13 COCs (38 percent) with both values. There is no MTCA Method C air cleanup level for 1,1,2,2-tetrachloroethane or cis-1,2-dichloroethene and no air RBC for cis-1,2-dichloroethene.

The lower air RBCs are due primarily to use of a target cancer risk level of 1.0E-06 for carcinogens compared to a level of 1.0E-05 used to calculate the MTCA Method C air cleanup levels. As a result, the air RBCs for 7 of the 9 carcinogens are lower than the MTCA Method C air cleanup levels.

The lower MTCA Method C air cleanup levels are due to (a) use of different toxicity reference values than those used in the Exposure Pathway Assessment for methylene chloride, tetrachloroethylene, trichloroethylene, and vinyl chloride) or (b) use of slightly different exposure factors, i.e., the Exposure Pathway Assessment used an 8-hour workday while MTCA Method C air cleanup levels do not incorporate an exposure time (1,1-dichloroethene, ethylbenzene, trans-1,2-dichloroethene, and mercury).

Section 3.0 References

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

WAC, 2013: Cleanup Levels and Risk Calculations (CLARC). Washington State Department of Ecology, 2013. Accessed March 2013. https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx.

TABLE E.1

COMPARISON OF RISK-BASED CONCENTRATIONS (RBCs) FOR SOIL - INDUSTRIAL/COMMERCIAL WORKER
STREAMLINED RISK ASSESSMENT RBCs AND MTCA METHOD C CLEANUP LEVELS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

		Streamlined Risk Assessment RBCs (1,2,3)			*MTCA Method C Cleanup Levels* (4,5,6)			
Constituents of Concern	***CAS Number***	***Carcinogen (mg/kg)***	***Non-Carcinogen (mg/kg)***	***Final (mg/kg)***	***Carcinogen (mg/kg)***	***Non-Carcinogen (mg/kg)***	***Final (mg/kg)***	***Lower RBC***
VOCs								
1,1,2,2-Tetrachloroethane	79-34-5	1.04E+00	2.91E+04	1.04E+00	6.56E+02	7.00E+04	6.56E+02	SRA
1,1,2-Trichloroethane	79-00-5	1.80E+00	5.82E+03	1.80E+00	2.30E+03	1.40E+04	2.30E+03	SRA
1,1-Dichloroethene	75-35-4	NV	3.51E+02	3.51E+02	NV	1.75E+05	1.75E+05	SRA
Benzene	71-43-2	1.56E+00	9.75E+01	1.56E+00	2.39E+03	1.40E+04	2.39E+03	SRA
Carbon Tetrachloride	56-23-5	1.48E+00	2.33E+02	1.48E+00	1.88E+03	1.40E+04	1.88E+03	SRA
Chloroform	67-66-3	5.48E-01	3.25E+02	5.48E-01	2.15E+04	3.50E+04	2.15E+04	SRA
cis-1,2-Dichloroethene	156-59-2	NV	3.98E+03	3.98E+03	NV	7.00E+03	7.00E+03	SRA
Ethylbenzene	100-41-4	NV	5.13E+03	5.13E+03	NV	3.50E+05	3.50E+05	SRA
Methylene Chloride	75-09-2	7.71E+02	1.38E+03	7.71E+02	1.75E+04	2.10E+05	1.75E+04	SRA
Tetrachloroethene	127-18-4	5.69E+01	1.58E+02	5.69E+01	6.25E+04	2.10E+04	2.10E+04	SRA
trans-1,2-Dichloroethene	156-60-5	NV	1.46E+02	1.46E+02	NV	7.00E+04	7.00E+04	SRA
Trichloroethene	79-01-6	2.81E+00	6.24E+00	2.81E+00	2.80E+03	1.75E+03	1.75E+03	SRA
Vinyl Chloride	75-01-4	9.81E-01	1.24E+02	9.81E-01	8.75E+01	1.05E+04	8.75E+01	SRA
SVOCs								
1,2,4-Trichlorobenzene	120-82-1	NV	1.18E+02	1.18E+02	4.53E+03	3.50E+04	4.53E+03	SRA
bis(2-Ethylhexyl)phthalate	117-81-7	1.79E+02	1.33E+04	1.79E+02	9.38E+03	7.00E+04	9.38E+03	SRA
Hexachlorobenzene	118-74-1	1.06E+00	5.33E+02	1.06E+00	8.20E+01	2.80E+03	8.20E+01	SRA
Hexachlorobutadiene	87-68-3	1.13E+01	6.67E+02	1.13E+01	1.68E+03	3.50E+03	1.68E+03	SRA
Pentachlorophenol	87-86-5	6.10E+00	3.33E+03	6.10E+00	3.28E+02	1.75E+04	3.28E+02	SRA
Pesticides								
4,4'-DDD	72-54-8	1.04E+01	NV	1.04E+01	5.47E+02	NV	5.47E+02	SRA
4,4'-DDE	72-55-9	7.16E+00	NV	7.16E+00	3.86E+02	NV	3.86E+02	SRA
4,4'-DDT	50-29-3	7.35E+00	3.33E+02	7.35E+00	3.86E+02	1.75E+03	3.86E+02	SRA
PCBs								
Total PCBs	1336-36-3	1.25E+00	NV	1.25E+00	6.56E+01	NV	6.56E+01	SRA
Dioxins/Furans								
2,3,7,8-TCDD (TEQ)	1746-01-6	1.92E-05	4.67E-04	1.92E-05	1.46E-03	NV	1.46E-03	SRA
Metals								
Antimony	7440-36-0	NV	5.33E+02	5.33E+02	NV	1.40E+03	1.40E+03	SRA
Arsenic	7440-38-2	3.33E+00	3.96E+02	3.33E+00	8.75E+01	1.05E+03	8.75E+01	SRA
Cadmium	7440-43-9	5.36E+03	6.58E+02	6.58E+02	NV	3.50E+03	3.50E+03	SRA
Chromium	7440-47-3	NV	2.00E+06	2.00E+06	NV	NV	NV	NV
Copper	7440-50-8	NV	5.33E+04	5.33E+04	NV	1.40E+05	1.40E+05	SRA
Lead	7439-92-1	NV	NV	NV	NV	NV	NV	NV
Mercury	7439-97-6	NV	2.05E+01	2.05E+01	NV	1.05E+03	1.05E+03	SRA
Nickel	7440-02-0	NV	2.39E+04	2.39E+04	NV	7.00E+04	7.00E+04	SRA
Silver	7440-22-4	NV	6.67E+03	6.67E+03	NV	1.75E+04	1.75E+04	SRA
Thallium	7440-28-0	NV	NV	NV	NV	NV	NV	NV
Zinc	7440-66-6	NV	4.00E+05	4.00E+05	NV	1.05E+06	1.05E+06	SRA

Notes:

RBCs = Risk-based Concentrations
mg/kg = milligram/kilogram
NV = No Value
TEQ = Toxic Equivalency

(1) See Table 3.19 for RBC derivation except for lead. See Table 3.28 for lead.
(2) Exposure pathways include incidental ingestion, dermal contact and inhalation of volatiles and particulates.
(3) Target risk level is 1.00E-06 and the target hazard quotient is 1.0.
(4) MTCA Method C Cleanup Levels taken from Cleanup Levels and Risk Calculations (CLARC) presented at https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx.
(5) The exposure pathway is incidental ingestion only consistent with MTCA Equations 745-1 and 745-2.
(6) Target risk level is 1.00E-05 and the target hazard quotient is 1.0, consistent with MTCA Equations 745-1 and 745-2, respectively for Method C industrial soil cleanup levels.

References:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

WAC, 2013: Cleanup Levels and Risk Calculations (CLARC). Washington State Department of Ecology, 2013. Accessed March 2013. https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx

TABLE E.2

COMPARISON OF RISK-BASED CONCENTRATIONS (RBCs) FOR AIR - INDUSTRIAL/COMMERCIAL WORKER
STREAMLINED RISK ASSESSMENT RBCs AND MTCA METHOD C CLEANUP LEVELS
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Constituents of Concern	*CASRn*	*Streamlined Risk Assessment RBCs* [1,2]			*MTCA Method C Cleanup Levels* [3,4]			
		Carcinogen (µg/m3)	*Non-Carcinogen (µg/m3)*	*Final (µg/m3)*	*Carcinogen (µg/m3)*	*Non-Carcinogen (µg/m3)*	*Final (µg/m3)*	*Lower RBC*
VOCs								
1,1,2,2-Tetrachloroethane	79-34-5	2.77E-01	NV	2.77E-01	NV	NV	NV	NV
1,1,2-Trichloroethane	79-00-5	1.00E+00	NV	1.00E+00	1.56E+00	NV	1.56E+00	SRA
1,1-Dichloroethene	75-35-4	NC	8.57E+02	8.57E+02	NV	2.00E+02	2.00E+02	CLARC
Benzene	71-43-2	2.06E+00	1.29E+02	2.06E+00	3.21E+00	3.00E+01	3.21E+00	SRA
Carbon Tetrachloride	56-23-5	2.68E+00	4.29E+02	2.68E+00	4.17E+00	1.00E+02	4.17E+00	SRA
Chloroform	67-66-3	6.99E-01	4.20E+02	6.99E-01	1.09E+00	NV	1.09E+00	SRA
cis-1,2-Dichloroethene	156-59-2	NV	NV	NV	NV	NV	NV	NV
Ethylbenzene	100-41-4	NV	4.29E+03	4.29E+03	NV	1.00E+03	1.00E+03	CLARC
Methylene Chloride	75-09-2	1.61E+03	2.57E+03	1.61E+03	5.32E+01	NV	5.32E+01	CLARC
Tetrachloroethene	127-18-4	6.18E+01	1.71E+02	6.18E+01	9.62E+01	3.99E+01	3.99E+01	CLARC
trans-1,2-Dichloroethene	156-60-5	NV	2.57E+02	2.57E+02	NV	6.00E+01	6.00E+01	CLARC
Trichloroethene	79-01-6	3.92E+00	8.57E+00	3.92E+00	6.30E+00	2.00E+00	2.00E+00	CLARC
Vinyl Chloride	75-01-4	3.65E+00	4.29E+02	3.65E+00	2.80E+00	1.00E+02	2.80E+00	CLARC
SVOCs								
Hexachlorobutadiene	87-68-3	7.31E-01	NV	7.31E-01	1.14E+00	NV	1.14E+00	SRA
Metals								
Mercury	7439-97-6	NV	1.29E+00	1.29E+00	NV	3.00E-01	3.00E-01	CLARC

Notes:

RBCs = Risk-based Concentrations
µg/m3 = microgram/cubic meter
NV = No Value

(1) See Table 3.12 for derivation.
(2) Target risk level is 1.00E-06 and the target hazard quotient is 1.0.
(3) MTCA Method C air cleanup levels taken from Cleanup Levels and Risk Calculations (CLARC) presented at https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx.
(4) Target risk level is 1.00E-05 and the target hazard quotient is 1.0, consistent with MTCA Equations 750-1 and 750-2, respectively for Method C air cleanup levels.

References:

WAC, 2007: Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation Chapter 173-340 WAC, Publication No. 94-06, Washington State Department of Ecology, October 12, 2007.

WAC, 2013: Cleanup Levels and Risk Calculations (CLARC). Washington State Department of Ecology, 2013. Accessed March 2013. https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx

Appendix F

Ambient Air Modeling

Table of Contents

List of Attachments

Section 1.0 Introduction

This appendix presents details regarding the equations used to estimate the volatilization of gases from contaminated groundwater pooled at the base of an excavation extending into the water table and the box model used to estimate the dispersion of the contaminants from the air inside the trench into the above-ground atmosphere. The chemical-specific volatilization factor is applied to estimate potential concentrations in ambient air in the immediate vicinity of the excavation that a construction/utility worker could inhale.

Section 2.0 Volatilization Factor

The volatilization factor is used to estimate the gaseous emissions from contaminated groundwater pooled at the base of an excavation extending into the water table. Further information regarding the mass transfer coefficient equation used to estimate the volatilization factor is also presented USEPA (1988).

The following conservative assumptions were used in the estimation of the volatilization factor:

- The area of impacted groundwater pooled at the based on an excavation was assumed to be 20 square meters (m^2) [based on an excavation of 2 meters [m] by 10 m)
- The concentrations within the pooled groundwater remain constant and do not deplete with time as they are emitted to ambient air

The volatilization factor is a simple volatile constituent mass transfer model and is based on the following equation (VDEQ, 2008):

$$VF_i = \frac{(K_i \times A \times F \times CF_1 \times CF_2 \times CF_3)}{(k \times ACH \times V)} \quad (1)$$

Where:

VF_i = Volatilization factor emission rate of compound from pooled groundwater (L/m^3)

K_i = Overall mass transfer coefficient of compound i (cm/sec)

F = Fraction of floor through which contaminant can enter (unitless)

A = Lagoon surface area of trench (cm^2)

CF_1 = Conversion factor (10,000 cm^2/m^2)

CF_2 = Conversion factor (L/1,000 cm^3)

CF_3 = Time conversion factor (3,600 sec/hr)

k = Mixing factor, (unitless)

ACH = Air changes per hour (1/hr)

V = Volume of trench (m^3)

As indicated above the dimension of the trench/excavation is 2 m wide by 10 m long. The trench/excavation is assumed to only intercept the groundwater for a few inches since a groundwater pool of more than a few inches would likely require dewatering. The depth of the trench was assumed to be 2.30 meters below ground surface (mBGS), as this is the typical depth of excavations.

The number of air changes per day in the trench can be estimated from the wind speed and length of trench, assuming (in the worst case) the long axis of the trench parallel to the wind direction:

$$ACH = \frac{u \times CF}{L} \tag{2}$$

Where:

ACH = Air changes per hour, (1/hr)

L = Length of the box in the direction of air flow (parallel to the wind), (m)

u = Wind speed, (m/s)

CF = Conversion factor, (3600 sec/hr)

The above equation assumes that uniform mixing will occur within the trench, however uniform mixing will not occur, therefore a mixing factor of 0.5 has been assumed based on the value presented in the USEPA memorandum (see Attachment A).

Overall mass transfer coefficient (**K_i**) is based on the following:

$$\frac{1}{K_i} = \frac{1}{k_{iL}} + \frac{RT}{H_i k_{iG}} \tag{3}$$

Where:

k_{iL} = Liquid-phase mass transfer coefficient, cm/s

R = Ideal gas constant, 8.2 x 10^{-5} atm–m^3/mole-°K

T = Absolute temperature, °K

H_i = Henrys Law constant of component I, atm-m^3/mole

k_{iG} = Gas-phase mass transfer coefficient, cm/s

Estimation of liquid-phase mass transfer coefficient (k_{iL}) is based on:

$$k_{iL} = \left(\frac{MW_{O_2}}{MW_i}\right)^{0.5} \left(\frac{T}{298}\right) (k_L, O_2) \tag{4}$$

Where:

k_{iL} = Liquid-phase mass transfer coefficient, cm/s

$MWO_2 ; MW_i$ = Molecular weights of oxygen (32.0) and component i, respectively, g/mole

T = Absolute temperature, °K

k_L, O_2 = Liquid-phase mass transfer coefficient for oxygen at 25°C, cm/s (default = 0.002 cm/s)

Estimation of gas-phase mass transfer coefficient (k_{iG}) is based on:

$$k_{iG} = \left(\frac{MW_{H_2O}}{MW_i}\right)^{0.335} \left(\frac{T}{298}\right)^{1.005} (k_{iG}, H_2O) \tag{5}$$

Where:

k_{iG} = Gas-phase mass transfer coefficient, cm/s

$MW_{H_2O} ; MW_i$ = Molecular weights of water (18.0) and component i, respectively, g/mole

T = Absolute temperature, °K

k_{iG}, H_2O = Gas-phase mass transfer coefficient of water vapor at 25°C, cm/s (default = 0.833 cm/s)

The volatilization factor is chemical specific and the results are presented in Table 3.27 of the main report.

Section 3.0 References

USEPA, 1988. Superfund Exposure Assessment Manual USEPA Office of Remedial Response, EPA/540/1-881001, OSWER Directive 9285.5-1, April.

VDEQ, 2008, Voluntary Remediation Program Risk Assessment Guidance, Virginia Department of Environmental Quality, www.deq.virginia.gov.vrprisk/raguide.html.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Ref: 8EPR-PS

To: Tracy Eagle, RPM Twins Inn

From: Helen Dawson, Ph.D., Hydrogeologist, Superfund Program Support

Date: July 29, 1999

Subject: Derivation of a volatilization factor to estimate upper bound exposure point concentration for workers in trenches flooded with ground water off-gassing volatile organic chemicals.

This memo presents the derivation of a volatilization factor that can be used to estimate the upper bound exposure point concentration for workers in trenches flooded with ground water off-gassing volatile organic chemicals (VOCs). The derivation is based on a mass balance equation developed using a well-mixed, single-compartment model, also referred to as a box model. This approach is commonly used to estimate air concentrations in enclosed spaces (Andelman, 1985). In this approach, the chemical concentration everywhere in the "box" (e.g., the trench air compartment) is assumed to be the same. The VOC enters the box through emission from ground water at the base of the trench, as shown in Figure 1, and leaves the box by wind-induced convection. This scenario was chosen because it is the more conservative of the possible scenarios for workers in trenches. A volatilization factor developed for a trench that intersects moist contaminated soil, rather than ground water, would yield lower exposure point concentrations in trench air, provided the pore water concentrations were equivalent to ground water concentrations, because the chemical emission rate would be reduced by the required diffusion through soil.

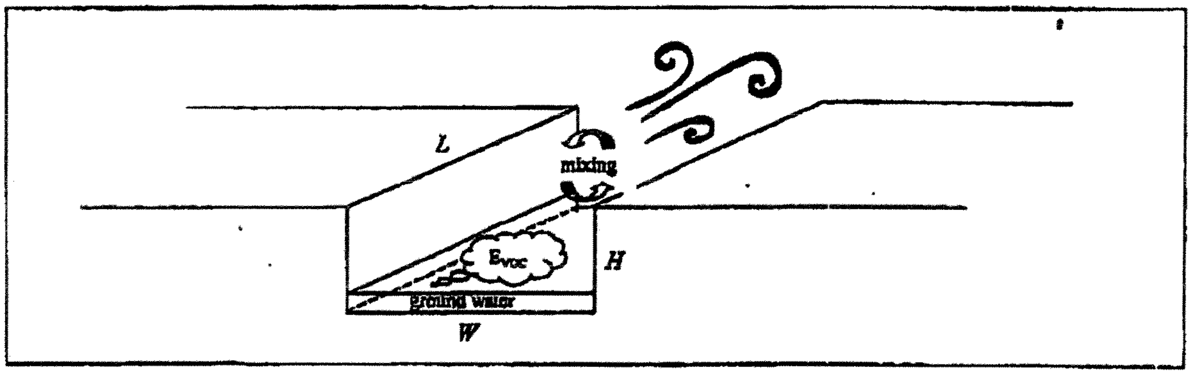

Figure 1. Scenario of exposure to workers in a trench flooded with VOC-contaminated ground water.

At steady state (a conservative assumption), the mass balance for the system depicted in Figure 1 is obtained by setting the emission rate (E) of chemical from water to air equal to the rate at which the chemical is carried away from the trench by exchange with the overlying air mass (after Schnoor, 1996, p.73; Andelman, 1985). Thus,

$$E_{VOC} = kNLWHC_a, \tag{1}$$

where E_{VOC} = emission rate of chemical from water to air [mg/sec],
k = mixing factor (deviation from complete mixing in real conditions) [unitless],
N = number of air exchanges per unit time in the trench [1/sec],
H = height of the trench [m],
L = length of the trench [m],
W = width of the trench [m], and
C_a = steady state, exposure point chemical concentration in trench air [mg/m^3].

Solving equation (1) can be for C_a yields

$$C_a = \frac{E_{VOC}}{kNLWH}. \tag{2}$$

In order to develop a volatilization factor for the scenario shown in Figure 1, an expression for E_{VOC} in terms of ground water concentration is needed. Guidance provided by the Superfund Exposure Assessment Manual (US EPA, 1988) recommends use of the following equation for volatilization from a surface water body to air:

$$E_{VOC} = k_{LG} A C_w, \tag{3}$$

where k_{LG} = overall mass transfer coefficient from the liquid phase to gas phase [m/sec],
A = surface area of water body (= LW) [m^2], and
C_w = chemical concentration in ground water (mg/l x 1000 l/m^3).

While ground water that has accumulated at the bottom of a trench is not strictly a surface water body, it can be considered a bulk liquid phase from which chemicals volatilize to air, which is the mechanism represented by equation (3). Thus, equation (3) is an appropriate model to apply in the scenario depicted in Figure 1. Substitution of equation (3) into equation (2) and canceling terms yields:

$$C_a = \left(\frac{k_{LG}}{kNH}\right)\left(\frac{1000\ \mathrm{l}}{\mathrm{m}^3}\right)C_w \tag{4}$$

Rearranging terms in equation (4) yields a volatilization factor (VF_{VOC}) for transfer of VOCs from ground water accumulations at the bottom of a trench to the air in the trench.

$$VF_{VOC}\left[\frac{\mathrm{l-water}}{\mathrm{m^3-air}}\right] = \frac{C_a[\mathrm{mg/m^3}]}{C_w[\mathrm{mg/l}]} = \frac{k_{LG}}{kNH}\left(\frac{1000\ \mathrm{l}}{\mathrm{m}^3}\right) \tag{5}$$

Equation (5) can be used to develop chemical specific volatilization factors for any volatile organic chemical. Alternately, a generic numeric VOC volatilization factor can be obtained by developing conservative estimates for k_{LG}, k, N and H, as described in the following paragraphs, that correspond to the scenario depicted in Figure 1.

The overall mass transfer coefficient k_{LG} is a function of the mass transfer coefficients for water and air on either side of the interface between the two phases, as shown in equation (6).

$$\frac{1}{k_{LG}} = \frac{1}{k_L} + \frac{RT}{H_c k_G}, \tag{6}$$

where k_L = liquid phase mass transfer coefficient [m/sec],
k_G = gas phase mass transfer coefficient [m/sec],
R = ideal gas law constant (8.2×10^{-5} atm·m³/mol·K),
T = temperature (K),
H_G = Henry's Law constant (atm·m³/mol).

For volatile chemicals (i.e., Henry's Constant greater than 1×10^{-4} atm·m³·mol⁻¹), the liquid mass transfer coefficient (k_L) is typically five or more orders of magnitude smaller than the gas phase mass transfer coefficient (k_G) and, consequently, mass transfer from water to air is limited by rate of mass transfer through the liquid. Thus, for a VOC, the overall mass transfer coefficient for water-to-air transfer is approximately equal to its liquid mass transfer coefficient.

$$k_{LG} \cong k_L \tag{7}$$

Liquid mass transfer coefficients (k_L) at 25°C can be estimated from the liquid mass transfer coefficient for dissolved oxygen and the aqueous diffusion coefficient of the chemical (Schwarzenbach et al, 1993), e.g.,

$$k_L = k_{L,oxy}\sqrt{\frac{D_{VOC}}{D_{oxy}}}, \tag{8}$$

where $k_{L,oxy}$ = liquid phase mass transfer coefficient for dissolved oxygen [m/sec],
D_{VOC} = aqueous diffusion coefficient of the dissolved VOC [m²/sec], and
D_{oxy} = aqueous diffusion coefficient of dissolved oxygen [m²/sec].

The liquid mass transfer coefficient for dissolved oxygen is a function of wind speed and is calculated as (Schwarzenbach et al, 1993):

$$k_{L,oxy} = 4.0 \times 10^{-6} + 4.0 \times 10^{-7}\, u \tag{9}$$

where u = wind speed 10 m above the water surface [m/sec].

The concentration of volatile organic chemicals in the trench will be highest on calm days, which corresponds to a wind speed of < 1 mph (Beaufort Wind Scale). Using this wind speed, the liquid mass transfer coefficient for dissolved oxygen is 4.2×10^{-6} m/sec.

For volatile organic chemicals, a conservative (large) estimate of D_{VOC} is 1.1×10^{-9} m²/sec. For oxygen, the diffusion coefficient at ambient temperature (25°C) is 2.1×10^{-9} m²/sec (Cussler, 1997). Applying these values to equations (7) and (8) yields a conservative (large) estimate for k_{LG} of 3.0×10^{-6} m/sec. This is equivalent to the conservative value obtained for volatile chemicals of concern at the Twins Inn site using the approach described in the US EPA Superfund Exposure Assessment Manual (1988), which is based on a ratio of molecular weights.

The number of air changes per day (N) in the trench can be estimated from the wind speed and the length of the trench, assuming (in the worst case) the long axis of the trench is parallel to the wind direction:

$$N = \frac{u}{L} \tag{10}$$

Assuming construction of a commercial building requires a trench length up to 30 m and using a calm wind speed of 1 mph (0.45 m/sec), the number of air changes per day is conservatively estimated to be 0.015/sec. This value assumes uniform mixing in the trench. In homes, the proportion of the well-mixed volume to total volume ranges from 0.1 to 0.3 (i.e., the "dead" space not subject to complete mixing is approximately 70% to 90% of the total volume) (Andelman, 1985). Mixing is likely to be closer to complete mixing in an open trench, thus a value of 50% ($k = 0.5$) is assumed.

When applied to equation (5), the values calculated or assumed above for k_{LG}, k, N, and assuming the maximum trench depth (H) is 3 m, yield a conservative numeric VOC volatilization factor for the scenario shown in Figure 1.

$$VF_{VOC}\left[\frac{\text{l}-\text{water}}{\text{m}^3-\text{air}}\right] = \frac{\left(3\text{x}10^{-6}\,\text{m/sec}\right)}{(0.5)(0.015/\text{sec})(3\text{m})}\left(\frac{1000\ \text{l}}{\text{m}^3}\right) = 0.133 \tag{11}$$

This calculated value is appropriate only for VOCs with Henry's Constants greater than $1\text{x}10^{-4}$ atm-m^3-mol^{-1}. Multiplying the volatilization factor by ground water concentration yields a conservative estimate of the air concentration to which workers in trenches with groundwater off-gassing VOCs could be exposed.

The generic VOC volatilization factor calculated in equation (11) is approximately 20% of the generic value calculated by Andelman (1985) for volatilization of VOCs in typical indoor water use for a family of four. This result is expected, as the mechanism for volatilization in a flooded outdoor trench is considerably less vigorous than that responsible for volatilization in typical indoor water use (e.g., showering), resulting in lower emission rates in the trench relative to an indoor scenario. However, the smaller volume of the trench, which has the effect of increasing concentration, counters the effect of the lower emission rate. Consequently, a five-fold difference between the two factors is reasonable and the value calculated in equation (11) is thus an acceptable, conservative ground water-to-trench air volatilization factor.

References:

Andelman, J.B., Inhalation Exposure in the Home to Volatile Organic Contaminants of Drinking Water, EPA/600/J-85/342, 1985.

Cussler, E.L., Diffusion, Cambridge University Press, 1997.

Schoor, J.L, Environmental Modeling, John Wiley & Sons, New York, NY, 1996.

Schwarzenbach, R.P., P.M. Gschwend, and D.M. Imboden, Environmental Organic Chemistry, John Wiley & Sons, New York, NY, 1993.

US EPA, Superfund Exposure Assessment Manual, EPA/540/1-88/001, 1988.

Appendix G

Indoor Air Sampling Memorandum

CONESTOGA-ROVERS
& ASSOCIATES

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MEMORANDUM

TO: Maury Wassmann

FROM: Mitch Bergner, Jason Cornetta/mm/015

C.C.: Ian Richardson, Jim Singer, Mary Lou Pauly

RE: **Indoor Air Monitoring**
Groundwater Treatment Facility
Tacoma, Washington

REF. NO.: 007843

DATE: October 5, 2010
December 22, 2010 (Rev. 1)
January 10, 2011 (Rev. 2)

INTRODUCTION

On August 19, 2010, Conestoga-Rovers & Associates (CRA) conducted an industrial hygiene monitoring event at the Occidental Groundwater Treatment Facility located at 605 Alexander Avenue in Tacoma, Washington (Site). The monitoring event included indoor air sampling at six (6) locations and one (1) outdoor location listed in Table 1. The air samples were analyzed for the chemicals of concern listed in Table 2.

SAMPLING METHODS

The air samples were collected in accordance with methods established by the National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA). A sample collection summary is included in Table 1.

The samples were collected utilizing calibrated equipment, over an approximate 6 to 7-hour period of the daylight shift. Based on CRA's observations of the areas, CRA believes that the sampling period in which the samples were collected was representative of the full 8-hour shift time for the day these samples were collected. Each sample was submitted for analysis, under chain-of-custody protocol, to Galson Laboratories located in East Syracuse, New York, and analyzed for the chemicals of concern using either NIOSH or OSHA methodology as applicable. Galson Laboratories is accredited by the American Industrial Hygiene Association (AIHA) to conduct this type of analysis.

ANALYTICAL RESULTS

The analytical results for the air samples collected during this sampling period are summarized in Table 2. For comparison, the Washington Industrial Safety and Health Act (WISHA) Permissible Exposure Limit (PEL) and the Federal OSHA PEL for each parameter is included in the table. The laboratory report, chain-of-custody, and pump calibration data are included in Attachment A. The concentrations of the analyzed parameters were all below their respective WISHA and OSHA PELs at all seven (7) sample locations.

CLOSING

The samples collected are representative of the activities and work area conditions on the day the monitoring was conducted. Any change in the work area, production activities and throughput, work practices, or environmental conditions may affect the monitoring results. Results in this report reflect the conditions at the time of the sampling events and do not necessarily reflect a continuous, steady state condition in the plant.

TABLE 1

SAMPLE COLLECTION SUMMARY - INDOOR AIR MONITORING
GROUNDWATER TREATMENT FACILITY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

	Location	Sampling Methodology	Pump/Regulator #	Pump Pulses	On	Off	Total Time (Minutes)	Total V (L)	Sample Number
1	Kitchen (Counter near microwave and refrigerator)	NIOSH 5517 (Hexachlorobenzene)	PP059/PP013	11938/10432	9:13 AM	4:17 PM	424	10.3147	AA-7843-K-A-1
									AA-7843-K-B-2
		OSHA Mod 39 (Pentachlorophenol)	3M336	425	9:13 AM	4:17 PM	424	80.136	AA-7843-K-A-17
									AA-7843-K-B-18
									AA-7843-K-C-19
		NIOSH 6009 (Mercury Vapor)	3M336	425	9:13 AM	4:17 PM	424	80.136	AA-7843-K-41
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	3M352	425	9:13 AM	12:51 PM	218	212.986	AA-7843-K-A-49
					12:51 PM	4:17 PM	206	201.262	AA-7843-K-B-50
		OSHA PV2120 mini can (VOCs)	WR377	na	9:13 AM	4:17 PM	424	na	AA-7843-K-64
2	Conference Room (on west end of conference table)	NIOSH 5517 (Hexachlorobenzene)	PP066	21622	9:09 AM	4:25 PM	436	11.6326	AA-7843-C-A-3
									AA-7843-C-B-4
		OSHA Mod 39 (Pentachlorophenol)	3M360	437	9:09 AM	4:25 PM	436	85.02	AA-7843-C-A-20
									AA-7843-C-B-21
									AA-7843-C-C-22
		NIOSH 6009 (Mercury Vapor)	3M360	437	9:09AM	4:25PM	436	85.02	AA-7843-C-42
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	3M332	437	9:09 AM	12:49 PM	220	226.6	AA-7843-C-A-51
					12:49 PM	4:25 PM	216	222.48	AA-7843-C-B-52
		OSHA PV2120 mini can (VOCs)	WR394	na	9:09AM	4:25 PM	436	na	AA-7843-C-65
3	Shower Room (shelf at coat rack)	NIOSH 5517 (Hexachlorobenzene)	PP070	21533	9:03 AM	4:05 PM	422	10.8742	AA-7843-S-A-5
									AA-7843-S-B-6
		OSHA Mod 39 (Pentachlorophenol)	3M390	420	9:03 AM	4:05 PM	422	82.29	AA-7843-S-A-23
									AA-7843-S-B-24
									AA-7843-S-C-25
		NIOSH 6009 (Mercury Vapor)	3M390	420	9:03 AM	4:05 PM	422	82.29	AA-7843-S-43
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	IH0000165	424	9:03 AM	12:47 PM	224	219.968	AA-7843-S-A-53
					12:47 PM	4:05 PM	198	194.436	AA-7843-S-B-54
		OSHA PV2120 mini can (VOCs)	RR224	na	9:03 AM	4:05 PM	422	na	AA-7843-S-66
4	Control Room #1 (top of old control panel)	NIOSH 5517 (Hexachlorobenzene)	PP028	20764	8:58 AM	3:53 PM	415	10.5182	AA-7843-CR1-A-7
									AA-7843-CR1-B-8
		OSHA Mod 39 (Pentachlorophenol)	3M340	415	8:58 AM	3:53 PM	415	83.415	AA-7843-CR1-A-26
									AA-7843-CR1-B-27
									AA-7843-CR1-C-28
		NIOSH 6009 (Mercury Vapor)	3M340	415	8:58 AM	3:53 PM	415	83.415	AA-7843-CR1-44
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	3M316	415	8:58 AM	12:44 PM	226	232.78	AA-7843-CR1-A-55
					12:44 PM	3:53 PM	189	194.67	AA-7843-CR1-B-56
		OSHA PV2120 mini can (VOCs)	WR560	na	8:58 AM	3:53 PM	415	na	AA-7843-CR1-67

TABLE 1

SAMPLE COLLECTION SUMMARY - INDOOR AIR MONITORING
GROUNDWATER TREATMENT FACILITY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

	Location	Sampling Methodology	Pump/Regulator #	Pump Pulses	On	Off	Total Time	Total V (L)	Sample Number
5	Motor Control Room #2 (table inside of north doorway to motor control room)	NIOSH 5517 (Hexachlorobenzene)	PP021	23417	8:52 AM	3:39 PM	407	10.4674	AA-7843-CR2-A-9
									AA-7843-CR2-B-10
		OSHA Mod 39 (Pentachlorophenol)	P1362	407	8:52 AM	3:39 PM	407	78.144	AA-7843-CR2-A-29
									AA-7843-CR2-B-30
									AA-7843-CR2-C-31
		NIOSH 6009 (Mercury Vapor)	P1362	407	8:52 AM	3:39 PM	407	78.144	AA-7843-CR2-45
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	3M307	407	8:52 AM	12:42 PM	230	225.86	AA-7843-CR2-A-57
					12:42 PM	3:39 PM	177	173.814	AA-7843-CR2-B-58
		OSHA PV2120 mini can (VOCs)	WR571	na	8:52 AM	3:39 PM	407	na	AA-7843-CR2-68
6	Office (table in front of desk)	NIOSH 5517 (Hexachlorobenzene)	PP060	24141	9:16 AM	4:33 PM	437	10.8393	AA-7843-O-A-11
									AA-7843-O-B-12
		OSHA Mod 39 (Pentachlorophenol)	3M344	435	9:16 AM	4:33 PM	437	87.837	AA-7843-O-A-32
									AA-7843-O-B-33
									AA-7843-O-C-34
		NIOSH 6009 (Mercury Vapor)	3M344	435	9:16 AM	4:33 AM	437	87.837	AA-7843-O-46
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	3M393	436	9:16 AM	12:52 PM	216	212.112	AA-7843-O-A-59
					12:52 PM	4:33 PM	221	217.202	AA-7843-O-B-60
		OSHA PV2120 mini can (VOCs)	RR182	na	9:16 AM	4:33 PM	437	na	AA-7843-O-69
7	Outside (outside south main office doorway)	NIOSH 5517 (Hexachlorobenzene)	PP036	34634	9:24 AM	4:40 PM	436	10.9789	AA-7843-OS-A-13
									AA-7843-OS-B-14
		OSHA Mod 39 (Pentachlorophenol)	P258	436	9:24 AM	4:40 PM	436	85.02	AA-7843-OS-A-35
									AA-7843-OS-B-36
									AA-7843-OS-C-37
		NIOSH 6009 (Mercury Vapor)	P258	436	9:24 AM	4:40 PM	436	85.02	AA-7843-OS-47
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	3M320	437	9:24 AM	12:55 PM	211	207.202	AA-7843-OS-A-61
					12:55 PM	4:40 PM	225	220.95	AA-7843-OS-B-62
		OSHA PV2120 mini can (VOCs)	WR635	na	9:24 AM	4:40 PM	436	na	AA-7843-OS-70
8	Blanks for QC	NIOSH 5517 (Hexachlorobenzene)	na	na	11:00 AM	na	na	na	AA-7843-B-A-15
									AA-7843-B-B-16
		OSHA Mod 39 (Pentachlorophenol)	na	na	11:00 AM	na	na	na	AA-7843-B-A-38
									AA-7843-B-B-39
									AA-7843-B-C-40
		NIOSH 6009 (Mercury Vapor)	na	na	11:00 AM	na	na	na	AA-7843-B-48
		OSHA 104 [bis (2-ethylhexyl) Phthalate]	na	na	11:00 AM	na	na	na	AA-7843-B-A-63
		OSHA PV2120 mini can (VOCs)	na	na	na	na	na	na	na

TABLE 2

ANALYTICAL RESULTS - INDOOR AIR MONITORING
GROUNDWATER TREATMENT FACILITY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Parameters							*Location:*	*Kitchen*	*Conference Room*	*Shower Room*	*Control Room #1*	*Motor Control Room #2*	*Office*	*Outside*
	units	*WISHA PEL*			*OSHA PEL*									
		TWA_8	*Ceiling*	*STEL*	*TWA_8*	*Ceiling*	*STEL*							
Method (NIOSH 6009)														
Mercury	*mg/m^3*	0.05	--	0.15	0.1	--	--	<0.00075	<0.00071	<0.00073	<0.00072	<0.00077	<0.00068	<0.00071
Method (OSHA Mod 39)														
Pentachlorophenol	*mg/m^3*	0.5	--	1.5	0.5	--	--	<0.01	<0.01	<0.01	0.01	<0.01**	<0.01	<0.01
Method (OSHA PV2120 mini can)														
Vinyl Chloride	*ppm*	1	--	5	1	--	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
1,1-Dichloroethene	*ppm*	1	--	3	--	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Methylene Chloride	*ppm*	25	--	125	25	--	125	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
trans-1,2-Dichloroethylene(1)	*ppm*	200	--	250	200	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
cis-1,2-Dichloroethylene(1)	*ppm*	200	--	250	200	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Chloroform	*ppm*	2	--	4	--	50	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Carbon Tetrachloride	*ppm*	2	--	4	10	25	200(2)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Benzene	*ppm*	1	--	5	1	--	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Trichloroethylene	*ppm*	50	--	200	100	200	300(3)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
1,1,2-Trichloroethane	*ppm*	10	--	20	10	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Tetrachloroethylene	*ppm*	25	--	38	100	200	300(4)	<0.005	<0.005	<0.005	0.011	0.0057	<0.01	<0.005
Ethylbenzene	*ppm*	100	--	125	100	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
1,1,2,2-Tetrachloroethane	*ppm*	1	--	3	5	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Hexachlorobutadiene	*ppm*	0.02	--	0.06	0.02*	--	--	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	*ppm*	--	5	--	--	5*	--	ND	ND	ND	ND	ND	ND	ND
Method (OSHA 104)														
bis (2-ethylhexyl) Phthalate	*mg/m^3*	5	--	10	5	--	--	<0.051	<0.048	<0.049	<0.047	<0.048	<0.051	<0.052
								<0.054	<0.049	<0.056	<0.056	<0.063	<0.050	<0.049
Method (NIOSH 5517)														
Hexachlorobenzene	*mg/m^3*	--	--	--	0.002*	--	--	<0.00048	<0.00043	<0.00046	<0.00048	<0.00048	<0.00046	<0.00046

TABLE 2

ANALYTICAL RESULTS - INDOOR AIR MONITORING
GROUNDWATER TREATMENT FACILITY
OCCIDENTAL CHEMICAL CORPORATION
TACOMA, WASHINGTON

Notes:

☐	Identifies the applicable PEL value, other values included for reference only.
*	2010 American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) not OSHA PEL.
**	Middle portion of the sample was spilled at the laboratory and could not be analyzed.
ND	Not detected - sample was analyzed for tentatively identified compounds (TICs) and no TICs were identified.
OSHA PEL	Federal Occupational Safety and Health Administration Permissible Exposure Limit
NIOSH	National Institute for Occupational Safety and Health.
TWA$_8$	8-hour Time Weighted Average Limit
WISHA PEL	Washington Industrial Safety and Health Act Permissible Exposure Limit
STEL	Short-term Exposure Limit. STEL pertains to 15-minute exposure period unless otherwise noted.
mg/m^3	Milligrams per cubic meter
(1)	The OSHA and WISHA PELs are for 1,2-dichloroethene and does not distinguish between isomers.
(2)	200 ppm 5-minute maximum peak in any 3 hours
(3)	300 ppm 5-minute maximum peak in any 2 hours
(4)	300 ppm 5-minute maximum peak in any 3 hours

ATTACHMENT A

LABORATORY REPORT, CHAIN-OF-CUSTODY, AND PUMP DATA

GALSON
LABORATORIES

Mr. Mitch Bergner
Conestoga-Rovers & Associates
1801 Old Highway 8
Suite 114
St. Paul, MN 55112

September 09, 2010

DOH ELAP# 11626 Account# 13571 Login# L221738

Dear Mr. Bergner:

Enclosed are the analytical results for the samples received by our laboratory on August 23, 2010. All test results meet the quality control requirements of AIHA and NELAC unless otherwise stated in this report. All samples on the chain of custody were received in good condition unless otherwise noted.

The samples submitted for Hexachlorobenzene were subcontracted to Bureau Veritas/Clayton Group Services, Inc. Their report is enclosed in its entirety.

Results in this report are based on the sampling data provided by the client and refer only to the samples as they were received at the laboratory. Unless otherwise requested, all samples will be discarded 14 days from the date of this report.

Please contact Patty Gregorich at (888)-432-5227, if you would like any additional information regarding this report.

Thank you for using Galson Laboratories.

Sincerely,

Galson Laboratories

Mary G Unangst

Mary G. Unangst
Laboratory Director

Enclosure(s)

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : Conestoga-Rovers & Associates
Site : NS
Project No. : 7843-M2

Date Sampled : 19-AUG-10
Date Received : 23-AUG-10
Date Analyzed : 26-AUG-10
Report ID : 660526

Account No.: 13571
Login No. : L221738

Mercury

Sample ID	Lab ID	Air Vol liter	Total ug	Conc mg/m3
AA-7843-K-41	L221738-17	80.136	<0.060	<0.00075
AA-7843-C-42	L221738-18	85.02	<0.060	<0.00071
AA-7843-S-43	L221738-19	82.29	<0.060	<0.00073
AA-7843-CR1-44	L221738-20	83.415	<0.060	<0.00072
AA-7843-CR2-45	L221738-21	78.144	<0.060	<0.00077
AA-7843-O-46	L221738-22	87.837	<0.060	<0.00068
AA-7843-OS-47	L221738-23	85.02	<0.060	<0.00071
AA-7843-B-48	L221738-24	NA	<0.060	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 0.060 ug
Analytical Method : mod. NIOSH 6009;CVAA;TUBE
OSHA PEL (TWA) : 0.1 mg/m3 CEIL
Collection Media : 226-17-1A

Submitted by: pef/pwl
Approved by : LLS
Date : 30-AUG-10 NYS DOH # : 11626
QC by: Tom Burgess

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified
NA -Not Applicable	ND -Not Detected	ppm -Parts per Million	

LABORATORY ANALYSIS REPORT

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East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : Conestoga-Rovers & Associates
Site : NS
Project No. : 7843-M2

Date Sampled : 19-AUG-10
Date Received : 23-AUG-10
Date Analyzed : 30-AUG-10
Report ID : 660541

Account No.: 13571
Login No. : L221738

Pentachlorophenol

Sample ID	Lab ID	Front ug	Middle ug	Back ug	Total ug	Conc mg/m3	ppm
AA-7843-K-ABC-17-19	L221738-9	<1	<1	<1	<1	<0.01	<0.001
AA-7843-C-ABC-20-22	L221738-10	<1	<1	<1	<1	<0.01	<0.001
AA-7843-S-ABC-23-25	L221738-11	<1	<1	<1	<1	<0.01	<0.001
AA7843-CR1-ABC-26-28	L221738-12	1	<1	<1	1	0.01	0.001
AA7843-CR2-ABC-29-31	L221738-13	<1	NA	<1	<1	<0.01	<0.001
AA-7843-O-ABC-32-34	L221738-14	<1	<1	<1	<1	<0.01	<0.001
AA-7843-OS-ABC-35-37	L221738-15	<1	<1	<1	<1	<0.01	<0.001
AA-7843-B-ABC-38-40	L221738-16	<1	<1	<1	<1	NA	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 1 ug
Analytical Method : mod. OSHA 39; HPLC/UV
OSHA PEL (TWA) : 0.5 mg/m3
Collection Media : 226-97

Submitted by: mwj
Approved by : nkp
Date : 30-AUG-10
NYS DOH # : 11626
QC by: Tom Burgess

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified
NA -Not Applicable	ND -Not Detected	ppm -Parts per Million	

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FAX: (315) 437-0571
www.galsonlabs.com

Client : Conestoga-Rovers & Associates
Site : NS
Project No. : 7843-M2

Date Sampled : 19-AUG-10
Date Received : 23-AUG-10
Date Analyzed : 30-AUG-10
Report ID : 660473

Account No.: 13571
Login No. : L221738

Galson ID:			L221738-40		L221738-41		L221738-42	
Client ID:			AA-7843-K-64		AA-7843-C-65		AA-7843-S-66	
	LOQ ppbv	LOQ mg/m3	ppbv	mg/m3	ppbv	mg/m3	ppbv	mg/m3
Vinyl Chloride	5.0	0.013	<5.0	<0.013	<5.0	<0.013	<5.0	<0.013
1,1-Dichloroethene	5.0	0.020	<5.0	<0.020	<5.0	<0.020	<5.0	<0.020
Methylene Chloride	5.0	0.017	<5.0	<0.017	<5.0	<0.017	<5.0	<0.017
Trans-1,2-Dichloroethene	5.0	0.020	<5.0	<0.020	<5.0	<0.020	<5.0	<0.020
cis-1,2-Dichloroethylene	5.0	0.020	<5.0	<0.020	<5.0	<0.020	<5.0	<0.020
Chloroform	5.0	0.024	<5.0	<0.024	<5.0	<0.024	<5.0	<0.024
Carbon Tetrachloride	5.0	0.031	<5.0	<0.031	<5.0	<0.031	<5.0	<0.031
Benzene	5.0	0.016	<5.0	<0.016	<5.0	<0.016	<5.0	<0.016
Trichloroethylene	5.0	0.027	<5.0	<0.027	<5.0	<0.027	<5.0	<0.027
1,1,2-Trichloroethane	5.0	0.027	<5.0	<0.027	<5.0	<0.027	<5.0	<0.027
Tetrachloroethylene	5.0	0.034	<5.0	<0.034	<5.0	<0.034	<5.0	<0.034
Ethylbenzene	5.0	0.022	<5.0	<0.022	<5.0	<0.022	<5.0	<0.022
1,1,2,2-Tetrachloroethane	5.0	0.034	<5.0	<0.034	<5.0	<0.034	<5.0	<0.034
Total Volatile Organics				ND		ND		ND

Analytical Method : mod.OSHA PV2120/EPA TO15
Collection Media : Mini Can

Submitted by: kaw/kak
Approved by : nkp
Date : 30-AUG-10 NYS DOH # : 11626
QC by : Tom Burgess

< -Less Than
\> -Greater Than
NA -Not Applicable
NS -Not Specified

MG -Milligrams
UG -Micrograms
ND -Not Detected
KG -Kilograms

M3 -Cubic Meters
L -Liters
ppbv-Parts per Billion Volume
LOQ -Limit of Quantitation

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : Conestoga-Rovers & Associates
Site : NS
Project No. : 7843-M2

Date Sampled : 19-AUG-10
Date Received : 23-AUG-10
Date Analyzed : 30-AUG-10
Report ID : 660473

Account No.: 13571
Login No. : L221738

Galson ID:			L221738-43		L221738-44		L221738-45	
Client ID:			AA-7843-CR1-67		AA-7843-CR2-68		AA-7843-O-69	
	LOQ ppbv	LOQ mg/m3	ppbv	mg/m3	ppbv	mg/m3	ppbv	mg/m3
Vinyl Chloride	5.0	0.013	<5.0	<0.013	<5.0	<0.013	<10	<0.026
1,1-Dichloroethene	5.0	0.020	<5.0	<0.020	<5.0	<0.020	<10	<0.040
Methylene Chloride	5.0	0.017	<5.0	<0.017	<5.0	<0.017	<10	<0.035
Trans-1,2-Dichloroethene	5.0	0.020	<5.0	<0.020	<5.0	<0.020	<10	<0.040
cis-1,2-Dichloroethylene	5.0	0.020	<5.0	<0.020	<5.0	<0.020	<10	<0.040
Chloroform	5.0	0.024	<5.0	<0.024	<5.0	<0.024	<10	<0.049
Carbon Tetrachloride	5.0	0.031	<5.0	<0.031	<5.0	<0.031	<10	<0.063
Benzene	5.0	0.016	<5.0	<0.016	<5.0	<0.016	<10	<0.032
Trichloroethylene	5.0	0.027	<5.0	<0.027	<5.0	<0.027	<10	<0.054
1,1,2-Trichloroethane	5.0	0.027	<5.0	<0.027	<5.0	<0.027	<10	<0.054
Tetrachloroethylene	5.0	0.034	11	0.071	5.7	0.039	<10	<0.068
Ethylbenzene	5.0	0.022	<5.0	<0.022	<5.0	<0.022	<10	<0.043
1,1,2,2-Tetrachloroethane	5.0	0.034	<5.0	<0.034	<5.0	<0.034	<10	<0.069
Total Volatile Organics				0.071		0.039		ND

Analytical Method : mod.OSHA PV2120/EPA TO15
Collection Media : Mini Can

Submitted by: kaw/kak
Approved by : nkp
Date : 30-AUG-10 NYS DOH # : 11626
QC by : Tom Burgess

<	-Less Than	MG	-Milligrams	M3	-Cubic Meters
>	-Greater Than	UG	-Micrograms	L	-Liters
NA	-Not Applicable	ND	-Not Detected	ppbv	-Parts per Billion Volume
NS	-Not Specified	KG	-Kilograms	LOQ	-Limit of Quantitation

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : Conestoga-Rovers & Associates
Site : NS
Project No. : 7843-M2

Date Sampled : 19-AUG-10
Date Received : 23-AUG-10
Date Analyzed : 30-AUG-10
Report ID : 660473

Account No.: 13571
Login No. : L221738

Galson ID: L221738-46
Client ID: AA-7843-OS-70

	LOQ ppbv	LOQ mg/m3	ppbv	mg/m3	ppbv	mg/m3	ppbv	mg/m3
Vinyl Chloride	5.0	0.013	<5.0	<0.013				
1,1-Dichloroethene	5.0	0.020	<5.0	<0.020				
Methylene Chloride	5.0	0.017	<5.0	<0.017				
Trans-1,2-Dichloroethene	5.0	0.020	<5.0	<0.020				
cis-1,2-Dichloroethylene	5.0	0.020	<5.0	<0.020				
Chloroform	5.0	0.024	<5.0	<0.024				
Carbon Tetrachloride	5.0	0.031	<5.0	<0.031				
Benzene	5.0	0.016	<5.0	<0.016				
Trichloroethylene	5.0	0.027	<5.0	<0.027				
1,1,2-Trichloroethane	5.0	0.027	<5.0	<0.027				
Tetrachloroethylene	5.0	0.034	<5.0	<0.034				
Ethylbenzene	5.0	0.022	<5.0	<0.022				
1,1,2,2-Tetrachloroethane	5.0	0.034	<5.0	<0.034				
Total Volatile Organics			ND					

Analytical Method : mod.OSHA PV2120/EPA TO15
Collection Media : Mini Can

Submitted by: kaw/kak
Approved by : nkp
Date : 30-AUG-10 NYS DOH # : 11626
QC by : Tom Burgess

< -Less Than	MG -Milligrams	M3 -Cubic Meters
> -Greater Than	UG -Micrograms	L -Liters
NA -Not Applicable	ND -Not Detected	ppbv-Parts per Billion Volume
NS -Not Specified	KG -Kilograms	LOQ -Limit of Quantitation

LABORATORY ANALYSIS REPORT

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Client : Conestoga-Rovers & Associates
Site : NS
Project No. : 7843-M2

Date Sampled : 19-AUG-10
Date Received : 23-AUG-10
Date Analyzed : 24-AUG-10 - 25-AUG-10
Report ID : 660074

Account No.: 13571
Login No. : L221738

---

di(2-ethylhexyl)Phthalate

Sample ID	Lab ID	Air Vol liter	Front ug	Back ug	Total ug	Conc mg/m3	ppm
AA-7843-K-A-49	L221738-25	212.986	<10	<10	<11	<0.051	<0.0032
AA-7843-K-B-50	L221738-26	201.262	<10	<10	<11	<0.054	<0.0034
AA-7843-C-A-51	L221738-27	226.6	<10	<10	<11	<0.048	<0.0030
AA-7843-C-B-52	L221738-28	222.48	<10	<10	<11	<0.049	<0.0031
AA-7843-S-A-53	L221738-29	219.968	<10	<10	<11	<0.049	<0.0031
AA-7843-S-B-54	L221738-30	194.436	<10	<10	<11	<0.056	<0.0035
AA-7843-CR1-A-55	L221738-31	232.78	<10	<10	<11	<0.047	<0.0029
AA-7843-CR1-B-56	L221738-32	194.67	<10	<10	<11	<0.056	<0.0035
AA-7843-CR2-A-57	L221738-33	225.86	<10	<10	<11	<0.048	<0.0030
AA-7843-CR2-B-58	L221738-34	173.814	<10	<10	<11	<0.063	<0.0039
AA-7843-O-A-59	L221738-35	212.112	<10	<10	<11	<0.051	<0.0032
AA-7843-O-B-60	L221738-36	217.022	<10	<10	<11	<0.050	<0.0031
AA-7843-OS-A-61	L221738-37	207.202	<10	<10	<11	<0.052	<0.0033
AA-7843-OS-B-62	L221738-38	220.95	<10	<10	<11	<0.049	<0.0031
AA-7843-B-A-63	L221738-39	NA	<10	<10	<11	NA	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 10. ug
Analytical Method : mod. OSHA 104; GC/FID
OSHA PEL (TWA) : 5 mg/m3
Collection Media : 226-56

Submitted by: edv
Approved by : KLD
Date : 30-AUG-10 NYS DOH # : 11626
QC by: Tom Burgess

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified
NA -Not Applicable	ND -Not Detected	ppm -Parts per Million	

GALSON
LABORATORIES

LABORATORY FOOTNOTE REPORT

Client Name : Conestoga-Rovers & Associates
Site :
Project No. : 7843-M2

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Date Sampled : 19-AUG-10
Date Received: 23-AUG-10
Date Analyzed: 24-AUG-10 - 30-AUG-10

Account No.: 13571
Login No. : L221738

Unless otherwise noted below, all quality control results associated with the samples were within established control limits.

Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method. Please note that results appearing in the columns preceeding the final result column may have been rounded in order to fit the report format and therefore, if carried through the calculations, may not yield an identical final result to the one reported.

The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).

L221738 (Report ID: 660526):
Reported results reflect elemental analysis of the requested metals. Certain compounds may not be solubilized during digestion, resulting in data that is biased low.
SOPs: im-hg(18), im-hgair(11)

L221738 (Report ID: 660541):
SOPs: il-osha39(4)
Total ug corrected for a desorption efficiency of 103%.

L221738-13 (Report ID: 660541:
During the preparation process, the middle portion of the sample spilled and the sample was lost. The middle portion of the sample could not be reported.

L221738 (Report ID: 660473):
SOPs: in-vocs(14)
Samples 40-46 were non-detect for 1,2,4-Trichlorobenzene and non-detect for Hexachloro-1,3-Butadiene.

L221738 (Report ID: 660074):
Total ug corrected for a desorption efficiency of 92%.
SOPs: GC-SOP-12(2), GC-SOP-16(5), GC-SOP-8(4)

< -Less Than	mg -Milligrams	m3 -Cubic Meters	kg -Kilograms
> -Greater Than	ug -Micrograms	l -Liters	NS -Not Specified
NA -Not Applicable	ND -Not Detected	ppm -Parts per Million	

BUREAU
VERITAS

September 01, 2010

Shelly Krause
GALSON LABORATORIES
6601 Kirkville Road
East Syracuse, NY 13057-

Bureau Veritas Work Order No. 10081382

Reference: L221738

Dear Shelly Krause:

Bureau Veritas North America, Inc. received 8 samples on 8/24/2010 for the analyses presented in the following report.

Enclosed is a copy of the Chain-of-Custody record, acknowledging receipt of these samples. Please note that any unused portion of the samples will be discarded 30 days after the date of this report, unless you have requested otherwise.

This material is confidential and is intended solely for the person to whom it is addressed. If this is received in error, please contact the number provided below.

We appreciate the opportunity to assist you. If you have any questions concerning this report, please contact a Client Services Representative at (800) 806-5887.

Sincerely,

Ellen Coffman for

Wendy Lesniak
Client Services Representative

cc:

Bureau Veritas North America, Inc.
22345 Roethel Drive
Novi, MI 48375

Main: (248) 344.1770
Fax: (248) 344.2655
www.us.bureauveritas.com

CASE NARRATIVE

Date: ***01-Sep-10***

Client: **GALSON LABORATORIES**

Project: **L221738**

Work Order No **10081382**

The results of this report relate only to the samples listed in the body of this report.

Unless otherwise noted below, the following statements apply: 1) all samples were received in acceptable condition, 2) all quality control results associated with this sample set were within acceptable limits and/or do not adversely affect the reported results, and 3) the industrial hygiene results have not been blank corrected.

Please not that there are not enough data points to provide statistical information.

ANALYTICAL RESULTS

Date: *01-Sep-10*

Client: GALSON LABORATORIES
Project: L221738
Work Order No: 10081382

Sample Identification: AA-7843-K-A/B-1/2
Lab Number: 001A
Sample Type PTFE Filt XAD-2
Analyst SAS
Date Sampled: 8/19/2010
Date Received: 8/24/2010
Air Volume (L): 10.3147

Analyte	Analytical Results (µg)	(mg/m³)	(ppm)	Reporting Limit (µg)	Test Method	Date Analyzed
Hexachlorobenzene	<0.005	<0.00048	--	0.005	NIOSH 5517	08/31/2010

Sample Identification: AA-7843-C-A/B-3/4
Lab Number: 002A
Sample Type PTFE Filt XAD-2
Analyst SAS
Date Sampled: 8/19/2010
Date Received: 8/24/2010
Air Volume (L): 11.6326

Analyte	Analytical Results (µg)	(mg/m³)	(ppm)	Reporting Limit (µg)	Test Method	Date Analyzed
Hexachlorobenzene	<0.005	<0.00043	--	0.005	NIOSH 5517	08/31/2010

Sample Identification: AA-7843-S-A/B-5/6
Lab Number: 003A
Sample Type PTFE Filt XAD-2
Analyst SAS
Date Sampled: 8/19/2010
Date Received: 8/24/2010
Air Volume (L): 10.8742

Analyte	Analytical Results (µg)	(mg/m³)	(ppm)	Reporting Limit (µg)	Test Method	Date Analyzed
Hexachlorobenzene	<0.005	<0.00046	--	0.005	NIOSH 5517	08/31/2010

ANALYTICAL RESULTS

Date: *01-Sep-10*

Client: GALSON LABORATORIES

Project: L221738

Work Order No: 10081382

Sample Identification: AA-7843-CR1-A/B-7/8

Lab Number: 004A

Date Sampled: 8/19/2010

Sample Type PTFE Filt XAD-2

Date Received: 8/24/2010

Analyst SAS

Air Volume (L): 10.5182

Analyte	Analytical Results (µg)	(mg/m³)	(ppm)	Reporting Limit (µg)	Test Method	Date Analyzed
Hexachlorobenzene	<0.005	<0.00048	--	0.005	NIOSH 5517	08/31/2010

Sample Identification: AA-7843-CR2-A/B-9/10

Lab Number: 005A

Date Sampled: 8/19/2010

Sample Type PTFE Filt XAD-2

Date Received: 8/24/2010

Analyst SAS

Air Volume (L): 10.4674

Analyte	Analytical Results (µg)	(mg/m³)	(ppm)	Reporting Limit (µg)	Test Method	Date Analyzed
Hexachlorobenzene	<0.005	<0.00048	--	0.005	NIOSH 5517	08/31/2010

Sample Identification: AA-7843-O-A/B-11/12

Lab Number: 006A

Date Sampled: 8/19/2010

Sample Type PTFE Filt XAD-2

Date Received: 8/24/2010

Analyst SAS

Air Volume (L): 10.8393

Analyte	Analytical Results (µg)	(mg/m³)	(ppm)	Reporting Limit (µg)	Test Method	Date Analyzed
Hexachlorobenzene	<0.005	<0.00046	--	0.005	NIOSH 5517	08/31/2010

ANALYTICAL RESULTS

Date: *01-Sep-10*

Client: **GALSON LABORATORIES**

Project: L221738 **Work Order No:** 10081382

Sample Identification: **AA-7843-OS-A/B-13/14**

Lab Number: **007A** **Date Sampled:** **8/19/2010**

Sample Type **PTFE Filt XAD-2** **Date Received:** **8/24/2010**

Analyst **SAS** **Air Volume (L):** **10.9789**

Analyte	Analytical Results			Reporting Limit (µg)	Test Method	Date Analyzed
	(µg)	(mg/m³)	(ppm)			
Hexachlorobenzene	<0.005	<0.00046	--	0.005	NIOSH 5517	08/31/2010

Sample Identification: **AA-7843-B-A/B-15/16**

Lab Number: **008A** **Date Sampled:** **8/19/2010**

Sample Type **PTFE Filt XAD-2** **Date Received:** **8/24/2010**

Analyst **SAS** **Air Volume (L):** **NA**

Analyte	Analytical Results			Reporting Limit (µg)	Test Method	Date Analyzed
	(µg)	(mg/m³)	(ppm)			
Hexachlorobenzene	<0.005	--	--	0.005	NIOSH 5517	08/31/2010

General Notes:
<: Less than the indicated reporting limit (RL).
--: Information not available or not applicable.
Back sections (if applicable) were checked and showed no significant breakthrough unless otherwise noted.

GALSON LABORATORIES
6601 Kirkville Rd
East Syracuse, NY 13057-9672
Tel: 315-437-5227
888-432-LABS(5227)
Fax: 315-437-0571
www.galsonlabs.com

Clayton

Check if change of address ☐
New Client ? yes ☐
no ☐

Report To :	**Shelly Krause**	Invoice To :	**Pamela Weaver**
	Galson Laboratory		Galson Laboratory
	6601 Kirkville Road		6601 Kirkville Road
	East Syracuse, NY 13057		East Syracuse, NY 13057
Phone No. :	888-432-5227	Phone No. :	888-432-5227
		Fax No.	315-437-0571

Site Name : **Project :** L221738 **Sampled By :** Client

Need Results By:	(surcharge)
☑ 10 Business Days	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☐ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same day	200%

Verbal Authorization :
Purchase Order No. : 13571
Credit Card No. : Card Holder Name : Exp. :

Fax Results To : Email Only Please Fax No. : Email Only Please
Email Results To : **skrause@galsonlabs.com**

Sample Identification	Date Sampled	Collection Medium	*Air Volume (liters)/ Passive Monitors (Min)	Analysis Requested	Method Reference	Specific DL Needed
AA-7843-K-A/B-1/2	8/19/2010	FilterTube	10.3147	Hexachlorobenzene	NIOSH 5517	
AA-7843-C-A/B-3/4	8/19/2010	FilterTube	11.6326	Hexachlorobenzene	NIOSH 5517	
AA-7843-S-A/B-5/6	8/19/2010	FilterTube	10.8742	Hexachlorobenzene	NIOSH 5517	
AA-7843-CR1-A/B-7/8	8/19/2010	FilterTube	~~10518.2~~ 10.5182	Hexachlorobenzene	NIOSH 5517	
AA-7843-CR2-A/B-9/10	8/19/2010	FilterTube	~~10467.4~~ 10.4674	Hexachlorobenzene	NIOSH 5517	
AA-7843-O-A/B-11/12	8/19/2010	FilterTube	10.8393	Hexachlorobenzene	NIOSH 5517	
AA-7843-OS-A/B-13/14	8/19/2010	FilterTube	~~10978.9~~ 10.9789	Hexachlorobenzene	NIOSH 5517	
AA-7843-B-A/B-15/16	8/19/2010	FilterTube	NA 9/1/10	Hexachlorobenzene	NIOSH 5517	

☑ **IF YOU DO NOT WANT A LABORATORY BLANK ADDED PLEASE CHECK BOX. If blanks are not submitted or box is not checked, our policy states that a laboratory blank will be added for each analyte and it will be charged at normal rate.**

Comments:

Please provide an uncertainty statement in accordance with AIHA LQAP policy document Section 2A.5.4.3. Need results by **09/08/10**. Rush charges are not authorized.

Chain of Custody	Print Name	Signature	Date/Time
Relinquished by :	M. Ferro	Matthew A Ferro	8/23/10 1328
Received by LAB :			

ILF4 Ver: 3 Approval Date: 01/07/2008 Approval By: wferro

10081382

GALSON LABORATORIES

6601 Kirkville Rd
East Syracuse, NY 13057-9672
Tel: 315-437-5227
888-432-LABS(5227)
Fax: 315-437-0571
www.galsonlabs.com

Clayton

Check if change of address ☐

New Client ? yes ☐ no ☐

Report To : **Shelly Krause**
Galson Laboratory
6601 Kirkville Road
East Syracuse, NY 13057
Phone No. : 888-432-5227

Invoice To : **Pamela Weaver**
Galson Laboratory
6601 Kirkville Road
East Syracuse, NY 13057
Phone No. : 888-432-5227
Fax No. 315-437-0571

Site Name :

Project : L221738

Sampled By : Client

Need Results By:	(surcharge)
☐ 10 Business Days	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☐ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same day	200%

Verbal Authorization :
Purchase Order No. : 13571
Credit Card No. :
Card Holder Name :
Exp. :

Fax Results To : Email Only Please
Fax No. : Email Only Please
Email Results To : **skrause@galsonlabs.com**

Sample Identification	Date Sampled	Collection Medium	*Air Volume (liters)/ Passive Monitors (Min)	Analysis Requested	Method Reference	Specific DL Needed
AA-7843-K-A/B-1/2 ✓	8/19/2010	FilterTube	10.3147	Hexachlorobenzene	NIOSH 5517	
AA-7843-C-A/B-3/4 ✓	8/19/2010	FilterTube	11.6326	Hexachlorobenzene	NIOSH 5517	
AA-7843-S-A/B-5/6 ✓	8/19/2010	FilterTube	10.8742	Hexachlorobenzene	NIOSH 5517	
AA-7843-CR1-A/B-7/8 ✓	8/19/2010	FilterTube	10518.2	Hexachlorobenzene	NIOSH 5517	
AA-7843-CR2-A/B-9/10 ✓	8/19/2010	FilterTube	10467.4	Hexachlorobenzene	NIOSH 5517	
AA-7843-O-A/B-11/12 ✓	8/19/2010	FilterTube	10.8393	Hexachlorobenzene	NIOSH 5517	
AA-7843-OS-A/B-13/14 ✓	8/19/2010	FilterTube	10978.9	Hexachlorobenzene	NIOSH 5517	
AA-7843-B-A/B-15/16 ✓	8/19/2010	FilterTube	NA	Hexachlorobenzene	NIOSH 5517	

☑ **IF YOU DO NOT WANT A LABORATORY BLANK ADDED PLEASE CHECK BOX. If blanks are not submitted or box is not checked, our policy states that a laboratory blank will be added for each analyte and it will be charged at normal rate.**

Comments:

Please provide an uncertainty statement in accordance with AIHA LQAP policy document Section 2A.5.4.3. Need results by **09/08/10**. Rush charges are not authorized.

Chain of Custody	Print Name	Signature	Date/Time
Relinquished by :	M. Ferro	Matthew A Ferro	8/23/10 1328
Received by LAB :		C. Slaughter	8/24/10 1109

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES
Tacoma WA

SHIPPED TO (Laboratory Name): Galson Laboratories

REFERENCE NUMBER: 7843-M2

SAMPLER'S SIGNATURE: Jason E. C

PRINTED NAME: Jason E. Cornetta

SEQ. No.	DATE	TIME	SAMPLE No.	Start Time:	SAMPLE TYPE	No. of Containers	PARAMETERS	NIOSH 5517 ①	OSHA Mod 39 ②	NIOSH 6009 ③	OSHA 104 ④						REMARKS
	8/19/10	1617	AA-7843-K-A-1	0913	AIR	1		X					Pump 3M 332	Pump 3M 336	Pump PP059/PP013		① Hexachlorobenzene
		1617	AA-7843-K-B-2	0913	AIR	1		X									② Pentachlorophenol
		1617	AA-7843-K-A-17	0913	AIR	1			X								③ Mercury Vapor
		1617	AA-7843-K-B-18	0913	AIR	1			X								④ Bis(2-Ethylhexyl)phthalate
		1617	AA-7843-K-C-19	0913	AIR	1			X								
		1617	AA-7843-K-41	0913	AIR	1				X							
		JEC ~~16~~1251	AA-7843-K-A-49	0913	AIR	1					X						②③ pump requires
		1617	AA-7843-K-B-50	1251	AIR	1					X						post-sample calibration
		1625	AA-7843-C-A-3	0909	AIR	1		X					Pump 3M332	Pump 3M360	Pump PP066		
		1625	AA-7843-C-B-4	0909	AIR	1		X									④ pump requires
		1625	AA-7843-C-A-20	0909	AIR	1			X								post-sample calibration
		1625	AA-7843-C-B-21	0909	AIR	1			X								
		1625	AA-7843-C-C-22	0909	AIR	1			X								Reports to:
		1625	AA-7843-C-42	0909	AIR	1				X							jcornetta@craworld.com
		1249	AA-7843-C-A-51	0909	AIR	1					X						+
		1625	AA-7843-C-B-52	1249	AIR	1					X						mbergner@craworld.com
			~~AA-7843~~ JEC														

TOTAL NUMBER OF CONTAINERS: 16

HEALTH/CHEMICAL HAZARDS:

RELINQUISHED BY: ① Jason E. C	DATE: 8/20/10 TIME: 1600	RECEIVED BY: ① Federal Express	DATE: 8/20/10 TIME: 1600
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ② C	DATE: 8/23/10 TIME: 1130
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White —Fully Executed Copy
Yellow —Receiving Laboratory Copy
Pink —Shipper Copy
Goldenrod —Sampler Copy

SAMPLE TEAM: J. Cornetta

RECEIVED FOR LABORATORY BY:

DATE: TIME:

Nº CRA 20687

1001 (D) APR 28/97(NF) REV. 0 (F-15)

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES
Tacoma WA

SHIPPED TO (Laboratory Name): Galson Laboratories

REFERENCE NUMBER: 7843-M2

SAMPLER'S SIGNATURE: J. Cornetta

PRINTED NAME: Jason Cornetta

SEQ. No.	DATE	TIME	SAMPLE No.	Start Time	SAMPLE TYPE	No. of Containers	PARAMETERS	NIOSH 5517 ①	OSHA Mod 39 ②	NIOSH 6009 ③	OSHA 104 ④						REMARKS
	8/19/10	1605	AA-7843-S-A-5	0903	AIR	1		X					Pump 11000165	Pump 3M340			① HCB
		1605	AA-7843-S-B-6	0903	AIR	1		X							Pump PP070		② Pentachlorophenol
		1605	AA-7843-S-A-23	0903	AIR	1			X								③ Mercury Vapor
		1605	AA-7843-S-B-24	0903	AIR	1			X								④ Bis(2-Ethylhexyl)
		1605	AA-7843-S-C-25	0903	AIR	1			X								phthalate
		1605	AA-7843-S-43	0903	AIR	1				X							
		1247	AA-7843-S-A-53	0903	AIR	1					X						②③ Pump requires
		1605	AA-7843-S-B-54	1247	AIR	1					X						post-sample calibration
		1553	AA-7843-CR1-A-7	0858	AIR	1		X									
		1553	AA-7843-CR1-B-8	0858	AIR	1		X					Pump 3M316	Pump 3M340	Pump PP028		④ Pump requires
		1553	AA-7843-CR1-A-26	0858	AIR	1			X								post-sample calibration
		1553	AA-7843-CR1-B-27	0858	AIR	1			X								
		1553	AA-7843-CR1-C-28	0858	AIR	1			X								Reports To:
		1553	AA-7843-CR1-44	0858	AIR	1				X							jcornetta@craworld.com
		1244	AA-7843-CR1-A-55	0858	AIR	1					X						
		1553	AA-7843-CR1-B-56	1244	AIR	1					X						mbergner@craworld.com

TOTAL NUMBER OF CONTAINERS ⑯

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① Jason E. C	DATE: 8/20/10 TIME: 1600	RECEIVED BY: ① Federal Express	DATE: 8/20/10 TIME: 1600
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: 8/23/10 TIME: 1130
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White —Fully Executed Copy
Yellow —Receiving Laboratory Copy
Pink —Shipper Copy
Goldenrod —Sampler Copy

SAMPLE TEAM: J. Cornetta

RECEIVED FOR LABORATORY BY:

DATE: TIME:

Nº CRA20688

1001 (D) APR 28/97(NF) REV. 0 (F-15)

CHAIN OF CUSTODY RECORD

29

CONESTOGA-ROVERS & ASSOCIATES
Tacoma WA

SHIPPED TO (Laboratory Name): Galson Laboratories

REFERENCE NUMBER: 7843-M2

SAMPLER'S SIGNATURE: Jas E C
PRINTED NAME: Jason E. Cornetta

SEQ. No.	DATE	TIME	SAMPLE No.	Start Time:	SAMPLE TYPE	No. of Containers	PARAMETERS	NIOSH 5517 ①	OSHA Md39 ②	NIOSH 6009 ③	OSHA 104 ④						REMARKS
	08/19/10	1539	AA-7843-CR2-A-9 Dbl Ptts	0852	AIR	1		X					Pump PR362	Pump PR024	Pump 3M307		① PCB
26-30-04		1539	AA-7843-CR2-B-10	0852	AIR	1		X									② Pentachlorophenol
26-97		1539	AA-7843-CR2-A-29	0852	AIR	1			X								③ Mercury vapor
		1539	AA-7843-CR2-B-30	0852	AIR	1			X								④ Bis(2-Ethylhexyl)
		1539	AA-7843-CR2-C-31	0852	AIR	1			X								phthalate
26-97-1A		1539	AA-7843-CR2-45	0852	AIR	1				X							
26-56		1242	AA-7843-CR2-A-57	0852	AIR	1					X						②③④ pump requires
		1539	AA-7843-CR2-B-58	1242	AIR	1					X						post-sample calib.
		1633	AA-7843-O-A-11	0916	AIR	1		X									
		1633	AA-7843-O-B-12	0916	AIR	1		X					Pump 3M344	Pump PR060	Pump 3M393		Reports to:
		1633	AA-7843-O-A-32	0916	AIR	1			X								
		1633	AA-7843-O-B-33	0916	AIR	1			X								Jason Cornetta:
		1633	AA-7843-O-C-34	0916	AIR	1			X								jcornetta@craworld.com
		1633	AA-7843-O-46	0916	AIR	1				X							
		1252	AA-7843-O-A-59	0916	AIR	1					X						+
		1633	AA-7843-O-B-60	1252	AIR	1					X						Mitch Bergner:
																	mbergner@craworld.com

TOTAL NUMBER OF CONTAINERS 16

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① Jas E C	DATE: 8/20/10 TIME: 1600	RECEIVED BY: ① Federal Express	DATE: 8/20/10 TIME: 1600
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: 8/23/10 TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: 1132 TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White —Fully Executed Copy
Yellow —Receiving Laboratory Copy
Pink —Shipper Copy
Goldenrod —Sampler Copy

SAMPLE TEAM: J. Cornetta

RECEIVED FOR LABORATORY BY:

DATE: TIME:

Nº CRA20689

1001 (D) APR 28/97(NF) REV. 0 (F-15)

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES
TACOMA, WA

SHIPPED TO (Laboratory Name): GALSON LABORATORIES

REFERENCE NUMBER: 7843-M2

SAMPLER'S SIGNATURE:

PRINTED NAME: Jason E. Cornutte

SEQ. No.	DATE	TIME	SAMPLE No.	Start Time:	SAMPLE TYPE	No. of Containers	PARAMETERS	NIOSH 5517 ①	OSHA Mod 32 ②	NIOSH 6009 ③	OSHA 104 ④						REMARKS
	8/19/10	1640	AA-7843-05-A-13	0924	AIR	1		X					Pump 3M330	Pump P258	Pump P036		① HCB
		1640	AA-7843-05-B-14	0924	AIR	1		X									② Pentachlorophenol
		1640	AA-7843-05-A-35	0924	AIR	1			X								③ Mercury Vapor
		1640	AA-7843-05-B-36	0924	AIR	1			X								④ Bis(2-Ethylhexyl)
		1640	AA-7843-05-C-37	0924	AIR	1			X								phthalate
		1640	AA-7843-05-47	0924	AIR	1				X							
		1255	AA-7843-05-A-61	0924	AIR	1					X						②③④ pump requires
		1640	AA-7843-05-B-62	1255	AIR	1					X						post-sample calibration
		1100	AA-7843-B-A-15	—	AIR	1		X					No Pump	No Pump	No Pump		
		1100	AA-7843-B-B-16	—	AIR	1		X									
		1100	AA-7843-B-A-38	—	AIR	1			X								Reports to:
		1100	AA-7843-B-B-39	—	AIR	1			X								Jason Cornutte:
		1100	AA-7843-B-C-40	—	AIR	1			X								jcornutte@craworld.com
		1100	AA-7843-B-48	—	AIR	1				X							
	↓	1100	AA-7843-B-A-63	—	AIR	1					X						+
			~~AA-7843-B-B~~ JEC														Mitch Bergmn:
																	mbergmn@craworld.com

TOTAL NUMBER OF CONTAINERS ⑮

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ①	DATE: 8/20/10 TIME: 1600	RECEIVED BY: ① Federal Express	DATE: 8/20/10 TIME: 1600
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: 8/23/10 TIME: 1130
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT:

WAY BILL No.

White —Fully Executed Copy
Yellow —Receiving Laboratory Copy
Pink —Shipper Copy
Goldenrod —Sampler Copy

SAMPLE TEAM: J. Cornutte

RECEIVED FOR LABORATORY BY:

DATE: TIME:

Nº CRA20690

CHAIN OF CUSTODY RECORD

CONESTOGA-ROVERS & ASSOCIATES Tacoma, WA	SHIPPED TO (Laboratory Name): GALSON LABORATORIES	REFERENCE NUMBER: 7843-M2

SAMPLER'S SIGNATURE: Jason E Cornetta PRINTED NAME: Jason E. Cornetta

SEQ. No.	DATE	TIME	SAMPLE No.	Start time:	SAMPLE TYPE	No. of Containers	PARAMETERS TO-15 ①	Regulator Number							REMARKS
476	8/19/10	1617	AA-7843-K-64	0913	AIR	1	⊗	WR377							① only select
474	8/19/10	1625	AA-7843-C-65	0909	AIR	1	⊗	WR 394							parameters –
479	8/19/10	1605	AA-7843-S-66	0903	AIR	1	⊗	RR 224							OSHA PV2120
485	8/19/10	1553	AA-7843-CR1-67	0858	AIR	1	⊗	WR 560							mini can
751	8/19/10	1539	AA-7843-CR2-68	0852	AIR	1	⊗	WR 571							
479	8/19/10	1633	AA-7843-O-69	0916	AIR	1	⊗	RK 182							See Attached
473	8/19/10	1640	AA-7843-OS-70	0924	AIR	1	⊗	WR 635							Sheet for
															parameters.
															Reports to:
															Jason Cornetta:
															jcornetta@craworld.com
															Mitch Bergner:
															mbergner@craworld.com

TOTAL NUMBER OF CONTAINERS 7 HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① Jason E Cornetta	DATE: 8/20/10 TIME: 1600	RECEIVED BY: ① FEDERAL EXPRESS	DATE: 8/20/10 TIME: 1600
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: 8/23/10 TIME: 1130
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT: WAY BILL No.

White —Fully Executed Copy Yellow —Receiving Laboratory Copy Pink —Shipper Copy Goldenrod —Sampler Copy	SAMPLE TEAM: J. Cornetta	RECEIVED FOR LABORATORY BY: DATE: TIME:	Nº CRA 20691

1001 (D) APR 28/97(NF) REV. 0 (F-15)

182005 7-cans 7 Regs

TABLE 1

ANALYTICAL PARAMETERS
FOCUSED AIR MONITORING
TACOMA, WASHINGTON

Site Constituents of Concern	*OSHA PEL*	*Sampling Methodology*
Volatiles		
1,1,2,2-Tetrachloroethane	5 ppm	OSHA PV2120 mini can
1,1,2-Trichloroethane	10 ppm	OSHA PV2120 mini can
1,1-Dichloroethene	200 ppm	OSHA PV2120 mini can
Benzene	10 ppm 25 ppm ceiling 50 ppm 10 minutes	OSHA PV2120 mini can
Carbon tetrachloride	10 ppm 25 ppm ceiling 200 ppm 5 minutes	OSHA PV2120 mini can
Chloroform (Trichloromethane)	50 ppm ceiling	OSHA PV2120 mini can
Ethylbenzene	100 ppm	OSHA PV2120 mini can
Methylene chloride	25 ppm	OSHA PV2120 mini can
Tetrachloroethene	100 ppm 200 ppm ceiling 300 ppm 5 minutes	OSHA PV2120 mini can
cis-1,2-Dichloroethene	200 ppm	OSHA PV2120 mini can
trans-1,2-Dichloroethene	200 ppm	OSHA PV2120 mini can
Trichloroethene	100 ppm 200 ppm ceiling 300 ppm 5 minutes	OSHA PV2120 mini can
Vinyl chloride	1 ppm	OSHA PV2120 mini can
Semi-volatiles		
1,2,4-Trichlorobenzene	5 ppm ceiling*	OSHA PV2120 mini can
bis(2-Ethylhexyl) phthalate	5 mg/m3	OSHA 104
Hexachlorobenzene	0.002 mg/m3*	NIOSH 5020
Hexachlorobutadiene	0.02 ppm*	OSHA PV2120 mini can
Pentachlorophenol	0.5 mg/m3	OSHA Mod 39
Metals		
Mercury Vapor	1 mg/10m3	NIOSH 6009

Notes:

* - 2010 ACGIH TLV not OSHA PEL

Method OSHA PV2120

Of the entire TO-15 list, please analyze and report only on the following:

1 1,1,2,2-Tetrachloroethane
2 1,1,2-Trichloroethane
3 1,1-Dichloroethene
4 Benzene
5 Carbon tetrachloride
6 Chloroform (Trichloromethane)
7 Ethylbenzene
8 Methylene chloride
9 Tetrachloroethene
10 cis-1,2-Dichloroethene
11 trans-1,2-Dichloroethene
12 Trichloroethene
13 Vinyl chloride
14 1,2,4-Trichlorobenzene
15 Hexachlorobutadiene

GALSON LABORATORIES

Laboratory Pump Calibration Data (for 222-Series Pumps)

PREP. # PSY182005 Page 1 of 1

Pump Calibration Record:

	Date	Pump Number	Actual Flow Rate Setting (LPM)	Calibrated Stroke Factor (mL/COUNT) Calibrated by: CMP A	COUNTER Starting Number B	COUNTER Ending Number C	Total Number of Pump Pulses (C minus B) D	Final Air Volume (mLs) (A X D)	*Post Sampling Verification Performed by: FOR LAB USE ONLY
	EXAMPLE		0.065	0.455	555000	555600	600	273	
Cnt.	8/13/2010	PP066	0.02638	0.538	13567	035189	21622	11632.6	
O	8/13/2010	PP060	0.02475	0.449	558189	582330	24141	10839.3	
CR2	8/13/2010	PP021	0.02594	0.447	846214	869631	23417	10467.4	
OS	8/13/2010	PP036	0.02533	0.317	390137	424771	34634	10978.9	
K	8/13/2010	PP059	0.02604	0.504	734566	746504	11938	6016.7	
S	8/13/2010	PP070	0.02611	0.505	28538	050071	21533	10874.2	
CR1	8/13/2010	PP028	0.02506	0.507	143239	163985	20746	10518.2	
K	8/13/2010	PP013	0.02513	0.412	978795	989227	10432	4298.0	

Switched @ 1328

10314.7

KITCHEN - TOTAL

N O T E : To obtain CORRECT SAMPLE AIR VOLUMES, you *MUST* calculate them using the pump's COUNTER numbers (as shown above). The Actual Flow Rate values shown in the 3rd column above show that the pump is set at a stroke frequency near the desired flow rate.

* The stroke factor will be verified by the laboratory, post sampling, when the pumps are returned. You will be contacted if there are any discrepancies.

GALSON LABORATORIES

This should NOT be used as a Chain of Custody

Laboratory Pump Calibration Data

PREP# PSY182005

Page 1 of 1

Date: 8/13/2010

Pump Calibration Record:

Date	Pump Number	Calibrated By: MPG (initials) Rotameter Reading (LPM)	Type of media and/or method	LCD reading BEFORE Post-Calibration (GALSON LABS USE ONLY)	Post-Calibrated By: mg/8/25/10 (initials and date) Rotameter Reading (LPM)	Average of Pre- and Post- readings	Adjusted (true) Flow Rate Use formula on Rotameter: (Use "Average" from previous column for "X" in formula on rotameter's side label)
8/13/2010	P258	0.200	A- Osha 39 B- Niosh 6009		0.200	0.200	0.195
8/13/2010	3M340	0.200	A- Osha 39 B- Niosh 6009		0.210	0.205	0.201
8/13/2010	3M360	0.200	A- Osha 39 B- Niosh 6009		0.200	0.200	0.195
8/13/2010	3M336	0.200	A- Osha 39 B- Niosh 6009		0.190	0.195	0.189
8/13/2010	3M344	0.200	A- Osha 39 B- Niosh 6009		0.210	0.205	0.201
8/13/2010	3M390	0.200	A- Osha 39 B- Niosh 6009		0.200	0.200	0.195
8/13/2010	P1362	0.200	A- Osha 39 B- Niosh 6009		0.195	0.198	0.192
8/13/2010	3M324	0.200	A- Osha 39 B- Niosh 6009		0.200	0.200	0.195

Rotameter Calibration: **(Calibration Method: Dry-Cal assumed unless otherwise specified):**

Date	Rotameter Number	Rotameter Formula	Rotameter NOT SENT when box is checked below	Rotameter Reading (LPM)	Primary Standard Reading (LPM)
8/12/2010	R241	Y= 1.24 X -0.053	☐	0.20	0.21
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		

FOOTNOTES:

STOCK NOTES:

*1) Flow rate shown is the ACTUAL flow rate, based on 10-reading average(s) from our Primary Flowmeter

*2) Flow rate shown is the same on each side of splitter

*3) Flow rates shown as: Splitter Holder "A" / "B" / etc. See splitter and/or pump tag(s) for media type details

*4) Pump(s) left Galson Laboratories UNCALIBRATED

GALSON LABORATORIES

This should NOT be used as a Chain of Custody

Laboratory Pump Calibration Data

PREP# PSY182005

Page 1 of 1

Date: 8/13/2010

Pump Calibration Record:

Date	Pump Number	Calibrated By: MPG (initials) Rotameter Reading (LPM)	Type of media and/or method	LCD reading BEFORE Post-Calibration (GALSON LABS USE ONLY)	Post-Calibrated By: / (initials and date) Rotameter Reading (LPM)	Average of Pre- and Post- readings	Adjusted (true) Flow Rate Use formula on Rotameter: (Use "Average" from previous column for "X" in formula on rotameter's side label)
8/13/2010	P258	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	3M340	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	3M360	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	3M336	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	3M344	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	3M390	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	P1362	0.200	A- Osha 39 B- Niosh 6009				
8/13/2010	3M324	0.200	A- Osha 39 B- Niosh 6009				

05
R1
4.
K
0
5
R2

Rotameter Calibration: **(Calibration Method: Dry-Cal assumed unless otherwise specified):**

Date	Rotameter Number	Rotameter Formula	Rotameter NOT SENT when box is checked below	Rotameter Reading (LPM)	Primary Standard Reading (LPM)
8/12/2010	R241	Y= 1.24 X -0.053	☐	0.20	0.21
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		

FOOTNOTES:

STOCK NOTES:

*1) Flow rate shown is the ACTUAL flow rate, based on 10-reading average(s) from our Primary Flowmeter

*2) Flow rate shown is the same on each side of splitter

*3) Flow rates shown as: Splitter Holder "A" / "B" / etc. See splitter and/or pump tag(s) for media type details

*4) Pump(s) left Galson Laboratories UNCALIBRATED

GALSON LABORATORIES

This should NOT be used as a Chain of Custody

Laboratory Pump Calibration Data

PREP# PSY182005

Page 1 of 1

Date: 8/13/2010

Pump Calibration Record:

Date	Pump Number	Calibrated By: MPG (initials) Rotameter Reading (LPM)	Type of media and/or method	LCD reading BEFORE Post-Calibration (GALSON LABS USE ONLY)	Post-Calibrated By: mg/8/25/10 (initials and date) Rotameter Reading (LPM)	Average of Pre- and Post- readings	Adjusted (true) Flow Rate Use formula on Rotameter: (Use "Average" from previous column for "X" in formula on rotameter's side label)
8/13/2010	3M364	1.000	226-56		1.100	1.050	1.030
8/13/2010	3M393	1.000	226-56		1.000	1.000	0.982
8/13/2010	3M352	1.000	226-56		0.990	0.995	0.977
8/13/2010	IH0000165	1.000	226-56		1.000	1.000	0.982
8/13/2010	3M332	1.000	226-56		1.100	1.050	1.030
8/13/2010	3M320	1.000	226-56		1.000	1.000	0.982
8/13/2010	3M307	1.000	226-56		1.000	1.000	0.982
8/13/2010	3M316	1.000	226-56		1.100	1.050	1.030

Rotameter Calibration: **(Calibration Method: Dry-Cal assumed unless otherwise specified):**

Date	Rotameter Number	Rotameter Formula	Rotameter NOT SENT when box is checked below	Rotameter Reading (LPM)	Primary Standard Reading (LPM)
7/28/2010	R311	Y= 0.95 X + 0.032	☐	1.00	0.98
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		

FOOTNOTES:

STOCK NOTES:

*1) Flow rate shown is the ACTUAL flow rate, based on 10-reading average(s) from our Primary Flowmeter

*2) Flow rate shown is the same on each side of splitter

*3) Flow rates shown as: Splitter Holder "A" / "B" / etc. See splitter and/or pump tag(s) for media type details

*4) Pump(s) left Galson Laboratories UNCALIBRATED

IP4 Ver: 9 Appr/Eff Date: 8/12/09 - 8/12/09 Approval By: tburgess

GALSON
LABORATORIES

This should NOT be used as a Chain of Custody

Laboratory Pump Calibration Data

PREP# PSY182005

Page 1 of 1

Date: 8/13/2010

Pump Calibration Record:

Date	Pump Number	Calibrated By: MPG (initials) Rotameter Reading (LPM)	Type of media and/or method	LCD reading BEFORE Post-Calibration (GALSON LABS USE ONLY)	Post-Calibrated By: / (initials and date) Rotameter Reading (LPM)	Average of Pre- and Post- readings	Adjusted (true) Flow Rate Use formula on Rotameter: (Use "Average" from previous column for "X" in formula on rotameter's side label)
8/13/2010	3M364	1.000	226-56				
8/13/2010	3M393	1.000	226-56				
8/13/2010	3M352	1.000	226-56				
8/13/2010	IH0000165	1.000	226-56				
8/13/2010	3M332	1.000	226-56				
8/13/2010	3M320	1.000	226-56				
8/13/2010	3M307	1.000	226-56				
8/13/2010	3M316	1.000	226-56				

0 | K | S | 4. | 05 | RZ | R1

(8

Rotameter Calibration: **(Calibration Method: Dry-Cal assumed unless otherwise specified):**

Date	Rotameter Number	Rotameter Formula	Rotameter NOT SENT when box is checked below	Rotameter Reading (LPM)	Primary Standard Reading (LPM)
7/28/2010	R311	Y= 0.95 X + 0.032	☐	1.00	0.98
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		
		Y= X +	☐		

FOOTNOTES:

STOCK NOTES:

*1) Flow rate shown is the ACTUAL flow rate, based on 10-reading average(s) from our Primary Flowmeter

*2) Flow rate shown is the same on each side of splitter

*3) Flow rates shown as: Splitter Holder "A" / "B" / etc. See splitter and/or pump tag(s) for media type details

*4) Pump(s) left Galson Laboratories UNCALIBRATED

PUMP-FORM-12 Ver: 0 Appr/Eff Date: 5/15/09 - 5/15/09 Approval By: tburgess

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LABORATORIES

This should NOT be used as a Chain of Custody

Laboratory Regulator Calibration Data

PSY182005

Page 1 of 1

Regulator Calibration Record

	Date	Regulator Number	Calibrated By: AVM (initials) Meter Reading(cc/min.)	Minutes or Hour(s)	Post Flow Meter Reading (cc/min) (LAB USE)	Calibration Can Reading (Between 10-30" Hg) (LAB USE)		
R2	8/13/2010	WR571	0.85	8 HOURS		30		
R1	8/13/2010	WR560	0.85	8 HOURS		30		
D	8/13/2010	RR182	0.85	8 HOURS		30		
OS	8/13/2010	WR635	0.85	8 HOURS		29		
K	8/13/2010	WR377	0.85	8 HOURS		29		
Ent	8/13/2010	WR394	0.85	8 HOURS		28		
S	8/13/2010	RR224	0.85	8 HOURS		26		

Flow Meter Calibration: **(Copy of Annual Manufacturers Calibration Certificate Available Upojn Request)):**

Date	Flow Meter Number	Serial Number	Checked Box Indicates Flow Meter Used		
3/10/2009	AS001	**8778**	☐		
3/10/2009	AS002	**13859**	☒		
3/27/2009	AS003	**17485**	☐		
3/27/2009	AS004	**21457**	☐		
			☐		

FootNOTES: Date Next to Flow Meter Number Indicates last Manufacturer Calibration Date