`State of Oregon
Department of Environmental Quality Memorandum

Date: October 1, 2020

To: FILE

Through: Paul Seidel Cleanup Program Manager and Dan Hafley DEQ Lead Worker

From: Kenneth Thiessen, Hydrogeologist, DEQ Northwest Region

Subject: **Former Koppers Wood-Treating Site Wauna, Oregon**
Staff Memorandum supporting a Certificate of Completion for Perched Groundwater Remediation, ECSI # 649

This memorandum presents the basis for the Oregon Department of Environmental Quality's (DEQ's) recommended Certificate of Completion for perched groundwater remediation at the former Koppers wood-treating site in Wauna, Oregon. As discussed in this memo, following remediation work, contaminant concentrations in perched groundwater are below applicable DEQ Level II Ecological Screening Level Values (SLVs) at prescribed points of compliance (monitoring wells) located on the shoreline of the Columbia River. DEQ considers the Remedial Action Objectives to be complete for remediation of perched groundwater at the Site, as outlined in DEQ's 2009 Record of Decision.

This memo proposes that the site meets the requirements of Oregon Administrative Rules Chapter 340 Division 122, Sections 010 to 0140; and ORS 465.200 through 465.455 and that a Certificate of Completion is warranted. This memo is based on the administrative record for the Site, presented in Section 9 of this memorandum.

In 2010, DEQ issued a separate Certificate of Completion for remediation of soil, drainage ditch sediment, stormwater management, and institutional and engineering controls at the former Koppers site, located in Wauna, Oregon. This 2020 Certificate of Completion recommendation includes a continuation of the existing restrictions in the 2010 Easement and Equitable Servitudes.

1. REGULATORY HISTORY

This Koppers wood-treating site in Wauna, Oregon (Site) is regulated under the following key DEQ documents:

- Staff Report for Recommended Remedial Action Former Koppers Wood-Treating Site Wauna, Oregon ECSI #649. DEQ, Feb. 2009
- Record of Decision for Former Koppers Wood-Treating Site Wauna, Oregon ECSI #649. DEQ, April 2009
- Order on Consent LQVC– NWR-09-01, with attached Scope of Work. DEQ, July 2009.
- Easement and Equitable Servitudes, recorded at Clatsop County. DEQ, Feb. 5, 2010.

- Certificate of Completion for completed remedial actions for soil, drainage ditch sediment, stormwater management, institutional and engineering controls per Record of Decision requirements. DEQ, April 6, 2010.

2. BACKGROUND

Site location
- Address: 92326 Taylorsville Road, Wauna, Clatsop County, Oregon.
- Latitude 46.1626º North, longitude -123.4121º West
- NW¼ of the SW¼ of Section 22, Township 8N, Range 6W, USGS Cathlamet Quadrangle
- The nearly flat Site elevation is approximately 11 feet above mean sea level.

Site setting

The 25-acre Site occupies the western portion of the Georgia-Pacific LP Consumer Products (GP) mill at Wauna, Oregon (Figure 1, Vicinity Map). The Columbia River borders the Site to the north. It is bordered on the south by the Portland Western Railway and the former Crawford Creek Slough drainage ditch, to the west by now-vacant land and a flowing segment of Crawford Creek Slough, and to the east by the GP pulp and paper mill.

The Site remains as generally undeveloped industrial land to the west of large GP Mill complex and includes pavement capped areas (per deed restriction) truck/trailer storage and GP materials storage areas (Figure 2, Site Layout, former Koppers Facility).

Locality of Facility

As stated in the 2002 Remedial Investigation Report, based on the site hydrogeologic model, the nature and extent of the contamination, the Contaminant of Interest (COI) migration pathways, and the potential human and environmental exposure pathways, the Locality of Facility (LOF) for the former Koppers wood-treating site includes the following:

- Surface soils and subsurface soils containing Contaminants of Potential Concern (COPC) outside the deed-restricted paved area at the site,
- Perched water-bearing zone beneath the former Koppers site, bounded to the south by the Crawford Creek slough and drainage ditch, to the north by the Columbia River, to the west by of the former treatment area by monitoring wells PMW-4 and PMW-07R, and to the east by monitoring well PMW-12 (within the GP mill complex),
- Sediment in the slough adjacent to the former treatment area, Groundwater seeps along the Columbia River adjacent to the site,
- The shall water-bearing zone beneath the former Koppers site,
- Sediment in the lower portion of the Crawford Creek Slough.

In 2020, following completion of interim remedial measures, the formerly complete contaminant exposure pathways, as described in this 2002 LOF description, have been closed.

Geology

The 2002 Remedial Investigation Report (RI) determined that the Site is underlain by 3 to 10 feet

of well-graded to poorly-graded sand representing fill material, with lenses of gravel and woody debris. The woody debris is discontinuous and occurs primarily towards the base of the fill unit. Underlying the sandy fill unit is a continuous silt layer ranging from greater than 3 feet to 14 feet thick. Underlying the silt layer, there are several thin, alternating layers of clayey silt, silty clay, and sandy silt extending downward to 30 feet below ground surface (bgs), the maximum depth of exploration during the RI.

Hydrogeology

There are two water-bearing zones beneath the site separated by a continuous, silt aquitard (See Figures 5, 6, 7, Location of Hydrogeologic Cross Sections, Cross Section A-A', Cross Section B-B'). The upper, perched, water-bearing zone is in a sandy fill unit. The lower, shallow, water-bearing zone is composed of layers of silt and sand extending to the maximum depth explored of 30 feet bgs. The silt aquitard separating the water-bearing zones has a very low hydraulic conductivity as compared to the upper, perched water-bearing zone. The silt aquitard is up to 14 feet thick.

The upper, perched water-bearing zone is recharged primarily by rainfall infiltration and discharges to the Columbia River. The Columbia River can locally recharge shoreline areas of the upper, perched water-bearing zone during high river stages.

A groundwater cut-off wall, installed in 2004, redirects perched groundwater, utilizing a funnel-and-gate type system, through a groundwater aeration trench prior to eventual discharge to the Columbia River via bank seepage and underflow recharge (Figure 3, Site Layout). The groundwater cut-off wall increases the horizontal flow path length between the contamination source area and areas of Columbia River discharge. Prior to the installation of a groundwater cut-off wall, the direction of perched groundwater flow was to the north and northwest toward the Columbia River. The direction of groundwater flow in the shallow water-bearing zone is also northward towards the Columbia River.

Groundwater studies performed during the Remedial Investigation determined that there is not a vertical gradient or significant hydraulic connection between the two water-bearing zones and that contaminants present in the upper, perched water-bearing zone have not significantly affected the lower water-bearing zone.

Hydrology

The Columbia River borders the north side of the Site. Water levels in the Columbia River fluctuate seasonally in response to upstream releases from dams and diurnal tidal fluctuations. Based on the sediment investigation conducted as part of the RI, the riverbank descends steeply from the uplands at an elevation of +10 feet National Geodetic Vertical Datum (NGVD) to the Columbia River navigation channel at -40 to -50 feet NGVD (Anchor Environmental, 2004). The upper portion of the riverbank is protected by riprap to a depth of -10 to -20 feet NGVD. The riverbank and river bed are affected by strong currents as evidenced by large sand waves and coarse bottom material (sand and gravel) on the river bed.

A drainage ditch formerly bordered the Site to the south (Figure 3, Site Layout). At the end of the drainage ditch was a small dam that formerly separated the ditch from the Crawford Creek Slough. The drainage ditch and dam were constructed before the early 1960s to help drain the property. Site remediation work resulted in filling the drainage ditch and piping stormwater from

the area to the GP Mill stormwater treatment plant. Water level elevations within the Crawford Creek Slough vary in response to Columbia River stage.

In 2006, the GP mill constructed a new paper machine within the storm water basin drained by the ditch. To ensure proper control over storm water from the new paper machine area, the mill routed storm water from this drainage basin to its central wastewater treatment system. This was accomplished by installing a pump station to transfer storm water to Frasier Lake (a reservoir south of the Site) for temporary storage prior to treatment. The pumping reverses the flow direction in the drainage ditch. This change eliminated the discharge of mill runoff from the ditch to Crawford Creek Slough. During the fall of 2006, storm events caused the water level in Crawford Creek Slough to rise enough to overtop the dam and flow into the ditch. The additional flow increased the amount of water that was pumped to Frasier Lake and put an unnecessary load on the entire storm water system. To prevent recurrence of such loads, the mill raised the level of the dam less than one foot in November 2006.

The RI determined that the degree of hydraulic connection between the upper, perched water-bearing zone and the slough/former drainage ditch is minimal. The minimal hydraulic connection is likely due to the presence of silt underlying the slough and the surcharged soil compaction by the railroad that runs along the north side of the slough.

Site environmental history

Wood-preserving operations were conducted at the Site between 1936 and 1966. The wood treating operators were the American Lumber and Timber Treating Company (1936-1954) and Koppers Company, Inc. (1954-1966). Primary features of the former wood treating operation included retorts, storage tanks, an unloading shed, treated wood storage area, incisor building and loading shed located in the eastern portion of the Site; a wigwam burner located near the western portion of the Site; and a creosote storage tank located south of Crawford Creek Slough. Figure 2 is an aerial photograph of the site from February 1961, showing the location of historical wood-treating operations.

As illustrated in the Site Layout, Figure 3, the eastern portion of the Site is now mostly paved except for a small area northeast of the deed-restricted area. The remainder of the Site is unpaved and covered with compacted gravel. Since 1966, the Site has been used for vehicle and equipment storage for the adjacent GP mill.

Four wood-preservatives were historically used at the Site: Wolman salts (fluorochromuim-arsenic phenol), chromium copper arsenate, creosote and centachlorophenol. No large spills or releases of wood preservatives are documented at this Site. The wood-treating constituents found at the Site are reportedly from drips and splashes during normal daily operations, or incidental releases from storage tanks and piping, or from handling and drying of freshly treated wood.

The RI states that released creosote originating in the former process area moved downward through soils to the aquitard and then moved laterally toward the Columbia River where it was observed emerging in seeps at the riverbank. The contaminated seeps were concentrated within a fifty-foot section of shoreline. In 2004, a groundwater cutoff wall was installed to stop the subsurface transport of creosote to the Columbia River.

Contaminants of Concern (COCs) dissolved in perched zone groundwater are derived primarily from creosote constituents and its carrier oil. Once dissolved in groundwater, the COC migration is primarily controlled by horizontal hydraulic gradients, the retardation coefficient of the constituent, the hydraulic conductivity, and the porosity of the water-bearing zone sand and fill material. Site data shows that ethylbenzene and tetrachloroethene tended to migrate further in perched groundwater than creosote.

Where present outside the former wood treating process area, COCs appear to be mainly adsorbed onto unsaturated soils above the perched water-bearing zone. These areas have been remediated through excavation, capping and institutional controls.

In 1988, an asphalt cap was installed over the former process area (including where the treated wood storage area and unloading shed were located) under an agreement between DEQ and Crown Zellerbach, to reduce the potential for exposure to constituents in soil. The remedial action also included a deed restriction, to prevent the removal or penetration of the asphalt cap or alteration of surface drainage on the restricted area. Construction of borings or pilings through the cap is not allowed. The deed restriction was put into place in 2010 using an Easement and Equitable Servitudes recorded with Clatsop County.

With successful completion of sediment and soil cleanup, DEQ provided a Certificate of Completion for these aspects of site cleanup on April 6, 2010.

Groundwater monitoring at the Site has been performed regularly since 2005. Two points of compliance were designated: the western point of compliance (monitoring wells ATT-12 and PMW-7R) and the eastern point of compliance (monitoring well SBW-08) as illustrated on figure 4, Groundwater Elevations. Groundwater monitoring was also been conducted in upland areas within the footprint of the former wood treating operations. Groundwater data are also available for comparison of water quality upgradient and down-gradient of the aeration trench in the data package included as Appendix A.

Improvements in groundwater quality enabled termination of active aeration treatment in the southern 50% of the trench in February 2011 (aeration treatment zones 7 through 11). Subsequent groundwater monitoring documented the effectiveness of monitored natural attenuation (MNA) in the southern part of the western exterior area, along the southern groundwater flow path extending from the southern part of the trench to the Columbia River from ATT-02 to ATT-12. This accomplishment became the basis for a model-based evaluation of whether aeration treatment could also cease in the northern part of the trench, allowing the western exterior area to fully transition to MNA.

In May 2016, the DEQ approved the transition to MNA for the northern flow path. Aeration treatment in the northern part of the trench (aeration zones 1 through 6) ceased in June 2016. Subsequent semi-annual groundwater monitoring through April 2019 demonstrated that MNA was protective of the Columbia River. On this basis, the DEQ requested (letter dated July 26, 2018) that GP and Beazer provide an evaluation of whether continued groundwater monitoring is necessary and if MNA is adequate to be considered a final site remedy for perched groundwater.

To determine if groundwater quality in the perched water-bearing zone compliance wells has met project remediation goals through natural attenuation at the western and eastern points of compliance on the bank of the Columbia River, three criteria were met:

1. Determine if sufficient time has elapsed since induced aeration treatment of perched groundwater ended to allow for untreated groundwater to migrate from upland areas to the western points of compliance monitoring wells ATT-12 and PMW-7R.

   Calculated groundwater travel times indicate that untreated groundwater (without induced aeration), is now present at western points of compliance.
   - The time for groundwater following a flow path from the southern aeration trench to reach the western points of compliance is calculated to be 2.5 years. Induced aeration of the southern portion of the aeration trench was shut off in 2011.
   - The time for groundwater following a flow path from the northern aeration trench to reach the western points of compliance is calculated to be 1 year. Induced aeration of the northern portion of the aeration trench was shut off in 2016.

2. Groundwater monitoring data for 2016 to 2020 have been evaluated to see if recent upland groundwater quality is consistent with contaminant concentrations evaluated for the March 2016 Monitored Natural Attenuation Evaluation. Recent groundwater quality data were found to be comparable to the pre-2016 data used for the Monitored Natural Attenuation Evaluation, corroborating the findings of the 2016 document that natural attenuation is occurring at the site.

3. Determine from analytical testing of groundwater at western compliance wells ATT-12 and PMW-7R, if natural attenuation is sufficient as a final remedy. Determine from analytical testing of groundwater at eastern compliance well SBW-08, if natural attenuation is sufficient as a final remedy.

   Analytical lab data indicate that groundwater quality at western and eastern riverbank points of compliance meets DEQ Level II ecological SLVs. Analytical laboratory data support that natural attenuation alone is sufficient as a final remedy for perched groundwater at this site. Tabulated groundwater quality lab data and groundwater quality data trend graphs are attached to this Memo as Appendix A.

Nature and Extent of Contaminants in Site Groundwater

From the RI, the contaminants of potential concern (COPC) at the Site include high molecular weight polycyclic aromatic hydrocarbons (HPACs), naphthalene, total petroleum hydrocarbon (TPH), volatile organic compounds (VOCs), dioxin/furans, and metals. Creosote and TPH are typically coincident at the Site.

Perched zone groundwater contains COPCs that originated in the former process area and former treated-wood storage area. The COPCs have migrated north toward the Columbia River. COPCs in perched zone groundwater are ethylbenzene, PAHs, pentachlorophenol, arsenic, and

chromium. Creosote product has historically flowed northward along the sandy water-bearing zone/aquitard contact to the Columbia River in two narrow flow paths.

Low concentrations of COPCs have been detected in the deeper, shallow groundwater zone at concentrations not requiring remediation.

Remedial Action Objectives
In the 2009 Record of Decision, DEQ stated the following objectives:

- *Human Health – The HHRA did not identify a potentially unacceptable risk associated with potential human exposure to shallow groundwater.*
- *Ecological – Reduce exposure to VOCs, SVOCs, and metals that could seep into the Columbia River at concentrations that could result in significant adverse effects on beneficial uses of water in the LOF.*
- *Migration – Control migration of VOCs, SVOCs, and metals to the Columbia River at concentrations that could result in significant adverse effects on beneficial uses of water in the LOF.*
- *Hot Spots of Contamination – Treat hot spots of contamination to non-hot spot levels by reducing their concentration, volume, or mobility.*

Based on DEQ Guidance for Identification of Hot Spots (April 23, 1998), groundwater at the Koppers site was originally found to be a highly mobile hot spot as contaminant concentrations exceeded Federal Ambient Water Quality Criteria or DEQ Level II Ecological Screening Level Values (SLVs), thereby potentially adversely affecting the key beneficial use of groundwater: recharge to the Columbia River. Thus, DEQ Level II Ecological SLVs are adopted for remediation of perched groundwater at this Site. Section 4 of this Memo lists the SLVs. Section 5 of this Memo discusses interim remedial measures implemented at the Site.

The 2009 Record of Decision did not provide site-specific numerical cleanup standards for COPCs in perched groundwater at the Site.

3. BENEFICIAL LAND AND WATER USE DETERMINATIONS

Land Use Zoning
The base land use zoning of the 25-acre Locality of Facility (LOF) and the GP mill complex is heavy industrial. Land use restrictions prescribed in the 2010 Easement and Equitable Servitudes for the Site prohibit residential use of any type and prohibit agricultural food crop use of any type.

Groundwater use
The beneficial use of perched ground water in the LOF is flow to the Columbia River as bank seepage and underflow recharge. Accordingly, groundwater contaminants within the perched water zone were screened against Ambient Water Quality Criteria and DEQ Level II ecological screening level values (SLVs) to protect aquatic life in the Columbia River.

The 2010 Easement and Equitable Servitudes document prohibits groundwater use from the Site for consumption or other beneficial use as long as hazardous substance concentrations in groundwater exceed the acceptable risk level for such use. This prohibition does not apply to extraction of groundwater for remediation or sampling purposes.

Surface water management
All stormwater from the Site is collected and sent to the GP stormwater treatment system, located to the east of the GP mill complex. Treated wastewater is released to the Columbia River under an NPDES 1200Z permit. See Hydrology Section above.

4. INVESTIGATION AND CLEANUP WORK

Perched Groundwater
Sampling of perched groundwater and riverbank seeps conducted during the RI identified the presence of organic and inorganic compounds associated with former wood treating operations. Constituents that could result in significant adverse effects on beneficial uses of water, based on a comparison of sampling results against DEQ Level II surface water SLVs, included ethylbenzene, semi-volatile organic compounds, including several PAHs, diesel- and oil-range petroleum hydrocarbons, and metals (arsenic, chromium and copper).

Prior to 2004, perched groundwater containing wood-treating chemical constituents was observed emerging as seeps along an approximately 250 foot stretch of the Columbia River bank. This perched groundwater historically flowed unimpeded to the Columbia River. Riverbank seeps historically discharging creosote were limited to a 50 foot stretch of riverbank.

The Interim Remedial Measure (discussed in Section 5 below) is designed to redirect flow of site contaminants in perched groundwater to the Columbia River containing the following Contaminants of Concern (COCs). The COC and DEQ Level II Ecological SLVs are as follows:

- Ethylbenzene, SLV = 7.3 micrograms per liter (µg/L)
- 2-Methyphenol, SLV =13 µg/L
- Benzoic Acid, SLV = 42 µg/L
- Napthalene, SLV = 620 µg/L
- Dibenzofuran, SLV = 3.7 µg/L
- Fluorene, SLV = 3.9 µg/L
- Pentachlorophenol, SLV = 15 µg/L
- Phenanthrene, SLV = 6.3 µg/L
- Fluoranthene, SLV = 6.16 µg/L
- BEHP, SLV = 3 µg/L

5. INTERIM REMEDIAL ACTIONS

In 2004, an Interim Remedial Measure (IRM) was implemented to address seepage of impacted, perched groundwater to the Columbia River through the installation of a "funnel and gate" subsurface barrier wall and aeration treatment trench.

The components of the "funnel and gate" IRM are as follows:

- A low-permeability, 2,330 foot-long, subsurface barrier to prevent direct flow of COCs in perched groundwater to the Columbia River and to redirect groundwater flow through an aeration treatment zone;
- A gate consisting of an aeration treatment trench providing a below-grade aerated treatment zone to promote biological activity, oxygenation and degrade organic constituents present in groundwater as it passes through the gate;
- Engineering controls (grading, paving, stormwater drainage and Site management) to reduce surface water infiltration within the confines of the subsurface barrier; and
- Groundwater monitoring wells to verify IRM performance.

The subsurface barrier wall, running from the former wood treatment process area in the southeast to the western-most seepage point along the Columbia River, redirects contaminated groundwater to the aeration treatment trench, which is installed perpendicular to the Columbia River shoreline (See Site Layout, Figure 3). The subsurface barrier wall and aeration treatment trench were installed in late 2004 and early 2005; final grading and planting of the vegetative cover occurred in late 2005. A number of additional monitoring wells were installed as part the IRM, including wells placed on either side of the subsurface barrier wall to monitor its effectiveness and wells placed upgradient, in and downgradient of the aeration treatment trench to monitor the effectiveness of both IRM components.

Water level monitoring indicates that the subsurface barrier has caused a shift in groundwater flow directions in perched groundwater. Groundwater now flows to the west toward the aeration treatment trench and then flows to the northwest toward the Columbia River (See Groundwater Elevations, Figure 4). A small percentage of perched groundwater flows around the southeast end of the barrier wall.

Perched groundwater on the Columbia River side of the IRM is evaluated using three monitoring wells. The last exceedance of a SLV from a monitoring well outside of the IRM was in 2005.

Monitoring results have shown that near the former process area source zone perched groundwater COC concentrations have been relatively constant or decreasing since the IRM was implemented. The aeration treatment trench, enhanced with air injection, operated from 2005 through 2011. Beginning in February 2011, air injection was shut off on the southern half of the trench to evaluate natural attenuation. Beginning on June 13, 2016, air injection was shut off on the northern half of the trench to evaluate natural attenuation.

Constituent concentrations in groundwater in the area downgradient from the IRM, between the aeration treatment trench and the Columbia River, have generally been below SLVs since 2007. Residual contaminants in groundwater from the source area have been found to attenuate to

below SLVs before groundwater discharges to the Columbia River.

6. COMPLETED REMEDIAL ACTIONS

The completed remedial actions listed below address the presence of COC wood-treating chemicals in contaminated soil, sediment, and perched groundwater at the Site. Each of these actions has had a beneficial effect on perched groundwater. The remedial actions are:

- Hydraulic containment of perched groundwater;
- Contaminant degradation in perched groundwater using in-situ aeration treatment of groundwater via funnel-and-gate induced groundwater flow pattern;
- In-situ soil treatment;
- Excavation and off-site disposal of contaminated soil;
- Engineering controls including filling, asphalt capping, and gravel surfacing of affected areas;
- Institutional controls including deed restrictions prohibiting use of groundwater and maintenance of protective caps;
- Groundwater Monitoring;
- Demonstrated Monitored Natural Attenuation of perched groundwater.

In aggregate, the completed remedial actions have allowed DEQ to make a determination that that perched groundwater meets Record of Decision requirements (Ambient Water Quality Criteria or DEQ Level II SLVs prescribed at top-of-riverbank points of compliance.

7. RISK EVALUATION

Key risk assessment documents prepared for the former Koppers Wood Treating Site in Wauna, Oregon include:

- *Human Health Risk Assessment.* AMEC Earth and Environmental, March 2005.
- Level II B *Ecological Risk Assessment.* Windward Environmental, August 13, 2007.
- *Residual risk calculations for the former Koppers wood-treating site per proposed soil remedial action.* AMEC June 5, 2009.

Human Health Risk Assessment
The 2005 Human Health Risk Assessment was completed prior to extensive 2005 and 2006 site remediation work using analytical data collected from 1985 to 2003. The Residual Human Health Risk Assessment (HHRA) was prepared in June 2009 following completion of upland site remediation work. These works concluded that following site remediation, there was no unacceptable risk to future site occupational workers from site soils. Perched groundwater was not considered in the 2005 or 2009 human health risk assessment work as a deed restriction prohibited use of site groundwater for beneficial human use.

The Human Health Conceptual Site Model (CSM) for the site is presented as a Figure 8. The complete exposure pathways indicated on the CSM were evaluated in the human health risk assessment.

The HHRA, approved by DEQ, found no unacceptable potential non-carcinogenic risks to current or future outdoor workers or to future indoor workers at the Site from perched groundwater. Potential excess lifetime cancer risks for the potential future indoor worker do not exceed any DEQ risk benchmarks.

Ecological Risk Assessment
The 2007 Level II Ecological Risk Assessment was performed for inclusion in the Remedial Investigation for the former Koppers Wood Treating Site and built on a Level I Scoping Ecological Risk Assessment. The findings of the Ecological Risk Assessment, in part, encouraged the property owners to undertake extensive removal and remedial actions at the Site.

The Preliminary Ecological Risk CSM for the site is presented as Figure 9. The complete exposure pathways indicated on the CSM were evaluated in the 2007 Ecological Risk Assessment. Upland remediation work, focused on areas of identified unacceptable ecological risk, were successfully completed and reevaluated in the 2009 residual risk calculations. The 2009 document determined that the final soil removal actions for the upland Site resulted in no unacceptable ecological risk.

Perched groundwater emerging as riverbank seeps was determined by DEQ to be an incomplete contaminant pathway and not applicable to the ecological risk assessment. Further, the ecological risk assessment did not consider that perched groundwater emerges into fluvial sediment and the water column as underflow water. Groundwater quality from upland monitoring wells triggered use of Ambient Water Quality Criteria and DEQ Level II SLVs to determine hot spots requiring the extensive IRM cleanup remedy.

Hot Spots
Based on DEQ Guidance for Identification of Hot Spots (April 23, 1998), groundwater at the Koppers site was originally found to contain contaminant concentrations above federal Ambient Water Quality Criteria or DEQ Level II SLVs, thereby potentially adversely affecting the key beneficial use of groundwater: recharge to the Columbia River. This Mobile Hot Spot determination necessitated a site-wide groundwater remediation plan to stop COCs in upland groundwater from entering the Columbia River via bank seepage and underflow recharge. The IRMs for this Site are discussed in Section 5.

This Mobile Groundwater Hot Spot was addressed through the IRM, and has effectively eliminated adverse affects to the Columbia River. DEQ proposes that the various groundwater remedial measures made in the IRM are adequately protective of the Columbia River.

8. RECOMMENDATIONS

DEQ considers the Remedial Action Objectives for remediation of perched groundwater at the Site to have been met. This is evidenced by a record of groundwater quality consistently meeting DEQ Level II Screening Level Values at top-of-bank compliance wells.

The 2010 Easement and Equitable Servitudes for the Site specifies annual site inspection and reporting on performance of the upland remedy. These upland site inspections will continue.

Upon review of any public comments received during the month of October 2020, DEQ will prepare a Certificate of Completion for the successful remediation of perched groundwater at the Site. Success is indicated by perched groundwater at established top of bank compliance wells consistently meeting DEQ Level II Screening Level Values. Upon approval of project closure documents, a Certificate of Completion for perched groundwater will be recorded in DEQ's ECSI database (ECSI # 649).

The Certificate of Completion will be attached to the Consent Order LQVC-NWR-09-01 and Record of Decision until time DEQ withdraws these agreements. Land use restrictions prescribed in the 2010 Easement and Equitable Servitudes for the Site prohibit beneficial groundwater withdrawal and use, residential use of any type, and prohibit agricultural food crop use of any type. These restrictions include both perched and shallow water-bearing zones groundwater and will remain in effect unless otherwise specified by DEQ.

9. ADMINISTRATIVE RECORD (Chronological Order)

CH2M Hill. Remedial Investigation Report, Former Koppers Wood-Treating Site, May 2002.

CH2MHILL, Supplemental Remedial Investigation Report, Former Koppers Wood-Treating Site, Wauna, Oregon, October 2003

Geomatrix. Groundwater Seeps Interim Remedial Measure Alternatives Evaluation, Former Koppers Facility, Wauna, Oregon, prepared for Beazer East, Inc. and Georgia Pacific Corporation, July 31, 2003.

Geomatrix. Conceptual Design Report, Groundwater Seeps Interim Remedial Measure, Former Koppers Facility, Wauna, Oregon, prepared for Beazer East, Inc. and Georgia Pacific Corporation, November 2003.

Geomatrix. Groundwater Seeps Interim Remedial Measure Design Report, Former Koppers Site, Wauna, Oregon, prepared for Beazer East, Inc. and Georgia Pacific Corporation, April 23, 2004.

Geomatrix. Revised Groundwater Seeps Interim Remedial Measure Design Report, Former Koppers Site, Wauna, Oregon, prepared for Beazer East, Inc. and Georgia Pacific Corporation, July 26, 2004.

Anchor Environmental. Columbia River Phase I Sediment Investigation, Former Koppers Wood-Treating Site, Wauna, Oregon, November 2, 2004.

AMEC Earth and Environmental, Inc. Human Health Risk Assessment, Former Koppers Wood Treating Site, Wauna, Oregon, March 2005.

Anchor Environmental. Phase 2 Sediment Investigation Report, Former Koppers Wood-Treating Site, Wauna, Oregon, July 2005.

Geomatrix. Groundwater Seeps Interim Remedial Measure Revised Construction Report, Former Koppers Site, Wauna, Oregon, June 2006.

Windward Environmental, LLC. Ecological Risk Assessment: Former Koppers Wood-Treating Site, August 13, 2007.

Geomatrix. Semiannual Monitoring Report, Groundwater Seeps Interim Remedial Measure, Former Koppers Facility, Wauna, Oregon, October 2007.

AMEC Earth and Environmental, Inc. Human Health Risk Assessment Addendum, Columbia River Shoreline, December 2007.

Geomatrix. Semiannual Monitoring Report, Groundwater Seeps Interim Remedial Measure, Former Koppers Facility, Wauna, Oregon, June 2008.

Bridgewater Group, Inc. (Bridgewater), Feasibility Study, Former Koppers Wood-Treating Site, Wauna, Oregon, February 2009

AMEC Geomatrix, Inc., Monitored Natural Attenuation Demonstration Work Plan, Former Koppers Wood Treating Facility, Wauna, Oregon, January 2010

AMEC Environment & Infrastructure, Inc., Monitored Natural Attenuation Interim Evaluation, Former Koppers Facility, Wauna, Oregon: Prepared for Beazer East, Inc., Pittsburg, Pennsylvania, December 2012

Amec Foster Wheeler, 2014 Annual Operations, Maintenance, and Monitoring Report, Final Site Remedy, Former Koppers Wood Treating Facility, Wauna, Oregon, March 2015

Amec Foster Wheeler Environment & Infrastructure, Inc., 2015 Annual Operations, Maintenance, and Monitoring Report, Final Site Remedy, Former Koppers Wood Treating Facility, Wauna, Oregon, March 2016

Amec Foster Wheeler, Final Report: Monitored Natural Attenuation Demonstration, Former Koppers Facility, Wauna, Oregon. March 2016

Wood Environmental and Infrastructure, Request for Discontinuation of Groundwater monitoring, Former Koppers Wood-Treating Facility, Wauna, Oregon. December 2, 2019

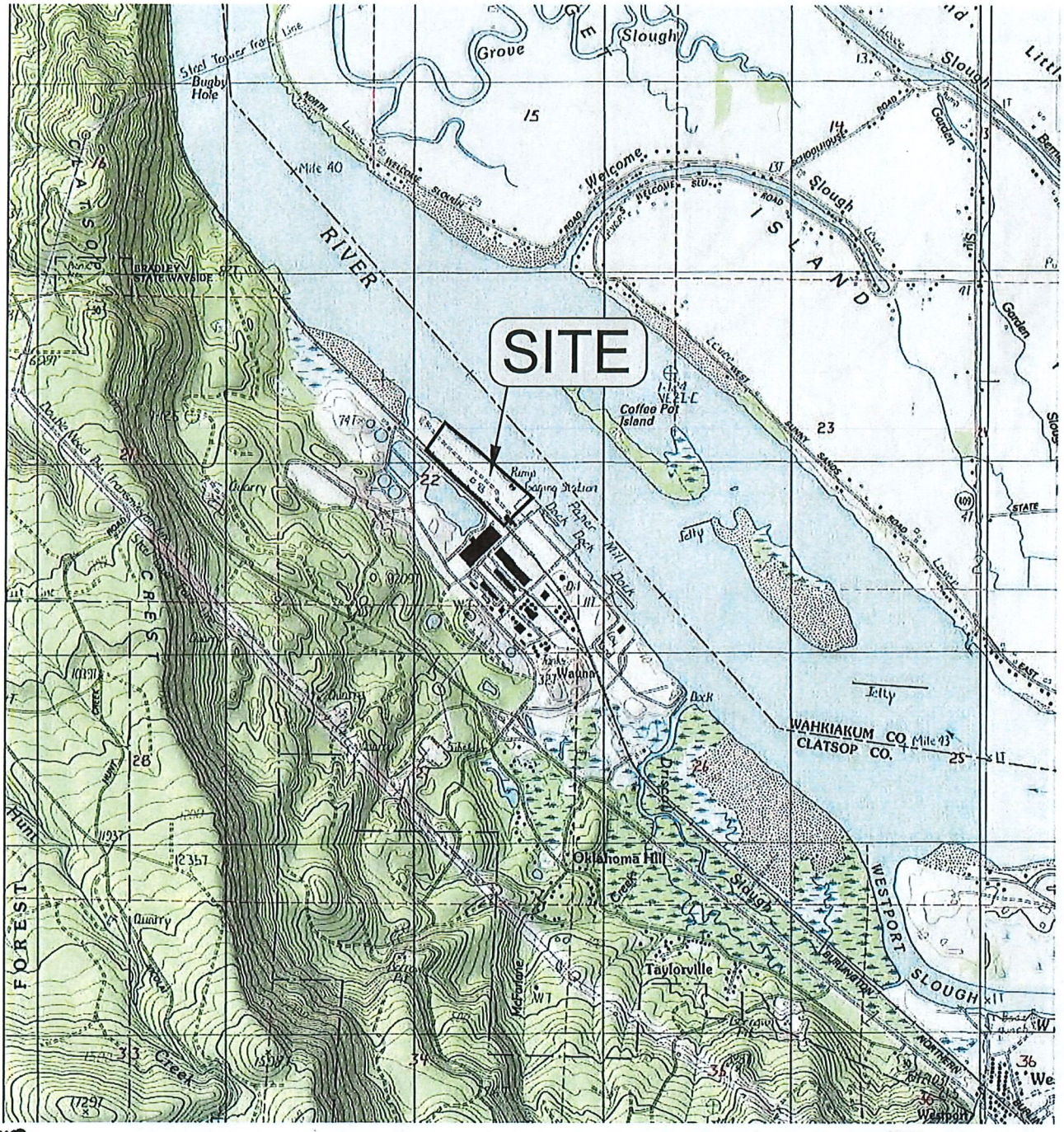
Wood Environmental and Infrastructure, Revised Request for Discontinuation of Groundwater monitoring, Former Koppers Wood-Treating Facility, Wauna, Oregon. March 9, 2020

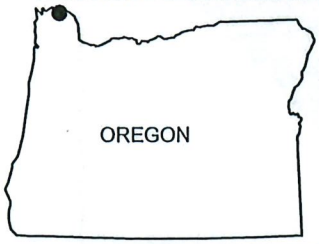
10. ATTACHMENTS

Figures

Figure 1, Former Koppers Facility Wauna, Oregon Vicinity map
Figure 2, Location of Historical Operations, annotated aerial photograph, February 1, 1961
Figure 3, Former Koppers Facility Wauna, Oregon Site Layout
Figure 4, Groundwater elevations April 19, 2019 Former Koppers Facility Wauna, Oregon
Figure 5, Former Koppers Site Wauna, Oregon Location of Hydrogeologic Cross-Sections
Figure 6, Former Koppers Site North-South Schematic Hydrogeologic Cross Section A-A'
Figure 7, Former Koppers Site North-South Schematic Hydrogeologic Cross Section B-B'
Figure 8, Human Health Risk Assessment Conceptual Site Model (CSM)
Figure 9, Ecological Risk Assessment Conceptual Site Model (CSM)

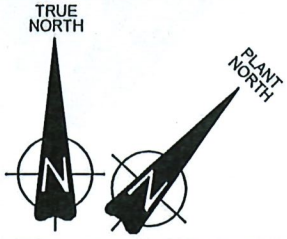
Appendix A Tabulated Groundwater Quality Lab Data and Groundwater Quality Data Trend Graphs





0' 500' 1,000' 1,500'

1" = 1,000'

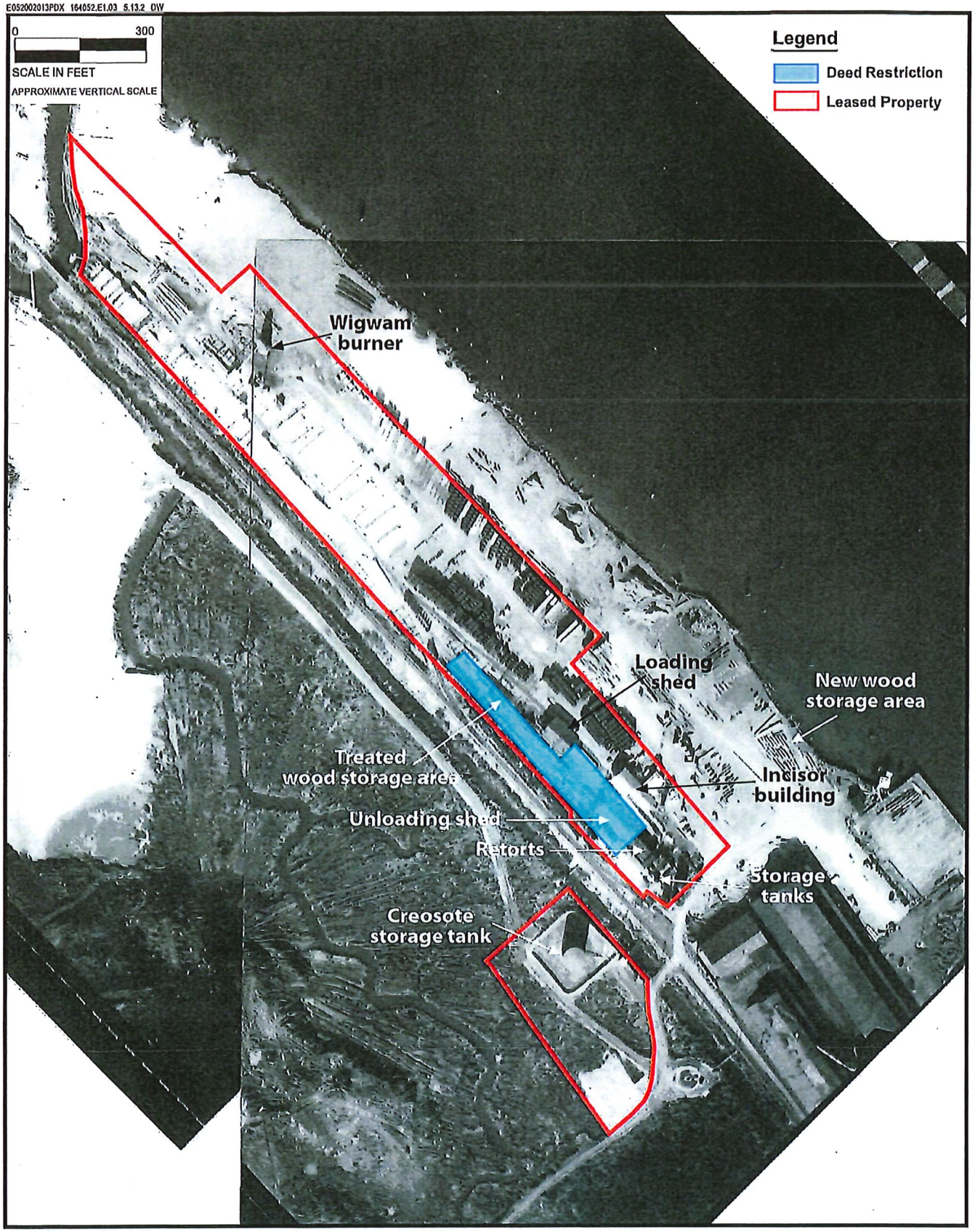


BEAZER EAST, INC. & GEORGIA-PACIFIC CONSUMER PRODUCTS LP	wood.	FORMER KOPPERS FACILITY WAUNA, OREGON	DATE MARCH 2019
			SCALE 1" = 1,000'
Wood Environment & Infrastructure Solutions, Inc. 7376 S.W. Durham Road Portland, OR 97224		SITE LOCATION MAP	PROJECT NO. 6-61M-13236
			FIGURE 1

DRAWN BY: PM CHECKED BY: MR

K:\13000\13200\13236\DWG_2018_Annual_Report\1 - Site Location_032719.dwg - 1 - Mar. 27, 2019 9:50am - brian.johnson

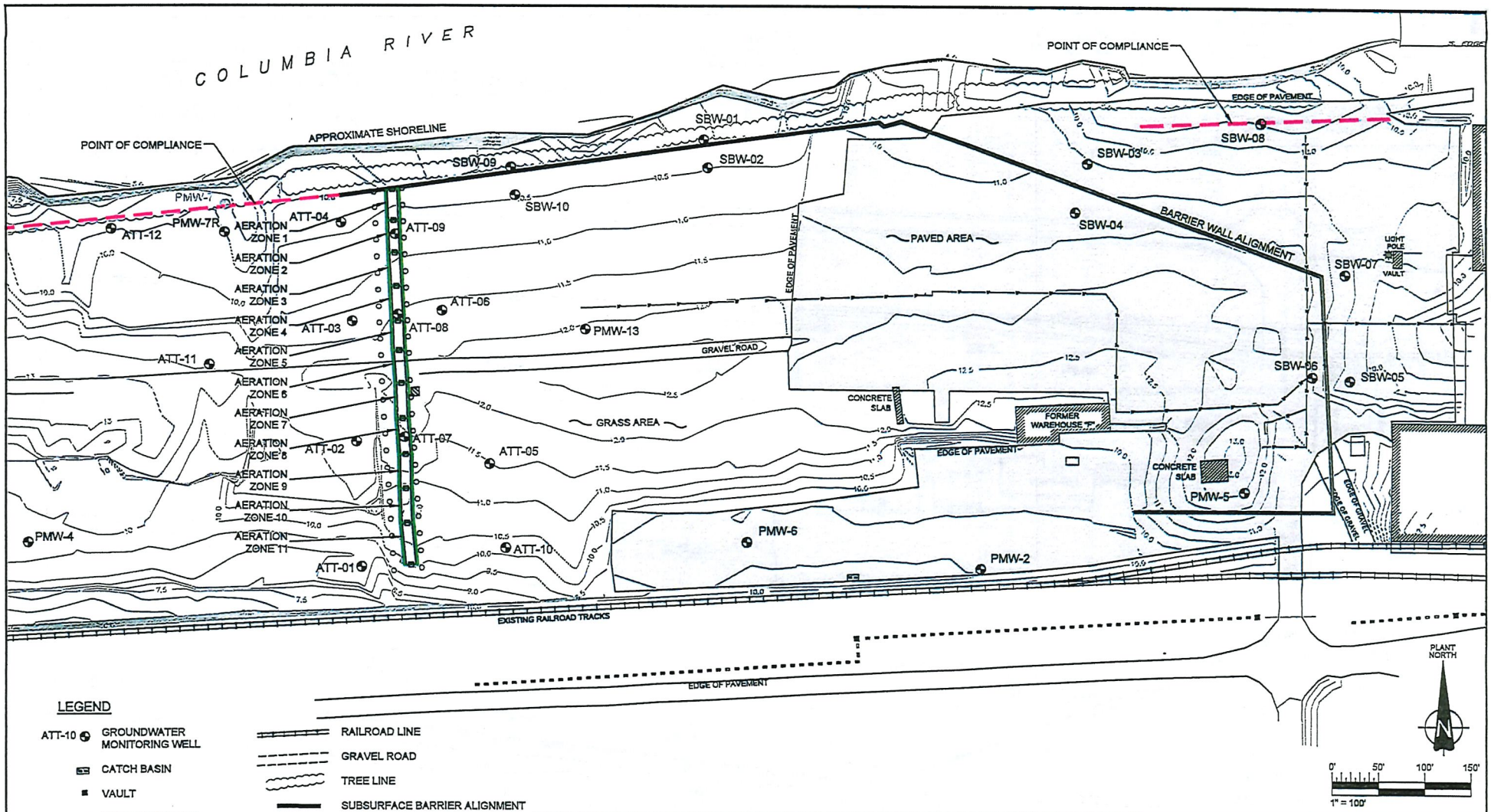
E052002013PDX 164052.E1.03 5.13.2 DW



NORTH

Figure 2
Location of Historical Operations (2/1/61)
FORMER KOPPERS WOOD-TREATING SITE
WAUNA, OREGON

CH2MHILL



LEGEND

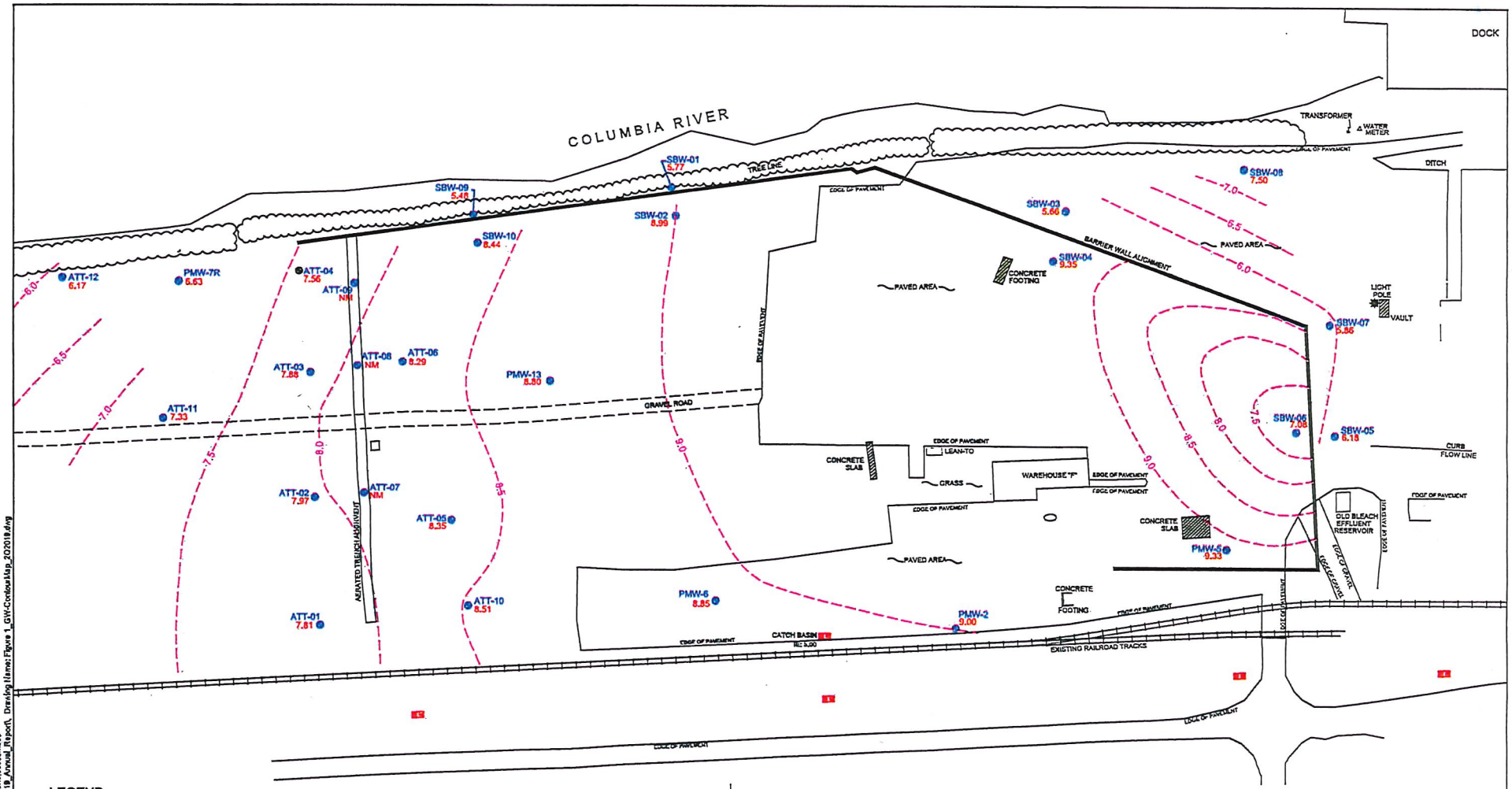
- ATT-10 GROUNDWATER MONITORING WELL
- CATCH BASIN
- VAULT
- ECOLOGY BLOCKS
- 10.5 TOPOGRAPHIC CONTOUR
- LIMITS OF PAVEMENT
- BUILDING
- RAILROAD LINE
- GRAVEL ROAD
- TREE LINE
- SUBSURFACE BARRIER ALIGNMENT
- AERATED TREATMENT TRENCH AND AERATION SYSTEM VALVE BOX
- AERATION SYSTEM ENCLOSURE
- BOLLARD

NOTE: PMW-7 ABANDONED AND REPLACED WITH PMW-7R IN MAY, 2015.

BEAZER EAST, INC. & GEORGIA-PACIFIC CONSUMER PRODUCTS LP	wood.	FORMER KOPPERS FACILITY WAUNA, OREGON	DATE MARCH 2019
			SCALE 1" = 100'
Wood Environment & Infrastructure Solutions, Inc. 7376 S.W. Durham Road Portland, OR 97224		SITE LAYOUT	PROJECT NO. 6-61M-13236
			FIGURE 3

BAUVIER PM DITCFCD BY LVR

K:\13000\13200\13236\DWG_2018_Annual_Report\2 - Wauna_SiteLayout_032718.dwg - 2 - Mar. 27, 2018 9:53am - brian.johnson



LEGEND:

ATT-10 7.28 — Groundwater Monitoring Well with Groundwater Elevation (Feet)

7.0 — Groundwater Elevation Contour (In Feet Above Mean Sea Level) (Dashed Where Approximate)

NM — Groundwater elevations were not measured for wells completed in active aeration trench wells that were inaccessible/buried, or because the groundwater elevation exceeded the top of casing elevation.

NOTES:

1. Contour Interval = 0.5 (feet)
2. Vertical Datum is based on NGVD 29
3. No contours were drawn along the river north of the barrier wall due to insufficient data.

N

PLANT NORTH

0 50 100

APPROXIMATE SCALE IN FEET

PLANT NORTH IS ROTATED 45° CLOCKWISE FROM TRUE NORTH

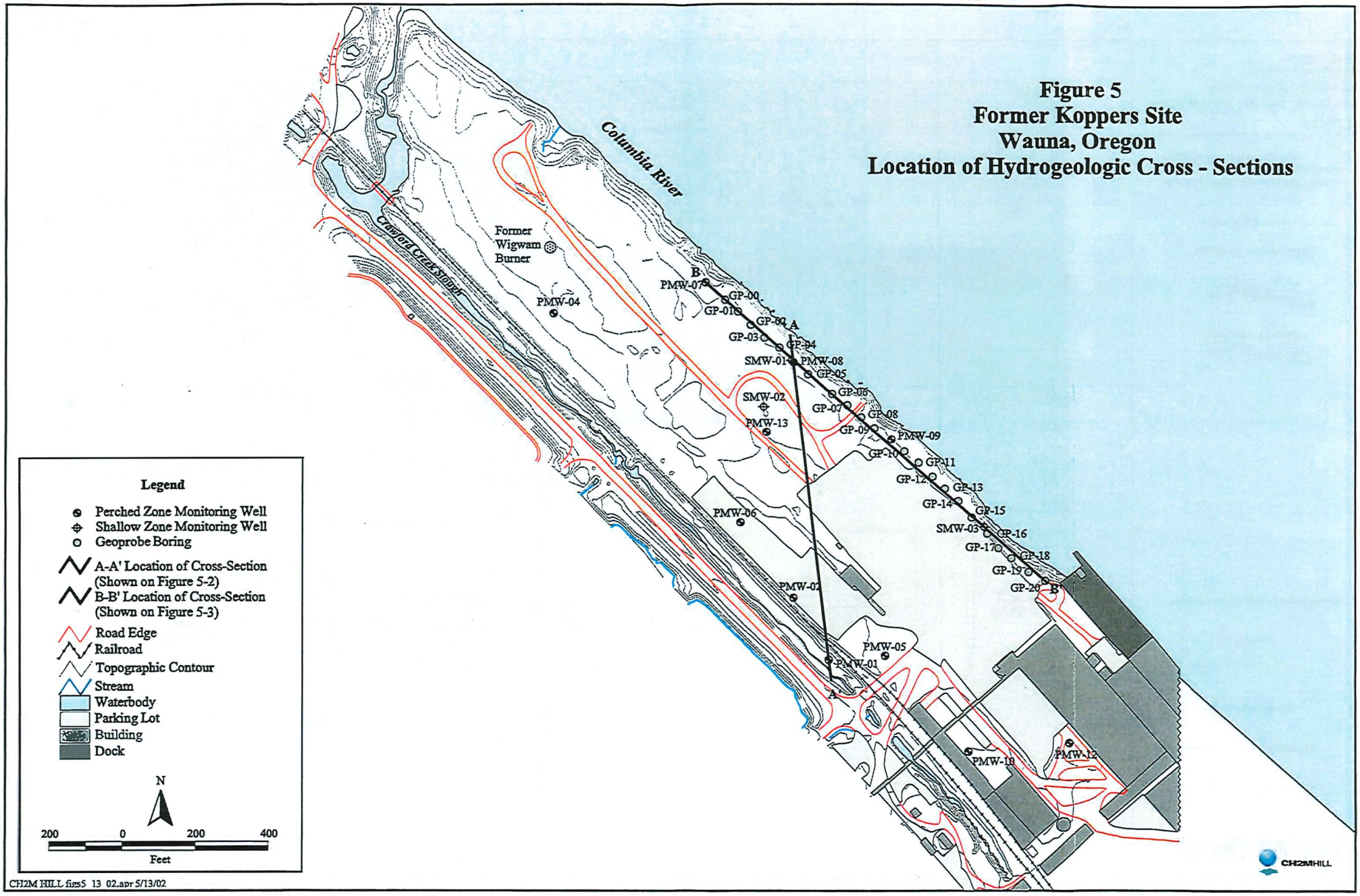
wood.

GROUNDWATER ELEVATIONS
APRIL 19, 2019
Former Koppers Facility
Wauna, Oregon

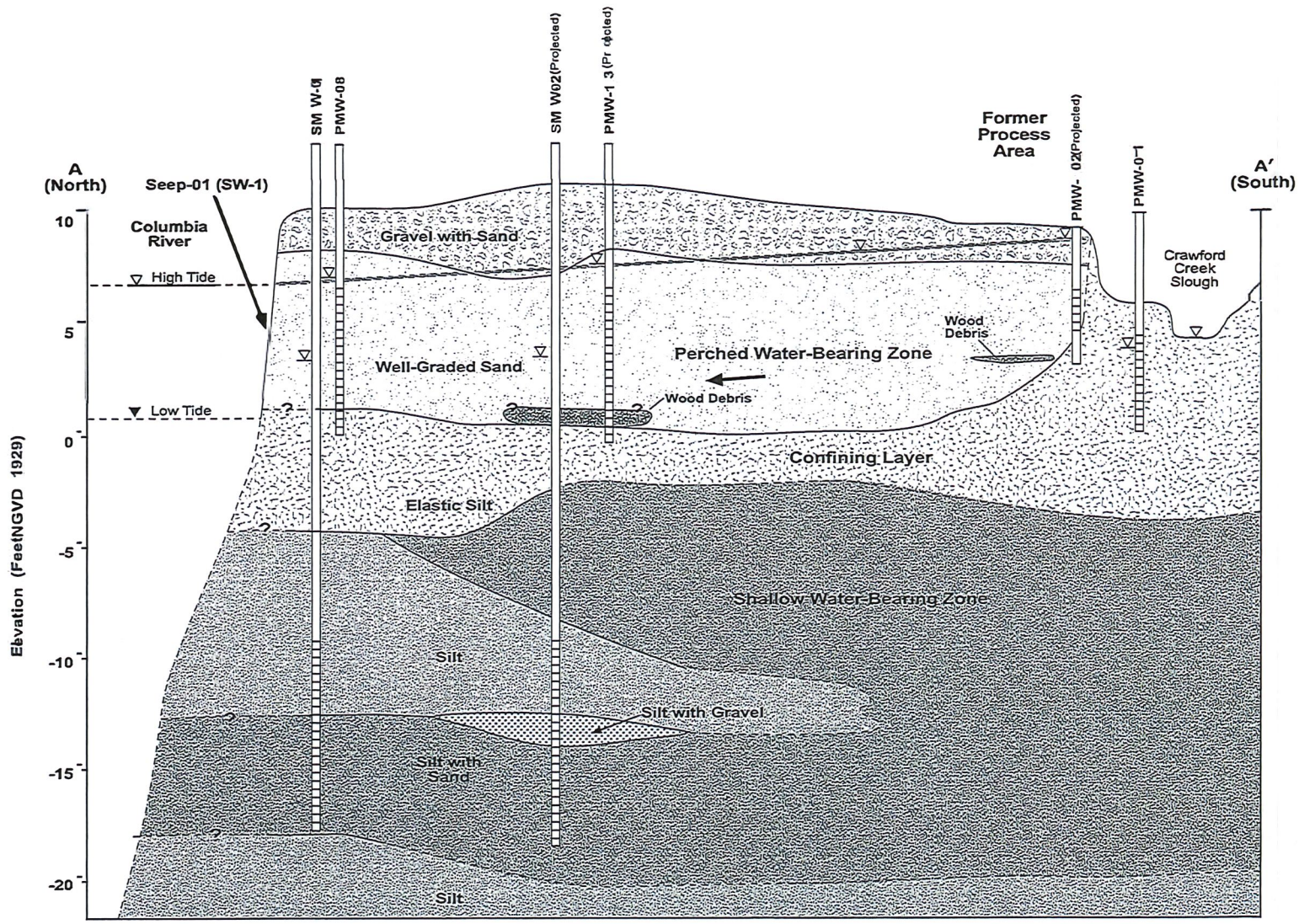
By: SD	Date: 05/31/19	Project No.132360.2018C
Wood Environment & Infrastructure Solutions, Inc.		Figure 4

Plot Date: 06/26/19 - 9:01am, Plotted by: stephane.decombes
Drawing Path: K:\130001\132001\132360\DWG_2019_Annual_Report\, Drawing Name: Figure 1_GW-Contour Map_202019.dwg

Figure 5
Former Koppers Site
Wauna, Oregon
Location of Hydrogeologic Cross - Sections



CH2M HILL figs5 13 02.apr 5/13/02



LEGEND

▽ Water Elevation
Groundwater Elevations Record
February 1, 2002

→ Direction of Groundwater Flow

SMW-1 ← Monitoring Well Number

← Casing Interval

← Screened Interval

*Monitoring Well Elevation = Surveyed Elevation

0 — 5 Feet
Approximate Vertical Scale

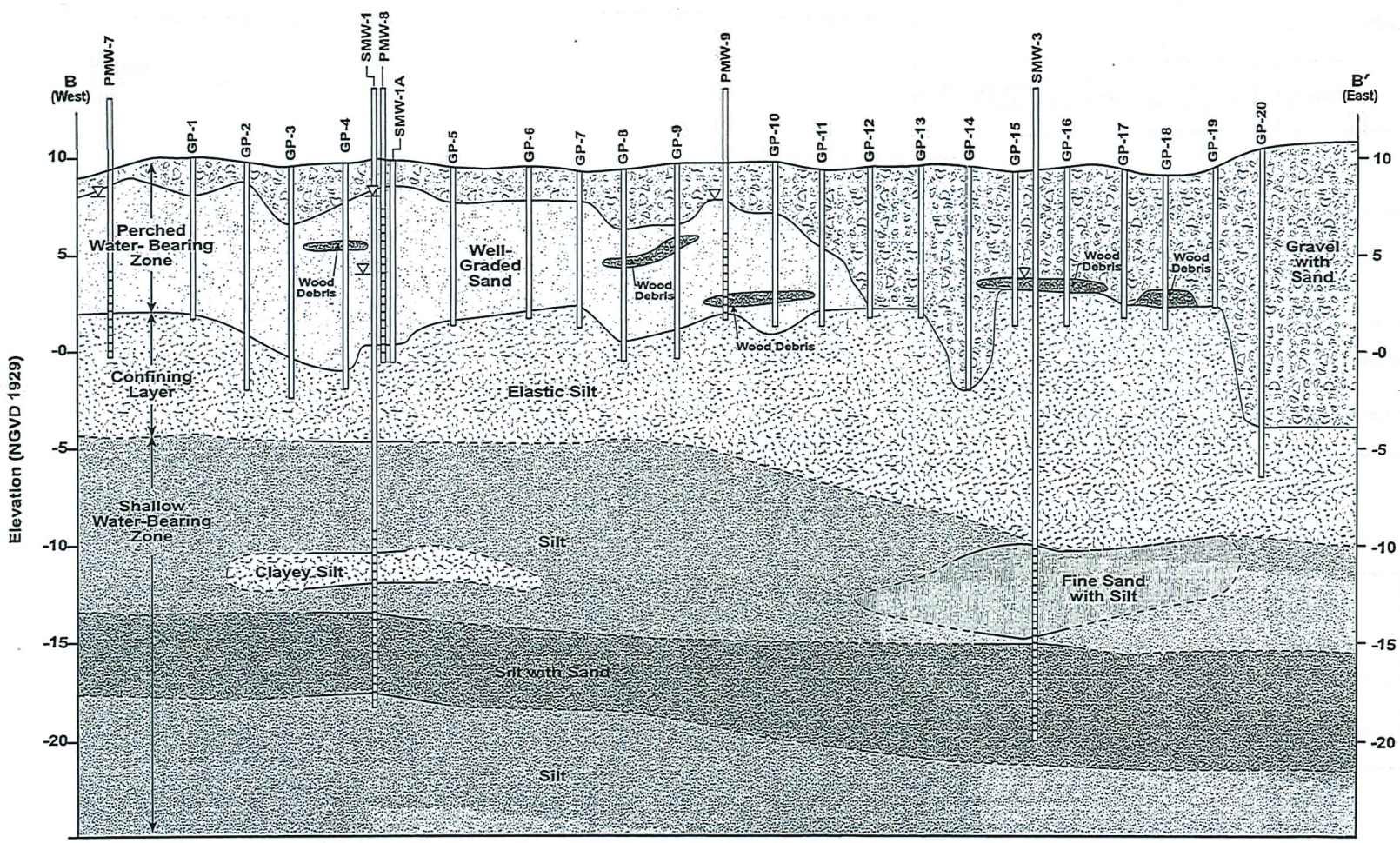
0 — 100 Feet
Approximate Horizontal Scale

Vertical Exaggeration = x20

Subsurface conditions depicted on cross section are interpretations of the CH2M HILL Hydrogeologist. Actual subsurface conditions may differ.

FIGURE 6
Former Koppers Site: North-South Schematic Hydrogeologic Cross-Section A-A′
WAUNA, OREGON

CH2MHILL



LEGEND

GP-3 ← Geoprobe Boring Number

← Depth of Boring

SMW-1 ← Monitoring Well Number

← Casing Interval

← Screened Interval

0 — 5 Feet
Approximate Vertical Scale

0 — 100 Feet
Approximate Horizontal Scale

Vertical Exaggeration = x20

Groundwater Elevations Record February 1, 2002
Subsurface conditions depicted on cross section are interpretations of the CH2M HILL Hydrogeologist. Actual subsurface conditions may differ.

FIGURE 7
Former Koppers Site: East-West Schematic Hydrogeologic Cross-Section B-B′
WAUNA, OREGON

CH2MHILL

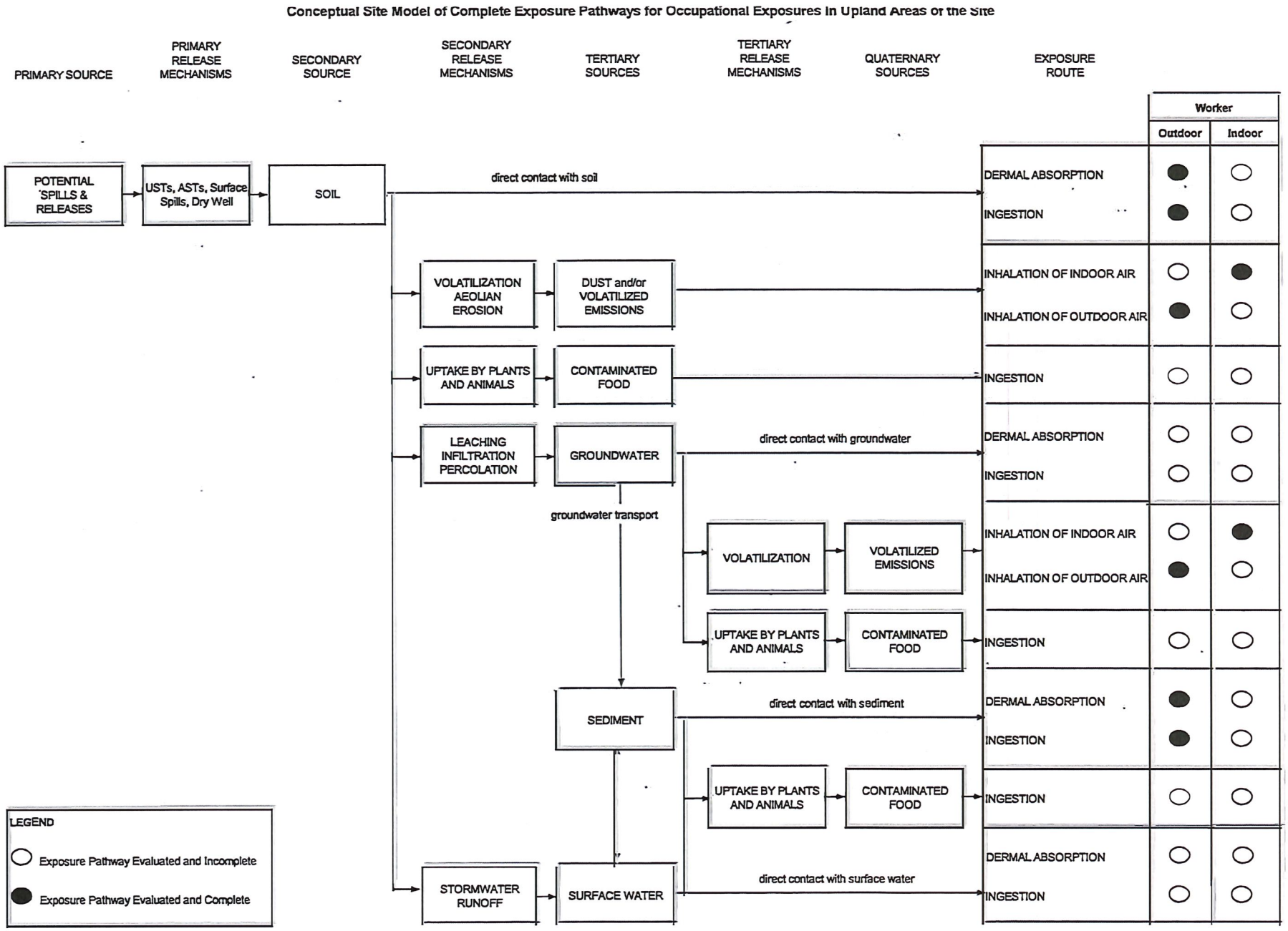


Figure 8. Human Health Conceptual Site Model (CSM)

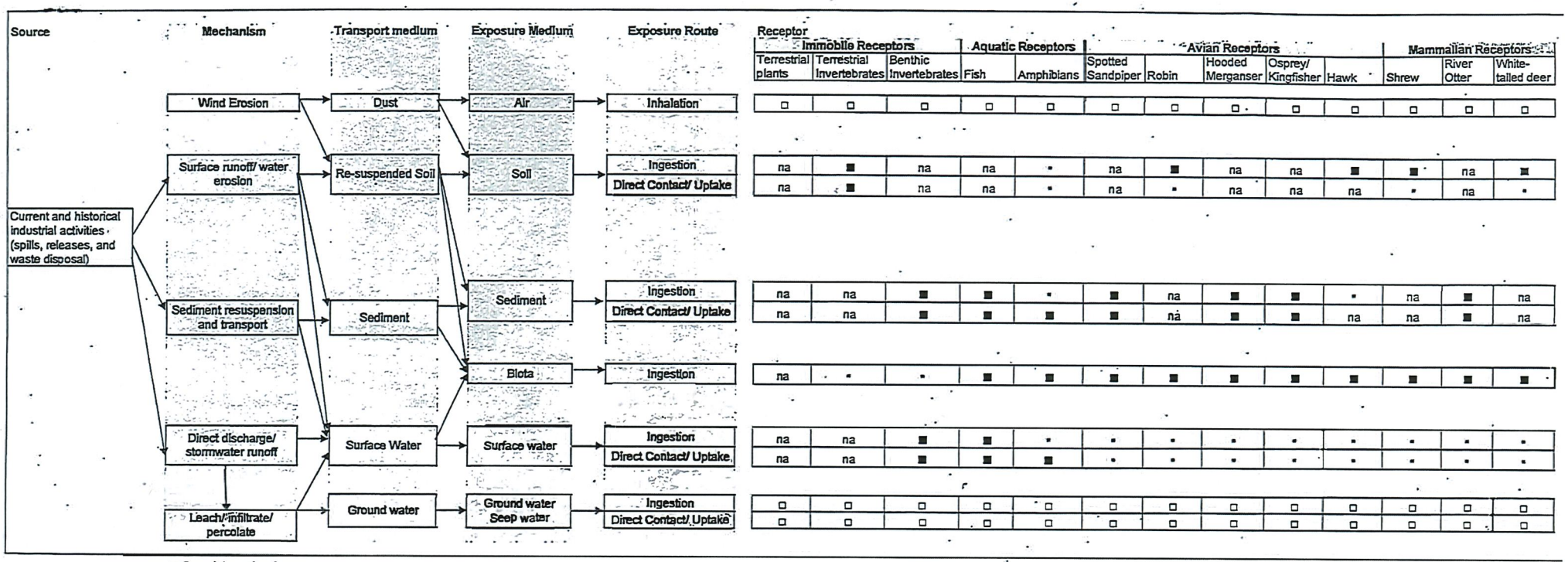


Figure 9
Preliminary Ecological Risk Conceptual Site Model (CSM)

Appendix A

Tabulated Groundwater Analytical Data

Groundwater Quality Data Trend Graphs

GROUNDWATER ANALYTICAL RESULTS[1,2]

Final Site Remedy
Former Koppers Facility
Wauna, Oregon

Constituent	Level II SLV[3] (ug/L)	Western Point of Compliance Wells																						
		ATT-12																						
		Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	1.0 U	1.0 U	1.0 U	0.049 U	1.0 U	0.049 U	0.0490 U	0.049 U	0.0490 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 J	0.050 J	0.050 J	0.10 J	0.050 U	0.050 J	0.51 U	0.51 U	0.51 U
2-Methylphenol	13	0.48 U	0.48 U	0.48 U	0.12 U	0.11 U	0.11 U	0.11 UJ	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.3 U
Benzoic acid	42	4.8 U	4.8 U	4.8 UJ	1.2 U	1.1 U	1.1 U	2.5 J	1.1 U	2.5 J	1.1 U	1.1 U	1.1 U	2.2	1.1 U	2.2 U	2.0 J	1.1 U	2.6 J	1.1 U	0.96 U	0.89 U	0.92 U
Naphthalene	620	0.20 U	0.20 U	0.20 U	0.030 J	0.20 U	0.091 J	0.18 J	0.091 J	0.18 J	0.022 U	1.5	0.58	0.022 U	0.032 J	4.7	0.022 U	0.024 J	0.026 J	0.022 U	0.17 J	0.075 J	0.12 J
Dibenzofuran	3.7	0.20 U	0.20 U	0.20 U	0.018 U	0.018 U	0.018 U	0.018 UJ	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.076 U	0.070 U	0.073 U
Fluorene	3.9	0.20 U	0.20 U	0.20 U	0.028 U	0.027 U	0.027 U	0.027 UJ	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.072 U	0.065 U	0.069 U
Pentachlorophenol	15	0.96 U	0.96 U	0.96 U	0.35 U	0.34 U	0.34 U	0.34 UJ	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.23 U	0.85 U
Phenanthrene	6.3	0.20 U	0.20 U	0.20 U	0.038 J	0.038 J	0.031 J	0.035 J	0.031 J	0.035 J	0.040 J	0.034 J	0.026 J	0.022 U	0.030 J	0.042 J	0.022 U	0.022 U	0.022 U	0.023 J	0.057 J	0.077 J	0.070 J
Fluoranthene	6.2	0.20 U	0.20 U	0.20 U	0.021 U	0.020 J	0.020 U	0.020 UJ	0.020 U	0.020 UJ	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.063 U	0.056 U	0.06 U
bis(2-ethylhexyl)Phthalate	3	0.96 U	0.96 U	0.96 U	0.16 J	0.13 U	0.13 U	0.21 J	0.13 U	0.21 J	0.13 U	0.13 U	0.78 J	0.22 J	0.13 U	0.19 J	0.13 U	0.13 U	0.13 U	0.13 U	4.8 U	4.4 U	6.2 U

Constituent	Level II SLV[3] (ug/L)	Western Point of Compliance Wells																																		
		PMW-7															PMW-7 (TR)																			
		Jun-06	Dec-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-08	Oct-08	Apr-09	Oct-09	Oct-09 Dup	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Oct-12 Dup	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-16	Oct-15	Apr-16	Oct16	Apr17	Oct-17	Apr-18	Oct-18	Apr19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.2 UJ	0.2 UJ	0.13 UJ	0.20 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.049 U	1.0 U	0.049 U	0.0490 U	0.0490 U	0.049 U	0.0490 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.51 U	0.51 U	0.51 U
2-Methylphenol	13	0.5 U	0.34 UJ	0.12 UJ	0.11 UJ	0.28 J	0.060 UJ	0.11 UJ	0.50 U	0.48 U	0.49 U	0.50 U	0.48 U	0.49 U	0.11 U	0.11 U	0.11 U	0.11 UJ	0.11 UJ	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.1 U
Benzoic acid	42	24 U	5.9 UJ	1.8 J	1.1 UJ	1.8 J	1.8 UJ	2.1 J	R	4.8 U	4.9 U	5.0 U	4.8 U	4.9 UJ	1.1 U	1.1 U	1.1 U	2.0 J	2.1 J	1.1 U	2.0 J	1.1 U	1.1 U	1.3 J	2.7	2.9	2.3 J	2.2 J	1.1 U	2.6 J	1.1 U	0.96 U	0.92 U	0.92 U
Naphthalene	620	9.5 U	0.45 J	0.083 J	0.059 J	0.13 J	0.012 UJ	0.66	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.069 J	0.20 U	0.060 J	0.022 UJ	0.022 UJ	0.060 J	0.022 UJ	0.022 U	0.030 J	0.055 J	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.16 J	0.061 U	0.059 U	0.10 J
Dibenzofuran	3.7	9.5 U	0.33 UJ	0.019 UJ	0.018 UJ	0.014 UJ	0.014 UJ	0.018 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.018 U	0.018 U	0.018 U	0.018 UJ	0.018 UJ	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.076 U	0.073 U	0.073 U
Fluorene	3.9	9.5 U	0.33 UJ	0.029 UJ	0.027 UJ	0.012 UJ	0.012 UJ	0.027 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.027 U	0.027 U	0.027 U	0.027 UJ	0.027 UJ	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.072 U	0.069 U	0.069 U
Pentachlorophenol	15	24 U	2.5 UJ	0.36 UJ	0.34 UJ	0.028 UJ	0.028 UJ	0.34 UJ	1.0 UJ	0.96 U	0.97 U	1.0 U	0.96 U	0.97 U	0.34 U	0.34 U	0.34 U	0.34 UJ	0.34 UJ	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.24 U	0.85 U
Phenanthrene	6.3	9.5 U	2.3 J	0.024 UJ	0.022 UJ	0.034 J	0.011 UJ	0.022 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.022 U	0.022 U	0.020 U	0.022 UJ	0.022 UJ	0.020 U	0.022 UJ	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.057 U	0.055 U	0.055 U
Fluoranthene	6.2	9.5 U	1.7 J	0.022 UJ	0.02 UJ	0.025 J	0.013 UJ	0.020 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.020 UJ	0.020 U	0.020 UJ	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.063 U	0.060 U	0.06 U
bis(2-ethylhexyl)Phthalate	3	9.5 U	2.0 UJ	0.14 UJ	0.15 J	1.7 J	0.27 UJ	0.13 UJ	1.0 U	0.96 U	0.97 U	1.0 U	0.96 U	0.97 U	0.13 U	0.13 U	0.13 U	0.15 J	0.19 J	0.13 U	0.15 J	0.25 J	0.13 U	0.34 J	0.14 J	0.19 J	0.13 U	0.25 J	0.13 U	0.35 J	0.13 U	4.8 U	4.6 U	6.2 U

Constituent	Level II SLV[3] (ug/L)	Eastern Point of Compliance Wells																						
		SBW-08																						
		Jun-05	Dec-05	Apr-06	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19	Aug-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.13 UJ	1.0 U	1.0 U	0.049 U	0.049 U	0.049 U	1.00 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.060 J	0.050 U	0.51 U	0.51 U	0.51 U	-
2-Methylphenol	13	11 U	1.3 J	0.54	0.49 U	0.48 U	0.11 U	0.11 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.29 U	0.0487 U
Benzoic acid	42	26 U	5.9 UJ	2.1 J	4.9 U	4.8 UJ	1.1 U	1.1 U	1.1 U	1.8 J	1.1 U	1.1 U	1.3 J	2.1	2.3	1.9 J	1.6 J	1.1 U	2.9 J	1.1 U	0.96 U	0.85 U	0.89 U	2.34 U
Naphthalene	620	11 U	2.5 J	0.76	0.20 U	0.20 U	0.036 J	0.20 U	0.091 J	0.022 UJ	0.022 U	0.045 J	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.03	0.062 J	0.061 J	0.18 UJ	0.057 U	0.0574 U
Dibenzofuran	3.7	11 U	0.33 UJ	0.12 J	0.20 U	0.20 U	0.018 U	0.018 U	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.067 J	0.029 J	0.076 U	0.068 U	0.07 U	0.0187 U
Fluorene	3.9	11 U	0.46 J	0.23	0.20 U	0.20 U	0.027 U	0.027 U	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.39	0.77	0.072 U	0.064 U	0.26	0.0187 U
Pentachlorophenol	15	26 U	2.5 UJ	0.029 UJ	0.97 U	0.96 U	0.34 U	0.34 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.22 U	0.81 U	0.189 U
Phenanthrene	6.3	11 U	2.9 J	0.48	0.20 U	0.20 U	0.022 U	0.022 U	0.022 U	0.022 UJ	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	2.1	1.4	0.075 J	0.052 J	0.45	0.0189 U
Fluoranthene	6.2	11 U	2.0 J	0.14 J	0.20 U	0.20 U	0.020 U	0.025 J	0.020 U	0.020 UJ	0.022 J	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.34	0.19 J	0.063 U	0.056 U	0.058 J	0.0187 U
bis(2-ethylhexyl)Phthalate	3	11 U	1.9 UJ	0.48 J	4.4 UJ	0.66 U	0.13 U	0.13 U	0.13 U	0.14 J	0.14 J	0.13 U	0.21 J	0.13 U	0.53	0.13 U	0.38 J	0.13 U	0.76 J	0.13 U	4.8 U	4.3 U	14	0.374 U

Constituent	Level II SLV[3] (ug/L)	Western Exterior Well - Northern Flow Path																																
		ATT-03																																
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.13 UJ	0.20 UJ	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.049 U	1.0 U	0.049 U	0.0490 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.51 U	0.51 U	0.51 U
2-Methylphenol	13	9.7 U	0.33 UJ	0.060 UJ	0.060 UJ	0.11 UJ	0.11 UJ	0.11 UJ	0.49 U	0.48 U	0.48 U	0.49 U	0.48 U	0.11 U	0.11 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.12 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.29 U
Benzoic acid	42	25 U	5.9 UJ	1.8 UJ	1.8 UJ	2.5 J	1.1 UJ	1.8 J	R	4.8 U	4.8 U	4.9 U	4.8 UJ	1.1 U	1.1 U	1.1 U	1.7 J	1.1 U	1.1 U	1.1 U	2.1	1.2 U	2.2 J	1.4 J	1.1 U	2.6 J	1.1 U	0.92 U	0.89 U	0.89 U
Naphthalene	620	9.7 U	0.42 J	0.12 J	1.6	0.081 J	0.17 J	0.059 J	0.20 U	0.20 U	0.64	0.20 U	0.20 U	0.035 J	0.20 U	0.12 J	0.053 J	0.022 J	0.037 J	0.049 J	0.022 U	0.035 J	0.037 J	0.022 U	0.022 U	0.087 J	0.028 J	0.059 J	0.063 J	0.057 U
Dibenzofuran	3.7	9.7 U	0.33 UJ	0.033 J	0.014 UJ	0.018 UJ	0.018 UJ	0.018 UJ	0.20U	0.20 U	0.20 U	0.20 U	0.20 U	0.018 U	0.018 U	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.018 U	0.019 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.073 U	0.070 U	0.07 U
Fluorene	3.9	9.7 U	0.46 J	0.041 J	0.012 UJ	0.027 UJ	0.027 UJ	0.027 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.027 U	0.027 U	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.029 J	0.027 U	0.069 U	0.066 U	0.06 U
Pentachlorophenol	15	25 U	2.5 UJ	0.029 UJ	0.029 UJ	0.34 UJ	0.34 UJ	0.34 UJ	0.98 UJ	0.96 U	0.96 U	0.97 U	0.96 U	0.34 U	0.34 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.35 U	0.35 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.24 U	0.23 U	0.81 U
Phenanthrene	6.3	9.7 U	2.6 J	0.12 J	0.011 UJ	0.022 UJ	0.022 UJ	0.022 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.022 U	0.022 U	0.022 U	0.022 UJ	0.022 U	0.022 U	0.022 U	0.022 U	0.023 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.066 J	0.053 U	0.053 U
Fluoranthene	6.2	9.7 U	1.5 J	0.12 J	0.013 UJ	0.02 UJ	0.02 UJ	0.020 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.020 U	0.020 U	0.020 U	0.020 U	0.021 U	0.020 U	0.020 U	0.020 U	0.120 U	0.020 U	0.060 U	0.058 U	0.058 U
bis(2-ethylhexyl)Phthalate	3	9.7 U	1.9 UJ	0.29 J	0.27 UJ	0.13 UJ	0.13 UJ	0.13 UJ	0.98 U	0.96 U	0.96 U	1.7 UJ	0.96 U	0.13 U	0.44 J	0.76	0.14 J	0.13 U	0.13 U	0.25 J	0.13 U	1.3	0.27 J	0.57 J	0.13 U	0.43 J	0.13 U	4.6 U	4.4 U	6 U

GROUNDWATER ANALYTICAL RESULTS[1,2]
Final Site Remedy
Former Koppers Facility
Wauna, Oregon

Constituent	Level II SLV[3] (µg/L)	Western Exterior Well - Northern Flow Path																													
		ATT-04																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.13 UJ	0.20 UJ	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.049 U	1.0 U	0.049 U	0.0490 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 U	0.050 J	0.050 U	0.050 U	0.050 U	0.050 U	0.51 U	0.51 U	0.51 U
2-Methylphenol	13	0.9 U	0.33 UJ	0.060 UJ	0.060 UJ	0.11 UJ	0.11 UJ	0.11 UJ	0.49 U	0.48 U	0.48 U	0.48 U	0.49 U	0.11 U	0.11 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.12 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.3 U
Benzoic acid	42	25 U	5.9 UJ	1.8 UJ	1.8 UJ	1.8 J	1.1 UJ	1.7 J	R	4.8 U	4.8 U	4.8 U	4.9 UJ	1.1 U	1.1 U	1.1 U	2.0 J	1.1 U	1.1 U	1.1 U	2.3	1.1 U	1.8 J	1.3 J	1.1 U	2.6 J	1.3	0.96 U	0.89 U	0.92 U
Naphthalene	620	9.9 U	0.37 UJ	0.92	5.1	0.080 J	0.039 J	0.022 UJ	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.044 J	0.20 U	0.11 J	0.022 UJ	0.029 J	0.033	0.039 J	0.022 U	0.022 U	1.5	0.022 U	0.022 U	0.022 U	0.022 U	1.1 J	0.095 J	0.077 J
Dibenzofuran	3.7	9.9 U	0.33 UJ	0.014 UJ	0.014 UJ	0.018 UJ	0.018 UJ	0.018 UJ	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.018 U	0.018 U	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.019 U	0.018 U	0.018 U	0.018 U	0.018 U	0.078 U	0.070 U	0.073 U
Fluorene	3.9	9.9 U	0.33 UJ	0.012 UJ	0.012 UJ	0.027 UJ	0.027 UJ	0.027 UJ	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.027 U	0.027 U	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.072 U	0.066 U	0.069 U
Pentachlorophenol	15	25 U	2.5 UJ	0.029 UJ	0.029 UJ	0.34 UJ	0.34 UJ	0.34 UJ	0.98 UJ	0.98 U	0.95 U	0.96 U	0.97 U	0.34 U	0.34 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.35 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.23 U	0.85 U
Phenanthrene	6.3	9.9 U	2.0 J	0.023 J	0.011 UJ	0.022 UJ	0.022 UJ	0.022 UJ	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.022 U	0.022 U	0.022 U	0.022 UJ	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.023 U	0.022 U	0.022 U	0.022 U	0.022 U	0.057 J	0.091 J	0.055 U
Fluoranthene	8.2	9.9 U	1.4 J	0.013 UJ	0.013 UJ	0.02 UJ	0.02 UJ	0.020 UJ	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.020 U	0.020 U	0.020 UD	0.020 UJ	0.020 UJ	0.020 U	0.020 U	0.020 U	0.020 U	0.021 U	0.020 U	0.020 U	0.020 U	0.020 U	0.063 U	0.058 U	0.06 U
bis(2-ethylhexyl)Phthalat	3	9.9 U	1.9 UJ	0.27 UJ	0.27 UJ	0.18 J	0.13 UJ	0.13 UJ	0.98 U	0.98 U	0.95 U	0.96 U	0.97 U	0.13 U	0.13 U	0.13 U	0.21 J	0.13 U	0.18 J	0.25 J	0.13 U	0.17 J	1.1	0.13 U	0.13 U	0.13 U	0.13 U	4.8 U	4.4 U	6.2 U

Constituent	Level II SLV[3] (µg/L)	Western Exterior Well - Southern Flow Path																													
		ATT-01																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.13 UJ	0.20 UJ	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	13	1.00 U	0.27 J	1.0 U	4.0	0.05 U	0.49 J	0.050 U	7.5	0.10 J	14	0.43 J	6.2	0.51 U	0.51 U
2-Methylphenol	13	20	0.33 UJ	0.060 UJ	0.060 UJ	0.11 UJ	0.11 UJ	0.12 UJ	0.49 U	0.48 U	0.49 U	0.50 U	0.49 U	0.11 U	0.11 U	1.1 UD	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.29 UJ
Benzoic acid	42	24 U	5.9 UJ	1.8 UJ	1.8 UJ	1.3 J	1.1 UJ	1.7 J	R	4.8 U	4.9 U	5.0 U	4.9 UJ	1.1 U	1.1 U	11 UD	1.1 UJ	1.1 U	1.1 U	2.6 J	1.1 U	4.5 D	2.0 U, I	1.1 U	1.1 U	1.1 U	1.1 U	0.98 U	0.89U	0.89 UJ
Naphthalene	620	9.5 U	0.37 UJ	0.071 J	0.20 U	0.033 J	0.043 J	0.17 J	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	57 D	0.20 U	340 D	0.022 UJ	19 D	0.022 U	100 D	1.4	25 D	0.7	160 D	37 D	230 D	0.046 J	70 J	0.072 J	0.39
Dibenzofuran	3.7	9.5 U	0.33 UJ	0.014 UJ	0.014 UJ	0.018 UJ	0.018 UJ	0.019 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.016 U	0.018 U	0.18 UD	0.018 UJ	0.42	0.33	0.38	0.23	0.17 JD	0.066 J	0.16 J	0.041 J	0.28	0.43	0.14 J	0.077 J	0.07 U
Fluorene	3.9	9.5 U	0.33 UJ	0.012 UJ	0.012 UJ	0.027 UJ	0.027 UJ	0.026 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.027 U	0.027 U	0.27 UD	0.10 J	0.54	0.52	0.63	0.52	0.60 D	0.46	0.88	0.6	1.9	2.6	1.2	1.7	1.3
Pentachlorophenol	15	24 U	2.5 UJ	0.029 UJ	0.029 UJ	0.34 UJ	0.34 UJ	0.35 UJ	0.98 UJ	0.96 U	0.97 U	1.0 U	0.98 U	0.34 U	0.34 U	3.4 UD	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.68 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.23 U	0.81 U
Phenanthrene	6.3	9.5 U	0.49 UJ	0.020 J	0.011 UJ	0.022 UJ	0.022 UJ	0.023 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.022 U	0.022 U	0.22 UD	0.022 UJ	0.22 U	0.022 U	0.029 J	0.022 U	0.044 U	0.039 J	0.025 J	0.022 U	0.050 J	0.068 J	0.087 J	0.11 J	0.13 J
Fluoranthene	6.2	9.5 U	0.68 UJ	0.013 UJ	0.013 UJ	0.02 UJ	0.02 UJ	0.021 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.021 J	0.20 UD	0.020 UJ	0.20 U	0.020 U	0.024 J	0.02 U	0.040 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.063 U	0.058 U	0.058 U
bis(2-ethylhexyl)Phthalat	3	9.5 U	1.9 UJ	0.27 UJ	0.27 UJ	0.39 J	0.13 UJ	0.14 UJ	0.98 U	0.96 U	0.97 U	1.0 U	0.98 U	0.13 U	0.13 U	1.3 UD	0.13 UJ	0.16 J	0.14 J	0.13 U	0.81	1.4 D	0.13 U	0.13 U	0.13 U	0.23 J	0.13 U	4.8 U	4.4 U	6 U

Constituent	Level II SLV[3] (µg/L)	Western Exterior Well - Southern Flow Path																													
		ATT-02																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.13 UJ	0.90 J	3.2	13	0.74 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2	7.5	1.0 U	9	5.0 C	1.0 U	0.070 J	1.7 JD	5.0 D	12	1.6	1.0	6.6	42 D	13	2.7	17
2-Methylphenol	13	11 U	0.33 UJ	0.32 J	0.060 UJ	0.11 UJ	0.11 UJ	0.11 UJ	0.50 U	0.48 U	0.48 U	0.50 U	0.50 U	0.11 U	1.1 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	2.2 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	1.5 U
Benzoic acid	42	26 U	5.9 UJ	1.8 UJ	1.8 UJ	1.1 UJ	1.1 UJ	1.8 J	R	4.8 U	4.8 U	5.0 U	5.0 UJ	1.1 U	11 U	1.1 U	1.1 UJ	2.2 U	1.1 U	1.4 J	1.1 U	22 U	2.1 U, I	1.9 J	1.1 U	2.9 J	5.5 U	0.96 U	0.89 U	4.6 U
Naphthalene	620	11 U	1.1 J	0.19 J	40 D	78 D	44 D	57 D	6.4	0.61	0.67	0.20 U	0.3	120 D	850 D	8.3	310 JD	320 D	140 D	50 D	500 D	840 D	500 D	170 D	10	280 D	1,500 D	160 D	52 U	70
Dibenzofuran	3.7	11 U	0.33 UJ	0.022 J	0.014 UJ	0.025 J	0.33	0.22	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.053 J	8.4 D	0.67	7.3 J	3.1	4.2	0.46	4.7	1.8 JD	6.8	0.65	3.2	0.49	22 D	1.9	6.7	0.65 J
Fluorene	3.9	11 U	0.33 UJ	0.022 J	0.012 UJ	0.064 J	0.24	0.14 J	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.063 J	4.2 D	0.39	7.8 J	4.2	5.6	1.5	11	7.2 D	18 D	5.1	13	4.9	32 D	4.5	14	3.6
Pentachlorophenol	15	26 U	2.5 UJ	0.029 UJ	0.029 UJ	0.34 UJ	0.34 UJ	0.34 UJ	1.0 UJ	0.98 U	0.96 U	1.0 U	1.0 U	0.34 U	3.4 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	6.8 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.23 U	4.2 U
Phenanthrene	6.3	11 U	1.8 J	0.11 J	0.011 UJ	0.022 UJ	0.022 UJ	0.022 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.022 U	0.22 U	0.031 J	0.52 J	0.94	1.4	0.59	2.1	3.3 JD	3.8	1.1	2.6	1.5	6.8	2.5	4.3	1.9
Fluoranthene	6.2	11 U	1.3 J	0.086 J	0.013 UJ	0.02 UJ	0.02 UJ	0.020 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.20 U	0.020 U	0.020 J	0.020 U	0.020 U	0.020 U	0.020 U	0.40 U	0.020 U	0.020 U	0.020 U	0.020 U	0.023 J	0.063 U	0.058 U	0.2 U
bis(2-ethylhexyl)Phthalat	3	11 U	1.9 UJ	0.54 J	0.27 UJ	0.57 J	0.13 UJ	0.13 UJ	1.0 U	0.98 U	0.96 U	1.0 U	1.0 U	0.13 U	1.3 U	0.25 J	0.26 J	0.17 J	0.13 U	0.13 U	0.13 U	2.6 U	0.13 U	0.15 J	0.13 U	0.27 J	0.13 U	4.8 U	4.4 U	31 U

Constituent	Level II SLV[3] (µg/L)	Western Exterior Well - Southern Flow Path																													
		ATT-11																													
		Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	1.0 U	1.0 U	1.0 U	0.049 U	1.0 U	0.049 U	0.0490 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 U	0.20 J	0.34 J	0.050 J	0.050 U	0.29 J	0.51 U	0.51 U	0.51 U
2-Methylphenol	13	0.49 U	0.51 U	0.48 U	0.11 U	0.11 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.89 U	
Benzoic acid	42	4.9 U	5.1 U	4.8 UJ	1.1 U	1.1 U	1.1 U	2.1 J	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	2.0 U, I	1.6 J	1.1 U	2.5 J	1.1 U	0.92 U	0.89 U	0.89 U
Naphthalene	620	0.20 U	1.5	8.5	1.6	4.2	1.2	4.4 J	0.4	0.022 U	2.3	0.15 J	17	43 D	13	1.2	0.67	3	0.46 J	0.58 J	0.082 J
Dibenzofuran	3.7	0.20 U	0.21 U	0.20 U	0.018 U	0.018 U	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.21	0.018 U	0.018 U	0.018 U	0.16 J	0.073 U	0.072	0.07 U
Fluorene	3.9	0.20 U	0.21 U	0.20 U	0.027 U	0.027 U	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.4	0.027 U	0.030 J	0.027 U	0.72	0.069 U	0.42	0.068 U
Pentachlorophenol	15	0.97 U	1.1 U	0.96 U	0.34 U	0.34 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.24 U	0.23 U	0.81 U
Phenanthrene	6.3	0.20 U	0.21 U	0.20 U	0.022 U	0.022 U	0.022 U	0.022 UJ	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.023 J	0.055 U	0.068	0.076 J
Fluoranthene	6.2	0.20 U	0.21 U	0.20 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.025 J	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.060 J	0.058 J	0.058 U
bis(2-ethylhexyl)Phthalat	3	0.97 U	1.1 U	0.96 U	0.13 U	0.13 U	0.13 U	0.15 J	0.16 J	0.13 U	0.13 U	0.13 U	0.13 U	0.95 J	0.16 J	0.19 J	0.35 J	0.13 U	4.6 U	4.4 U	6 U

GROUNDWATER ANALYTICAL RESULTS[1,2]
Final Site Remedy
Former Koppers Facility
Wauna, Oregon

Constituent	Level II SLV[3] (µg/L)	Western Interior Well ATT-05																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	3.6	5.5	8.7	68.0	42	74	8.9	75	9.7	24	8	43	3.9	36	5.2	40.6	7.2 C	10	4.5	16 D	4.4	53	5.7	22 D	4.9	44 D	8.8	31	14
2-Methylphenol	13	9.7 U	0.33 UJ	0.30 UJ	0.060 UJ	0.11 UJ	1.1 UJ	1.1 UJ	0.49 U	0.48 U	0.50 U	0.52 U	25 U	0.11 U	1.1 U	1.1 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	2.5 U	0.29 U
Benzoic acid	42	25 U	5.9 UJ	8.6 UJ	160 UJ	1.1 UJ	11 UJ	11 UJ	R	4.8 U	5.0 U	5.2 U	250 UJ	1.1 U	11 U	11 U	2.2 J	1.1 U	1.1 U	1.1 U	1.1 U	2.2 U	1.1 U	2.3 J	1.1 U	1.1 U	5.5 U	0.96 U	21 U	0.89 U
Naphthalene	620	100	210 D	350 D	2,800	420 D	2,400 D	330 D	2,500 D	390 D	350 D	280 D	1,100 D	260 D	870 D	420 D	1,400 JD	210 D	2.4	0.21	170 D	0.044 U	2,000 D	250 D	600 D	0.022 U	1,800 D	220 D	480 U	180
Dibenzofuran	3.7	9.7 U	1.1 J	1.2 D	3.4	4.2	11 D	4.7 D	14	6.6	11	4.4	9.7 U	4.7	7.5 D	6.3 D	9.8 J	8.6	8.4	6.5	6.1	5.5 D	17	8.6	14	7.3	28 D	6.2	11 J	6.8
Fluorene	3.9	9.7 U	1.9 J	2.1 D	4.9	4.3	0.27 UJ	5.5 D	12	7.4	12	6.1	9.7 U	5.6	9.8 D	7.6 D	12 J	11	12	8.8	9.4	7.6 D	28 D	11	25 D	11.0	42 D	8.9	18	9.8
Pentachlorophenol	15	25 U	2.5 UJ	0.15 UJ	0.029 UJ	0.34 UJ	3.4 UJ	3.4 UJ	0.98 UJ	0.96 U	0.99 U	1.1 U	49 U	0.34 U	3.4 U	3.4 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.68 U	0.34	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	5.6 U	0.81 U
Phenanthrene	6.3	9.7 U	0.49 UJ	0.071 JD	0.32	0.32	0.78 JD	1.1 JD	1.9	1.6	2.4	1.3	9.7 U	1.5	2.5 D	2.0 JD	3.5 J	2.5	2.4	2.2	2.8	1.8 D	6.3	2.8	5.4	2.7	11	3.0	5.5	3.0
Fluoranthene	6.2	9.7 U	0.66 UJ	0.061 UJ	0.013 UJ	.021 J	0.2 UJ	0.20 UJ	0.20 U	0.20 U	0.20 U	0.21 U	9.7 U	0.021 J	0.20 U	0.20 U	0.025 J	0.078 J	0.020 U	0.021 J	0.020 U	0.040 U	0.047 J	0.020 U	0.035 J	0.024 J	0.072 J	0.063 J	1.4	0.058 U
bis(2-ethylhexyl)Phthalat	3	9.7 U	1.9 UJ	1.4 UJ	0.27 UJ	0.2 J	1.3 UJ	1.3 UJ	0.98 U	0.98 U	0.99 U	1.1 U	49 U	0.15 J	1.3 U	1.3 U	0.14 J	0.17 J	0.13 U	0.59 J	0.13 U	0.26 U	0.13	0.13 U	0.14 J	0.97 U	0.13 U	4.8 U	110 U	6 U

Constituent	Level II SLV[3] (µg/L)	Western Interior Well ATT-06																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	34	26	14	5.5	4.0	4.4	23	5.9	16 J	1.0 U	11	2.4	23	2.1	16	1.00 U	7.6 C	1.0 U	2.6	0.11 J	5.6	0.64	8.5	0.16 J	7.3 J	6.1	3.4 U	0.51 U	0.51 U
2-Methylphenol	13	9.7 U	0.34 UJ	0.30 UJ	0.060 UJ	0.12 UJ	0.11 UJ	1.1 UJ	0.50 U	0.48 U	0.49 U	0.49 U	4.9 U	0.11 U	1.1 U	0.55 UD	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.55 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.3 U
Benzoic acid	42	25 U	5.9 UJ	8.6 UJ	1.8 UJ	1.2 UJ	1.1 UJ	11 UJ	R	4.8 U	4.9 U	4.9 U	49 UJ	1.1 U	11 U	5.5 UD	2.8 J	1.1 U	1.1 U	1.2 J	2.1	5.5 U	1.9 U, I	1.1 U	1.1 U	1.1 U	1.1 U	0.96 U	0.85 U	0.92 U
Naphthalene	620	190.0	580 D	380 D	180 D	250 D	110 JD	800 D	180 D	650 D	0.20 U	0.46	97 D	590 D	110 D	300 D	7.5 J	160 D	6.7	33 D	1.2	62 D	7.0	110 D	3.1	180 D	120 D	36 J	0.090 J	1.2 J
Dibenzofuran	3.7	9.7 U	2.1 J	1.2 D	0.48	7.2	2.0 J	13 D	2.5	8.6	0.20 U	2.4	2.0 U	4.4	0.93 JD	2.3 D	0.45 J	1.6	0.51	0.97	0.28	1.2 D	0.7	2.3	0.62	5.0	4.2	1.7 J	0.34 J	0.30 J
Fluorene	3.9	10	7.4 J	7.1 D	8.1	16 JD	8.6 J	23 D	10	20 D	0.37	12	10 D	18	13 D	14 D	3.6 J	15 D	4.6	9.6	2.8	8.7 D	8.6	9.2	3.4	13.0	12.0	4.9 J	2.0 J	1.9 J
Pentachlorophenol	15	25 U	2.5 UJ	0.15 UJ	0.029 UJ	0.36 UJ	0.34 UJ	3.4 UJ	1.0 UJ	0.96 U	0.97 U	0.97 U	9.8 U	0.34 U	3.4 U	1.7 UD	0.34 J	0.34 U	0.34 U	0.34 U	0.34 U	1.7 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.25 U	0.22 U	0.85 U
Phenanthrene	6.3	9.7 U	1.6 J	2.4 D	2.2	2.8	2.2 J	4.9 D	3.4	7.4	0.20 U	4.2	4.7 D	10	6.3 D	7.2 D	1.5 J	6.8	1.9	4.4	1.3	3.7 D	4.1	3.9	1.3	7.1	7.3	2.6 J	0.38 J	0.7 J
Fluoranthene	6.2	9.7 U	0.66 UJ	0.080 JD	0.013 UJ	0.031 J	0.025 J	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	2.0 U	0.049 J	0.20 U	0.10 UD	0.020 UJ	0.025 J	0.020 U	0.041 J	0.020 U	0.10 U	0.12 J	0.029 J	0.020 J	0.051 J	0.075 J	0.063 J	0.056	0.06 U
bis(2-ethylhexyl)Phthalate	3	9.7 U	2.0 UJ	1.4 UJ	0.27 UJ	0.14 UJ	0.13 UJ	1.3 UJ	1.0 U	0.98 U	0.97 U	0.97 U	9.8 U	0.13 U	1.3 U	0.65 UD	0.22 J	0.13 U	0.13 U	0.23 J	0.13 U	0.65 U	0.13 U	0.13 U	0.13 U	2.2 J	0.13 U	4.8 U	4.3 U	6.2 U

Constituent	Level II SLV[3] (µg/L)	Western Interior Well ATT-06 (dup)																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09		May-10	Oct-10	Apr-11	Oct-11			Apr-13	Oct-13	Apr-14		Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	NA*	NA*	NA*	7.4	NA*	NA*	NA*	NA4	23 J		11.0	2.2	23.0	2			7.8 C	1.0 U	2.0		6.3	0.11	6.4	NA	12	6.5	4.2	0.51 U	0.51 U
2-Methylphenol	13	9.8 U	0.34 UJ	0.30 UJ	0.060 UJ	0.11 UJ	0.11 UJ	1.1 UJ	0.48 U	0.50 U		0.48 U	4.9 U	0.11 U	1.1 U			0.11 U	0.11 U	0.11 U		0.55 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.31
Benzoic acid	42	24 U	5.9 UJ	8.6 UJ	1.8 UJ	1.9 J	1.1 UJ	11 UJ	R	5.0 U		4.8 U	49 UJ	1.1 U	11 U			1.1 U	1.1 U	1.1 U		5.5 U	2.0 U, I	1.1 U	1.1 U	2.6 J	1.1 U	0.92 U	0.85 U	0.96 U
Naphthalene	620	190.0	690 D	380 D	160 D	300 D	53 JD	920 D	160 D	410 D		0.36	94 D	670 D	120 D			150 D	5.1	28 D		53 D	0.56 J	110 D	2.4	190 D	120 D	82 DJ	0.055	0.55 J
Dibenzofuran	3.7	9.8 U	2.5 J	1.1 D	0.48	7.3	1.1 J	11 D	2.4	7.8		2.1	2.0 U	4.9	0.90 JD			1.8	0.6	0.84		0.96 JD	0.1	2.2	0.53	5.0	4.5	2.6	0.25 J	0.20 J
Fluorene	3.9	11	8.5 J	6.4 D	9.4	18 JD	4.7 J	20 D	9.7	16 D		11	11 D	19	12 D			12 D	6	8.5		7.2 D	8.4	8.6	3.1	13.0	12.0	7.3 J	1.6 J	0.072 U
Pentachlorophenol	15	24 U	2.5 UJ	0.15 UJ	0.029 UJ	0.34 UJ	0.34 UJ	3.4 UJ	0.95 UJ	0.99 U		0.98 U	9.8 U	0.34 U	3.4 U			3.4 U	0.34 U	0.34 U		1.7 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.24 U	0.22 U	0.88
Phenanthrene	6.3	9.6 U	2.0 J	2.1 D	2.3	3.0	1.2 J	4.3 D	3.5	6.3		3.7	5.3 D	10	5.8 D			7.1	1.7	4.1		3.5 D	1.8	3.7	1.2	6.8	7.8	4.3 J	0.17 J	0.52 J
Fluoranthene	6.2	9.6 U	0.66 UJ	0.064 JD	0.013 UJ	0.02 UJ	0.02 UJ	0.20 UJ	0.19 U	0.20 U		0.20 U	2.0 U	0.037 J	0.20 U			0.040 J	0.028 J	0.028 J		0.10 U	0.024	0.026 J	0.020 U	0.048 J	0.075 J	0.060 J	0.056	0.063 U
bis(2-ethylhexyl)Phthalate	3	9.6 U	2.0 UJ	1.4 UJ	0.27 UJ	0.29 J	0.13 UJ	1.3 UJ	0.95 U	0.99 U		0.98 U	9.8 U	0.13 U	1.3 U			0.13 U	0.15 J	0.13 U		0.65 U	0.14	0.13 U	0.13 U	0.31 J	0.13 U	4.8 U	4.3 U	6.5 U

Constituent	Level II SLV[3] (µg/L)	Western Interior Well ATT-10																													
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.57 J	0.20 UJ	2.0	0.2 UJ	1.1	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1	1.00 U	2.6 C	1.0 U	0.34 J	0.18 J	0.080 J	0.12 J	0.080 J	0.59	0.050 J	1.1	0.51 U	1.1	0.51 U
2-Methylphenol	13	9.7 U	0.33 UJ	0.060 UJ	0.080 UJ	0.11 UJ	0.11 UJ	1.1 UJ	0.49 U	0.48 U	0.48 U	0.50 U	0.48 U	0.11 U	1.1 U	1.1 UD	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.22 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.3 U
Benzoic acid	42	25 U	5.9 UJ	2.0 J	1.8 UJ	1.8 J	1.1 UJ	11 UJ	R	4.8 U	4.8 U	5.0 U	4.8 UJ	1.1 U	11 U	11 UD	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	2.2 U	2.0 U, I	1.1 U	1.1 U	1.1 U	1.1 U	0.92 U	0.89 U	0.92 U
Naphthalene	620	9.7 U	0.74 J	46 D	86	230 D	140 D	280 D	260 D	220 D	76 D	180 D	59 D	240 D	58 D	150 D	5.8 J	89 D	2.2	2.7	5.2	0.45 D	0.59 J	1.8	85 D	1.5	93 D	14 U	13	0.12 J
Dibenzofuran	3.7	9.7 U	0.33 UJ	0.014 UJ	0.014 UJ	0.47	0.55	0.95 JD	1.9	2.1	1.1	2.3	1.5	2.2	2.4 D	2.0 JD	1.3 J	2.3	1.2	0.80	0.20	0.21 JD	0.089 J	0.18 J	0.58	0.098 J	0.69	0.087 J	0.58 J	0.10 J
Fluorene	3.9	9.7 U	0.33 UJ	0.20 J	0.28	1.3	1.6	2.2 D	3.9	4.4	2.7	4.8	4.6	5.0	5.4 D	5.2 D	4.9 J	8.1	8.4	4.9	7.1	10 D	8.0	4.1	6.8	5.1	13.0	4.0	6.8	3.4
Pentachlorophenol	15	25 U	2.5 UJ	0.029 UJ	0.029 UJ	0.34 UJ	0.34 UJ	3.4 UJ	0.98 UJ	0.96 U	0.98 U	1.0 U	0.96 U	0.34 U	3.4 U	3.4 UD	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.68 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.24 U	0.23 U	0.85 U
Phenanthrene	6.3	9.7 U	0.49 UJ	0.041 J	0.045 J	0.057 J	0.054 J	0.22 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.26	0.24	0.66 JD	0.41 JD	0.46 UJ	0.69	1.1	0.65	1.2	1.4 D	1.6	0.59	1.5	0.89	2.7	0.80	1.6	0.7
Fluoranthene	6.2	9.7 U	0.66 UJ	0.013 UJ	0.013 UJ	0.02 UJ	0.02 UJ	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.20 U	0.20 UD	0.020 UJ	0.020 U	0.020 U	0.020 U	0.020 U	0.040 U	0.025 J	0.020 U	0.020 U	0.020 U	0.020 U	0.060 J	0.058	0.19 U
bis(2-ethylhexyl)Phthalate	3	9.7 U	1.9 UJ	0.27 UJ	0.27 UJ	0.21 J	0.13 UJ	1.6 JD	0.98 U	0.98 U	0.98 U	1.0 U	0.96 U	0.13 U	1.3 U	1.3 UD	0.13 UJ	0.16 J	0.13 U	0.24 J	0.13 U	0.26 U	0.27 J	0.13 U	0.13 U	0.22 J	0.13 U	4.8 U	4.4 U	6.2 U

GROUNDWATER ANALYTICAL RESULTS[1,2]

Final Site Remedy
Former Koppers Facility
Wauna, Oregon

Constituent	Level II SLV[3] (µg/L)	Eastern Exterior Well SBW-05																											
		Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Apr-12 Dup	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.20 UJ	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.049 U	0.049 U	0.049 U	0.049 U	1.00 U	0.049 U	1.0 U	0.050 U	0.050 U	0.050 U	0.050 U	0.080 J	0.050 J	0.49 J	0.050 U	3.0	0.51 U	0.51 U
2-Methylphenol	13	0.060 UJ	0.11 UJ	0.11 UJ	0.11 UJ	0.51 U	0.49 U	0.48 U	0.49 U	0.48 U	0.11 U	0.55 U	0.11 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.3 U
Benzoic acid	42	1.8 UJ	1.3 J	1.1 UJ	1.3 J	R	4.9	4.8 U	4.9 U	4.8 UJ	1.1 U	5.5 U	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 U	1.1 U	2.1	1.1 U	2.0 UJ	1.3 J	1.1 U	2.7 J	1.1 U	0.92 U	0.85 U	0.92 U
Naphthalene	620	0.012 UJ	0.063 J	0.079 J	0.19 J	3.2	0.20 U	0.20 U	0.20 U	0.20 U	0.024 J	0.18 JD	0.062 J	0.075 J	0.042 J	0.47	0.058 J	0.044 J	0.022 U	0.022 U	0.088 J	1.1	0.14 J	34 D	0.26	110 J	0.096 J	0.059 U
Dibenzofuran	3.7	0.014 UJ	0.018 UJ	0.15 J	0.023 J	0.21 U	0.20 U	0.20 U	0.20 U	0.20 U	0.018 U	0.090 U	0.046 J	0.049 J	0.018 UJ	0.018 U	0.018 U	0.018 U	0.57	0.018 U	0.18 J	0.018 U	0.018 U	0.78	0.026 J	2.3 J	0.088 U	0.073 U
Fluorene	3.9	2.9	1.0	3.3	4.5	5.4	7.3	7.4	1.0	11	0.83	11 D	3.7	4.0	4.6 J	0.71	0.45	3.6	4.3	0.13 J	14	2.8	4.7	0.8	0.14 J	2.7	1.6	0.069 U
Pentachlorophenol	15	0.029 UJ	0.34 UJ	0.34 UJ	0.34 UJ	1.1 UJ	0.97 U	0.96 U	0.97 U	0.96 U	0.34 U	1.7 U	0.34 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.56 J	0.34 U	0.34 U	0.34 U	0.24 J	0.22	0.85 U
Phenanthrene	6.3	0.075 J	0.022 UJ	0.053 J	0.026 J	0.22	0.20 U	0.20 U	0.20 U	0.21	0.022 U	0.022 U	0.043 J	0.041 J	0.085 J	0.022 U	0.023 J	0.022 U	0.19	0.022 U	0.25	0.081 J	0.14 J	0.057 J	0.022 U	0.35	0.080 J	0.085 J
Fluoranthene	6.2	0.13 J	0.14 J	0.11 J	0.037 J	0.21 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.18 JD	0.17 J	0.15 J	0.27 J	0.11 J	0.17 J	0.15 J	0.46	0.034 J	0.24	0.020 U	0.039 J	0.020 U	0.035 J	0.060 U	0.077 J	0.06 U
bis(2-ethylhexyl)Phthalat	3	0.27 UJ	0.13 UJ	0.13 UJ	0.13 UJ	1.1 U	3.1	0.98 U	17 UJ	0.96 U	0.19 J	0.65 U	0.13 U	0.13 U	0.13 UJ	0.13 U	0.13 U	0.13 U	1.4	0.13 U	0.14 J	0.13 U	0.13 U	0.54 J	0.13 U	4.6 U	4.3 U	6.2 U

Constituent	Level II SLV[3] (µg/L)	Eastern Exterior Well SBW-07																											
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	May-10	Oct-10	Apr-11	Oct-11	Apr-12	Oct-12	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	Apr-16	Oct-16	Apr-17	Oct-17	Apr-18	Oct-18	Apr-19
Ethylbenzene	7.3	0.13 U	0.13 UJ	0.13 UJ	0.20 UJ	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.049 U	0.49 U	0.049 U	0.0490 U	0.049 U	1.0 U	0.050 U	0.050 J	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.51 U	0.51 U	0.51 U
2-Methylphenol	13	11 U	0.33 UJ	0.060 UJ	0.060 UJ	0.12 UJ	0.11 UJ	0.11 UJ	0.49 U	0.48 U	0.49 U	0.49 U	0.48 U	0.11 U	0.48 U	0.11 U	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.10 U	0.29 U
Benzoic acid	42	26 U	5.9 UJ	1.8 UJ	1.8 UJ	1.5 J	1.1 UJ	1.3 J	R	4.8 U	4.9 U	4.9 U	4.8 UJ	1.1 U	4.9 U	1.2 J	1.1 UJ	1.1 J	1.1 J	1.1 U	2.1	1.5 J	1.9 J	1.4 J	1.1 U	2.5 J	1.1 U	0.92 U	0.85 U	0.89 U
Naphthalene	620	11 U	7.0 J	2.5	0.1	0.065 J	2.2	0.14 J	1.2	0.20 U	0.20 U	0.20 U	2.5	0.030 J	0.20 U	0.060 J	0.025 J	0.022 U	0.065 J	0.029 J	8.2	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.52	0.059 U	0.055 U	0.057 U
Dibenzofuran	3.7	11 U	1.2 J	0.29	0.040 J	0.064 J	0.022 J	0.018 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.018 U	0.20 U	0.018 U	0.018 UJ	0.018 U	0.018 U	0.018 U	0.047 J	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.073 U	0.068 U	0.07 U
Fluorene	3.9	11 U	2.7 J	0.70	0.085 J	0.20 J	0.22	0.027 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.027 U	0.021 J	0.027 U	0.027 UJ	0.027 U	0.027 U	0.027 U	0.22	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.027 U	0.069 U	0.064 U	0.066 U
Pentachlorophenol	15	26 U	2.5 UJ	0.029 UJ	0.029 UJ	0.36 UJ	0.34 UJ	0.34 UJ	0.98 UJ	0.96 U	0.97 U	0.98 U	0.98 U	0.34 U	0.20 U	0.34 U	0.34 UJ	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.24 U	0.22 U	0.81 U
Phenanthrene	6.3	11 U	3.2 J	0.29	0.011 UJ	0.023 UJ	0.022 UJ	0.022 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.023 J	0.20 U	0.022 U	0.022 UJ	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.084 J	0.051 U	0.053 U
Fluoranthene	6.2	11 U	2.3 J	0.14 J	0.013 UJ	0.021 UJ	0.02 UJ	0.020 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.96 U	0.020 U	0.020 UJ	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.060 U	0.056 U	0.058 U
bis(2-ethylhexyl)Phthalat	3	11 U	2.8 J	0.74 J	0.45 J	0.14 UJ	0.47 J	0.13 UJ	0.98 U	0.96 U	0.97 U	0.98	0.96 U	0.13 J	0.20 U	0.13 U	0.13 UJ	0.13 U	0.18 J	0.13 U	0.3	0.32	0.17 J	0.48 J	0.13 U	0.17 J	0.13 U	4.6 U	4.3 U	6 U

Constituent	Level II SLV[3] (µg/L)	Contained Area Wells PMW-5 (Monitored from Jun-05 to Oct-09)									Embankment Area Well (Monitored Jun-05 to Oct-09) SBW-01										Embankment Area Well (Monitored Jun-05 to Oct-09) SBW-09									
		Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	Jun-05	Dec-05	Apr-06	Oct-06	Jun-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09
Ethylbenzene	7.3	56	58	68	67	59	50	51	38	38	46	0.13 U	0.13 UJ	0.13 UJ	0.20 UJ	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U	16	15	3.5	0.8	0.2 UJ	0.2 UJ	0.20 UJ	1.0 U	1.0 U	1.0 U
2-Methylphenol	13	73	44 D	29 JD	160	95 D	240 D	26 D	98 U	26 D	29 D	9.9 U	0.33 UJ	0.060 UJ	0.060 UJ	0.12 UJ	0.11 UJ	0.11 UJ	0.50 U	0.48 U	0.49 U	11 U	0.34 UJ	0.060 UJ	0.03	0.11 UJ	0.11 UJ	0.11 UJ	0.53 U	0.48 U	0.48 U
Benzoic acid	42	240 U	12 UJ	180 UJ	90	110 UJ	110 UJ	220 UJ	R	480 U	48 U	25 U	5.9 UJ	1.8 UJ	1.8 UJ	1.5 J	1.1 UJ	1.7 J	R	4.8 U	4.9 U	27 U	6.0 UJ	1.8 UJ	0.9	1.5 J	1.1 UJ	1.3 J	R	4.8 U	4.8 U
Naphthalene	620	13,000	12,000 D	9,500 D	12,000	13,000 D	12,000 D	8,100 D	9,300 D	9,600 D	11,000 D	9.9 U	0.37 UJ	0.13 J	0.012 UJ	0.085 J	0.03 J	0.053 J	0.20 U	0.20 U	0.20 U	120	160	20 D	1.2	0.25	0.52	0.19 J	0.67	0.20 U	0.19 U
Dibenzofuran	3.7	520	530 D	280 D	260	260 D	270 D	180 D	200 D	190 D	360 D	9.9 U	0.33 UJ	0.014 UJ	0.014 UJ	0.019 UJ	0.018 UJ	0.018 UJ	0.20 U	0.20 U	0.20 U	15	15	0.78	2.6	0.43	0.72	0.034 J	0.52	0.20 U	0.19 U
Fluorene	3.9	730	600 D	300 D	220	230 D	230 D	170 D	170 D	170 D	310 D	9.9 U	0.33 UJ	0.012 UJ	0.012 UJ	0.029 UJ	0.027 UJ	0.027 UJ	0.20 U	0.20 U	0.20 U	18	18	0.8	2.9	0.43	0.66	0.057 J	1.1	0.20 U	0.19 U
Pentachlorophenol	15	24 U	32 JD	48 JD	1.45	34 UJ	34 UJ	3.4 UJ	200 UJ	1.6	9.5 U	25 U	2.5 UJ	0.029 UJ	0.029 UJ	0.36 UJ	0.34 UJ	0.34 UJ	1.0 UJ	0.96 U	0.97 U	27 U	2.5 UJ	0.029 UJ	0.0145	0.34 UJ	0.34 UJ	0.34 UJ	1.1 UJ	0.96 U	0.95 U
Phenanthrene	6.3	1,400	1,100 D	410 D	190	170 D	190 D	140 D	160 D	140 D	400 D	9.9 U	0.46 UJ	0.050 J	0.011 UJ	0.023 UJ	0.022 UJ	0.022 UJ	0.20 U	0.20 U	0.20 U	11 U	14	0.26	0.61	0.050 J	0.2 J	0.022 UJ	0.22 U	0.20 U	0.19 U
Fluoranthene	6.2	630	700 D	140 D	17	18 JD	16 JD	11 D	39 U	16	110 D	8.9 U	0.66 UJ	0.047 J	0.013 UJ	0.021 UJ	0.02 UJ	0.020 UJ	0.20 U	0.20 U	0.20 U	11 U	2.6 J	0.023 J	0.026	0.02 UJ	0.02 UJ	0.020 UJ	0.22 U	0.20 U	0.19 U
bis(2-ethylhexyl)Phthalate	3	9.5 U	3.8 UJ	27 UJ	12.5	13 UJ	13 UJ	1.3 UJ	200 U	0.96 U	9.5 U	8.9 U	1.9 UJ	0.60 J	0.27 UJ	0.14 UJ	0.13 UJ	0.13 UJ	1.0 U	0.96 U	0.97 U	11 U	2.0 UJ	0.27 UJ	0.135	0.13 UJ	0.13 UJ	0.13 UJ	1.1 U	0.96 U	0.95 U

Notes:

1. Data qualifiers are as follows:
   D = The reported result is from a dilution or reporting limits are elevated due to the dilution.
   J = Analyte was positively identified. Indicated result is estimated concentrations.
   R = The result was rejected due to data quality control issues.
   U = Analyte was not detected at the concentrations indicated, which is standard laboratory reporting limit.
   UJ = The analyte was not detected above the method detection limit, which is an estimated value.
2. Bold indicates that the constituent concentration exceeds the Oregon Level II SLV.
3. Level II SLVs taken from Oregon Department of Environmental Quality, Guidance for Ecological Risk Assessment, Level II Screening Level Values, December 2001.
4. NA = Not available. Field duplicate was not analyzed for ethylbenzene.

Abbreviations:
µg/L = micrograms per liter
SLV = Oregon Department of Environmental Quality Screening Level Value

Figure C-1-1
Western Interior Wells
Ethylbenzene

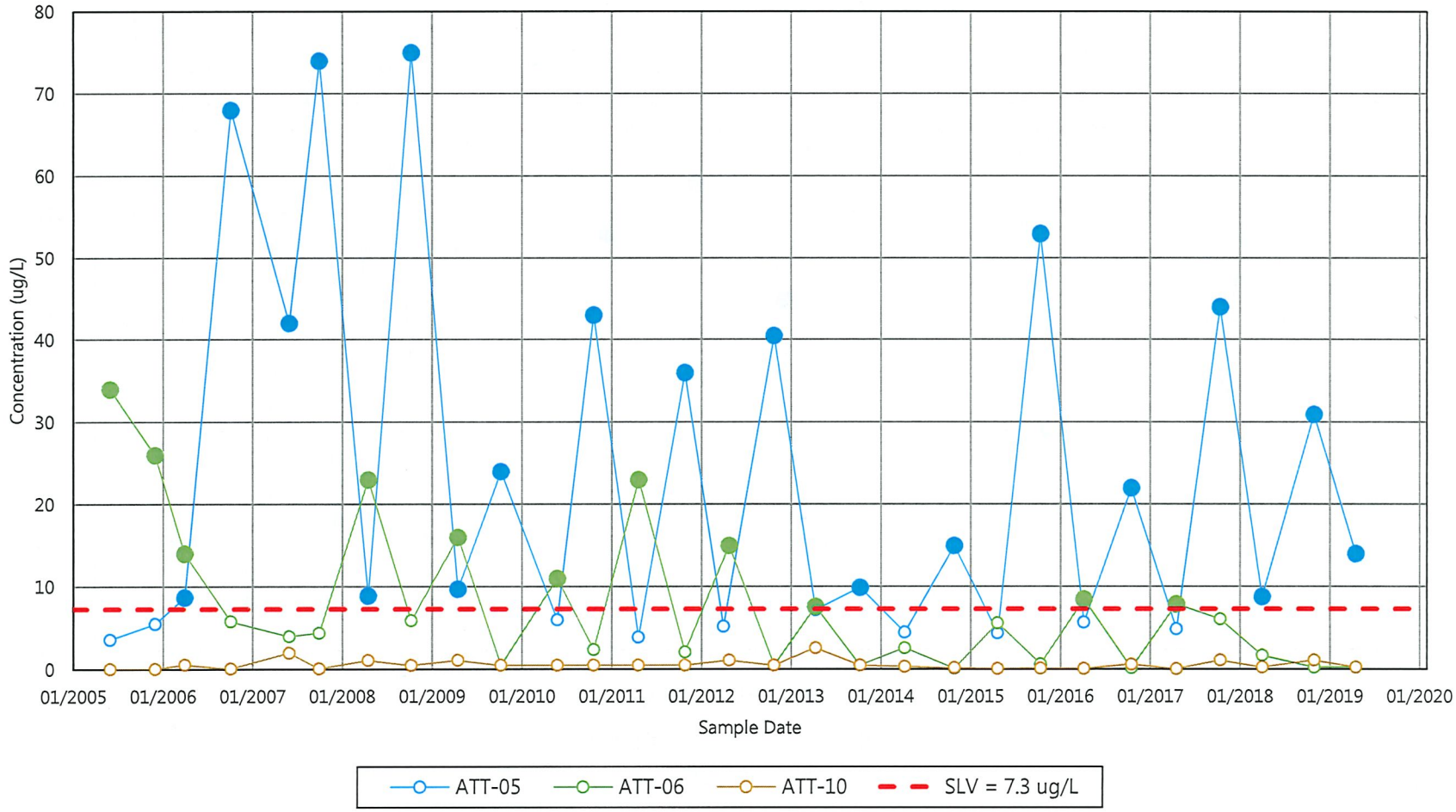


Figure C-1-2
Western Interior Wells
Naphthalene

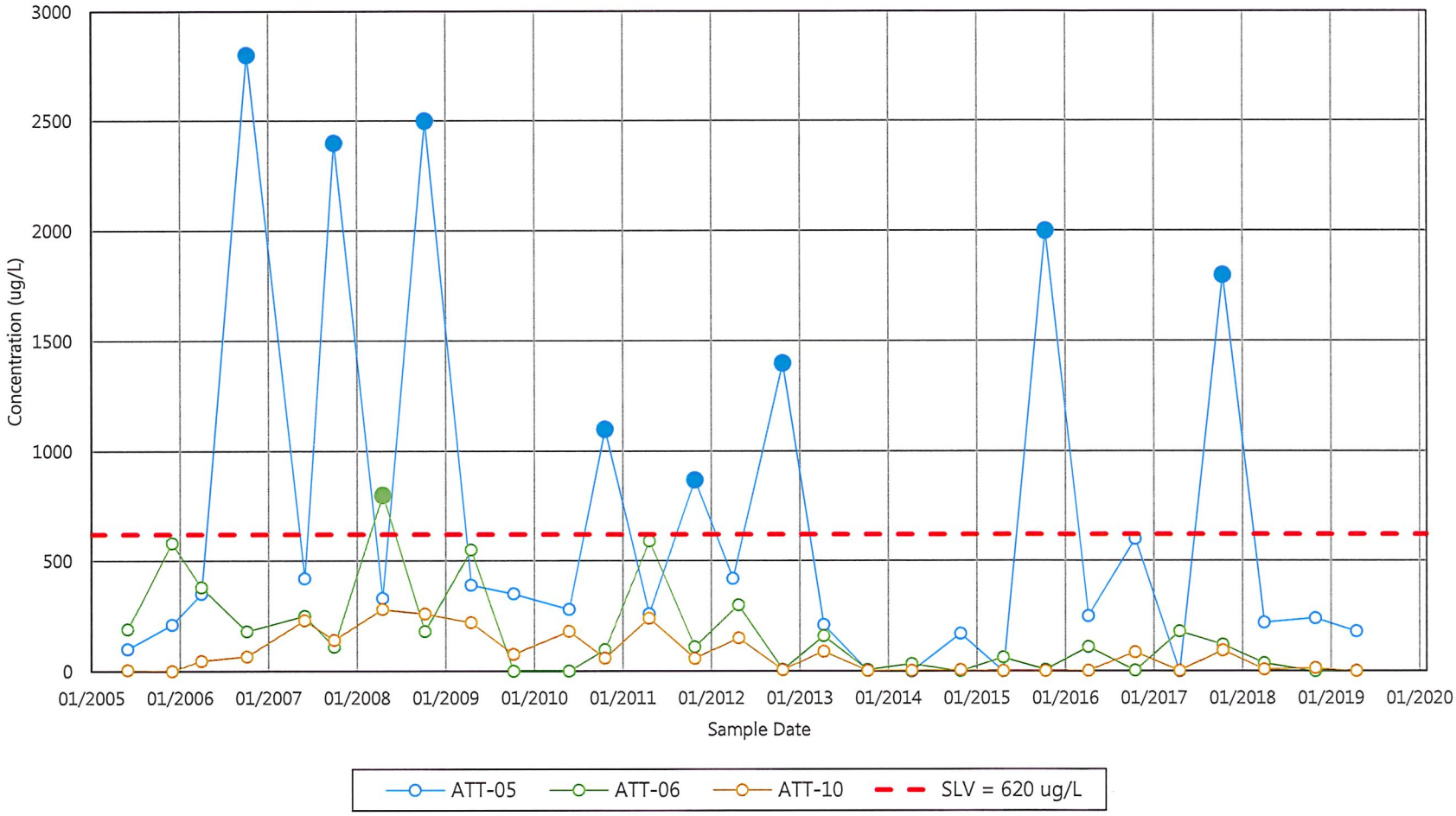


Figure C-1-3
Western Interior Wells
Dibenzofuran

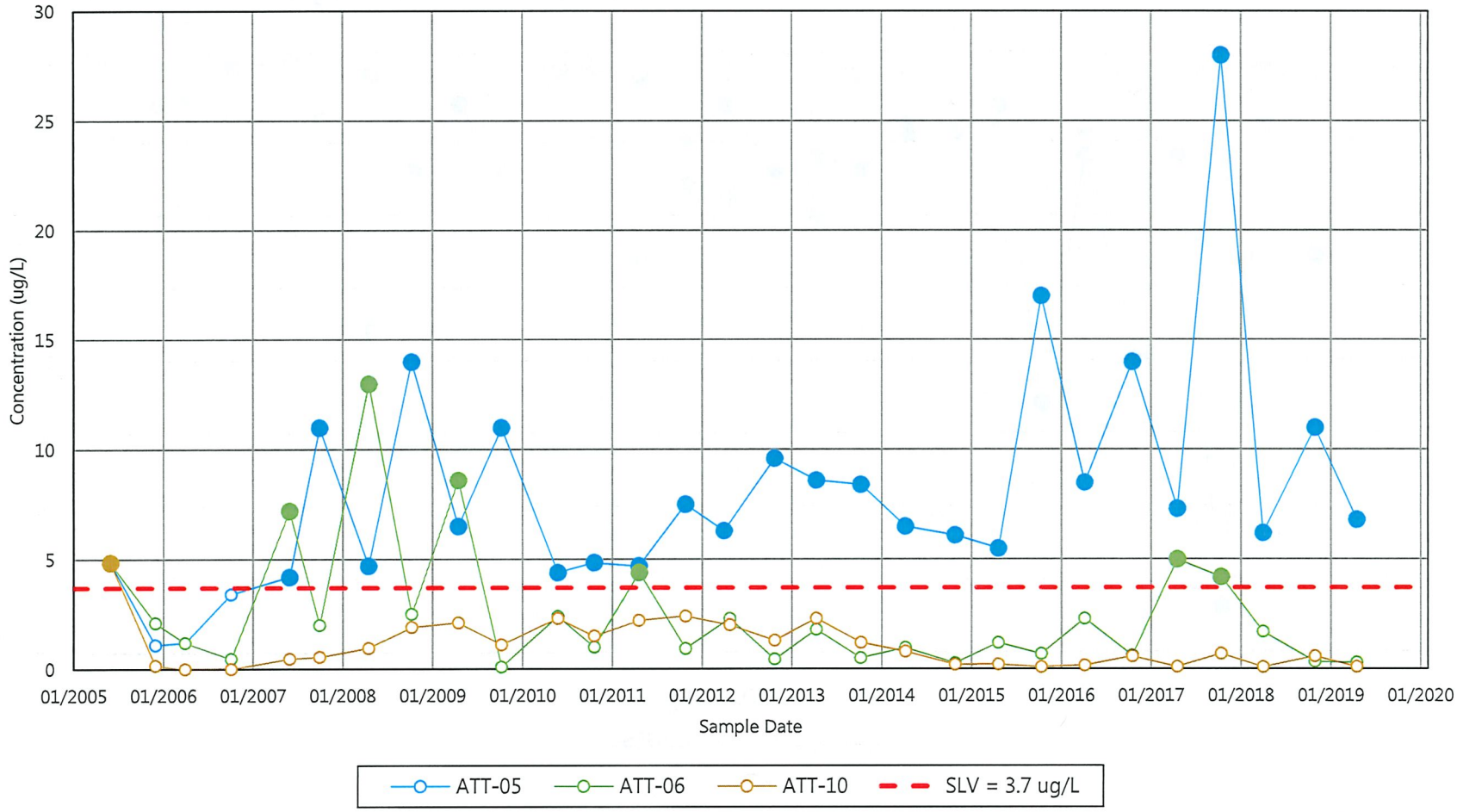


Figure C-1-4
Western Interior Wells
Fluorene

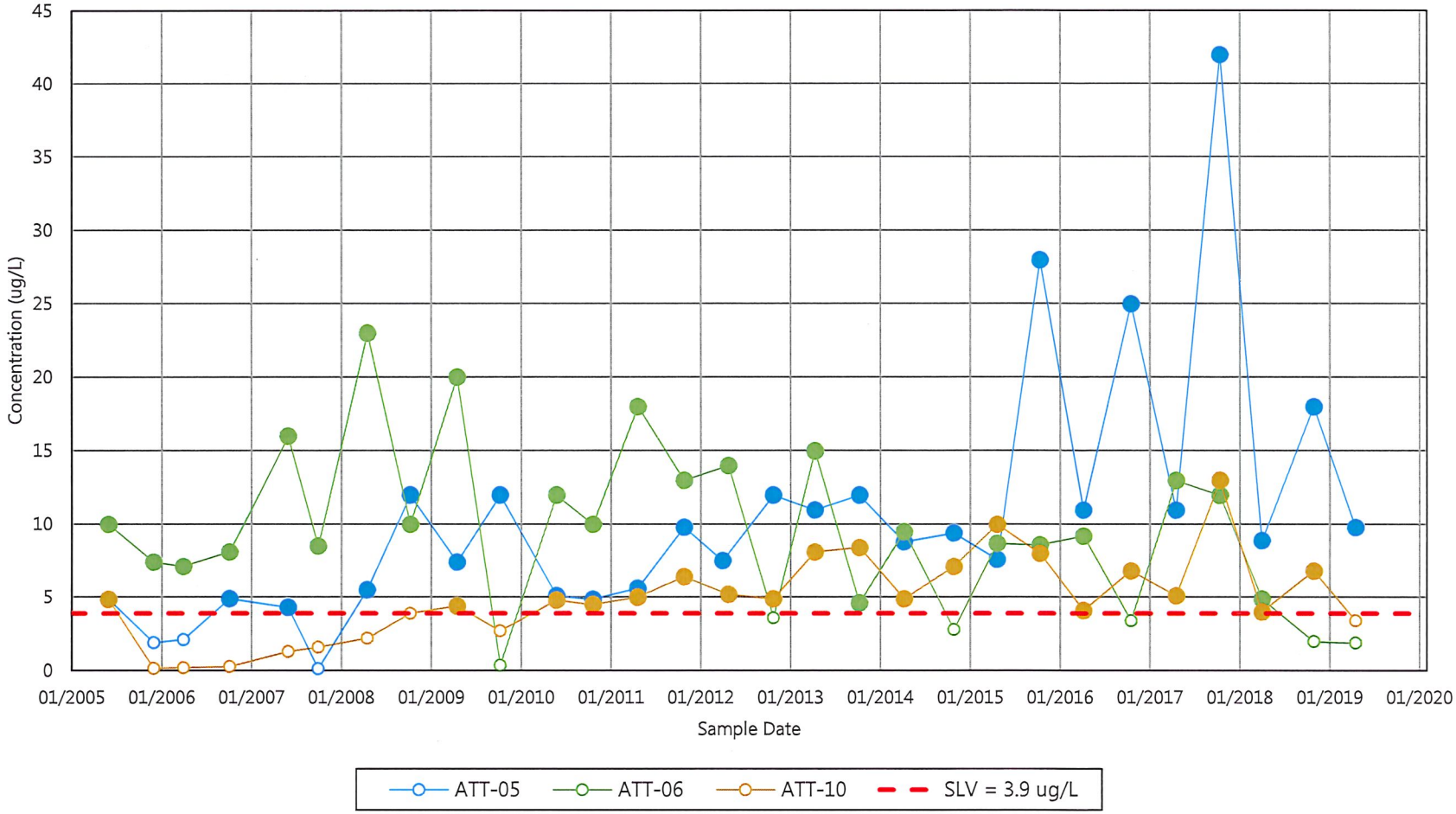


Figure C-1-5
Western Interior Wells
Phenanthrene

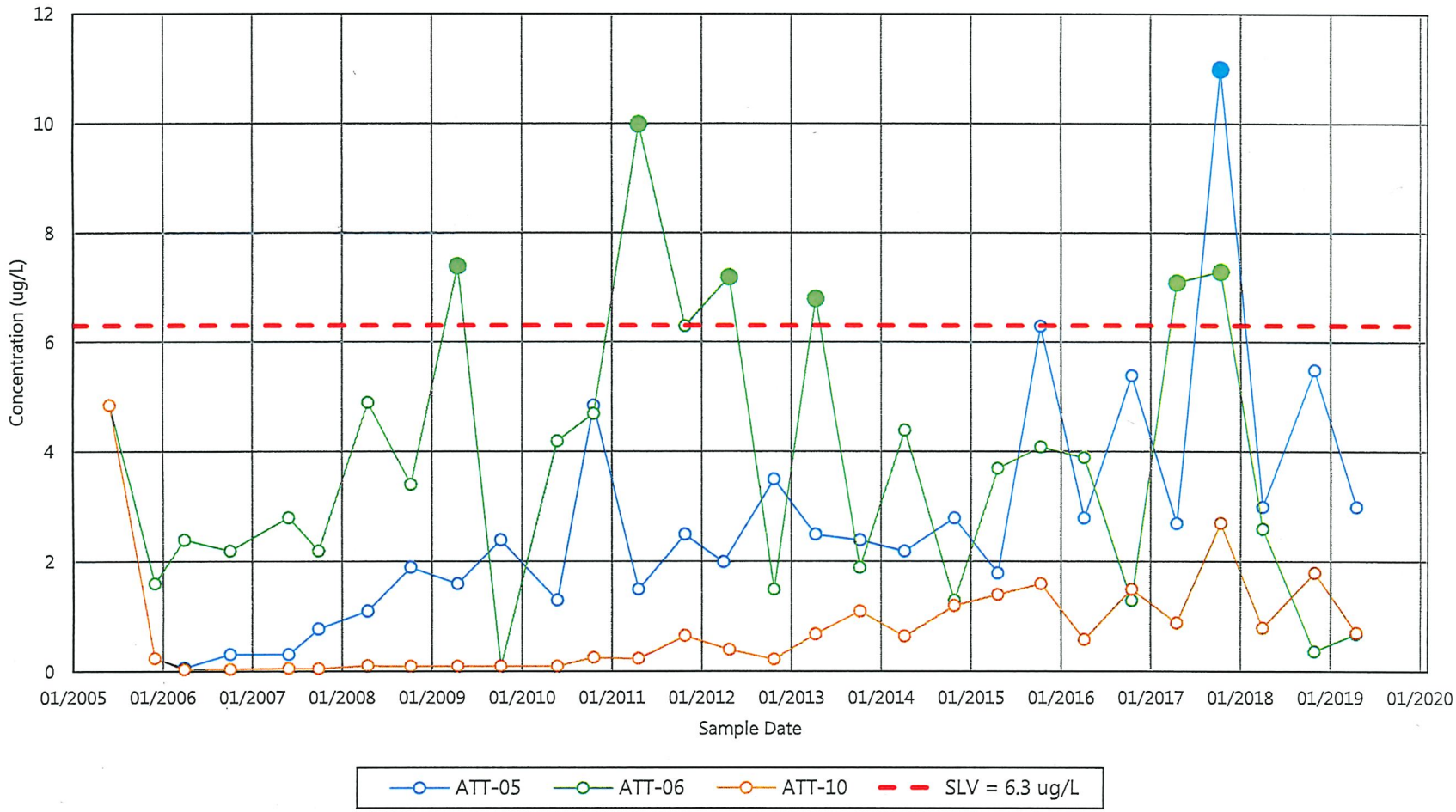


Figure C-2-1
Western Exterior - Northern Flow Path Wells
Ethylbenzene

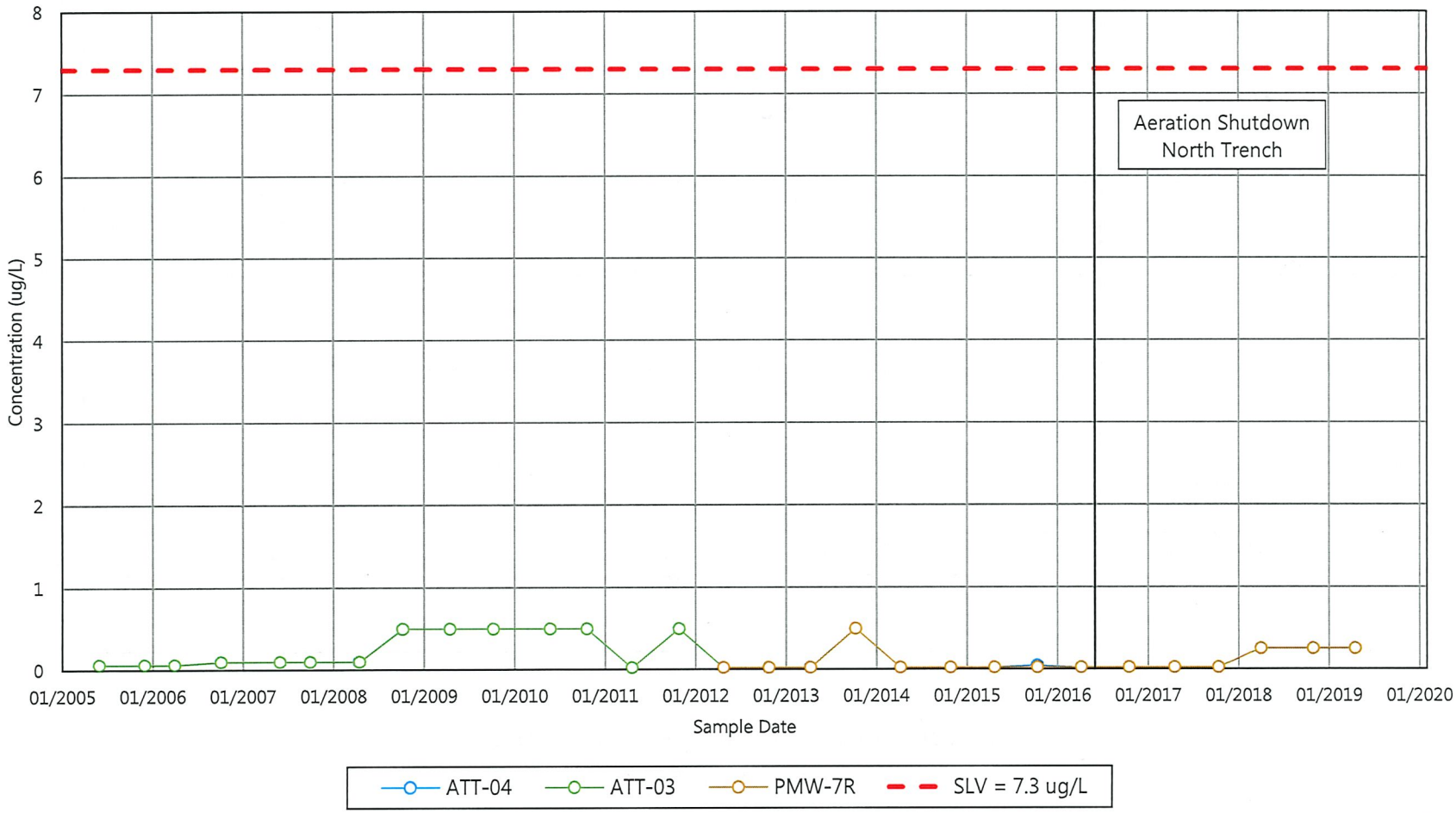


Figure C-2-2
Western Exterior - Northern Flow Path Wells
Naphthalene

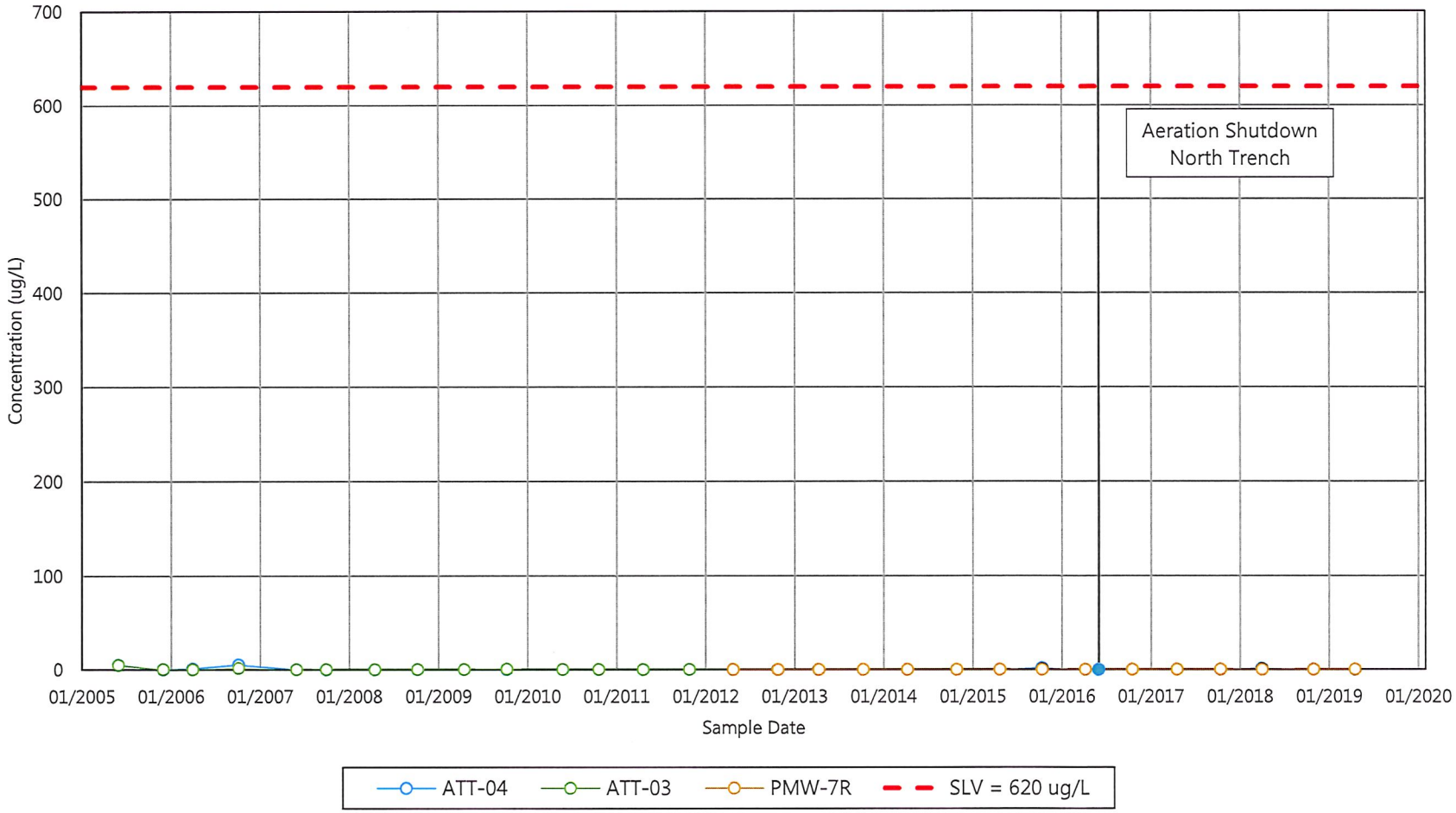


Figure C-2-3
Western Exterior - Northern Flow Path Wells
Dibenzofuran

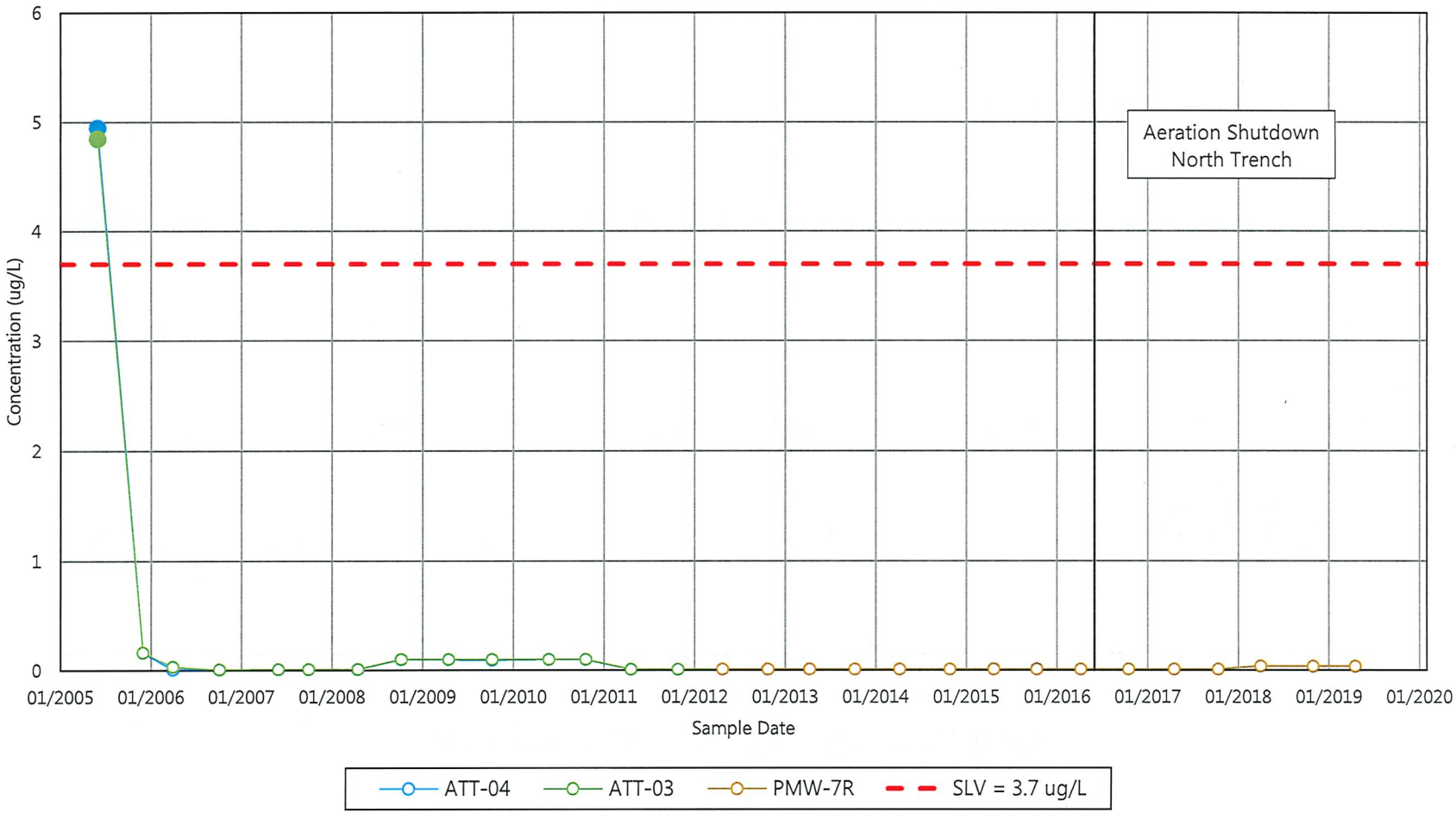


Figure C-2-4
Western Exterior - Northern Flow Path Wells
Fluorene

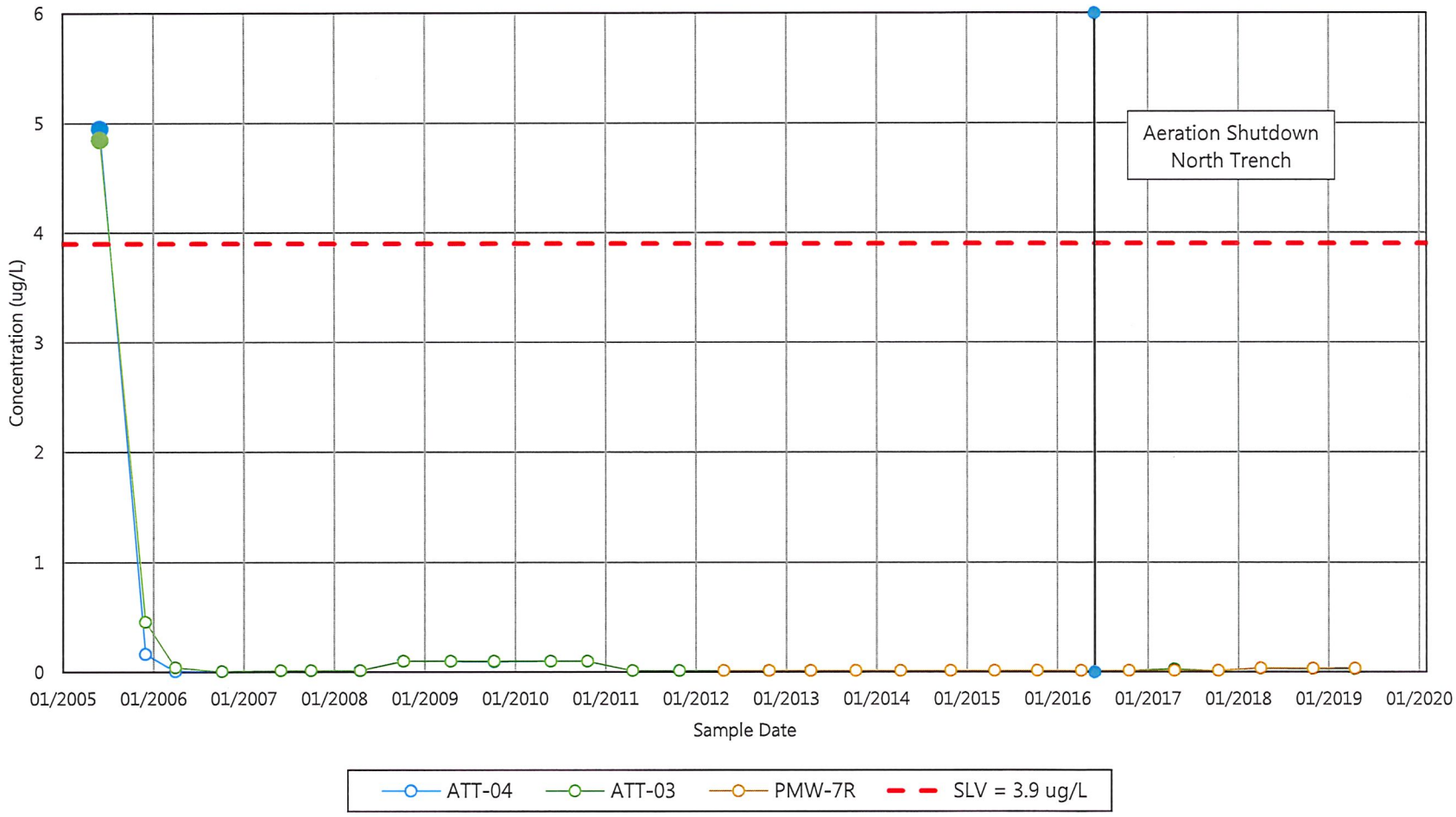


Figure C-2-5
Western Exterior - Northern Flow Path Wells
Phenanthrene

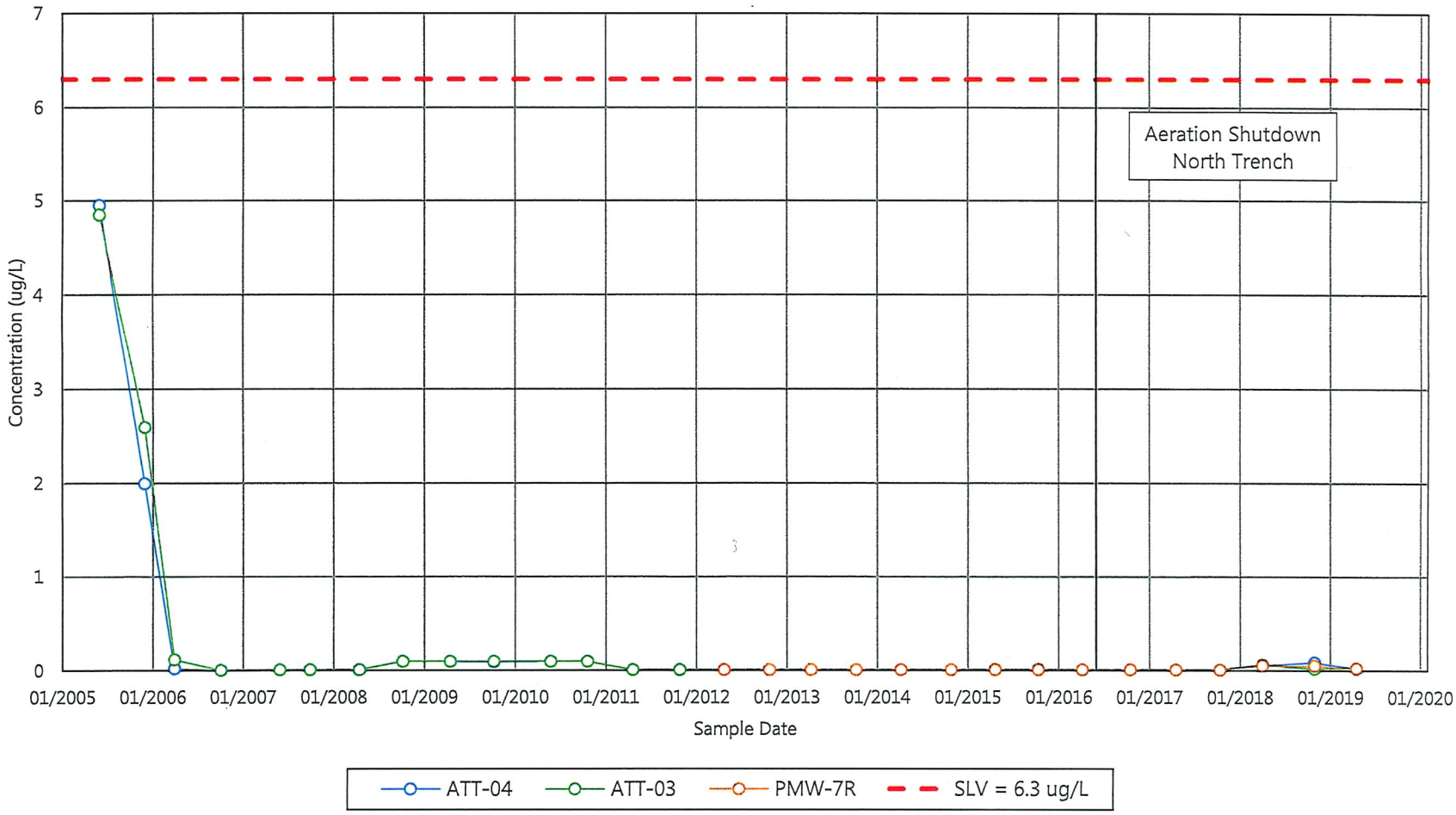


Figure C-3-1
Western Exterior - Southern Flow Path Wells
Ethylbenzene

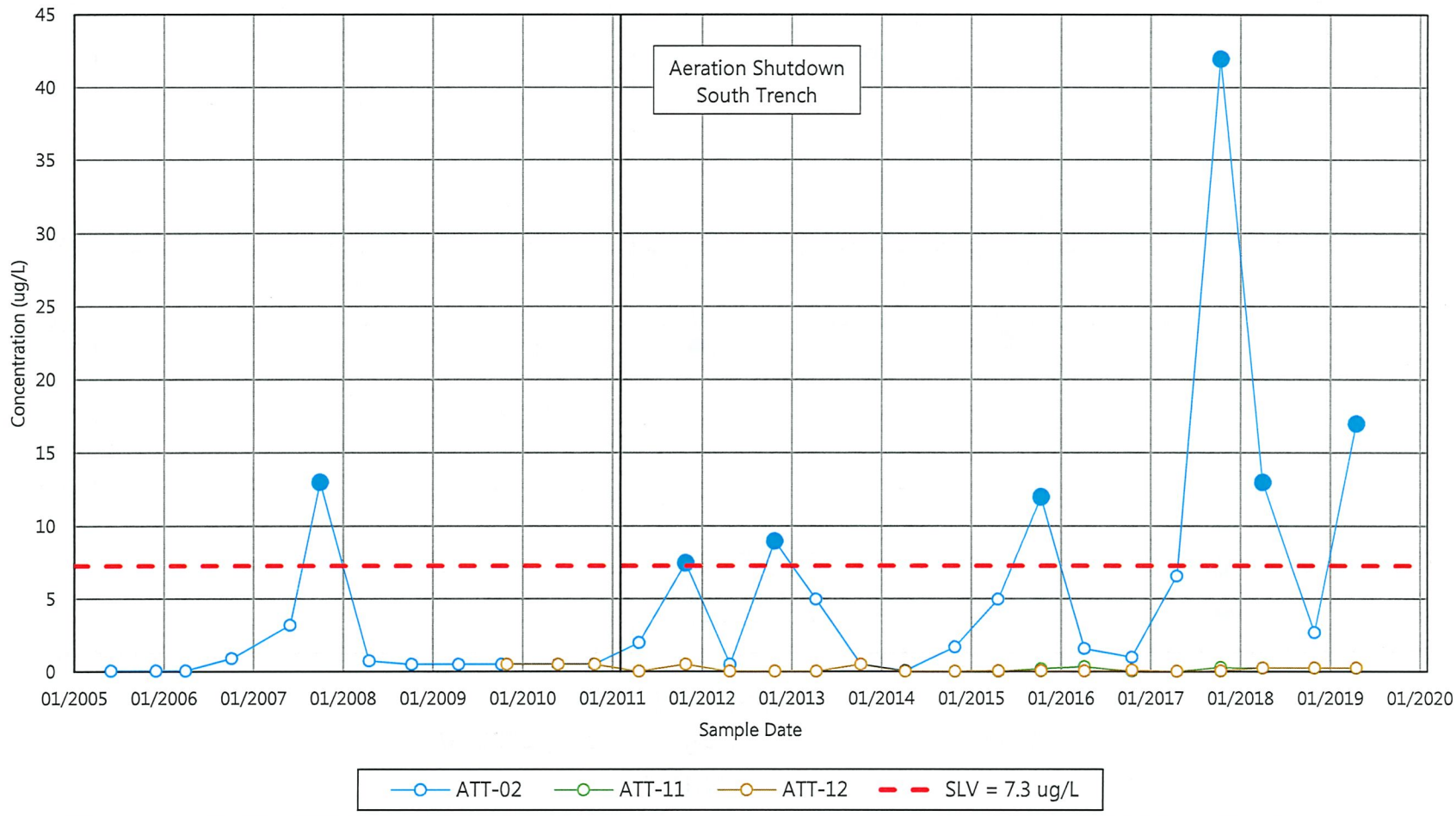


Figure C-3-2
Western Exterior - Southern Flow Path Wells
Naphthalene

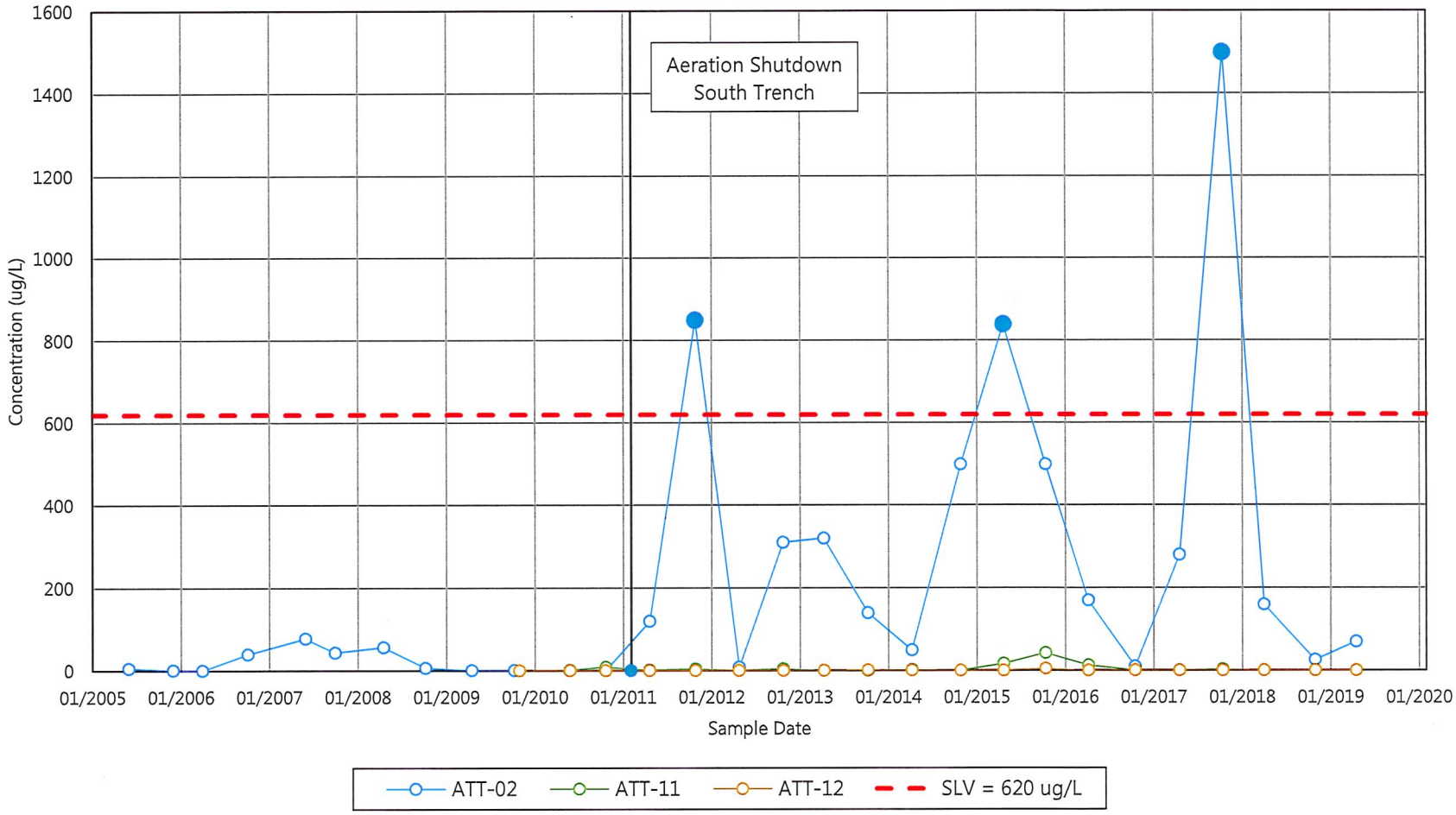


Figure C-3-3
Western Exterior - Southern Flow Path Wells
Dibenzofuran

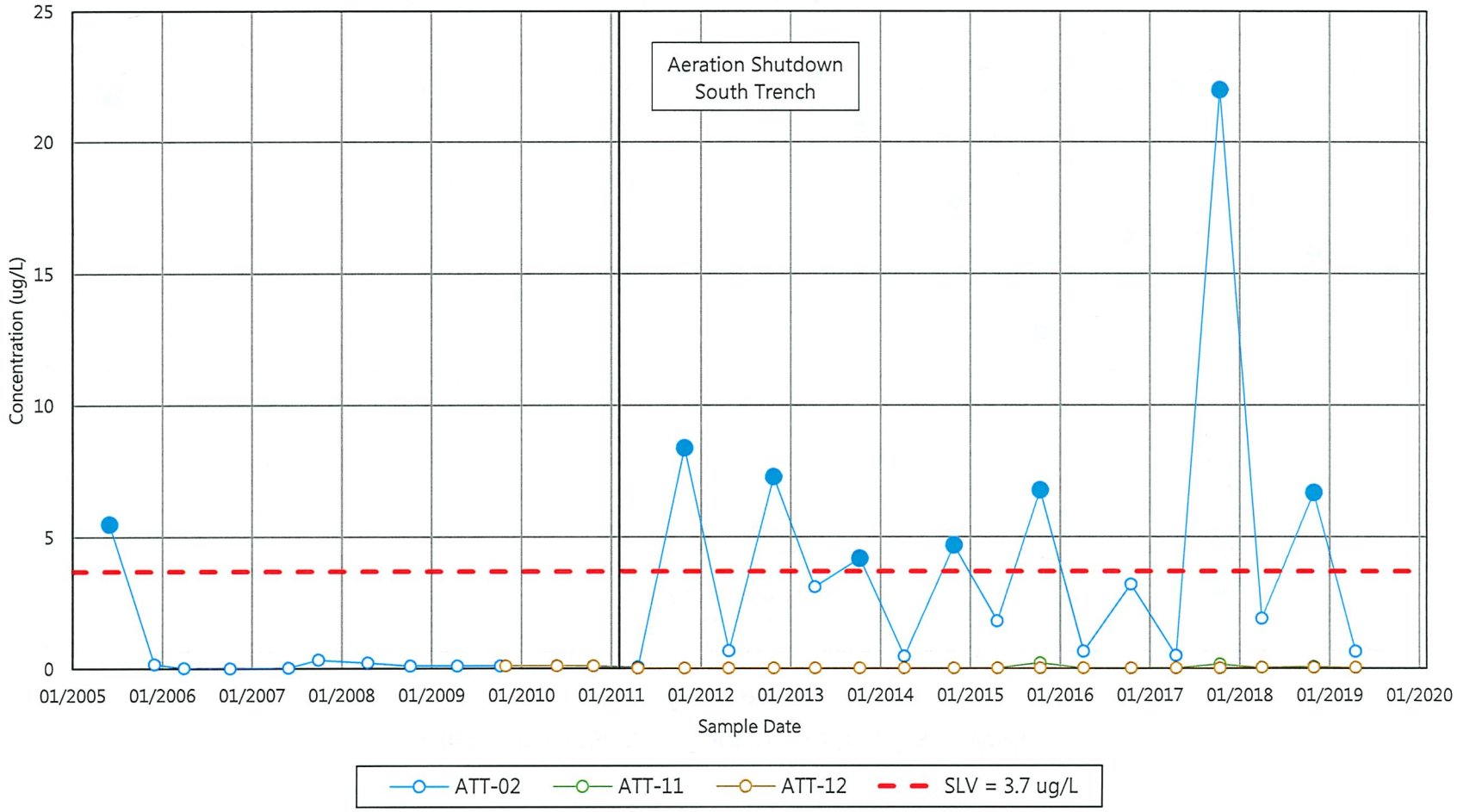


Figure C-3-4
Western Exterior - Southern Flow Path Wells
Fluorene

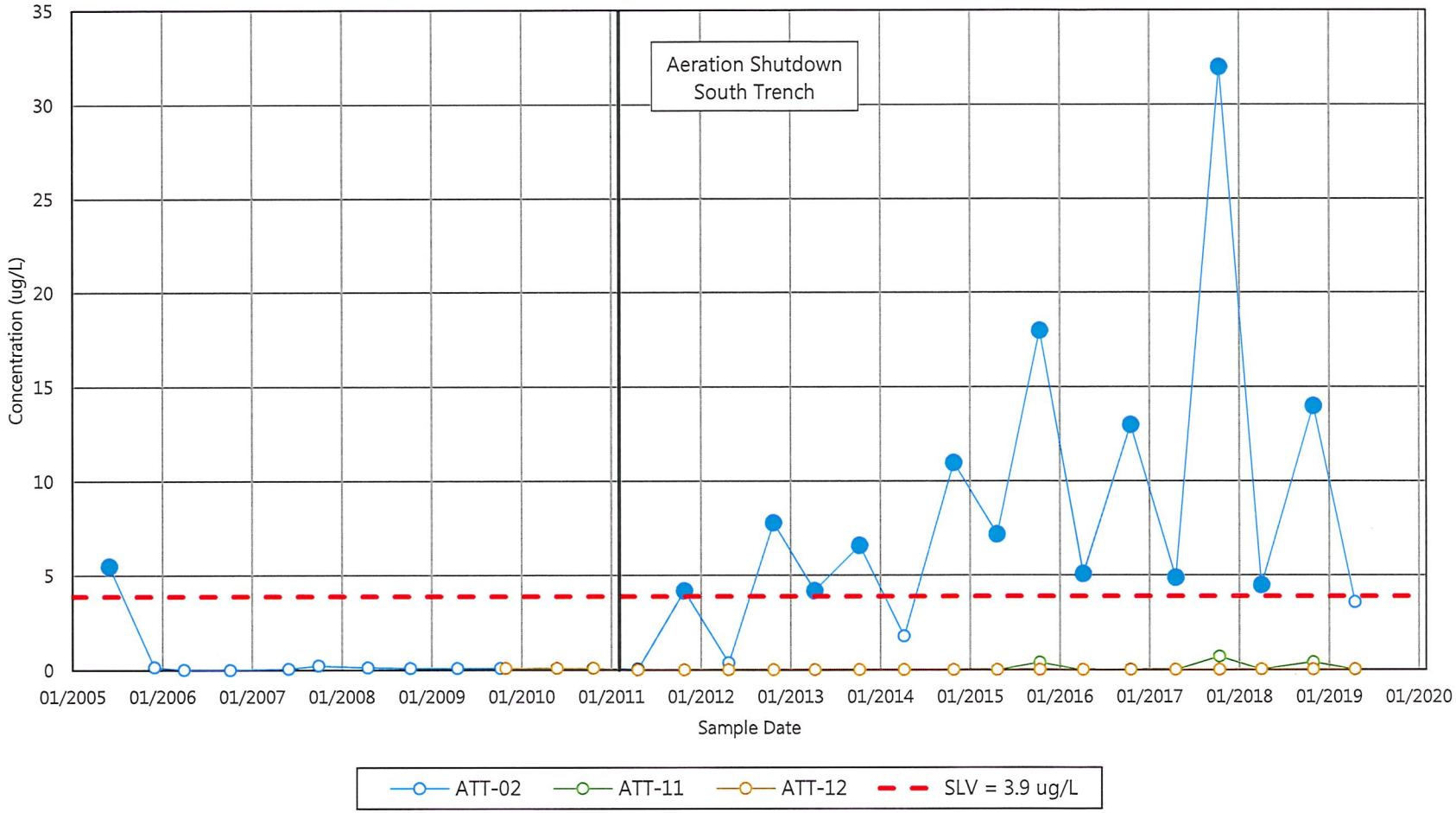
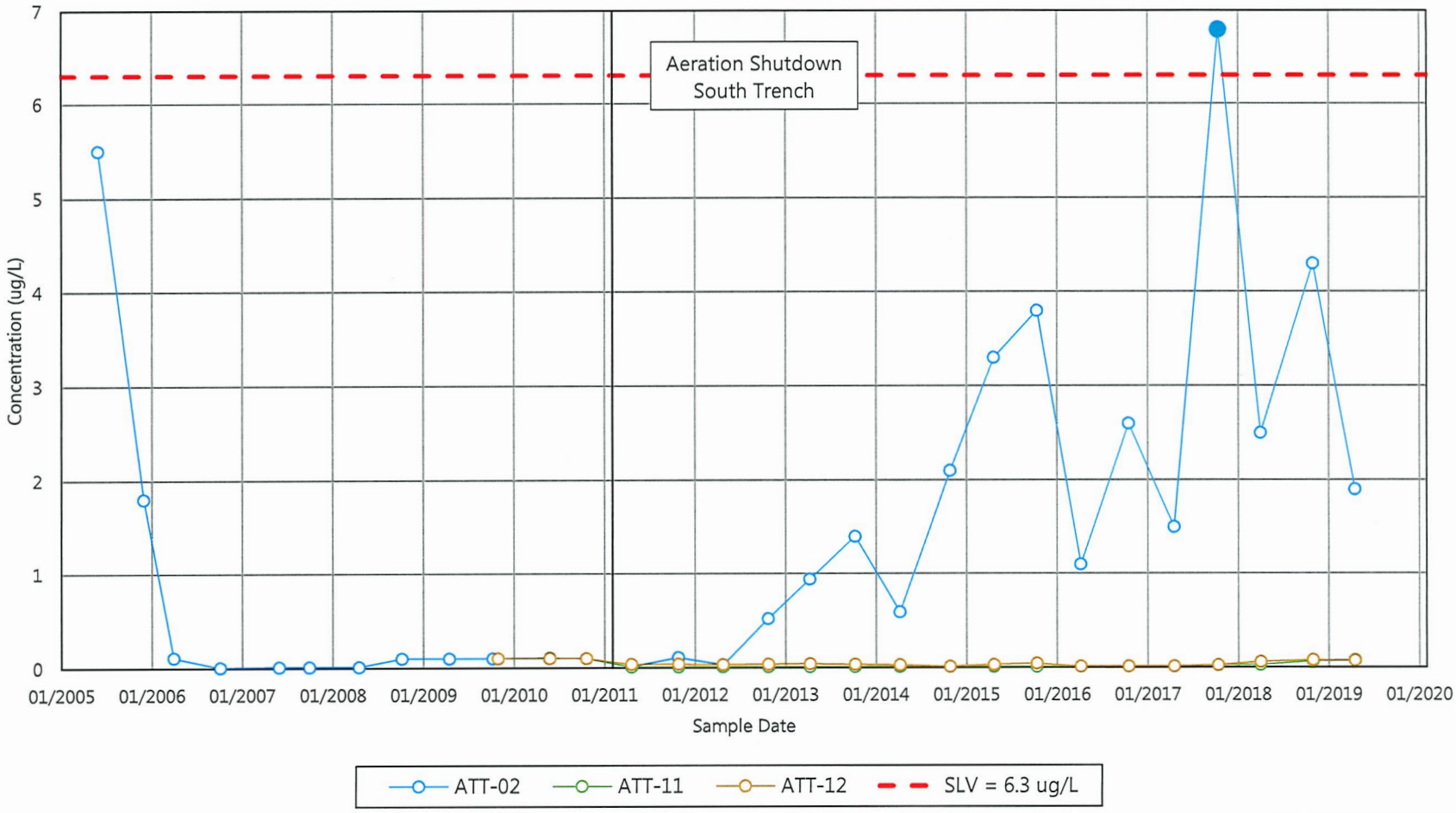



Figure C-3-5
Western Exterior - Southern Flow Path Wells
Phenanthrene